VOLUME III

A CRITICAL EVALUATION OF SELECTED SHORELINE MANAGEMENT TOOLS

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RESPONSIBILITY

The views and opinions expressed in this report are those of its author and do not necessarily reflect the positions of the Commonwealth of Virginia or any of its component units.

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EXECUTIVE SUMMARY

Virginia coastal localities have available to them a variety of potential land use tools and techniques to manage nonpoint water pollutants. This report reviews and critically evaluates a selective set of techniques against four key criteria: 1) technical effectiveness (at reducing nonpoint water pollutants); 2) political acceptability; 3) administrative cost and complexity; and 4) ease of enforcement. Each technique is reviewed and assigned a low, moderate, or high rating based on these criteria. A summary table is provided at the end of the report. In addition, an extensive discussion is provided of the numerous local factors and conditions which might influence the effects and functioning of these techniques specific features or components of techniques which may influence effectiveness are also discussed.

While there is considerable variation among the tools and techniques reviewed, certain measures ranked high on all four criteria. In particular, the following techniques were assessed as having generally high technical effectiveness, generally high political acceptability, generally low administrative cost and complexity, and generally high ease of enforcement: clustering, setbacks and buffers, stormwater runoff standards, erosion and sedimentation controls and sliding scale density systems. Several techniques were believed to hold considerable technical effectiveness. These include: density bonuses, capital improvements programs, agricultural and forestal districts, and use-value assessments. While many other strategies rated high in terms of political acceptability, they were viewed as providing very little assurance that water quality objectives would be advanced.

No attempt was made in this report to assess the benefits or consequences of packages or combinations of management tools. In many cases it is clear that the most effective and politically acceptable management solution will be a creative combination of two or more of the techniques described here.

I. Introduction

This report is the third in a series of reports prepared by the Institute for Environmental Negotiation on the shoreline management options available to Virginia Coastal localities. The first two reports presented descriptions of various tools, techniques, and management programs in use around the country, and within Virginia respectively. This third report seeks to move beyond the descriptive and to critically evaluate the advantages and disadvantages of different management measures. While each local circumstance will be somewhat different, it is hoped that a critical comparison of management tools and strategies will help localities in selecting appropriate measures or combinations of measures.

The tools and techniques described and evaluated below represent potential strategies for controlling non-point sources of water pollution. Despite considerable progress at controlling point sources at federal and state levels, the non-point problem remains a difficult one to tackle and, many feel, one where relatively little progress has been made. Non-point sources have, however, received substantial new attention in recent years (e.g., as reflected in the 1987 federal Water Quality Act, and Virginia's Chesapeake Bay Preservation Act). Local governments in Virginia are being given the responsibility of controlling non-point source pollutants and are confronted with basic choices about which land use and growth management techniques, or combination of techniques, will be most effective and most appropriate. This report seeks to generalize about how well these different non-point strategies have functioned in the past, as measured against certain key evaluative standards.

While this report focuses on the use of growth management tools to protect water quality it should be mentioned that this is but one objective of a local management framework. Other local objectives include the protection of recreational and other resource amenities, economic development, redirection of traffic and congestion, protection of farmland and rural open space, historic preservation, reducing exposure to natural hazards such as flooding, protection of wildlife habitat among many others. Many of these objectives are complementary to protection of water quality and can be accomplished simultaneously through many of the same actions or policies. A shoreline setback, for instance, may accomplish a number of objectives besides water quality, including reduction of exposure to natural hazards, protection of wildlife habitat, protection of prime farmland, and protection of scenic and visual resources, among others. When considering the management tools and techniques discussed below localities should keep in mind these other important objectives.

It is important to acknowledge that the list of tools and techniques evaluated in this report is but a subset of larger set of management levers available to local governments. In particular localities should keep in mind that there are complementary state and federal programs that can serve as important management tools and which can go far in accomplishing water quality protection and other management objectives. State and federal wetlands restrictions are a good example of such complementary programs. The goal of protecting water quality can be advanced substantially through an aggressive application of the Virginia Wetlands Act. Other state and federal programs offer similar management handles and should be utilized where possible by local governments.

An initial step in the analysis of management measures is to identify a set of relevant criteria against which to measure the different management tools and techniques. While there are undoubtedly numerous evaluative standards that could be employed, four were considered to be of particular importance: technical effectiveness; political acceptability; administrative cost and complexity and ease of enforcement. Each of these evaluative criteria is discussed and illustrated in section II below. The bulk of this report is a detailed analysis of the extent to which specific management tools and techniques satisfy these evaluative standards. Following the text, a summary table is provided.

It should be acknowledged that an evaluation such as this is necessarily subjective and is intended to provide relatively broad guidance to a locality considering the management options available to it. It is entirely possible, for instance, that a locality may achieve different results for a certain management tool depending upon its actual design, enforcement, etc. What follows are necessarily general observations based on observing the use of these tools and techniques in other localities.

II. Methodology

Volume I in the report series -- Shoreline Management Options for Virginia Coastal Localities -- provided a very detailed description of a variety of specific management tools and techniques. (See Institute for Environmental Negotiation, 1988a.) Time and space limitations prevented the evaluation of each specific measure listed in Volume I. Rather, the authors have been selective in identifying certain key management tools and techniques for evaluation and discussion here. These tools and techniques were chosen primarily for their potential at protecting water quality and their suitability for Virginia coastal localities. Virtually all of the management tools evaluated (with perhaps the exception of the transfer of development rights) are legally authorized in Virginia and are in use somewhere in the State (see Institute for Environmental Negotiation, 1988b). It is reasonable for the reader to assume that the various management tools evaluated here would be authorized under Virginia law. However, no legal assessment has been made by the Institute for Environmental Negotiation, and legality is not an evaluative criteria employed for the purposes of this study.

A. Techniques Selected for Review

Of the number and variety of management tools identified and described in Volume I, the following have been chosen for detailed evaluation here:

a. Intensity and Use Restrictions

- density limitations
- land use classification systems
- urban growth boundaries/urban service districts
- resource overlay zones
- clustering
- density bonuses and development incentives
- sliding scale density systems

b. Performance Approaches

- stormwater runoff standards/requirements
- development setbacks and buffers
- erosion and sedimentation controls
- floodplain restrictions

c. Land Acquisition

- conservation easements/purchase of development rights (PDR)
- fee-simple acquisition

d. Conservation Incentives and Public Investment Policies

- Capital Improvements Program (CIP)
- agricultural and forestal districts
- use-value assessment
- Transfer of Development Rights (TDR)

Each of these tools and techniques are briefly described and defined below prior to evaluation. However, the emphasis in this report is on analysis and evaluation and the reader is referred to Volume I and II for more detailed descriptions and examples of these techniques.

It should be noted that many, if not most, localities will wish to employ more than one of these techniques in controlling non-point pollutants and accomplishing other local objectives. Local officials, then, should consider which "packages" or combination of management tools and techniques will be most effective and most appropriate for their locality. Localities should remember that merits and evaluative efforts of a specific management tool may be different when applied in combination with other tools and techniques. In some cases the combination of two tools which are each rated relatively low on the criterion of technical effectiveness (i.e., ability to protect water quality) may achieve a moderate or high level of effectiveness when used together. Unfortunately it was not possible because of time and space limitations to consider packages or combinations here.

B. Evaluative Criteria

Before progressing further it will be useful to briefly define the four evaluative standards or criteria used below. Each of these criteria is necessarily broad and is intended to capture a general category or set of concerns. Within each criterion there are numerous more specific standards that could be used and some of these standards

are worked into the discussion of each technique. The four evaluative standards are as follows:

1. Technical Effectiveness. A central issue is the extent to which a particular management tool or technique will be effective at protecting and enhancing the quality of streams, rivers, lakes, and the Chesapeake Bay. The criterion of technical effectiveness is used here to assess the likely effectiveness of measures at protecting water quality when there is a strong commitment to implement and enforce these measures. For instance, we might conclude that erosion and sedimentation control requirements are very effective at protecting water quality, but we assume this only where there is a reasonably strong effort by local officials to hold development to these standards. Erosion and sediment control would be very ineffective, on the other hand, in localities that did not seek to implement or enforce such measures. Consequently, this criterion assumes a serious and good faith effort at implementation and enforcement. It should again be reiterated that technical effectiveness at protecting water quality is but one goal among many at the local level. Our definition of effectiveness here is not intended to preclude localities from considering these other goals and objectives. For instance, while one particular land use measure may be ineffective at reducing water pollution, it may still be desirable for the locality to adopt and implement such a measure because it is found to be effective in other ways (e.g., protecting visual qualities, protecting wildlife habitat, promoting economic development, and so on).

2. Political Acceptability. Local officials must necessarily be concerned with how politically feasible and acceptable management tools may be. A particular management tool may be unacceptable, for example, because it places too high a cost on certain historically vocal and powerful elements of the community. In Virginia, management measures which are seen as too great an infringement on private property rights, or as causing too extensive a government role in the land market, will tend to be less politically acceptable. On the other hand, certain measures may be particularly feasible or acceptable because they tend to garner natural support from groups and interests in the community (e.g., the agricultural and farm community supporting use value assessment), and raise little if any opposition from others. Of course, the actual public acceptability of a measure will vary greatly from place to place, and the criterion is again intended to identify general tendencies.

3. Administrative Cost and Complexity. Management tools and techniques vary considerably in their complexity and the ease with which the public can understand them. Some tools and techniques, such as conventional zoning, which have been used

for many years and which are relatively simple in concept, are fairly well understood by the public. Other techniques, such as the transfer of development rights (or "TDR") involve concepts relatively new to public thinking, and can be quite complex in their functioning. These tend to be less readily understood by the public. Public understanding can be seen as a valuable objective in itself (i.e., it might be felt that it is simply not fair or appropriate to impose a regulation or requirement that cannot be understood), and as something which tends to either reinforce or undermine other criteria such as effectiveness and ease of enforcement.

It is also important to know how difficult or easy it is to develop, adopt and implement a particular management measure. There are numerous questions relating to the cost and expense of such an effort. Does a proposed measure require an entirely new institutional framework, for instance, or does it build upon or fit within an existing management framework? Will a measure require extensive development costs (e.g., an idea which is so complex that it requires outside experts and consultants to prepare the necessary ordinances)? Will a measure require the addition of planning staff to oversee implementation or can these activities be easily undertaken by existing staff? Will a proposed management measure require the collection of certain types of data or information? Will the costs of administering a particular tool or technique be borne primarily by the public body, or are administrative and implementation responsibilities shared by the private sector as well?

For a jurisdiction which already has in place many of the tools and techniques which have low or moderate costs and complexity, the marginal cost of adding a tool or technique which we have rated as having high cost might not be as great as our rating implies.

4. Ease of Enforcement. Many management tools and techniques appear attractive in concept but are of questionable effectiveness because it is difficult to enforce them. This criterion is specifically intended to assess the extent to which officials can effectively monitor compliance and enforce adopted programs and standards. Again, actual success at enforcement will depend on the commitment of resources and personnel to such activities. However, other things being equal, certain tools and techniques are easier to enforce than others.

This criterion is also concerned with how easily the implementation of a local ordinance or program can be monitored by outside agencies, in particular the Chesapeake Bay Preservation Board, under the newly adopted Chesapeake Bay

Preservation Act. How easily will this Board be able to confirm that a coastal jurisdiction is effectively implementing the ordinances and management provision it has on the books? Will effective implementation and enforcement of certain management tools and techniques be more obvious to an outside agency than others. For instance, it may be relatively easy for a state agency to determine whether a locality is enforcing a uniform shoreline setback (i.e., by measuring the actual location of new structures along the shore). It may be more difficult, however, to determine whether a locality is properly implementing a sliding scale density ordinance. To evaluate the latter may require a detailed examination of the physical characteristics of development sites (e.g., soils, topography, presence of public facilities) as well as an examination of the administrative processes through which permissible density is actually assigned.

III. Evaluation of Selected Management Tools

What follows below is a technique-by-technique assessment of selected shoreline management options, employing the evaluative standards developed in Section II. The order of tools and techniques roughly follows the outline presented in the two earlier reports in this series (Volume I and II). More specifically, selected tools can be grouped into the following categories: Intensity and Use Restrictions; Performance Approaches; Land Acquisition; and Conservation Incentives and Public Investment Policies.

The analysis for each specific technique follows the same format. First, the management tool or technique is briefly described or defined. (The reader is again referred to Volume I and II for greater detail on these.) Each of the four evaluative criteria are then applied to the tool or technique, with a two or three paragraph discussion for each criterion. Analysis in this section is in text form only, with an evaluative "rating table," comparing and contrasting the tools contained in Section IV.

A. Intensity and Use Restrictions.

A-1. Density Limitations. Localities may seek to accomplish water quality and other objectives by limiting the permissible density of development in sensitive areas, usually through conventional zoning and subdivision regulations. A local subdivision ordinance, for example, might impose a substantial minimum lot size near or adjacent to shorelines in order to reduce the level of urban runoff and pollution entering important water bodies (see Institute for Environmental Negotiation, 1988a).

- Technical Effectiveness

The technical effectiveness of density limitations is high and they hold considerable promises for reducing non-point pollutants.

The extent to which density restrictions will result in protection of water quality will, however, depend in large measure on the extent of these limitations. Where minimum lot sizes are substantial (say on the order of twenty, thirty, or forty acre minimum lots), i.e., where permitting density in sensitive areas is low, water quality protection is great, and the certainty of that protection is high. Research indicates that even minimum lot sizes on the order of five to ten acres in shoreline areas can be very effective at reducing non-point pollution.

- Political Acceptability

The political acceptability of density limitations will be low to moderate, primarily because they involve substantial reductions in property values. Where density restrictions require a "downzoning" and where these limitations are quite extensive or severe, tremendous opposition frequently result from affected landowners and the development community. Reductions in density are often seen by these groups as directly and significantly reducing the profitability of land development. The extent of public opposition will vary from community to community and will depend in part on how much of a break such restrictions are from past density restrictions. A reduction in density, say a change in minimum lot size from twenty acres to thirty acres, may be more politically feasible in one community than a change from a one acre minimum to a five acre minimum will be in another. Political acceptability will also likely depend on the actual extent or portion of the community affected by the limitations. A county-wide downzoning will be be less politically acceptable than selective downzonings in, for example, sensitive watershed areas.

The public acceptability of density limitations can be enhanced substantially through provisions which lessen the economic sting of such actions. Incorporating provisions which allow the transfer of density to other sites, for example, may allow the affected landowner or developer to recoup a portion of the losses associated with density limitations. (See Section D-4 for a discussion of the transfer of development rights or "TDR" concept.) As a further example, some states and localities refund a portion of previously collected property taxes assessed on the basis of higher density zoning designations (as reflected in higher land values; e.g., see Wylder, 1980).

- Administrative Cost and Complexity.

The cost and administrative complexity of density limitations is relatively low. As mentioned, density limitations are typically implemented through existing local zoning and subdivision regulations. These are fairly conventional land use regulatory tools which have been in use for many years and which the general public has a relatively good understanding of. Such ordinances are not terribly complex in concept, and residents and developers alike will have little trouble in understanding them.

Because most localities already have zoning and subdivision ordinances in place, and have been using and implementing these ordinances for many years, the cost and complexity of administration is relatively low. Typically, density limitations involve the

changing of density numbers in the ordinances, but without the need for a major revising or rehauling of the ordinances themselves. The time and cost here are, then, relatively low, and such changes can generally be completed in-house; that is, without the need for extensive outside consulting help. Furthermore, additional planning staff would not likely be needed. Of course, in the process of limiting density a community may be confronted with the need to create new zoning categories, and to redraw existing zoning boundaries to better reflect water quality protection and these activities may present some additional costs. In many jurisdictions, however, this simply amounts to selectively changing the zoning categories in relevant resource areas. Once the density changes have been made there is little additional cost or inconvenience in implementing the ordinances. In theory, local officials continue to implement the same basic regulatory program in place prior to the additional density limitations.

- Ease of Enforcement

The ease with which density limitations are enforced is relatively high, as it occurs within the normal zoning and subdivision process. These are regulations which builders and developers are quite familiar with and which have been a normal part of the land development process in most localities. Moreover, it is usually relatively easy for local enforcement officials to detect violations of such restrictions, as the physical landscape is changed in obvious and visible ways. Moreover, in the implementation process there is relatively little complexity in determining the permissible density and few avenues for staff discretion.

A concern with any land use regulation is the extent to which there are avenues available for obtaining exceptions to the restrictions or for otherwise circumventing the regulations. It is always possible that local politics can result in rezonings and other actions which undermine density restrictions. Density limitations, while providing some flexibility for unique circumstances, should be conceived in such a way that they are uniformly and consistently applied to similarly - situated landowners.

There are several ways in which density limitations lend themselves to evaluation by outside agencies such as the Chesapeake Bay Local Assistance Board. At the ordinance level because of the clarity and typical definiteness of the density restrictions (e.g., establishment of a minimum lot size of twenty acres) there is relatively little uncertainty about the physical outcome of the ordinances, assuming localities make good faith efforts to consistently impose the requirements. This contrasts, for instance, with ordinance and regulatory provisions which are keyed to subjective or discretionary criteria in which

it is difficult to determine what the physical outcome (e.g., density use, etc.) will be without looking at the specifics of each development proposal. Compared to this type of approach the ability to evaluate implementation of conventional density restrictions is relatively high.

A second dimension is the extent to which an outside agency or party can determine whether the ordinance requirements have in fact been conscientiously implemented and enforced. Again the ability is relatively high, at least compared to other forms of land regulation. Aerial photographs, U.S.G.S. maps, and windshield surveys, for instance, would be relatively easy ways to detect the general consistency of development patterns with adopted density standards.

A-2. Land Use Classification Systems

In addition to managing the intensity or density at which development occurs, a local management program may also accomplish water quality objectives by regulating the types of uses permitted in sensitive areas. A number of different approaches to managing shoreline and coastal uses can be identified. (See Institute for Environmental Negotiation 1988a for a full review.) Many coastal states and localities have developed land use classification systems which attempt to sort out uses and to organize them in ways which maximize protection for natural resources while accommodating development and growth in desirable locations. Typically such systems include certain basic use categories, such as natural, conservation and development zones or districts, though they can be substantially more detailed than this. Typically such systems are developed and incorporated as part of the local land use or comprehensive plan, and in turn serve to guide zoning and other land use regulations.

- Technical Effectiveness.

The technical effectiveness of land use classification systems is moderate. Effectiveness will depend, of course, on its specific content and the actual restrictions placed on growth and development as a result. In concept, land use classification systems can be very effective in enhancing water quality in their ability both to restrict new growth in sensitive natural areas, and to direct and accommodate growth into designated development zones where the impacts can be more effectively and efficiently handled (for instance, through the development of public sewage treatment plants, community stormwater runoff systems, etc.). Typically areas designated as development zones are locations of existing development where infilling and more compact and

contiguous growth patterns can occur. On the other extreme, designated resource on conservation zones are typically areas where little or no development is permitted, serving to effectively reduce nonpoint pollution from septic tanks, roads, loss of vegetation, and so on. Here the effects will be similar to those described for density limitations. In addition to development zones and natural area zones, there may well be intermediate districts which provide some more limited, level of development. Where development is permitted in these areas, it is usually restricted to recreational or water-dependent activities, or very limited residential uses. Again, the water quality impact will depend on the specific content of such provisions. The impacts of such intermediate zones, for instance, will depend on how recreational and water-dependent uses are defined. Certain recreational uses, such as marinas and boat facilities, may produce serious water quality problems.

Consequently, use classification systems can provide a moderately effective mechanism for guiding coastal development, although much depends on how the use categories are defined and how the boundaries are drawn. For a use classification system which prevents or very severely limits development in large areas in and around sensitive shorelines, effectiveness at enhancing water quality will be high. If, on the other hand, a system is applied in such a way that the natural/conservation areas are small, and the development areas large, or if the natural/ conservation areas permit extensive development, then the effectiveness of such a system will be low.

- Political Acceptability.

Land use classification systems are moderate in terms of political acceptability. A land use classification system is likely to result in political opposition similar to that of density limitations. Where the system results in severe reductions in the developability of considerable amounts of land in the community, there will be vocal opposition by landowners and the development community. Under a land use classification, however, there are some modifying effects. The fact that such a program takes a broader and more comprehensive view of community-wide development patterns will enhance its public and political credibility. Moreover, the development community will find it more acceptable in that such a system does designate places to build, as well as places where little or no development is to be permitted. This broader management program will also suggest that this is not an attempt to unfairly single-out a particular area or set of landowners, but that development restrictions have been carefully considered and applied as part of a larger community design.

However, because a land use classification system does seek to delineate areas where growth will or should take place some residents will object fearing the negative impacts of development in and around these areas (usually not owners of undeveloped land).

- Administrative Cost and Complexity.

Land use classification system rate moderate to high in terms of their administrative cost and complexity. Unlike a more limited action, however, such as the density reductions discussed earlier, a land use classification system entails a considerably larger task. Usually this involves an analysis of a larger area, ideally the entire jurisdiction (although it could be a quite limited area, such as required under the Maryland Critical Areas Program), and a more extensive consideration of growth and development patterns, demographic trends, the extent to which existing developed areas can accommodate further growth and if so where, among a number of other important questions. Once adopted it will require that zoning and other local land use controls be reviewed and modified (at least in the affected areas) to ensure consistency. For example, instead of simply reducing permissible densities in certain areas, the jurisdiction must consider the distribution of a variety of uses and densities, perhaps raising densities in designated development areas. At least in the short-term this will require additional staff time, and in many jurisdictions may require the services of an outside consultant. Once put into place, however, a land use classification system will be relatively easy to administer.

Ease of administration may depend in large degree on how similar a jurisdiction's existing plan and land use regulations are to such a system. In some jurisdictions, for example, much of the background work may already be done, with a fairly good classification system already in place. It might require, for instance, that the jurisdiction create and designate a conservation or natural areas zone, with development and other zones already designated.

Many Virginia localities are already implementing such land use classification systems, typically embodied in the generalized land use map contained in the comprehensive plan. The idea of sorting-out and managing land uses is a primary assumption behind traditional zoning, and as such public understanding will be relatively high. This is especially the case where the number of use categories is small and the spatial boundaries are logical and uncomplicated. Such a system will likely be easy for

developers and landowners to understand, as well, in turn enhancing its political acceptability.

- Ease of Enforcement.

The ease of enforcement of a land use classification system is moderate. Local enforcement of a land use classification system will hinge directly on the enforcement of zoning, subdivision and other local land use controls. In this sense implementation depends on the assurance that these implementing measures are complementary to and consistent with the classification system. After development areas are designated, for example, will the jurisdiction take the necessary actions to encourage and accommodate future growth in these areas (e.g., by providing the necessary services, changing the zoning to permit greater development densities, and so on)? Enforcement under a classification system in many ways becomes a larger and more difficult problem (although these are implementation and enforcement activities many localities would already be undertaking). Moreover, under a land use classification framework, it becomes important that all elements be enforced or implemented. For instance, if development is not adequately accommodated in designated growth areas, there may be sufficient political pressure to permit development in conservation or natural areas. If development is occasionally permitted in natural areas where it was to be prohibited, this may prevent population levels in designated developed areas from reaching sizes necessary to efficiently provide certain public services there (such as public wastewater disposal).

The ability of an outside board or agency to evaluate the implementation of a use classification system depends on a number of factors. One important issue is the extent to which localities are required to employ common use designations -- that is, the same use categories (i.e., development, conservation, natural) with the same or similar meanings concerning what specific uses, activities, and densities are permitted in them. Where a common classification system is required of localities, the ability to monitor and make sense of a specific local system will be considerably easier. A second consideration is the specific set of tools or techniques used to implement and effectuate the use categories. Where there are a variety of local measures or actions intended to influence the pattern of uses, the job of monitoring and evaluating enforcement will be much greater.

For most localities the primary implementation device will likely be the zoning ordinance. It should be relatively easy on one level to evaluate enforcement simply by

comparing the zoning ordinance with adopted land use categories. To what extent is the ordinance consistent with or complementary to the broader land use classification system? It would be reasonably easy to detect an implementation or enforcement problem, for example, where the zoning ordinance permitted by-right significant levels of development in a conservation or natural area. At another level, evaluation of the classification system requires information about the extent to which zoning is actually being enforced -- information that cannot be obtained simply by reading or reviewing the provisions of the ordinance. As with monitoring density restrictions, noted earlier, violations or inconsistencies with the classification system can be detected by changes in the physical landscape. That is, the construction of a subdivision or other extensive forms of development in a designated natural area can be defected and seen as obvious inconsistencies.

A-3. Urban growth boundaries/Urban service areas

Urban growth boundaries (UGB) are utilized in a number of states and localities as a way of distinguishing between urban areas or areas where growth is desirable and should be encouraged, and rural and resource areas where growth is less desirable. An urban growth boundary as used in Oregon, for example, is a relatively stringent measure which prevents most forms of development outside of the UGB, unless related to farming or other resource activities. (For a discussion of this type of growth boundary, see Beatley, Brower, and Brower, 1988; Gustafson, Daniels, and Shirack, 1982) UGB's are required by law in this state, and must incorporate enough urbanizable land to accommodate approximately twenty years of future growth. Urban services and facilities are then provided only within the UGB, and are phased and planned to promote a compact and efficient growth pattern. The designation of urban growth areas or urban service districts is more common in Virginia, although the basic concept is the same. Again the intent is to distinguish between urban and rural/resource areas, with land use controls and capital investments intended to implement and be consistent with this scheme. The UGB or urban services concept is typically not as stringently applied in other states and localities as in Oregon, and usually some level or degree of growth and development is allowable outside of growth areas (e.g., low-density residential).

- Technical Effectiveness

Urban growth boundaries will tend to have moderate technical effectiveness. Such a strategy will have a substantial positive effect to the extent that growth is directed and funnelled away from sensitive rural and resource areas and into designated

centers. However, effectiveness at protecting water quality hinges on several assumptions. First, the UGB concept as applied in most places may allow considerable development outside of the UGB or growth area. While the quantity of development and growth in rural and resource areas may be reduced, it can occur in ways which undermine water quality and other resource management objectives (e.g., buildings close to streambanks and shorelines heavy reliance on septic tanks in areas where soils are inappropriate; destruction of natural vegetation, and so on. Second, developers and landowners are frequently able to circumvent the UGB requirements, often by seeking ad hoc boundary changes and extensions. An effective UGB requires that local officials be willing to resist such changes.

Many forms of urban service areas or districts rely heavily on creating incentives to build and locate in these areas. The assumption is that by providing urban services and facilities (e.g., public sewer and water, police and fire, parks, etc.) in these areas there will be a natural incentive for developers to want to locate and build in these areas. Such incentives are often ineffective where market demand favors the kinds of low density homes and development that can be accommodated only in rural areas outside of UGB's. Thus while a UGB or urban service area typically allows greater densities of development, it does not preclude development outside of these areas and local demand may in fact favor the latter.

An additional problem confronted by some localities is what to do to ensure that development within the UGB or designated growth area occurs at a high enough density. Where very low density growth occurs within the UGB (well below allowable zoning) this can play havok with planned allocations of development (i.e., that "x" number of dwelling units or "y" percent of the community's growth will occur within the UGB). If very low density growth occurs within the UGB, this will force development into other areas outside the UGB, and will create pressures to expand or modify the boundaries of designated growth areas.

- <u>Political Acceptability</u>

Urban growth boundaries or urban service areas will tend to meet with moderate political acceptability. Actual political opposition or support will depend on the specifics of the program, and the more severe are the restrictions to building outside of the UGB the less politically acceptable the program will tend to be. This type of UGB, then, amounts to serious downzoning -- not a politically popular action in most localities.

Political resistance will be less significant where the restrictions on permissible development outside the UGB are not as great.

It should be observed that UGB's will also garner some support from the development community to the extent that they are perceived as accommodating and encouraging growth, albeit in certain defined areas. To many individuals in the development community this will apppear to be a positive outlook in contrast to no-growth or slow-growth attitudes apparent in some communities. The local business sector will also see the benefits of promoting and accommodating growth and will likely also express support.

Consequently, the designation of urban growth areas may enhance the political acceptability of certain resource regulatory measures. Severely downzoning areas where development may create water quality problems may be made more politically acceptable when other areas can be pointed to where extensive development is allowed. Protection of resource and conservation areas are balanced by the designation of development or growth areas.

- Administrative Cost and Complexity

Urban Growth Boundaries can involve a high degree of administrative cost and complexity. The concept of funneling and directing urban growth into designated growth areas is not fundamentally complex. Most citizens, public officials and developers will have little trouble understanding it. Yet, despite its simplicity in concept it may involve substantial administrative costs and difficulties. This administrative complexity involves initially the preparation of a plan or program which, among other things, identifies the size and location of growth areas. This alone, and the population, public service and other studies ideally needed, may require considerable time and administrative energies. These difficulties are minimized to the extent that a locality incorporates growth boundaries or growth centers into its normal comprehensive or land use planning process (e.g., an updating and revising of the local land use plan would have been done anyway). Inevitably, when initiating this type of program there is considerable controversy and disagreement over what precisely the boundaries of the urban growth area ought to be, and how much land, to accommodate what period of growth into the future should be included.

Once a UGB or urban service areas program is adopted, there are considerable administrative responsibilities necessary to implement the concept. One of the most

significant is ensuring that public services and capital facilities are sufficiently in place to accommodate growth in these areas. A failure to provide the adequate infrastructure will undermine the success and credibility of an urban growth boundary or growth areas program.

- Ease of Enforcement

Ease of enforcement is moderate to high. On one level a UGB is a regulatory program in that it permits greater development densities in and near designated growth areas and restricts permissible development outside of these areas. In this sense the ease of enforcement is similar to most forms of zoning. Indeed local enforcement may be somewhat easier because of the ability to identify with geographical precision where urban growth should and should not be occurring. Moreover, urban growth boundaries are typically delineated around existing towns, cities and development nodes making it especially obvious when impermissible development occurs in rural or resource areas, clearly away from and outside of urban growth centers. For these reasons as well, it will be relatively easy for a locality to reach some conclusions about how successful its program is over time at directing growth away from resource areas and into designated growth centers. It will be visibly possible to see whether the program makes a difference.

An UGB approach may also tend to be relatively easy for an outside agency, such as the Chesapeake Bay Local Assistance Board, to track for many of the same reasons. It may not be necessary to review every development proposal or every development review undertaken by the jurisdiction to judge success. Again the physical landscape will tell much of the story (e.g., have large developments been built outside of the UGB; have numerous single family homes appeared in resource areas, perhaps as the result of cumulative exceptions granted to the program, etc.?).

A number of impediments at the local level exist to the successful implementation of a UGB; issues somewhat beyond enforcement in the narrow sense. Because the concept rests to a large degree on incentives (i.e., making designated growth area attractive and desirable places to develop in) success is less controllable. However, where localities provide adequate public localities and services in a timely fashion these incentives may prove successful. A locality must also be willing to hold the line against attempts to modify the UGB, including requests to build in rural and resource areas and to move boundaries to facilitate development. Facilitating development within the UGB should make it easier to resist pressures to build outside it.

A-4. Resource Overlay Zones

A number of communities have created special resource overlay zones which follow the boundaries of an important ecological or environmental feature in the community, such as a wetland area, a shoreline, or a groundwater recharge area, among others. Such overlay zones are typically incorporated as additions to a local zoning ordinance and add an extra layer of regulatory standards for development proposed in these areas. A proposed development must also typically satisfy the use and density requirements of the underlying zoning designation. Usually resource or environmental overlays stipulate certain performance controls, including many of the specific management techniques described in other sections of this report (e.g., setbacks and buffers, clustering, etc.), as well as additional use and density restrictions (see Institute for Environmental Negotiation, 1988a for a more detailed description of overlay zones).

- Technical Effectiveness

Resource Overlay Zones can be rated as moderate in their effectiveness at protecting water quality. This is largely because of the uncertainty of the specific requirements imposed by such zones. The actual effectivenss will depend in large part on the actual performance standards and other requirements that are stipulated for development occurring in these areas. If the overlay zone incorporates, for example, a substantial setback and buffer requirement around a stream, wetland or shorefront the technical effectiveness may tend to be high. The effectiveness may also tend to be high where substantial clustering provisions are applied or where development must stay within certain impervious surface restrictions. However, where the requirements of the overlay zones are minimal (for instance, if the setback is very small and no other performance standards are imposed) effectiveness at protecting water quality is likely to be much lower.

The impact on protecting water quality will also depend upon the actual geographical extent of the overlay zone. Where the zone is quite small and encompasses only a small portion of the land which might influence water quality, the technical effectiveness will tend to diminish.

- Political Acceptability

Political acceptability will tend to be relatively high. Usually overlay zones do not prevent or severely restrict development options, but rather place certain stipulations on

how it can occur. (That is, through such things as setback and clustering requirements.) The development community is not likely to strongly resist these types of restrictions, particularly where such requirements can be used to enhance the attractiveness and marketability of a subdivision or development project (e.g., attractive open space areas, wildlife habitat, jogging and hiking trails).

The political acceptability of such a measure will depend, of course, upon the stringency of the standards applied to development. Some overlay districts do impose tremendous reductions in permissible densities or exclude important and profitable types of development, in turn lowering the market value of land within these overlay areas. The adoption of a resource overlay zone can in some cases, then, amount to a downzoning, with considerably less political acceptability.

- Administrative Cost and Complexity

Resource overlay zones will typically involve low levels in administrative cost and complexity. The overlay concept while not universally used, has been employed widely and for many years around the country. Resource overlay zones are in use in a number of localities in Virginia. (See Institute for Environmental Negotiation, 1988b.) Resource overlay zones are not terribly complex in concept and should be reasonably easy to understand both by the general public and the development community.

The administrative costs in preparing, adopting, and implementing a resourse overlay zone will tend to be low. Typically such zones are additions or amendments to a locality's zoning ordinance and do not require a major rewriting or rehauling of this ordinance. Moreover, the requirements of the overlay are added onto those requirements already imposed by the local zoning ordinance. The costs associated with administering these additional requirements will be relatively minor.

Again, however, the administrative costs and complexity will vary depending upon the precise type of natural resource area covered and the specific content of the performance standards or other restrictions imposed within the overlay zone. One important issue is the ease with which the boundaries of an overlay zone can be drawn. This often depends on the extent to which data and maps about the resource area already exist and are available (often from a state agency such as the Virginia Marine Resources Commission [VMRC]). Often the text of an overlay district will refer an applicant to a map to determine whether a parcel is located within an overlay district. For example, it may be relatively easy to prepare, adopt and implement a wetlands

overlay zone because sufficient maps exist which delineate wetland areas (e.g., the VMRC tidal wetlands maps, the National Wetlands Inventory (NWI) maps, etc.). However, where a county attempts a groundwater protection overlay district it may be substantially more difficult to delineate with any degree of precision the exact boundaries of sensitive groundwater zones. This may require the involvement of hydrology experts and the expenditure of large amounts of public time and money in mapping these areas.

- Ease of Enforcement

Overlay zones should be relatively easy to enforce, although again this depends in large degree on the precise requirements. The fact that the overlay zone is a part of the conventional zoning restrictions enhances enforcement. Whether or not an applicant is in resource overlay district typically becomes an additional check-off item in local zoning and development review. In fact, it may become easier for local officials to enforce certain performance standards and environmental regulations because of the ability to identify and delimit "special" management areas. Location in a resource zone automatically signals special review and consideration. The existence of precisely defined geographical managment areas may also tend to facilitate local monitoring and compliance. It provides a geographical focus for such enforcement activities (e.g., zoning officials know the geographical zones or areas in which certain restrictions must be followed and will find it easier to ground-check this compliance).

Local enforcement will not be as easy where the spatial dimensions of the overlay zone are more uncertain. Some local overlay districts are applied not through the use of a map but rather through a list of features or conditions, the existence of which will trigger the overlay requirements (e.g., the discovery or presence of an endangered species or endangered species habitat). In such cases it may be more difficult to pinpoint geographical areas and geographical boundaries in which certain development practices must be followed (e.g., impervious surface standards).

Resource overlay zones may tend to facilitate review by outside agencies such as the Chesapeake Bay Local Assistance Board. Again, the ability to delineate a particular geographical area will contribute to monitoring and longterm tracking. Beyond this, much will depend on the actual development standards. It will be substantially easier for an outside agency to monitor and verify a uniform setback requirement within an overlay district than it will be to verify compliance with a sliding-scale density standard, for instance. Outside monitoring will also be more difficult where the overlay zone is applied through a set of conditions or criteria rather than through reference to a map.

A-5. Clustering

Clustering is the practice of shifting the bulk of a parcel's overall permissible density onto only a small portion of that parcel (e.g., see Institute for Environmental Negotiation, 1988a). In the process, a large portion of the parcel is retained in open space or other undeveloped uses. Many environmental objectives can be achieved through clustering, in areas such as wetlands, floodplains, wildlife habitat, highly erosive areas, and so on, can be set-aside. Development on the site is ideally concentrated in more desirable, less-sensitive locations. Clustering provisions can either be mandatory or voluntary. Often voluntary clustering programs incorporate a density bonus to encourage clustering (see section A-6 for a discussion of density bonuses).

- Technical Effectiveness

The technical effectiveness of clustering is moderate to high. Clustering can be a useful tool in protecting water quality by orienting development away from shoreline areas, flood plains, and wetlands. In this way it has effects similar to shoreline setbacks and buffers. Several factors will influence the actual protection given to water quality, including whether or not clustering is mandatory, the stringency of the clustering standard, the uses to which the remaining undeveloped portions of the parcel are put, and the overall density permitted, among others. Clustering is often presented as an option for developers, rather than something which has to be done. Where clustering is simply an option, albeit one encouraged locally, its success at enhancing water quality is more questionable.

The stringency of the actual clustering standard is another variable. Increasingly, communities are imposing stiffer standards, requiring the setting aside of as much as 85% of the area of a parcel. The larger the area set aside, the greater will be the buffering and other water quality benefits provided. Another factor is how the undeveloped land is actually used. If natural vegetation is stripped, for instance, or if wetlands are filled or modified, the water quality benefits are severely reduced.

It is clear, as well, that clustering cannot completely solve the problems of development in shoreline or coastal areas and that the overall permissible densities in such areas are quite important. A low-density conventional development may have fewer water quality impacts than a high density clustered development. Other things being equal, however, clustering will do much to protect water quality.

- Political Acceptability

The political acceptability of clustering is relatively high. It has become a common and conventional requirement around the country and in Virginia, and the development community does not tend to see it as a particularly onerous or constricting requirement. Increasingly the practice of clustering is undertaken as a response to demands by housing consumers for open space, trees and other elements of the natural environment. Moreover, clustering in theory does not take away any density but rather reshuffles it, so that most developers and landowners are no worse-off in terms of the number of dwelling units and the amount to development they are able to construct. Some opposition may result from the perception that clustering is inconsistent with market demands for housing (i.e., that people would rather buy single family units on large detached lots in conventional subdivisions) and that consequently clustering requirements cut into development profits.

The prospect of preserving significant amounts of open space, at little or no additional public cost, is attractive to public officials and the public at-large. Clustering, then, is neither radical nor terribly onerous in its impacts, and should meet with relatively high political acceptability.

- Administrative Cost and Complexity

The administrative cost and complexity of clustering is relative low. While many localities are already employing some form of clustering it is a relatively new concept to others. Such provisions will usually require a modification of existing zoning and subdivision regulations, but certainly not a radical departure from these conventional tools. Once enacted, clustering provisions will typically create an additional requirement (under a mandatory program) that local planners must implement, but its administration should be relatively easy. Moreover, once the clustering standard is set forth, (e.g., that development must be clustered on fifty-percent of the parcel) the responsibility is placed on the developer or landowner to design projects accordingly. Clustering provisions typically do not require an additional layer of land use decision-making, but rather can be included within existing development review procedures. For this reason most of the expense will be involved in developing the provisions and incorporating them into existing zoning and subdivision regulations. Generally, the administration should be relatively easy.

Of course, more complex forms of clustering will tend to involve greater problems of administration. When a clustering standard requires development to be located outside of a particular wildlife habitat or some other important natural area, substantial time may be required in mapping or delineating these areas, or in site analysis and study by local planners.

Clustering has become an increasingly popular tool in recent years and no longer a foreign or unusual concept in land use planning circles. Public understanding, however, will likely be mixed. Because the concept is somewhat different from conventional zoning and subdivision regulations, the general public as well as many public officials may find the concept confusing. Landowners attempting to calculate what can be done with their land may be temporarily confused. However, the concept is not so inherently complex that it cannot be understood and comprehended in a short period of time by all those involved in the development process. Of course, clustering ordinances and provisions vary in their complexity and this may have a considerable influence on the level of public understanding.

- Ease of Enforcement

Clustering will be relative easy to enforce. If mandatory for development in designated areas, development projects will be required to cluster as a condition to obtaining normal development approval. It is possible, of course, that some development projects could occur in non-clustered ways (i.e., in violation of the clustering standard) but this is unlikely. Most development proposals that will fall under clustering requirements are usually of such a substantial size that it is unlikely they would not be detected by the public or by local planning staff. Local planning staff will be required to make subsequent inspections to ensure that approved cluster projects have in fact oriented homes and buildings consistent with approved plans. This is not an onerous task, however, and it should be apparent when inconsistencies and violations occur.

One important question involves how the open space lands will be protected over time. Typically, the locality requires the donation of an easement which runs with the land and which prevents subsequent development of these areas. From the perspective of protecting water quality, these set-aside areas should not only be protected from future development, but should ideally be maintained in natural, vegetated conditions. The legal instrument used to protect the open areas should also prevent subsequent actions which would disrupt the water quality benefits of these natural areas (e.g., prohibiting the cutting of trees, the destruction of vegetation, the unnecessary grading of

land). The enforcement responsibilities here may be somewhat more difficult, and the easement mechanism should be designed to ensure that such natural disruptions and modifications are prohibited or restricted. These possible modifications may also be more difficult to detect by the public and more difficult for planning personnel to identify and enforce. Again, periodic inspection will likly be necessary.

Another aspect of enforcement involves attempts by landowners and developers to develop or subdivide set aside areas at a later date. A recent case in a Piedmont County illustrates this potential problem. Here a landowner sought and received approval to subdivide land that had previously been set aside under clustering requirements. This particular landowner argued that because other developments had surrounded the open space it was no longer viable for farming (with preservation of farmlands being a major intent or objective of this county's clustering ordinance). For clustering to be effective requires a willingness of public officials to resist pressures to develop these open areas (or to carefully identify those few circumstances under which some exceptions may be made).

Ability to evaluate the implementation of a clustering requirement will be relatively high in that basic physical differences can be seen between clustered and non-clustered development. It will be relatively easy to identify the existence of open areas which have been set aside during the development review process. Such general patterns of clustering will be easy to discern. Evaluating whether specific projects are consistent with clustering standards (e.g., are buildings outside the floodplain, are buildings located at specified distances from streambanks, does development avoid important wildlife habitats, and so on) will require additional effort, particularly where the conditions or criteria contained in the clustering provisions are numerous and detailed. Nevertheless, a review of selected local projects should indicate the extent to which the provisions result in desirable physical differences.

An outside agency will find it relatively easy to assess the likely impacts of a clustering ordinance or provision. This is so because the key implementing provision is typically a percentage figure stating the minimum portion of the site that must be kept open and undeveloped (e.g., 60%, 85%, etc.). Assuming good faith efforts to apply such provisions at the local level, an outside agency can be reasonably assured of the physical outcome.

A-6. Density Bonuses

Density bonus provisions are incentives made available to developers who incorporate certain desirable design features into their development projects. Typically a locality offers on an optional basis additional development density, over and above what is permitted by-right, in exchange for these project design features. A common density bonus is one which provides a developer with additional allowable density in exchange for a clustered development, or one which sets-aside large amounts of open space. Density bonuses might also be given in exchange for greater shoreline setbacks, for example, or for projects which protect large amounts of native vegetation. In some cases the incentive is provided not in terms of additional density, but in the relaxation of other development standards or requirements (e.g., being relieved of on-site parking requirements, or sideyard setbacks, etc.). (For a more extensive description of density bonuses, see Institute for Environmental Negotiation, 1988a; 1988b.)

- Technical Effectiveness

Density bonuses as a primary strategy to protecting water quality rank low in technical effectiveness. Because density bonuses are not mandatory, but rather act as incentives, there is relatively little assurance that desired project designs will result. Much depends on the local land and development market. In many situations additional density may simply not be a desirable carrot (for instance, in an area where the development market is primarily single family detached homes on large lots) or a carrot sufficient enough to induce major changes in the design and layout of a project.

Even where the demand for additional density is quite strong, effectiveness will depend on what changes in project design are actually stipulated. Providing additional density in exchange for a substantial buffer or shoreline setback may result in considerable water quality benefits. However, if additional density is provided in exchange for relatively minor changes (e.g., a few extra feet of setback) the water quality benefits are less certain.

It is also conceivable that the water quality and other benefits achieved through better project designs (e.g., clustering) could be offset by the damaging impacts of greater levels of permissible density. Greater allowable density, for instance, may translate into greater sewage and waste problems, greater traffic, etc. In designing density bonuses public officials must be careful to adequately assess the impacts and

desirability of additional people and dwelling units, even under the best project configuration and design.

- Political Acceptability

The political acceptability of density bonuses is high. Their optional, non-regulatory nature will make them relatively popular with landowners and developers, particularly where they are viewed as offering levels of development higher than would otherwise be the case. They do not impose any direct costs on landowners and the development community, unlike many of the other management tools and techniques described in this report.

While a number of localities around the county, and some within Virginia, are using density bonuses, the idea will be foreign to some. The idea is not a terribly complex one, however, and most developers and citizens at-large will have little trouble in understanding it.

While the development community is likely to support density bonuses, others in the community are likely to be opposed and this may influence political acceptability. In particular, citizens living in close proximity to eligible projects may strongly resent the prospect of additional density, and the traffic, noise, etc. that it may bring. Moreover, it leads to questions about the integrity of the local comprehensive plan and whether providing such bonuses serves to undermine this carefully constructed document. To some extent such local or neighborhood opposition to increased density may be overcome by a more desirable project design (e.g., many neighbors would probably prefer a higher density clustered development which protected substantial amounts of open space than a lower-density development that did not).

- Administrative Cost and Complexity

While a density bonus would create an additional administrative feature, the administrative cost and complexity would be relatively low. Such a provision would be an addition to existing zoning regulations, requiring relatively small modifications to the existing regulatory framework. Most density provisions take the form of relatively simple density tables, fairly easy to implement (if "x" occurs, then "y" percentage increase in density is permitted, not to exceed "z" amount).

Several sources of administrative complexity could emerge. One source involves the specification of project design feature for which bonuses are to be awarded. These can vary considerably in their complexity and subjectivity. Determining, for instance, whether a development plan adequately handles stormwater runoff (as a condition of receiving additional density) may be substantially more difficult than determining whether a project sets aside some specified percentage of open space. Some complexity and cost arises as well in designing the bonus incentives. Careful analysis of local market conditions is ideally necessary to determine whether and to what degree a bonus incentive will actually result in the desired project design.

- Ease of Enforcement

Because a density bonus provision is an incentive and not a mandatory regulation, enforcement questions are less important. Once bonuses are awarded, however, localities will want to ensure that the quid pro quo is indeed carried out. The fact that a limited number of development projects will likely take advantage of such incentives (at least a smaller subset of all eligible development) local enforcement and compliance responsibilities will be minimized.

Enforcement will, of course, be more or less difficult depending upon the actual project features or designs required as a condition of receiving the bonus. Again, it will be relatively easy for a locality to determine whether or not buildings have been set-back some additional distance from a streambank or shoreline, for instance, or whether buildings have been clustered (i.e., at the time of construction). It may be more difficult to determine, however, the extent to which vegetative buffers or other natural areas are maintained in a natural and undisturbed state overtime.

From the point of view of an outside agency seeking to evaluate the implementation and enforcement of such a program it may be somewhat difficult. Because the density bonus is optional there is little certainty when reviewing the ordinance and provisions that the desired physical results will occur. An understanding of the impact of such provisions would require a review of all eligible local development proposals to determine which, if any, took advantage of the incentives. Once this information is obtained, the monitoring and verification problems become similar to those apparent at the local level.

A-7. Sliding Scale Density Systems

Sliding scale density systems seek to vary the permissible density in a locality based on certain physical and ecological characteristics. Typically permissible density, as expressed for instance in terms of minimum lot sizes, decreases the more important a parcel is to preserve or protect. Often where farmland preservation is the objective, greater density is given in circumstances where existing lots of record are small, or where the quality of the farmland is low (e.g., as determined through the SCS Soil Capability Classification System, see Toner, 1976). As the existing lots of record become smaller, permissible density becomes increasingly greater (e.g., see Thurow, 1981). The sliding scale concept can be especially useful for protecting water quality where the density-determining factors or site characteristics have some influence on nonpoint water pollution. Permissible density may decline on a sliding scale based on such factors as slope, presence of wetlands, distance to surface waters, relevant soil conditions and other critical water quality factors.

- Technical Effectiveness

The technical effectiveness of sliding scale systems is moderate to high. The potential for protecting water quality resources is great, although it will depend heavily on which factors are used in applying the sliding scale and the actual density restrictions that are applied. Where slope is the factor applied, substantial benefits from reduced erosion could result. The same is true of other factors, such as the distance of a parcel from streams, rivers, and other critical water bodies, or the presence of wetlands, wet soils, or critical vegetation and habitat.

Much depends, however, on the density restrictions applied. Where the densities permitted are high throughout the sliding scale, even where critical environmental factors are present, such a system may have little impact. Also, the most common form of sliding scale currently in use in Virginia and elsewhere appears to be the approach of assigning increasingly greater density to smaller lots of record. If evaluating this arrangement from the vantage point of water quality, the benefits would be quite uncertain. Indeed, such an arrangement might be even more damaging to water quality, for instance where small lots are characterized by high slopes, proximity to water bodies, presence of critical vegetation, and so on.

- Political Acceptability

The political acceptability of sliding scale density systems is moderate. The acceptability of a density system will depend in large degree on the the actual levels of density assigned. Where the sliding scale leaves substantial portions of a locality with relatively little development potential opposition from the development community will be intense. The political ramifications are similar to that of a conventional downzoning. It may also appear inequitable in the sense that permissible densities are dramatically different for different landowners who may own visually similar tracts of land (which may differ in terms of slope, soil type, etc.). Where the spectrum of possible densities is relatively narrow, and the lowest permissible density is still not extremely low, (say five acre minimums), political acceptability will tend to be greater. A countervailing political influence is the fact that some landowners and developers may tend to benefit where their land does not contain critical environmental factors (or where lots of record are small in the typical case of sliding scale in rural areas).

While sliding scale systems can be simple and forthright, the concept is still a relatively new one in Virginia and elsewhere. It may not be immediately understandable by landowners, developers, public officials and the public at-large. This complexity and newness may contribute to the political problems confronted by such a system. Also contributing to these problems are the perceived uncertainties about what a system will create in terms of a rational and appealing landscape (e.g., some parcels will contain a number of dwelling units, others will accommodate few).

- Administrative Cost and Complexity

The administrative costs and complexity of a sliding scale density system are moderate to high. As already noted, this is anything but a conventional growth management tool and will be relatively foreign to many local planners and public officials. Preparation of sliding scale system that has any direct relationship to water quality (i.e., not simply the parcel size programs used to protect agricultural land) will involve some additional administrative costs, particularly where more than a single environmental constraint or factor is employed in the system (e.g., "If your lot contains these soils . . . and this slope. . . and this proximity to a streambed. . . your permitted number of dwelling units is . . ."). Prior to implementing such a system, substantial mapping may also be necessary, particularly where the local understanding of critical environmental features is low.

Ultimately sliding scale is implemented by way of the conventional local zoning or subdivision ordinance. However, additional local review will be needed to ensure that densities are calculated based on appropriate physical features (and to verify the presence or absence of these features on a parcel or lot). These activities will involve some additional administrative costs.

- Ease of Enforcement

A sliding scale system complicates somewhat local zoning and subdivision enforcement and ease of enforcement is low to moderate. While the locality will likely be required to map critical features used in determining permissible density, actual density calculations are typically made on a parcel-by-parcel basis, usually at the time of development approval. It is frequently the responsibility of the developer to determine the allowable density of his or her site, subject to local review and approval. Where such review must be conducted for each proposed development and where the environmental factors are several in number, local planning personnel and resources may be swamped. Much reliance may need to be placed on the honesty and good faith of the applicant.

Once development projects complete local review and approval it may be difficult to visually detect problems of compliance. Perhaps unlike a simple uniform shoreline setback, it may be difficult to determine, without going through the sliding scale system for that particular parcel, whether the type and amount of development actually taking place is consistent with the ordinance. Detecting compliance problems may be somewhat more difficult. A similar concern can be expressed about the reviewability or tracking of such a system by an outside agency. Again it may be difficult to determine (e.g., with aerial photography, windshield surveys) whether the physical patterns of development occurring in the locality overtime are consistent with the adopted sliding scale, and thus advancing water quality objectives. The fact that a sliding scale system incorporates as many as twenty or thirty different permissible density categories as a part of its sliding scale density table, further complicates this ability to track compliance.

B. Performance Approaches

B-1. Stormwater Runoff Standards. Stormwater runoff represents a major source of surface water degradation. Many states and localities have taken actions which require new development to meet certain minimum stormwater runoff standards. Often this standard is expressed in terms of a design storm which must be planned for (e.g., the 10-year storm event, or "x" number of inches of rain in a twenty-four hour period).

Developers typically must calculate the likely hydrological effects of their projects (e.g., the runoff created by impervious surfaces, reduction in natural infiltration) and must find ways, usually through a combination of retention and detention, of handling this additional runoff. A stormwater management plan is typically required. (See Institute for Environmental Negotiation, 1988a.)

- Technical Effectiveness

Stormwater management standards and the retention/detention measures which follow from them rate high in technical effectiveness. They are particularly effective at controlling toxic and other urban forms of nonpoint pollution. Effectiveness, of course, varies from one specific retention or detention technique to another, but have a relatively high certainty of protecting water quality. Research indicates that the majority of these nonpoint pollutants are picked up and carried during the "first flush" of rain, and that even less-stringent stormwater standards can have considerable impact.

- Political Acceptability

As with many other types of performance standards political acceptability is relatively high. Such standards, and the measures that must be incorporated into development projects as a result, may increase the cost of development somewhat, but are not major roadblocks to development. Moreover, stormwater management has become a fairly standard requirement in recent years, and represents a design consideration most developers would likely be concerned with anyway. Once adopted at the state or local level, stormwater management standards tend to become standard operating procedure with little resistance from the development community.

One issue is the cost and expertise required to conduct the hydrological analysis and the resulting stormwater mangement plan. This may be the source of some discontent in the development community, but again resistance is likely not to be great or long lasting. Once such a requirement is enacted it quickly becomes pro forma, and can be prepared alongside the erosion and sedimentation control plan, and other project-related planning studies.

- Administrative Cost and Complexity

The administrative costs and complexities of stormwater runoff standards are moderate. While most of the cost associated with preparing the stormwater analyses and management plans is assumed by the developer, a locality will incur additional costs associated with reviewing these studies and plans. Often small localities must contract with a consulting engineer to provide the necessary review services. Local departments of public works may also be in a good position to assist in review of stormwater studies and plans. The need to review and enforce stormwater plans and requirements may require additional in-housing planning staff.

Generally, however, stormwater runoff standards can be incorporated into the normal process of development review and approval at the local level without great difficulty.

- Ease of Enforcement

Ease of enforcement is low to moderate. Stormwater standards may require additional local personnel to administer and enforcement may be a significant task. Ease of enforcement will depend partly on the types of retention/detention measures employed. There are really two levels of enforcement involved. The first involves the question of whether specified detention/retention measures are sufficient to achieve compliance with the stormwater standard (e.g., will grass swales and porous pavement be sufficient to handle the 10 year storm event). This level of enforcement in theory occurs during review of the proposed stormwater plan and depends heavily upon the level of staff or consultant expertise and time available. Where the amount of development occurring in the community is great, the ability to ensure compliance will often be quite low. A second enforcement question involves whether projects are actually constructed according to approved stormwater plans (e.g., are the swales the agreed upon size; is the porosity of the porous pavement actually what was agreed upon and approved, etc.?). These are equally difficult enforcement problems and would require inspection resources well beyond most local governments. Moreover, even where there is reasonable assurance that a stormwater system has been installed according to the approved plan, there is no assurance that this system will be maintained and remain functional over time (e.g., the swale may be paved over; a detention system may become filled with sediment, etc.).

These local enforcement problems make it even more difficult for an outside agency to evaluate local enforcement. Enforcement could be assessed through a selective sample of development projects, but it would probably be difficult to make any definitive conclusions about local enforcement from such a procedure. In contrast to some of the other performance or site controls discussed in this report, such as shoreline setbacks or clustering, each proposed project from the point of view of stormwater management, will involve a unique set of hydological and design conditions, and each stormwater plan may involve a distinct combination of control strategies (unless control strategies are stipulated by the jurisdiction). Unlike a physically-measurable shoreline setback, it is difficult to visually detect non-compliance.

B-2. Buffers and Setbacks

Buffers and setbacks are common land use controls used to achieve a variety of planning objectives, including control of nonpoint pollution, visual enhancement, and reduction of coastal and river flooding damages. Setbacks require buildings and structures to be located a certain distance away from a shoreline or streambank. The required setback may be a certain uniform distance from a shoreline (e.g., 100 feet from mean high water) or it may be variable depending upon different shoreline features (e.g., the building setback may be greater in areas where shoreline erosion is greater). The concept of a buffer differs slightly from a building setback in that a buffer typically implies the provision or protection of trees, vegetation and other natural features which serve to filter non-point pollutants. The actual effects of setbacks and buffers are quite similar, and the terms typically used interchangeably, and are consequently discussed together here.

Buffers and setbacks vary considerably in the minimum distances required, typically between 50 feet and 300 feet from a shoreline or streambank. Studies indicate that buffers can be very effective at filtering pollutants from upland areas and can prevent disturbance of wetlands and plant and wildlife habitat areas (e.g., see Sullivan, 1986).

- Technical Effectiveness

The technical effectiveness of setbacks and buffers is high. Development buffers and setbacks have been found to have considerable success at reducing nonpoint pollution. This is particularly the case where set-aside areas between development and water bodies or wetlands are left in a natural, vegetated state. Studies also indicate that

vegetated and forested buffers of only a few hundred feet can substantially reduce the amount of agricultural runoff, with tremendous positive effects for water quality. Consequently, the certainty of protecting water quality with buffers and setbacks is relatively high.

Water quality benefits will vary, however, depending upon the actual requirements imposed. A small setback or buffer, perhaps ten or twenty feet may have a relatively small impact, while 100, 200, or 300 feet buffers will likely have a substantial effect at protecting water quality. The greater the size of the buffer, the greater will be the certainty of water quality benefits. Certainty will also depend on the actual uses, if any, permitted in buffer areas. If the requirements prevent the location of homes in these areas but permit the placement of septic tank drainfields there, the water quality results may be disastrous. As well, another important variable is the extent of restrictions placed on the alteration of natural features and natural vegetation (e.g., the grading of land, the cutting of trees, etc.). A setback/buffer will be considerably more effective at protecting water quality where such restrictions are a part of the regulations. Such regulations may also be more effective where they require developers or landowners to reestablish vegetation, enhancing the buffering capacity of these strips of land.

A major issue is whether these requirements apply only to residential, commercial and other developed uses, or rather would also apply to agricultural and forestry activities. Studies clearly indicate that agricultural runoff is a major, if not the most serious, form of nonpoint source pollution (see Clark, Haverkamp, and Chapman, 1985). Would farmers and farm owners be prevented from tilling or otherwise using these lands as part of the farm unit (e.g., location of livestock facilities). Where farming and agricultural operations must also acknowledge the buffering standard such a tool will be tremendously more effective at enhancing water quality. This will be true for timber harvesting operations as well.

- <u>Political Acceptability</u>

The political acceptability of setbacks and buffers is high. Setbacks and buffers have become common development restrictions under the conventional zoning ordinance (e.g., sideyard and frontage setbacks) and consequently should strike most developers, landowners, and citizens as entirely reasonable. Use of setbacks and buffers around shorelines and riverbanks are less common and less familiar to the public, yet should also be fairly acceptable. In most cases a setback or buffering requirement will

not seriously hinder the ability to develop an area or parcel of land, but is rather an additional design constraint which is most instances can be easily worked around. Such a development feature can also enhance the attractiveness of a home or property and may in turn add to its profitability. Of course, the level of acceptability from the developer or landowner's perspective will depend on the actual size and extent of the setback/buffer imposed. A large buffer (e.g., perhaps 300 feet or greater) may seriously reduce the developability of a parcel, and may in the case of existing lots make development impossible. (A careful analysis of existing parcel sizes will provide a fairly clear answer to this question.) Generally speaking, a development setback or buffer requirement will meet with considerable political acceptability.

The possibility of restricting agricultural operations within a buffer zone may raise some serious problems of political and public acceptability, however. What would typically result is a prohibition of activities that have occurred along the shoreline for many years. Asking farmers to set aside these areas may be difficult to do, and may seriously cut into the acreage available for production (particularly in those farm units containing a large amount of shoreline). Public acceptability for this type of buffer would tend to be lower and the political chances of enacting such restrictions much lower. Such an approach will tend to be more politically acceptable where farmers are provided some level of compensation. The Cropland Reserve Program now operated by the federal government, and state programs such as the Reinvest in Minnesota ("RIM") program might serve as good models.

- <u>Administrative Cost and Complexity</u>

The administrative cost and complexity of setbacks and buffers is low. Shoreline setbacks and buffers can be incorporated into a locality's existing traditional land use controls with relatively little difficulty. The extent to which buffer and setback standards have been satisfied by developers can be determined during normal development and site plan review procedures. Administration will tend to be easiest where a uniform distance is imposed and where the point from which the setback/buffer is to be measured is clear and identifiable. For instance, a shoreline setback requirement based on erosion rates may be difficult to administer because of the paucity of information concerning shoreline erosion rates. As a further example, a setback measured from a streambank may be more difficult to administer because these points have not been precisely located on maps. Such difficulties will tend to reduce ease of administration.

Administrative costs and difficulties will likely be much greater where setback and buffers are imposed on agricultural and lumbering activities. There are uses which would not normally be required to go through a local development review process and would consequently require an additional layer of governmental review, with perhaps the need for additional personnel to conduct such reviews.

Because buffer and setback standards have been a normal part of conventional zoning regulations public understanding of these tools will tend to be high. Moreover, the concepts are relatively simple and easy to understand even if they have not been used before in a community. For most developers and landowners such restrictions will not seem very complex and will be relatively easy to incorporate into the planning and design of development projects. Public understanding will diminish somewhat where calculation of the required setback/buffer is based on a complex or less than straightforward method. Public understanding will tend to be higher, for example, where a uniform shoreline setback is employed, as opposed to a setback based on certain variable natural features (e.g., rate of erosion, location of the 100-year floodplain, and so on).

- <u>Ease of Enforcement</u>

Local enforceability of setbacks and buffers would be relatively easy. During development and post-development site inspections it is easy for planning officials to determine whether requirements have been satisfied. Enforceability may be somewhat more difficult where non-uniform setbacks are imposed or where the points of measurement are difficult to discern visually. Enforcement may also be more difficult over time where regulations require that trees and vegetation not be disturbed. Enforcement of agricultural and lumbering setbacks/buffers may also be difficult to enforce, again largely because they would not normally fall under conventional development review. Farm owners and lumber operators may be unfamiliar with the requirements and would have little occasion to find out about them. Enforcement here will also be problematic because of the typically large geographical area covered by such uses and the remoteness and inaccessibility of these areas. Periodic aerial photography would provide a relatively quick way to assess enforcement of this type of setback/buffer.

Ability to evaluate the implementation of setback/buffering standards by an outside agency or group would be relatively high. As with density limitations discussed earlier, setbacks and buffers should result in a physically different and visually discernible pattern of development. It will be particularly easy to gauge implementation where a

where a uniform setback is imposed, and again where it is easy to identify points from which setback distances are measured (e.g., a mapped shoreline, mean high water line, etc.). Ability to assess implementation will be more difficult, as well, where the locality imposes some element of discretion (e.g., where the setback/buffer is flexible depending upon certain criteria) or
where the distance of the setback or buffer is determined through some equation or point system.

On another level, it will be relatively easy for an outside agency to review the local setback/buffer requirements themselves and to make some likely conclusions about their impacts on water quality. Assuming a good faith effort to implement the standards, an outside agency can be reasonably certain that a 200 foot development setback will lead to a reduction in non-point pollutants and serve to enhance water quality.

B-3. Erosion and Sedimentation Controls

Erosion and sedimentation controls are intended to reduce runoff and sediment loss from land disturbing activities, particularly development and construction activities. In Virginia, localities are required by law to adopt an erosion and sedimentation control program. Typically such programs require the preparation and approval of an erosion and sedimentation control plan (or "E and S" plan) prior to undertaking land disturbing activities of a certain size. (See Cox and Herson, 1987.) Developers must typically incorporate a variety of erosion control techniques and procedures in this plan and once approved must adhere to these during the construction process. Included among the erosion control strategies typically required are: the use of mesh fencing, straw bales, and mulching; the construction of sedimentation ponds and basins; and restrictions to the extent of grading and site clearance. Localities often require performance bonds to ensure that the specified erosion controls are put into place.

- Technical Effectiveness

Erosion and sedimentation controls have a high technical effectiveness at protecting water quality in their ability to trap and contain large amounts of runoff and sediment. Many of the techniques and practices have been used for many years, with a high degree of confidence that they will have an appreciable and important impact in reducing water pollutants.

While all erosion and sedimentation controls will have some degree of positive effect they vary, of course, in the water quality benefits they provide. Exclusive reliance on silt fencing will obviously be less effective than use of a combination of controls (e.g., silt fencing along with sedimentation ponds and restrictions to vegetation disturbance, among others).

The certainty of water quality protection will also depend heavily on the types and variety of land disturbing activities which must adhere to such requirements. It is a common criticism of the Virginia erosion and sedimentation control requirements that certain critical activities are exempted, including: agricultural and silvacultural activities; commercial development less than 10,000 square feet; and disturbance from single family structures not developed as part of a subdivision. These are important exclusions which seriously undermine the ability of such a requirement to adequately protect water quality from land disturbing activities. Some Virginia localities have sought to overcome these loopholes and have narrowed the exceptions. (See Institute for Environmental Negotiation, 1988b.) To the extent that all major erosion and land-disturbing activities are covered under such requirements the technical effectiveness of such measures will be greater.

- Political Acceptability

The political acceptability of erosion and sedimentation control requirements will be relatively high. While the cumulative effects of a number of required erosion control measures may be costly, typically they are relatively small site-level requirements, not terribly onerous in their impacts. Moreover, in Virginia and most other states these types of site disturbance controls are generally considered to be standard operating procedure. The development community in particular seems well accustomed to them and there appears relatively little resistance to them (although there are certainly frequent cases of individual developers or landowners who violate or fail to satisfy necessary standards). Generally speaking, political acceptability of erosion and sedimentation requirements will be high.

- Administrative Cost and Complexity

Erosion and Sedimentation control requirements rate moderate in their overall administrative cost and complexity. Costs to implement local erosion and sedimentation control standards can be significant, however. Additional personnel and staff time may be necessary to implement the provisions, in particular to work with developers and to

analyze and review submitted E and S plans. Substantial resources may also be necessary to conduct necessary periodic site inspections and to perform enforcement responsibilities.

Public understanding of erosion and sedimentation controls will tend to be fairly high. These requirements have been in use for many years and have become fairly conventional. Moreover, the concept of trapping and retaining construction site sediment is intuitively simple. Public understanding is likely to be high for developers, landowners, and public officials as well as the average citizen (who is used to seeing mesh fences and other erosion control devices along roads, highways, and construction sites).

- Ease of Enforcement

Ease of enforcement will be low to moderate. Local enforcement of erosion and sedimentation control standards has historically been a major problem in Virginia and elsewhere. A sophisticated E & S plan may be prepared and approved at the local level and be completely disregarded by the builder and contractors at the site level. Violations typically are misdemeanor offenses, carrying small fines. Even where violations have been committed, the chances of prosecution are relatively low.

Where there are numerous development projects concurrently taking place in community enforcement will be that much more difficult. A locality is likely not to have the necessary inspection personnel, with appropriate background and expertise in the erosion control area. Moreover, to fully assess the implementation of E & S controls would require frequent inspections, not simply an occasional visit at major steps in the development project. A developer may install adequate mesh fences one day, for example, yet fail to keep them clean and upright the next day, thus reducing or completely eliminating their usefulness at controlling sediment runoff. A full time staff of E & S enforcement personnel would ideally be required.

Several major obstacles to evaluate of enforcement by an outside agency can be identified. First, E & S standards are largely applied on a case-by-case project-by-project basis. It is thus difficult to compare the written requirements with what actually results in the way of control measures and to make firm or definite conclusions about enforcement (in the same way you might be able to determine whether a uniform shoreline setback has been adhered to). At another level an outside agency might primarily be interested in whether developers and landowners are following the

requirements set forth in approved E & S plans. Evaluating implementation is made that much more difficult because the land disturbing activity may not last very long (as compared to say the shorefront home used to evaluate implementation of the coastal setback). Consulting aerial photographs, for example, to obtain a general sense of compliance will not be very successful.

Ultimately the most important indication of successful enforcement is the reduction in the amount of sediment and erosion occurring during the construction process. Given the level of construction and building, is sediment runoff above or below average? This too is difficult to assess, both because it is difficult to measure sediment and runoff, and difficult to conclude whether this level is high or low compared with other places, and would be occurring even without the E & S standards.

B-4. Floodplain Restrictions

Largely since the creation of the National Flood Insurance Program (NFIP), localities around the county have been regulating development activities in floodplains. Under the minimum requirements of NFIP these restrictions have primarily taken the form of elevating buildings to the 100-year flood level and prohibiting most development in the "floodway" (that is, the main flood channel where the bulk of water movement occurs). Localities must adopt these minimum regulations in order to participate under the federal program (and in order for individual floodplain property owners to purchase federal flood insurance; see for instance, Kusler, 1982). Increasingly local governments have gone beyond these minimum requirements, for instance requiring additional building elevation beyond the specified 100-year flood elevation (so-called "free boarding"). Many jurisdictions have taken even stronger regulatory actions, preventing all forms of urban development from occurring in the 100-year floodplain. The analysis to follow is of this type of stringent floodplain regulation.

- Technical Effectiveness

The technical effectiveness of floodplain regulation is moderate to high. The extent to which floodplain restrictions protect and enhance water quality will depend on whether the regulatory floodplain is coterminous to some substantial degree with water quality impact areas. In most cases floodplain regulations will amount to a shoreline or streambank setback and consequently will have considerable water quality benefits.

Where the spatial extent of the floodplain is small, the water quality benefits of such regulations will be smaller as well.

Furthermore, by protecting the 100-year floodplain, wetlands and other important habitat will also likely be protected, and these areas will also serve a buffering function for development and other polluting activities outside of the floodplain. As with setbacks, however, floodplain regulations do not generally regulate how these areas are to be managed. There are usually no restrictions on the destruction of vegetation, for example, which would serve to undermine the buffering and habitat functions of floodplains. Such regulations generally do not restrict the filling or degradation of wetlands (although other state and federal regulations do). The actual water quality impacts of floodplain restrictions will also depend on what other types of uses or activities are permitted in the flood zone. Floodplain management standards are usually oriented to minimizing property damage and exposure of people to flood risks and not protection of water quality. Such an ordinance may permit the location of septic drainfields, landfills or hazardous waste facilities, or recreation-oriented facilities (e.g., marinas and boat facilities) that may generate substantial water pollutants. Also, as already noted, agricultural uses may have considerable water quality impacts and a floodplain ordinance would do little to restrict these types of uses.

- Political Acceptability

Floodplain regulations have a low to moderate political acceptability, depending heavily upon the geographical extent of the 100-year regulatory floodplain. Prohibiting development in the floodplain where the floodplain is large and wide will tend to have a substantial devaluation effect on floodplain property. Entire parcels or holdings may lie in the floodplain. Floodplain regulations would in this case, amount to a serious downzoning, and would receive strong opposition from the local development and real estate community.

On the other hand, the floodplain restrictions may amount simply to a site planning issue where the quantity or magnitude of permissible development is not affected but rather it location on the site (e.g., requiring the developer to avoid certain portions of the site, to cluster development, etc.). Where this is the case (usually where the floodplain is narrow or relatively small in size), the political acceptability of floodplain regulations will tend to be greater.

Floodplain regulations could, of course, be combined with other management measures to enhance its political acceptability. For instance, the public could acquire fee-simple or less-than-fee-simple rights to all or some portion of a private parcel where the floodplain consumed a large portion of that parcel. Landowners severely affected by floodplain restrictions could, as another example, be permitted to transfer a certain amount of development density onto other sites in the locality. (See the discussion of Transfer of Development Rights in Section D-4.)

- Administrative Cost and Complexity

Floodplain regulations rank relatively low in terms of administrative cost and complexity. The costs of developing and implementing floodplain regulations will be minimal. Assuming the 100-floodplain is selected as the regulatory zone, these areas have been clearly and precisely mapped under the NFIP (and depicted on flood insurance rate maps). Such regulations would essentially be amendments or modifications to the existing local zoning and subdivision regulations and would not require any new or special land use controls to implement the provisions. Indeed most localities with any degree of flood hazard are already participating in the National Flood Insurance Program and thus have already adopted some form of floodplain restrictions. The kinds of restrictions discussed here would simply extend and make more stringent these regulations.

The concept of restricting the location of development in floodplains is not complex and will be readily understood by citizens, public officials, and developers. Moreover, because these are risky and hazardous places to build in the first place the idea of placing restrictions in these areas has considerable appeal to common sense.

- Ease of Enforcement

Floodplain regulations rank relatively high in terms of ease of enforcement. Again, the restrictions would be imposed as part of the local zoning ordinance and no special enforcement activities or resources would be necessary. As with setbacks, compliance with floodplain regulations will be relatively easy to monitor. It will be possible to discern the physical results of complying or failing to comply with the regulations (i.e., easy to determine whether buildings have been constructed in the floodplain.

For these same reasons the ability of an outside agency to determine compliance will be relatively high. Ability to gauge compliance may be somewhat more difficult where the local hydrogeologic conditions result in peculiar floodplain boundaries, not intuitively obvious without careful reference to floodplain maps.

C. Land Acquisition

C-1. Conservation Easements and Development Rights Purchase. An increasingly common approach to land and resource conservation is the purchase of less-than-fee simple interests in land. Typically these programs involve a state or local plan to acquire the "development rights" to land, allowing the landowner to retain underlying ownership and use rights. While the Purchase of Development Rights or "PDR" has not yet been used as a conservation tool in Virginia, numerous landowners have donated scenic or conservation easements which entail similar restrictions on future development. (Usually these have been donated in exchange for tax benefits (e.g., the landowner receives a federal and state tax deduction).

Less-than-fee simple acquisition programs have a number of advantages. Because the entire rights are not being purchased, the per acre cost is usually lower than fee-simple acquisition (although in rapidly urbanizing areas the development value of land may comprise a very large proportion of the entire value of the parcel). Furthermore, maintaining the underlying ownership of the land in private hands keeps the property on the local tax rolls and reduces the management and maintenance costs to the public. (See Coughlin and Plaut, 1978 for a good overview of less-than-fee simple acquisition; see also Beatley, Brower, and Brower, 1988).

- Technical Effectiveness

The technical effectiveness of conservation easements and PDR programs is high. Acquisition of easements and development rights can accomplish water quality objectives in several ways. The conventional approach is to purchase the right to build, usually in perpetuity, in particularly important resource areas. Acquisition of development rights in shoreline, stream bank, wetland and other sensitive water quality areas could do much to reduce urban runoff, loss of vegetation and natural areas, sewage leachate, and so on. Certainty here is relatively high. However, the water quality benefits will depend on the precise nature of the remaining rights (i.e., the rights retained by the fee-simple landowner). If the underlying rights permit the destruction of vegetation, and the

and the undertaking of extensive agricultural operations in close proximity to such areas, the water quality impacts may be just as severe, if not more severe.

Perhaps the most effective PDR program is one which purchases rights to development, but also the rights to certain other water quality - damaging practices, including high or normal tillage farming, and by activities which involve the destruction or loss of natural vegetation. Here the federal government's relatively new Cropland Reserve Program, which provides for the purchase of 10-year easements for highly erodible farmlands, offers perhaps a good model to emulate. As already mentioned, some states, such as Minnesota("Reinvest in Minnesota Program") have developed their own similar programs (e.g., see Institute for Environmental Negotiation, 1988a).

- Political Acceptability

Political acceptability of a local PDR program should be moderate to high. There will be some who view government involvement in such an activity as inappropriate, but for the most part local support by most elements in the community will be positive. Landowners and the development community will view a PDR approach as more equitable than a regulatory action which might accomplish the same end. Landowners receive fair market compensation under a PDR program and consequently will be less vocal in opposition. Whether or not an easement/development rights purchase program is voluntary or whether a locality uses its powers of eminent domain may have some bearing on political and public acceptability. While many landowners will see the financial and other benefits of selling development rights, some, including landowners holding land for speculative purposes, will object to the use of eminent domain. In many conservative localities any attempt to acquire development rights involuntarily will be politically difficult

The question of expense is also relevant here. Land acquisition programs, including less-than-fee simple acquisition, can be tremendously expensive. Typically they require the floating of bonds and referenda for such purposes meet with considerable opposition even in progressive-minded places (e.g., King County, Washington; see Beatley, Brower and Brower, 1988).. A recent public survey of local attitudes towards the use of PDR to protect farmland, for example, showed heavy support, but this support was substantially lower when respondents were asked whether they would be willing to pay for such programs (e.g., Furuseth, 1987). Thus, while the concept of acquiring development rights at a micro or site level may be publicly and politically acceptable, acceptability of an expensive program and plan for funding such

acquisitions (over a considerable period of time and in a systematic way) is more questionable. There are, of course, other avenues for funding such acquisitions, some of which may be more politically palatable. (For instance, communities are increasingly using land transfer taxes, which raise large amounts of money by extracting a small percentage of the sale price of land and property -- a tax which is perceived to fall heavily on the rich speculator and thus may be politically popular.)

- Administrative Cost and Complexity

A PDR program rates relatively high in terms of administrative cost and complexity. A program in which a local or state agency simply accepts donated easements from interested property owners will not be very difficult to administer or implement. However, the development and implementation of a purchase of development rights program, as described here, will involve substantial costs and will be difficult to administer. The nature of these costs are several. First, any successful PDR program requires the careful preparation of a systematic plan of action, which among other things identifies the location and amount of acreage to be targeted for acquisition, the ultimate acreage desired, and the likely cost of the program.

Such a program must also establish a framework and system for soliciting, negotiating and securing rights, including preparation of legal agreements to be used in completing the transaction (although some standardized agreements are available for use). Typically major activity is lining up the necessary funding sources (for instance, the preparation of a bond package and the development of a financial plan). Finally, once the program has been prepared and adopted, the process for actually buying rights is itself costly and time consuming, clearly requiring additional personnel, frequently for a considerable period of time.

Public understanding about easements and PDR will be mixed, depending upon that portion of the public consulted. While many citizens, developers, landowners, and public officials may have little familiarity with PDR programs, many will have direct experience with or understanding about easements, typically scenic easements. Easements are a standard tool in American property law and have been used for many years to accomplish private sector objectives. Moreover, the concept of an easement (without delving into the more complicated aspects, such as distinctions between negative and positive easements, and easements in gross versus appurtenant easements) is relatively simple and easy to understand.

- Ease of Enforcement

Ease of enforcement is moderate. Several enforcement and implementation problems are confronted at the local level. Initially there is the problem of securing easements or development rights from a sufficient number of property owners, with sufficient acreage, and in desired locations to make the program successful. It is difficult to know in advance what the level of participation will be (that is, if eminent domain powers are not to be used). This is largely beyond control, although higher prices and other incentives can be offered to make the voluntary sale of development rights more attractive.

Once easements or development rights are secured by the public, major enforcement responsibilities arise. Enforcement problems appear to become more serious over time as landowners either forget or disregard easement restrictions, or the land changes hands with new owners less familiar with easement restrictions (if they are aware that they exist at all). Serious enforcement problems have been documented in past federal and state efforts at buying scenic easements (see Coughlin and Plaut, 1978). These experiences suggest that if a locality embarks on a PDR program, then a serious effort should be made to thoroughly educate landowners about the land use restrictions, as well as make some effort to inform new purchasers of restricted land. Enforcement must also involve a process or method for detecting easement violations, especially any major building or modification of the natural environment. A long term monitoring program (e.g., using spot site visits, aerial photographs, etc.) should developed, as well as a systematic approach to keeping track of where easements are geographically located, as well as the specific requirements of each of these easements.

During the program up-start and development rights purchasing phases it will be relatively easy for an outside agency to assess implementation. Summary data will tell much of the picture (e.g., development rights purchased for "x" number of acres, contracts pending for "x" additional acres). Once the program moves from acquisition to an enforcement phase, ability to evaluate implementation becomes more difficult. An outside agency or party confronts the same problems faced by the locality in enforcement. Similar techniques (e.g., use of aerial photographs, etc.) could also be used. However, unlike a uniform shoreline setback or downzoning it will probably not be as apparent when violations have happened (i.e., when certain physical changes occur, such as the construction of a home in a critical shoreline zone, it will be difficult to detect which properties have sold development rights and which have not). This fact suggests perhaps that localities give some priority in the acquisition process to securing

developing rights in relatively contiguous blocks so that detection of easement violations would be easier.

The success of such a program will ultimately depend on how valid the assumptions behind the acquisition plans are. Are the rights to be secured of the right type, in the right quantity and in the right location to make a significant impact on water quality? This is difficult to assess with any great deal of certainty, although an outside agency could make tentative conclusions based on the acquisition plan and program formulated.

C-2. Fee-simple Acquisition

One strategy to protecting water quality is the fee-simple acquisition (that is, acquisition of the entire bundle of rights) of certain critical water quality areas, particularly shorefront, stream bank, and wetland areas where development could result in serious nonpoint pollution. (For a discussion of the use of fee-simple acquisition to secure environmentally-sensitive land, see Owens, 1983. Fee-simple acquisition has been used in a variety of states and localities to protect open space and environmentally sensitive areas. (See Beatley, Brower and Brower, 1988.)

- Technical Effectiveness

The technical effectiveness of fee simple acquisition is high. Land acquisition has a relatively high certainty of protecting water quality, although this certainly depends on the amount and location of land purchased. Fee-simple acquisition has the advantage of providing the public with a greater level of control over the use of these lands, with most ideally set aside for natural areas, undisturbed by any development or alteration. Land acquisition can prevent all forms of development in a sensitive location, while land use regulations such as zoning and subdivision ordinances must generally provide some level of private economic use.

- Political Acceptability

The political acceptability of land acquisition is relatively low. Fee-simple acquisition, particularly for the purposes of protecting water quality, is likely to confront several major problems of public and political acceptability. First, there are many who believe that government does not have a legitimate role in intervening in the private land market for this type of activity. Aside from occasionally taking small amounts of land for

specific public sector needs (e.g., the need for a new school or park), many believe government should not be in the landownership business. The development community will also likely resent the competition and encroachment onto what has historically been a private sector area. Another, and perhaps more serious impediment is the fact that fee-simple acquisition will usually require a tremendous financial commitment. This is especially the case where high-priced coastal and waterfront properties are to be purchased. A systematic, comprehensive public program to secure sensitive lands will often involve exorbitant costs; resources that would normally far exceed the limited capacities of most coastal local governments. This is particularly the case in less-populated, rural areas.

In most successful fee-simple land acquisition programs special revenues are typically collected through some additional means and outside of normal local property taxes (e.g., though a special sales tax or land transfer tax). Localities must often float bonds (frequently requiring a community-wide referendum) to obtain enough money in the short term to make necessary acquisitions. Each approach to financing fee-simple holds implications for political acceptability. A program funded through a land transfer tax (because it skims off a small percentage of a speculative land value) will tend to be more politically-feasible than a program funded through sharp rises in the local property tax.

- Administrative Cost and Complexity

The administrative cost and complexity of fee-simple land acquisition program will tend to be very high. Fee-simple acquisition of natural areas will involve tremendous public expense and tremendous additional administrative efforts. Any reasonably systematic effort to secure natural areas will entail considerable direct public expense in the form of purchase prices (particularly so in waterfront and coastal areas experiencing recent and second home growth pressures), as well as substantial secondary expenses involved in organizing and implementing such a program. Administrative tasks include the preparation and implementation of a financing plan (e.g., a bond package, or preparation of a land transfer tax), the identification of lands eligible or targeted for acquisition, development of a set of procedures and legal instruments for acquiring lands, and a plan or program for managing these public lands once they are acquired. In some localities entire new departments or divisions have been formed to handle these additional administrative responsibilities.

Land acquisition is not complex or difficult to understand. Indeed, public agencies have used land acquisition to accomplish a variety of public goals and objectives, from the need to construct highways to the provision of public services/utilities. While the public may find the idea of extensive intervention to protect natural areas foreign and somewhat unacceptable, few will have difficult understanding the concept. Public understanding may be reduced where the local program incorporates unique or complex arrangements for funding the acquisitions, for identifying appropriate lands, or for managing lands that have been acquired.

- Ease of Enforcement

Ease of enforcement is moderate. Since acquisition involves the full level of public control over natural areas, local enforcement in the usual regulatory sense becomes irrelevant. There is little concern, as there is with setback restrictions or stormwater standards, that private landowners and developers will adhere to regulatory requirements. Several implementation issues become important, however. One involves how these lands will be used. Once such lands are acquired by the public, there may be pressures to open them up for public use. Many of these uses (e.g., extensive boating and marina use) may be as damaging or more damaging from the point of view of water quality than private development would have been. The preparation of a clear management plan, and the attaining of consensus about the purposes of acquisition, tends to reduce these problems. Regardless of what uses these lands are to be put to, the locality will still be confronted with the need for some degree of control and management (e.g., fire control, controlling off-road vehicles, etc.).

A broader question of enforcement or implementation has to do with the long term disposition of these acquired natural areas. How assured can we be that these lands will remain in a natural and undeveloped state? Is it not possible that a future local governing body less supportive of the acquisition concept would seek to sell or otherwise dispose of these lands. Such changes in political circumstances could seriously jeopardize the long term protection of water quality. Such implementation worries could be addressed through the placement of development easements on the land (perhaps held by third-party groups such as the Nature Conservancy) or through the creation of special public or quasi-public entities (e.g., such as the Nantucket, Massachusetts, Land Bank; see Phillips, 1985) whose control of acquired land would be insulated from local political decisions. It is not uncommon, for example, for a locality to create an Open Space Board of Trustees (e.g., such as exists in Boulder, Colorado), with

authority over acquired open space and natural lands. (See Beatley, Brower and Brower, 1988.)

Evaluation by an outside agency of the progress and results of fee-simple acquisition programs will be relatively easy. A periodic review of the amount of acreage obtained, and its location relative to sensitive natural systems (e.g., how much of it is shoreline, stream bank, floodplain, wildlife habitat, etc.) will tell much of the story. Evaluation of the acquisition plan will also yield important information, for instance the extent to which the locality has been able to secure high priority lands.

Once lands in the system have been acquired, an outside agency or group will be able to follow the status and disposition of these lands with little difficulty. The management of fee-simple lands may be more difficult to evaluate over time, yet periodic field visits and windshield surveys will provide basic information about how these lands are being used and managed.

D. Conservation Incentives and Public Investment Policies

D. 1. Capital Improvements Programs (CIP). Decisions about capital facilities and other public investments, including roads, sewage disposal and water distribution systems, can have substantial impacts on the location and timing or urban growth and development. Many of these decisions find expression in the local Capital Improvements Program (CIP) which identifies specific improvements, their priority and timing, and how they will be financed. (For a more detailed discussion of the CIP, see Brower, et al, 1984; Deutsch, 1978; Getzels and Thurow, 1980.) Typically a CIP will plan and program capital expenditures for a seven year period into the future, and is usually revised on a yearly basis. The CIP is one major (and common) tool among others available at the local level for achieving planning and growth management objectives through careful public investments decisionmaking. The evaluation which follows below addresses the general strategy of community planning for such public facilities.

- Technical Effectiveness

The technical effectiveness of such capital facility strategies is relatively low. However, to the extent that capital facility decisions can influence the location, type and pace of urban growth, they can influence water quality impacts. Funelling public road improvements and extensions away from sensitive shoreline areas, for example, might significantly reduce demand for development in these areas. This might in turn reduce

the extent of urban runoff and water quality degradation. In much the same way that urban growth boundaries are intended to promote infill and more compact and contiguous development patterns so also could capital facilities decisions. As already discussed, more compact development and growth patterns will provide opportunities to efficiently handle the pollutants and other negative side effects of growth (e.g., may permit economical public sewage treatment, stormwater drainage and retention systems, and so on).

While such capital facility decisions could influence growth patterns, which could in turn enhance and protect water quality, the certainty that this will happen is relatively low. Even where growth is funneled into development nodes or more efficient urban centers, the option to build along the shorefront or in other sensitive areas, employing on-site sewage disposal, typically still remains. The availability of capital facilities can act as an incentive, but there are few assurances that growth will indeed occur in these areas.

Moreover, even a carefully crafted CIP which places great importance on directing growth away from sensitive water quality areas can be circumvented in the political process. There is little assurance that the program will be implemented as planned, as political and economic conditions change.

It should, of course, also be obvious that numerous specific capital facilities and investments could substantially improve water quality in certain circumstances. For example, the installation of a public sewage collection and treatment system in an area were septic tanks are failing would do much to enhance water quality. Separation of a city's stormwater collection and sewage collection systems, as a further example, might significantly reduce treatment plant overflows, in turn reducing the water quality impacts of growth and development.

- <u>Political Acceptability</u>

The political acceptability of CIPs and capital facilities is high. The use of the CIP as a decisionmaking tool (and any tool which guides or directs local public investments) is relatively uncontroversial. It has a conventional planning technique both within and outside Virginia. However, as already mentioned, the specific content of CIP's can change from year to year, and specific projects or improvements can be the focus of heated political controversy and debate. Thus the tool itself, and the practice of capital facilities programming, is of relatively high public and political acceptability. The

precise content of the CIP may or may not meet with political acceptability depending on who will be benefitted or harmed, and their relative power and standing in the community.

CIP's and similar efforts are likely to meet with considerable support from the development community because of the added certainty such a document can provide concerning the availability of public services in the future. While individual developers and landowners may be disgruntled about the content of a CIP, most will welcome efforts to carefully plan for and fund essential public services and facilities.

- Administrative Cost and Complexity

Most localities employ a CIP or something like it. In this sense the administrative costs and energies of adjusting and modifying the existing CIP to explicitly consider water quality impacts will tend to be small. Most localities are already going through such a planning process and no great "start-up" or initiation costs would appear to exist. The normal process of updating on a yearly basis the CIP (and the various information gathering procedures, such as soliciting advice and recommendations from various local agencies and departments) is a relatively limited commitment of time and administrative resources, and again is likely to occur (and usually does) anyway for other, non-water quality related purposes.

Public understanding of the CIP is likely to be relatively high. The CIP is a conventional land use and community planning tool used for many years around the country. Moreover, its premise is not radical or unique -- it makes perfect sense to carefully list desired projects and to identify a schedule and financial plan to bring them about. The concept is not complex, but rather is a natural extension of human/individual rationality.

- Ease of Enforcement

Ease of enforcement is moderate. Unlike a zoning restriction which places certain restrictions on private actions and activities, a CIP is intended to serve as a guide for future public decisions. A CIP is enforced or implemented to the extent that its content and recommendations are effectuated. Does the top item on the CIP get funded and built first? Or, do political and other factors intervene to prevent this from occurring? Is the CIP merely a wish list, unrealistic in scope and of relatively little utility

in yearly budgetary and financial decisions? Do projects garner political and public support, and get built, which are not even in the CIP?

The extent of such enforcement or implementation will tend to vary from place to place according to the local commitment given to such a document. In some communities the CIP will have a history of strong use, while in others it will amount to little more than an advisory document. It is difficult in light of these local variations to conclude that "enforceability" is either very difficult or very easy.

A common local difficulty is keeping up with what the CIP specifies or requires. A community may have the best of intentions but for various reasons finds it difficult to expend the necessary money and to make the improvements which are indicated for that year in the CIP. Backlogs can and often occur, thus substantially reducing the planning benefits derived from such a tool.

For an outside agency or group interested in evaluating the implementation of a CIP or similar tool this is a relatively easy task. It is simply a matter of comparing the listed facility recommendations contained in the CIP (as updated yearly) with the improvements the locality actually makes. From this it would be relatively easy both to identify specific water quality related projects that did not get funded, as well as patterns of public facilities decisionmaking and investments. If a locality has generally disregarded the logic and content of its CIP, this will be largely evident through such an analysis.

D.2 Agricultural and Forestal Districts

Agricultural and forestal districts can be enacted by ordinance at the local level in Virginia at the request of petitioning landowners. These districts must comprise a certain minimum acreage (usually 500 acres with a contiguous outer boundary) and once enacted provide certain protections to farmers and landowners from urban development. More specifically, the formation of agricultural or forestal districts provides the following benefits: 1) use-value taxation (whether or not a local use-value ordinance has been adopted); 2) restrictions to the use of eminent domain; 3) restrictions to the allocation of public monies for public projects within districts; 4) restrictions to local "nuisance" ordinances which unreasonably regulate normal farming practices; 5) restrictions on the taxing ability of public service districts; and 6) requirements that adjacent land use decisions be consistent with the agricultural and forestal district. This tool has been widely used around Virginia with some jurisdictions having a large percentage of their

rural land contained within them. Districts are formed for periods of five to eight years. At the end of this period a locality can renew the district as is, modify the district in some way, or dissolve it.

- Technical Effectiveness

The technical effectiveness of agricultural and forestal districts is low. While the formation of agricultural and forestal districts undoubtedly has many desirable effects, it rates low in its ability to protect water quality. First, agricultural and forestal districts are completely voluntary and no one is forced to join who is not willing to sign the necessary petition. The agricultural and forestal district provisions, moreover, do not require a solid district, but rather permit a "swiss cheese effect" (i.e., a district can encompass numerous non-participating properties). It is unlikely, as well, that much incentive will exist on the parts of landowners to form districts in shoreline and other coastal areas where the speculative values and development potentials are very high.

In addition, it is not clear that agricultural and forestal districts present any obstacles whatsoever to building and development, even if they are formed in strategically located coastal sites. While there are some provisions which reduce pressures to develop, typically the underlying local zoning is not affected and the district will not present a serious obstacle to subdividing or developing land. And, again, those landowners and farmers intending to develop in the near future would not be inclined to join a district in the first place.

It should also be noted that protecting and promoting farming and agricultural operations near sensitive surface waters may do more harm than good unless certain agricultural best management practices are required. Such basic requirements could include contour and low-till farming, and the setting-aside of vegetated buffers and shoreline filter-strips. Thus, in many instances not only is there little certainty that agricultural and forestal districts will prevent water quality degradation there is some reason to believe that the promotion and enhancement of agricultural activities in these coastal areas may lead to a direct decline in water quality.

- Political Acceptability

The political acceptability of agricultural and forestal districts will tend to be very high. The need to protect farmland and rural open space is an objective embraced by many including the public at-large. Furthermore, the agricultural and forestal district

mechanism is a relatively painless way to address this need. It is politically acceptable because it does not force any landowners to join who do not want to join, and it does not visibly cost taxpayers anything (use value assessment does, of course, result in a tax shift, but this effect is relatively hidden; see Section D-3 on use-value assessment).

Some disagreements have arisen when proposed districts have encircled landowners, who see the restrictions as impeding in some way their ability to develop (e.g., by preventing extension of public services). However, in most cases the district provisions would not prevent development (at least at typical rural densities). And, in many cases the location within an agricultural and forestal district is a plus from a marketing and sales position.

In some jurisdictions the formation of a district must also be accompanied by changes in zoning and subdivision regulations which restrict development throughout the district (i.e., a downzoning). Public and political acceptability will tend to be lower in these instances.

- Administrative Cost and Complexity

The administrative cost and complexity of agricultural and forstal districts are low. The need to review proposed districts and to prepare and enact an ordinance for each district will create some additional administrative burden; but the extent of this burden is likely to be small. While planning staff will likely be required to devote some time to district matters, much of the responsibility associated with reviewing the merits of proposals falls to special agricultural and forestal district committees, appointed by the local governing body. This group provides advice, for instance, on the quality and productivity of the farmland to be included in a proposed district. Some planning staff time is also taken up in conducting informational meetings, explaining to farming groups what agricultural and forestal districts do and do not mean in terms of the long-term developability of their land, and so on. Time will also be taken up as each district comes up for renewal. The administrative difficulties will be somewhat greater where a locality attempts to adjust zoning and permissible densities in or around proposed districts.

Public understanding of agricultural and forestal districts is mixed. This technique has been extensively used throughout the state for a number of years and has received substantial publicity. For this reason public understanding may be high in many areas, particularly in rural farming areas where substantial acreage is contained in districts.

At a more conceptual level, the concept can be somewhat confusing, and its full extent of protective benefits fairly complex. There have been numerous points of confusion and conflict over what district enactment did and did not mean. Some have believed that such a district is essentially a zoning district, implying additional land use restrictions. Many have been confused about the actual benefits and protective features (the notice of intent requirement that state agencies must go through in case of eminent domain and expenditures of funds is confusing to many, for example).

- Ease of Enforcement

Ease of enforcement is relatively high. In most cases agricultural and forestal districts involve relatively little to enforce. (Enforcement issues for use-value taxation are the same as those described in Section D-3.) Much of the responsibility for enforcement and implementation falls on state agencies that must conduct notice of intent procedures where use of eminent domain or allocation of development monies within districts is to occur. As well, because districts are formed through citizen and farmer interest and activism, these groups also serve an important monitoring and enforcement role. Even where a land use decision (e.g., a rezoning) is not explicitly prohibited under agricultural and forestal district provisions, these groups are typically quite active in arguing that the objectives of the district would be jeopardized or undermined by such actions.

One enforcement/implementation issue which has arisen in some localities is the ease with which landowners can get out of districts. Generally this is relatively easy, requiring the submission of a petition to the local governing body. Localities concerned about protecting the integrity of these critical masses of farmland may wish to consider provisions which would make it more difficult

Evaluation of enforcement is relatively easy by an outside agency. Information on the location, size and composition of districts would be readily available, and this could easily be compared with the location of sensitive coastal areas to determine the extent to which the districts serve to moderate growth and development there. Even where districts are enacted in these sensitive areas, an analysis of building and land-disturbing activities will be necessary to determine the actual effects of the district. This could be assessed relatively easily by determining the number of building permits issued in coastal or sensitive-area districts. Again, it should be remembered that promoting farming and agricultural production in close proximity to sensitive rivers, streams and coastal waters

may have a negative impact on water quality (unless certain agricultural best management practices, such as vegetated, buffer or filter strips are employed; see Section B.2.).

D-3. Use-Value Assessment

Use-value assessment, or land use taxation as it is sometimes called, is a mechanism for providing preferential tax assessment as an incentive for maintaining open and underdeveloped uses. Instead of being assessed at its fair market value, such undeveloped limits are taxed at their productive value, for instance the value in agricultural and forestal production. These assessed values are typically much lower than fair market value, the latter usually reflecting very high speculative value especially near burgeoning metropolitan areas. In addition to land in agricultural and forestal uses, lands in open space and recreational uses also typically qualify for lower assessments (for a good national overview of use value programs, see Keene, et al, 1976). The central premise behind this approach to land conservation is that by lowering property taxes on these lands, pressures to convert them to developed uses will be lessened, serving as a strong land conservation incentive.

- Technical Effectiveness

The technical effectiveness of use-value assessment is low. The connection between use value-assessment and protection of water quality is not a very direct one relative to many of the other tools and strategies discussed here. In its ability to discourage the conversion of open space and rural lands to developed uses it may provide some protection to water resources. However, there are a number of serious reasons to question whether such a taxing tool will have much impact. First, in most localities the benefits are provided to eligible landowners on a jurisdiction-wide basis (some localities use it only in conjunction with agricultural and forestal districts and this application is described in section D-2) and consequently there is little ability to direct or funnel the benefits to those lands which have an impact on water quality. Use-value could also be criticized on the grounds that by supporting and subsidizing agriculture, water quality is damaged rather than protected, in that extensive agricultural operations in close proximity to water bodies may have much greater impacts than other forms of development.

At a more fundamental level, however, use value simply lacks the protective teeth of other measures such as density restrictions under zoning, or acquisition of easements or development rights. Use-value is merely an incentive, and studies of its effects on

land use suggest that it has relatively little influence on the land conversion process. Where development pressures are significant, and the profits to be made from selling and developing coastal land are high, use-value assessment offers little protection (see Keene, et al. 1976).

Recent changes in Virginia's use-value law do offer the potential for a more effective management program. Under 1988 amendments which expand the definition of eligible open space land, localities have potentially greater flexibility and control in providing use-value benefits. For open space to be eligible for use-value benefits it must either be located in an agricultural or forestal district, be covered under a perpetual protective easement, or be subject to a recorded agreement between the locality and the landowner that the land will not change uses for a minimum period of four years (and a maximum of ten). The latter provision offers localities greater control over participating land and an assurance that qualifying lands will remain in an open and undeveloped state for some minimum period of time. A Virginia locality could incorporate these greater teeth by restricting the provision of use-value only to qualifying open space uses. The new amendments also expand the amount of local land that would be eligible for use-value assessment providing Virginia localities the flexibility of providing benefits to shoreline or other sensitive areas that did not previously qualify.

On the other hand, use-value assessment is probably better conceived of as a supplemental tool which may minimize the financial sting of other more effective tools such as natural area downzonings. Use-value assessment can also be supported as a tool which promotes equity in property taxation. Farmers or owners of forestlands, it can be argued, ought not to have their property taxes based upon the potential development of the land, but rather on its current use. Farmers should not be penalized for pursuing in good faith their profession. Others have argued that, contrary to this position, every farmer is a potential developer and that no tax breaks should be given to them. A compromise used in most states is the deferred taxation version of use-value, which contains a rollback provisions requiring repayment of back taxes (usually for a period of five to ten years) if and when the land is converted to a developed area.

Depending upon the actual characteristics of the jurisdiction using the technique, the resulting tax reduction for farmers and other qualifying landowners may be very small. This is especially the case where there are many farms and qualifying lands and relatively little urban development onto which to shift the tax burden. What a farmer gains through a reduction of assessed value on his or her land, may be taken away through a higher tax rate applied to his or her home and other buildings not eligible for

reduced assessments. The maximum level of tax benefit is available to the farmer located in a county where there are few other qualifying farms.

- Political Acceptability

The political acceptability of use value assessment is high. Use-value assessment enjoys considerable public and political support and popularity, and relatively little opposition. Few groups oppose what to many is almost a patriotic issue -- helping the family farm stay in business. And, again, many are struck by the intuitive fairness of taxing farmers according to the current use of their land. Use-value also has the great political advantage of hidden costs. It requires no direct or obvious expenditure of public funds, and thus is usually supported by elected officials. Use-value can be very expensive, however, and can constitute a significant loss of local revenue. Moreover, the fact that these revenues must typically be compensated for by increasing the local tax rate, creates what is referred to as a "tax shift." This, again, is a relatively hidden phenomenon; one which does not result in any visible or vocal opposition.

Use-value is also often supported by development and landowner interests who view the tax as a tool for reducing the costs of holding speculative lands. Indeed, this is one of the strongest arguments against the use of such preferential taxation schemes. That is, it is very difficult to distinguish between the genuine farmer and the speculative landholder. The eligibility requirements that must be satisfied to receive use-value benefits are typically so basic that virtually any type of landowner can qualify (e.g., usually requires the pasturing of a small number of cattle, or the yearly mowing of fields, etc.).

- Administrative Cost and Complexity

The administrative costs and complexity of use-value assessment are relatively low. Use-value assessment is relatively easy to administer, usually though the jurisdiction's tax assessment office. Many of the more technical aspects of the program -- for instance, calculating appropriate use-value for different types of farmland in different regions -- are handled at the state level. Consequently, a local planning office would have little or no role in administering the program, and the costs to localities generally is relatively small. Periodic checking of lands to ensure that they are still qualified to receive reduced assessments is necessary and this may create a significant additional enforcement cost.

Public understanding of use-value assessment can be said to be relatively high. It has become a fairly conventional land use tool, in use in most states including Virginia for many years. The basic premise of the approach is easy to understand and intuitively appealing to the general public. As noted, the public tends not to comprehend the more complex aspects of the functioning of use-value assessment, such as the tax shift, but this does not seem to jeopardize public support or popularity for such programs. Use value is relatively easy to understand by most interested parties, including farmers and landowners, and the development community.

- Ease of Enforcement

Ease of enforcement is moderate. Use-value assessment raises several types of enforcement issues. First, do farms and other properties receiving the use-value benefits meet the necessary qualifying criteria (e.g., the minimum standards by which a commercial farming operation is typically defined)? This can be a difficult and time consuming process and one which would normally fall on the county or city tax assessors office. Second, when do changes in land use occur which would require the payment of back taxes? While still the responsibility of local tax assessment officials, local planning staff can play an important role in alerting tax officials to these changes (that is, presumably landowners/ developers must obtain permits and approvals under subdivision and zoning ordinances, building code, etc.). Few localities, however, are engaged in extensive policing activities, and to ensure full enforcement would be difficult and costly. Each year thousands of landowners receive benefits and to investigate and verify the validity of each claim would likely be prohibitively expensive.

On the other hand, from the perspective of legitimate farmers and qualifying landowners it is relatively easy for them to receive benefits and few difficulties in implementing the provisions of use-value assessment are apparent. Most qualifying farmers automatically receive lower assessments with few hitches or difficulties.

For an outside agency interested in independently reviewing enforcement and implementation of a use-value ordinance it would be quite difficult. The agency could, however, simply review the specific use-value ordinance in place, the procedures and policies used by the local tax assessor, and the information on actual farmers and landowners receiving the benefits. To independently certify that each landowner in fact meets state and local criteria, and has not converted land to non-qualifying uses, would be a herculean task. Verification samples could be undertaken but this would also be costly and difficult.

An even more difficult assignment would be to attempt to evaluate whether the use-value benefits in fact had any appreciable influence in slowing the conversion of rural and resource land. This would be a methodologically complex venture that would not likely result in any definitive answers. Unfortunately there are numerous other local and extra-local influences, many much more important in encouraging or discouraging development, and it would be difficult or impossible to adequately control for these influences. An outside agency could survey a selected number of landowners to collect general impressions concerning the impact of use-value but again it would be difficult to extract firm conclusions from such information.

D-4. Transfer of Development Rights (TDR)

The transfer of development rights or "TDR" is a concept that could be highly useful in protecting sensitive natural areas from damaging urban development. A direct extension of the clustering concept discussed earlier, TDR either permits or requires the transfer of density from one location where it is deemed undesirable, to other sites in the jurisdiction where it is considered more appropriate. Thus it involves the delineation of "sending zones," or areas where development is to be discouraged, and "receiving zones," where additional levels of growth and development will be accommodated. TDR programs are either voluntary or mandatory. Voluntary programs give landowners the option of transferring unused density should they wish to retain a portion or all of their land in an undeveloped state. Under a mandatory program the locality typically downzones property in sending zones leaving landowners with only the option of transferring or selling their development rights. (For more extensive discussions of the TDR concept, see Beatley, Brower and Brower, 1988; Pizor, 1986.)

- Technical Effectiveness

The technical effectivenes of TDR is moderate. TDR could be a highly effective program at reducing nonpoint sources of water pollution where it is used to set aside large amounts of land in shoreline, stream bank and other sensitive areas. The actual result will depend on the specific features of such a program, including the size and location of the sending zones, and the uses allowable following the transfer of development rights. The more extensive the sending zone, and the greater the extent to which sensitive areas are covered, the more certain will be the water quality benefits. The remaining underlying rights of use and development are also important. Some TDR programs, while severely downzoning sending areas, still permit some amount of limited

development. The greater such residual development rights are, the less effective the concept will be at protecting water quality.

A critical question is whether the TDR program is voluntary or mandatory. Mandatory programs -- that is, programs which leave landowners with few options but to sell or transfer their development rights -- will have a relatively high certainty of effectiveness, compared to voluntary programs. Voluntary programs may or may not result in reduced levels of development in sensitive sending zones, depending upon the plans and desires of the landowners. From the point of view of protecting water quality, mandatory programs are to be preferred.

- Political Acceptability

The political acceptability of TDR is moderate. TDR has a potentially strong political advantage over simple density reductions or downzonings. In theory at least it seeks to provide landowners with some significant return on their land. While the actual design of the TDR program, and local market conditions, will strongly influence the precise market value or return from the sale or transfer of TDR, some level of compensation is given to regulated landowners. TDR, then, has the potential of being much more politically acceptable than similar density reductions which do not provide such compensation. Acceptability will likely depend somewhat on the perceived impacts and functioning of such a system. Where landowners are skeptical that such a system will work, or skeptical that the level of return on development rights will be low, TDR will tend to be less acceptable.

Different groups in the community will tend to have different views about TDR. The development community while typically opposed to density - reductions, and regulations which restrict development in sensitive areas, may be more supportive of TDR. This will tend to be the case where they view the program as expanding development opportunities in other portions of the locality (i.e., in designated receiving zones). For other local groups such a prospect is cause for opposition. The TDR concept assures that just as areas will be downzoned, other areas will be "upzoned" (i.e., permitted densities will be allowed where development rights are acquired and applied to a project). Often this translates into high traffic, noise, loss of open space and amenities, and more dense living environments than residents had counted on. This has been a major problem and source of political conflict in a number of jurisdictions using TDR, and it may be argued that TDR provisions serve to undermine and disregard an otherwise carefully developed local comprehensive plan (see Tustian, 1983).

- Administrative Cost and Complexity

The adminsitrative costs and complexity of a TDR program will be high. For most localities TDR represents a new way of doing things and as such would involve substantial start-up and development costs. A number of technical questions must be answered, including: what will be the size and extent of both receiving and sending zones; which land uses will be affected by such a system (e.g., will it apply only to residential uses, or will the system encompass commercial and industrial activities as well); how will development credits be allocated to sending zone properties and how will they be translated into additional development in receiving zones; will the program be voluntary or mandatory; how will transfer or sales of rights be coordinated and will the local government take an active role in this process; how will the local government ensure that once development rights are transferred no subsequent building or development will be permitted at some point in the future (over and above whatever residential development rights are permitted under the ordinance); among many other questions. These are questions which will require some level of sophistication at the local level, particularly by local planning staff. Additional staff will likely be needed, at least during the start-up period, but probably also for long term coordination and monitoring of the program. Many of the technical development and start-up issues might be best addressed with the aid of an outside consultant, particularly one with experience in developing TDR systems in other jurisdictions.

While the Transfer of Development Rights is no longer a radical concept, it is not commonly used in most localities, and certainly not in Virginia. Experience has shown that the public has a relatively difficult time fully comprehending the concept and how it works in practice. Moreover, a TDR system must address a variety of technical and administrative questions (e.g., how will development rights be assigned, where will sending and receiving zones be located, and so on) and to the public TDR appears to be very complex. Understanding is also likely to be low among those individuals actually involved in the planning and land development process, including affected landowners, developers and the elected and appointed officials who must make local land use decisions. What this may suggest is a clear need to develop a public education element to the TDR program which would familiarize the public and key actors with the concept and how it works. It may be important to emphasize the fact that TDR represents a logical extension of more conventional land management such as clustering, and is now extensively used by localities around the country to accomplish a variety of planning objectives.

Also, the more aggressive the role played by the locality in implementing the system the more costly and difficult will be the task of administration. In some jurisdictions local TDR banks have been established which act as middlemen in development rights transactions. In these instances, the local government will actually broker rights; buying rights from landowners wishing to sell them and then selling these rights to developers interested in increasing density in designated receiving zones. This approach has the advantage of giving the locality greater control over the flow of development rights, and also greater control over the market value such rights bring (and thus ensuring that landowners selling rights receive a fairly equitable price). This approach contrasts with a more "hands-off" program in which the locality's role is restricted essentially to defining rules of the game, leaving the actual transaction of rights, and the resulting market prices of these rights, to the free market. The more aggressive local approach would obviously increase the costs and difficulty of administration, probably requiring the permanent addition of planning staff.

- Ease of Enforcement

Ease of enforcement is low to moderate. Under a mandatory TDR program, in which permissible development in designated sending zones is severely restricted, the enforceability is similar to that of normal density reductions (downzonings). It will be relatively easy to determine whether individuals have violated these restrictions and if building has occurred in protected sending zones. There are possibilities, however, for political circumvention. Just as any zoning restriction can be modified in the political process, land within TDR sending zones can over time be granted additional development rights or perhaps be excluded from the boundaries of the sending zone. In many TDR programs, a restrictive covenant must be entered into once development rights are sold or transferred. Such a covenant usually stipulates that further subdivision or development is prohibited and where such requirements exist political circumvention is less likely.

The ability of an outside agency to evaluate enforcement and implementation will depend to some degree on whether the program is mandatory or voluntary. Under a mandatory program the outside agency ought to be able to determine the location of sending zones (sensitive or important natural areas) and to assess the extent to which critical areas have been protected. (That is, prevented from being developed.) A voluntary program offers no such assurance that sending areas will remain in undeveloped uses, but rather gives the option of TDR to the conservation-minded

landowner. An outside evaluation of this system would be more difficult, requiring a careful analysis of all transfers in the community to determine the extent to which the TDR program actually made a difference.

The extent to which outside evaluation is possible is also a function of how active a role the locality plays in the transaction process. Where the locality acts as a broken or coordinator of transactions (e.g., it may at a minimum require the registering of sales, with sale price, etc.), considerably more information is available concerning the functioning of the system. Some sense of the average market value of development rights is usually available, for example. Such information can also determine the amount of land acreage which has been protected through TDR sales, where perhaps developers are holding these rights for use at a later time (clearly an important measure of success). An analysis of the physical environment would not usually tell the whole story. The presence of large tracts of undeveloped land could indicate either that rights had been sold and thus the land was protected, or that rights had not been sold and the landowner had not ruled out development at some future date. (This option could only occur, of course, under a voluntary program.)

IV. Summary

Virginia coastal localities have available to them a number of different land use management tools and techniques. This report has critically evaluated a selective set of these techniques against four evaluative standards: 1) technical effectiveness at reducing nonpoint water pollutants; 2) political acceptability; 3) administrative cost and complexity; and 4) ease of enforcement. Each management technique has been rated on a high-moderate-low continuum for each of these criteria and the results are presented in Table 1 (presented on the following page).

Readers should exercise care in using and interpreting this table. While a high rating is considered positive for the criteria of technical effectiveness, political acceptability and ease of enforcement, high is a negative rating in the case of administrative cost and complexity. It should also be remembered that a number of specific local factors will influence the actual functioning of these techniques, as well as the content and formulation of techniques. These are explained more fully in the text of the report. The evaluative ratings presented in Table 1 are intended to represent the general tendencies of these different management tools and techniques. In addition, no attempt was made to assess the merits of packages or combinations of techniques. Localities may often find, however, that the most desirable management strategies are combinations of individual tools and techniques.

Table 1 - **SUMMARY COMPARISON OF MANAGEMENT TECHNIQUES**

Rating: High, Moderate, Low	**Technical Effectiveness**	**Political Acceptability**	**Administrative* Cost & Complexity**	**Ease of Enforcement**
A. Intensity & Use Restrictions				
1. density limitations	high	low/moderate	low	high
2. land use classification system	moderate	moderate	high	moderate
3. urban growth boundaries/areas	moderate	moderate	high	moderate/high
4. resource overlay zones	moderate	high	low	high
5. clustering	moderate/high	high	low	high
6. density bonuses	low	high	low	moderate
7. sliding scale density systems	moderate/high	moderate	moderate/high	low/moderate
B. Performance Approaches				
1. stormwater runoff standards	high	high	moderate	low/moderate
2. setbacks and buffers	high	high	low	high
3. erosion/sedimentation controls	high	high	moderate	low/moderate
4. floodplain restrictions	moderate/high	low/moderate	low	high
C. Land Acquisition				
1. conservation easements/PDR	high	moderate/high	high	moderate
2. fee-simple acquisition	high	low	high	moderate
D. Conservation Incentives & Public Investment Policies				
1. Capital Improvements Program	low	high	low/moderate	moderate
2. ag. and forestal districts	low	high	low	high
3. use-value assessment	low	high	low	moderate
4. transfer of development rights (TDR)	moderate	moderate	high	moderate

* While a high rating for the other categories is considered a positive, high is considered a negative rating as far as cost and complexity are concerned. The casual reader should note this difference.

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