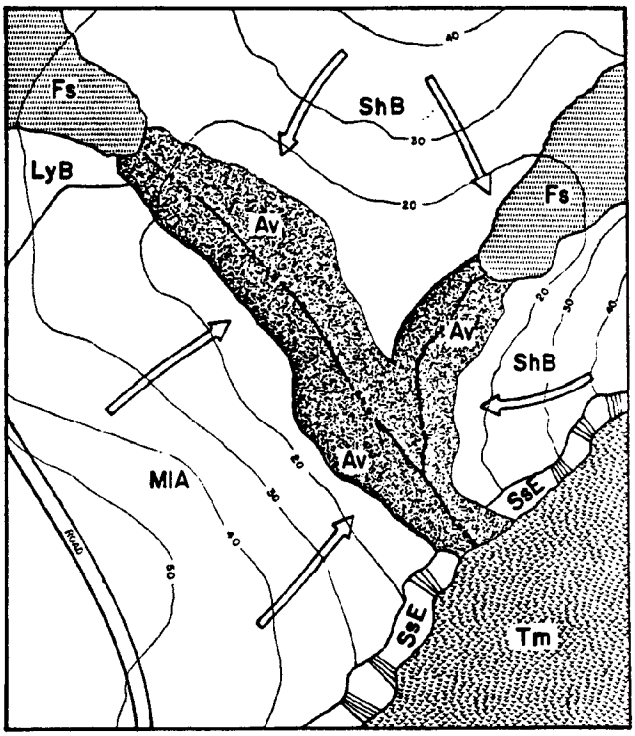


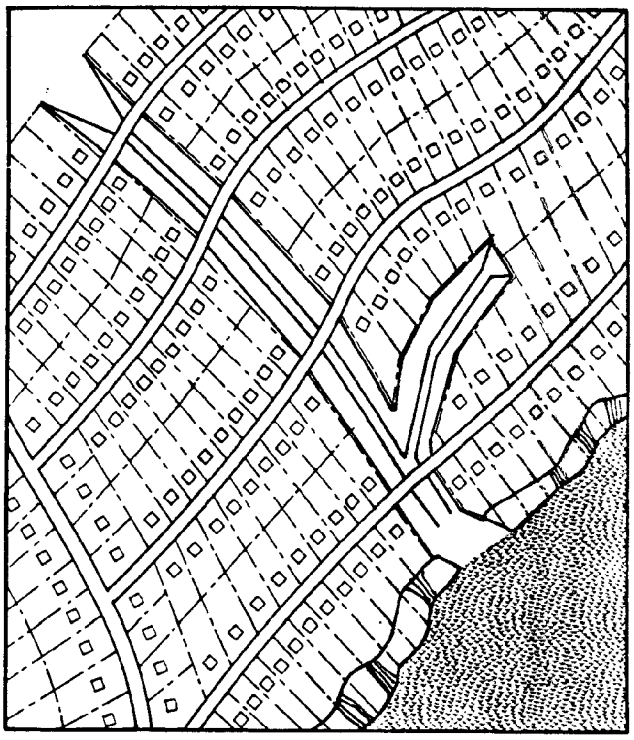

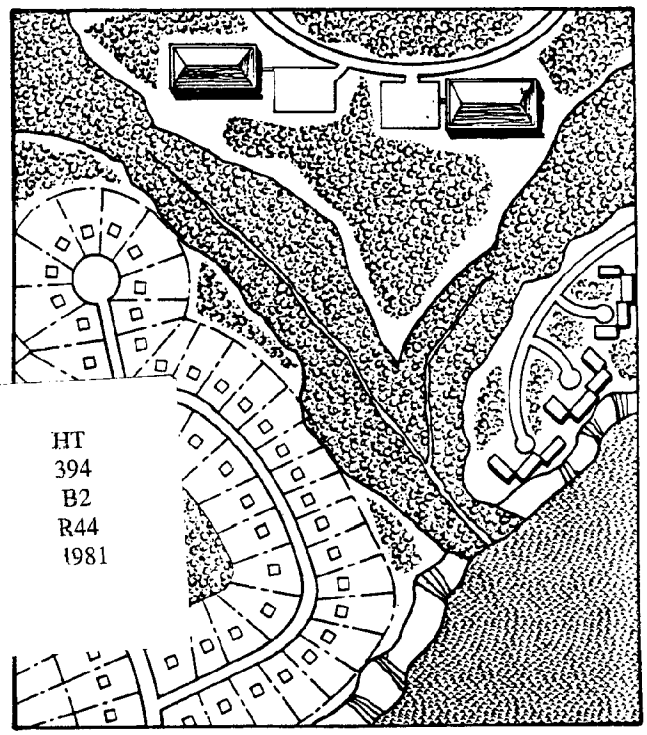



# RECOMMENDED INITIATIVES BY LOCAL GOVERNMENTS IN THE BALTIMORE METROPOLITAN TO ASSURE THE ENVIRONMENTAL INTEGRITY AND FULL DEVELOPMENT POTENTIAL OF COASTAL AREAS

PREPARED BY COASTAL ZONE
METROPOLITAN ADVISORY BOARD

APRIL, 1981

# RECOMMENDED INITIATIVES BY LOCAL GOVERMENTS IN THE BALTIMORE METROPOLITAN AREA TO ASSURE THE ENVIRONMENTAL INTEGRITY AND FULL DEVELOPMENT POTENTIAL OF COASTAL AREAS

Prepared By:

Sensitive Areas Sub-Committee of the Coastal Zone Metropolitan Advisory Board. (An advisory committee of the Regional Planning Council)

April 1981

The preparation of this report was in part supported by a grant from the Maryland Coastal Zone Management Program (Tidewater Administration), funds provided by the Office of Coastal Zone Management.

## ABSTRACT

Recognizing that actions by local governments are necessary to resolve the land use and environmental problems in coastal areas, this report offers a format for local action. It begins by describing the nature and interrelationships of the natural environment and coastal areas. The report proceeds to present in some detail a "new approach" in determining optimum land use based on soil information. The report concludes by reviewing on a subject-by-subject basis current regulations, suggested policies, and additional regulations by which local governments can deal with the various land use and related problems.

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CHAPTER I

# INTRODUCTION

## Background

The coastal areas of the nation have experienced the greatest degree of concentrated growth of any area within the country. This is particularly significant since the coastal zone contains sensitive environmental resources and valuable economic and recreational resources. Coastal areas as a whole have the potential to accommodate additional growth and development. However, it is important that future development consider factors that were ignored or not adequately considered in the past. These factors include natural resource protection, additional public health and general welfare considerations, protection of sensitive environmental areas, reservation of land particularly suited for water-related development, and the maintenance of recreational opportunities and aesthetic qualities. By including these considerations in land-use planning decisions, both existing and future development will be enhanced. It makes economic sense to proceed with a balanced planning program, one which accommodates development within a framework, minimizing the loss or degradation of existing natural and man-made features.

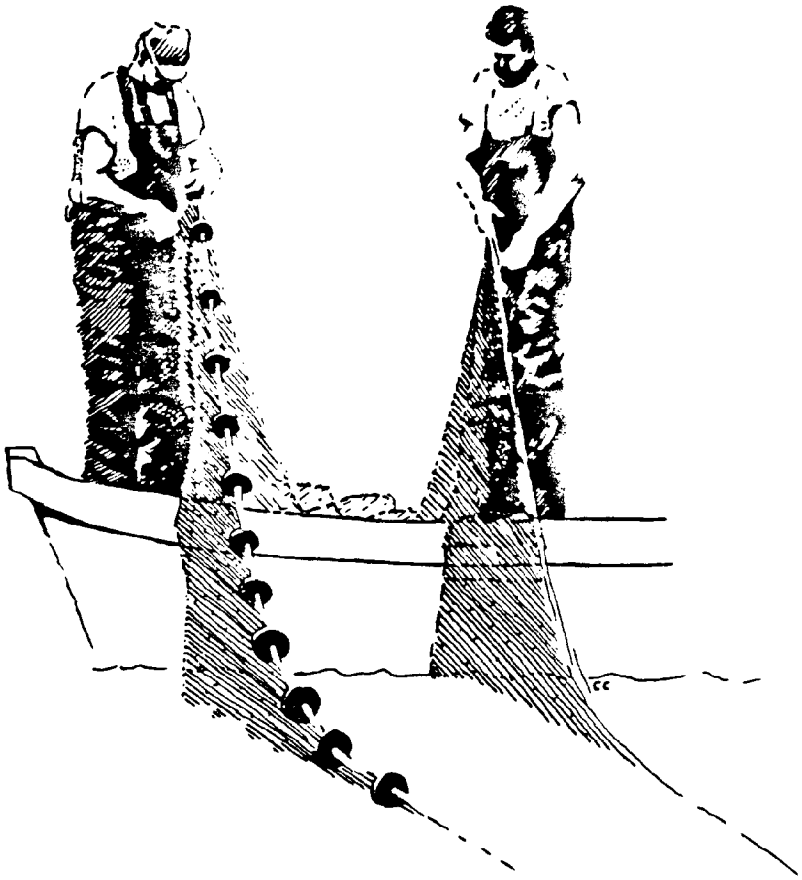
## Objectives

The State of Maryland's Coastal Zone Program, the Baltimore Metropolitan Coastal Area Study, the Chesapeake Bay Program, the 208 Water Quality Program, and other studies have provided much needed technical information which makes it possible to adequately identify problems and offer solutions. This study is consistent with these various programs and studies and offers the means to carry these programs forward.

The specific objectives of this study are to:

1. Provide local coastal counties in Maryland with a comprehensive understanding of the major coastal-related problems which they all experience to some degree.
2. Develop a rational, simplified technique utilizing soil data to address the various problems which can be comprehensively incorporated within existing regulations.
3. Describe current actions being taken to address these problems.
4. Suggest policies to be followed in dealing with these problems.
5. Specify the appropriate local government regulations or techniques which can be tailored to deal with these coastal-related problems.

This study does not provide model regulations nor specific regulatory language. Rather, it provides the basis for these regulations. Any interested coastal jurisdiction should be able to incorporate into local provisions the policies, techniques and other suggestions provided in this report.



# CHAPTER II

# THE NEED TO PROTECT SENSITIVE AREAS

CHAPTER II

## THE NEED TO COMPREHENSIVELY ADDRESS THE PROTECTION OF SENSITIVE AREAS AND THE EFFICIENT UTILIZATION OF DEVELOPABLE LAND.

The protection of sensitive environmental areas and the efficient utilization of developable land are two sides of the same issue. The wise use of resources requires that the natural systems which promote a healthy, stable environment be maintained to continue their functions adequately. At the same time, static resources such as sand and gravel, historical or archeological sites, agricultural land, and prime developable land must be identified and used conservatively. Both the basic elements of the natural systems and these static resources must be carefully managed for present and future needs. (For more detailed discussion of impacts of these systems and resources, see Appendix A.)

Both types of resources involve interactions which are often highly complex and, to some extent, unknown. Therefore, impacts on these resources and their causes are sometimes difficult to identify and quantify. However, some basic inter-relationships are understood and should be incorporated into management practices (e. g. development regulations).

Existing development regulations have evolved over time, often in response to specific public health, safety or direct economic welfare concerns of the human community. Now that the relationship of impacts on natural systems and the sources of these impacts are better understood, steps should be taken to incorporate the new knowledge comprehensively into existing regulations.

The difficulty of explaining the need for revised regulations to the general public is a reflection of the nature of the impacts. Impacts are most difficult to perceive when they are separated from the source by time or distance. The buffering capacity of the Chesapeake Bay and its tidal estuaries often hides impacts until they become severe. In

addition, naturally occurring fluctuations in size and distribution of many natural resources are generally unknown. Impacts on seemingly unimportant plants or animals can impair the productivity of a whole biological community. (A description of types of impacts is in Appendix A.)

Recognizing the complex nature of these resources, this report recommends a rational approach to comprehensively revising local development regulations. The aim of these recommendations is to protect developable land and sensitive environmental areas alike.

Major Natural Management Components of the Coastal Zone

When managing coastal environmental resources, particular types of impacts can be associated with various features. These are the shoreline, the uplands, the watercouses and tidal waters. The biological health of the Bay is dependent on the physical stability and balance of these components of the coastal environment. The well-being of the human environment is enhanced by these resources and the cultural resources of the Bay region.

Disturbance to soils in upland areas may drastically alter the character of receiving waters both through changes in sedimentation rates and water flow regimes. The combined impacts from various disturbances which occur within a watershed may be significant. Management practices such as improper herbicide application, poor landfill practices, and land drainage pattern modification can limit the biological productivity of receiving water bodies. The coastal aquatic area eventually receives impacts from all upland development.

The shoreline is the access point for recreational and commercial opportunities. It is in demand for residential homesites, especially where access exists to boatable waters. The natural stability of the shoreline areas is vital to the stability of the aquatic biological resources. The maintenance of natural shoreline vegetation is desirable since the vegetation buffers land-generated impact to water and water impacts

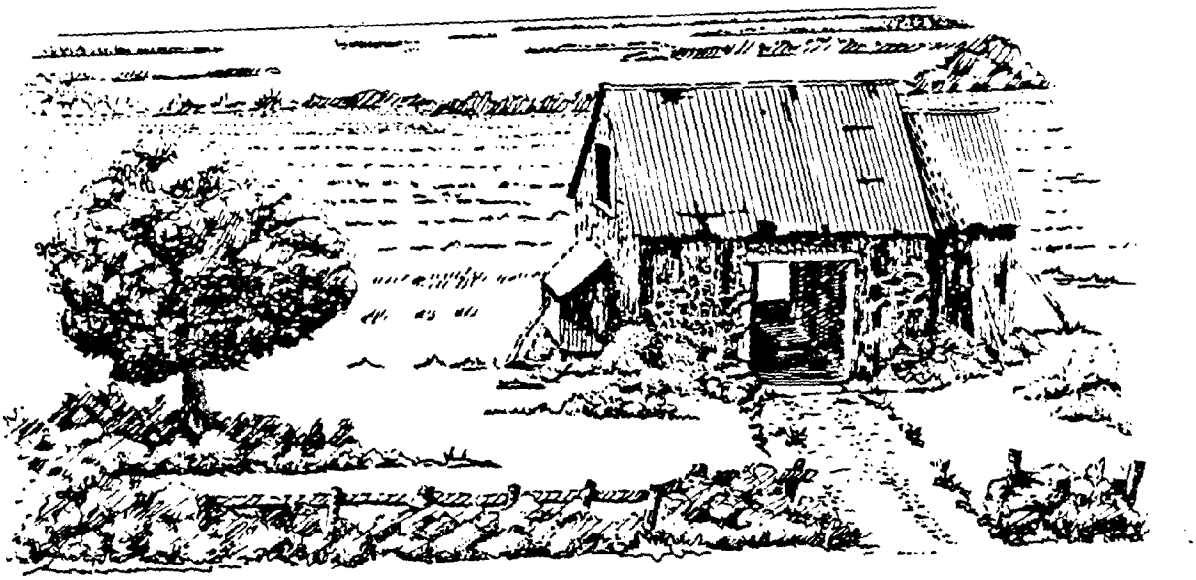
to land, literally a "living bulkhead" moving to adjust for changes in physical impact intensity.

Alterations to watercourses and water quality have an impact on coastal resources. Induced environmental instability by excessive additions of pollutants and stormwater disturbances will degrade the aquatic environment. The tidal waters themselves may be the site of direct impacts -- dumping of pollutants, intense boating activity, and dredging and filling.

Impacts to cultural resources are often irretrievable losses. Historical buildings or archeological sites may be destroyed without knowledge of their worth.

A Rational Approach to Resource Protection At the Local Level

The natural history of the land and its suitability for various uses is most often defined by soil characteristics and other geological formations. The evidence of flooding, springs, wetlands and the suitability of the land to support forest, agriculture, wildlife habitat, or development are all available in soil surveys. Many of the impacts described above can be addressed through an approach based on soil characteristics (described in Chapter III), while others require additional protection as described in Chapter IV.



# CHAPTER III

# UTILIZING SOILS INFORMATION

CHAPTER III

## UTILIZATION OF SOIL INFORMATION AS A TOOL IN SOLVING LAND USE RELATED COASTAL PROBLEMS

### Soil Characteristics

The land surface of the coastal areas of Maryland is covered with many distinct soil types. (Over 700 soil types exist in Maryland.) Soil scientists and technicians of the Soil Conservation Service of the U. S. Department of Agriculture have, through research and field investigation, identified and mapped these individual soil types or units. Each soil unit has particular properties which distinguish it. These soil properties include such characteristics as texture, depth, stoniness, degree of wetness, slope, and others. Based on their properties, soils are classified with respect to their potentials or limitations with regard to various uses. Soil suitability is rated for such diverse uses as crop production, woodland management, septic systems, homes with basements, and camp areas.

Figure 1 depicts the component soil type for a land area in the Maryland coastal province. The area shown encompasses an area of 54 acres. The various soil types indicated are quite diverse. Some have few limitations for most uses while others have severe limitations. The upland areas of the site consist of Mattapex (MIA) and Sassafras (ShB) soils. These soils are relatively level and well-drained and can be successfully adapted for many uses. However, other areas of the site have serious limitations for most uses due mainly to wetness, flooding, or steepness. It is important to understand that the areas containing severe limitations for most man-related uses also serve fundamental hydrologic, hydraulic, and biological functions.

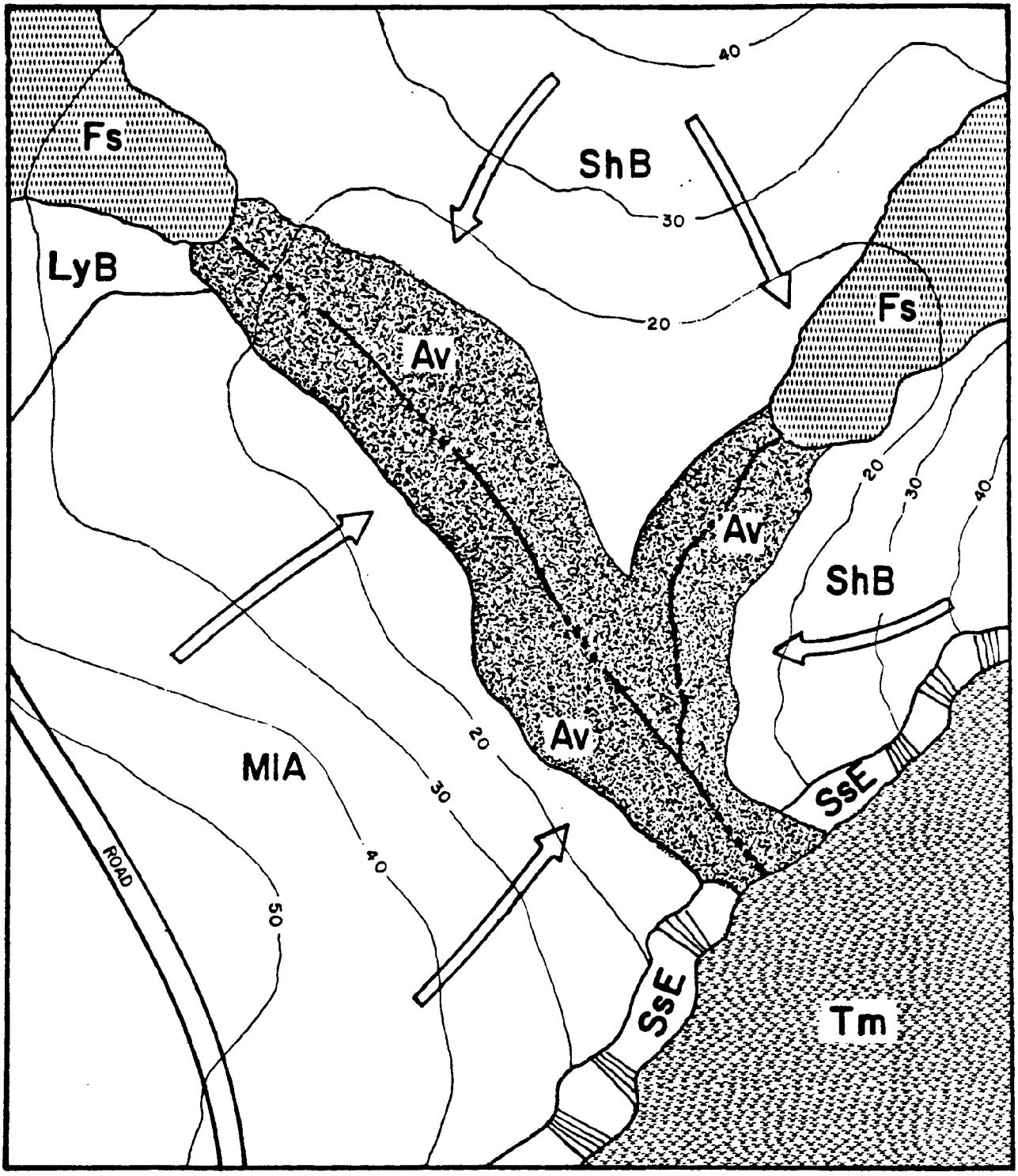



Figure 1 TYPICAL SOIL SURVEY MAP – MARYLAND COASTAL AREA

| | | |
|---|---|---|
| MlA | (Mattapex silt loam) | – No serious use limitations |
| ShB | (Sassafras sandy loam) | – No serious use limitations |
| LyB | (Loamy and clayey land) | – Moderate use constraint - instability |
| Fs | (Fallsington loam) | – Severe use constraint - wetness |
| Av | (Alluvial land) | – Severe use constraint - flooding |
| SsE | (Sassafras and Joppa soils) | – Severe use constraint - steepness |
| Tm | (Tidal marsh) | – Severe use constraint - tidal flooding |

In order to assure a wise use of this site, the individual nature of the various soils and their relationship must be fully understood. The loamy and clayey land (LyB), due to a high clay content, lacks stability. The Fallsington soils (Fs) are poorly drained and have a high water table. These soils store water, releasing it slowly. The alluvial soils (Av) are floodplain soils, and they also store water and have a high water table; in addition, they transport stormwater from stream channel overflow. Floodplains serve to store stormwater and reduce both its velocity and sediment load. Tidal marsh (Tm) areas serve to trap and assimilate sediment and other pollutants from upland flows. They act as buffers, reducing the intensity of both upland flows and tidal storms. Biologically, most wetlands are more productive than prime agricultural land. Wetlands serve as breeding and nursery grounds for shellfish, finfish, and waterfowl. Hence, wetlands serve biological and hydrological functions and are important economically since the Bay's use as a commercial fishery is dependent on the existence of wetlands. The Sassafras and Joppa soils (SsE), which are distinctly different from the more usable Sassafras sandy loam (ShB), generally contain slopes over 25 percent. Most of these soils are in woodland. They serve to buffer the wetlands they border.

Alternative Development Patterns

Typically, the process of converting land from its natural state into residential or commercial development (or some other developed use) often ignores the full potential and natural limitations of the site for development and the natural function and interrelationship of the soils. In this case, the following practices are likely to occur without adequate requirements as development takes place (see Figure 2):

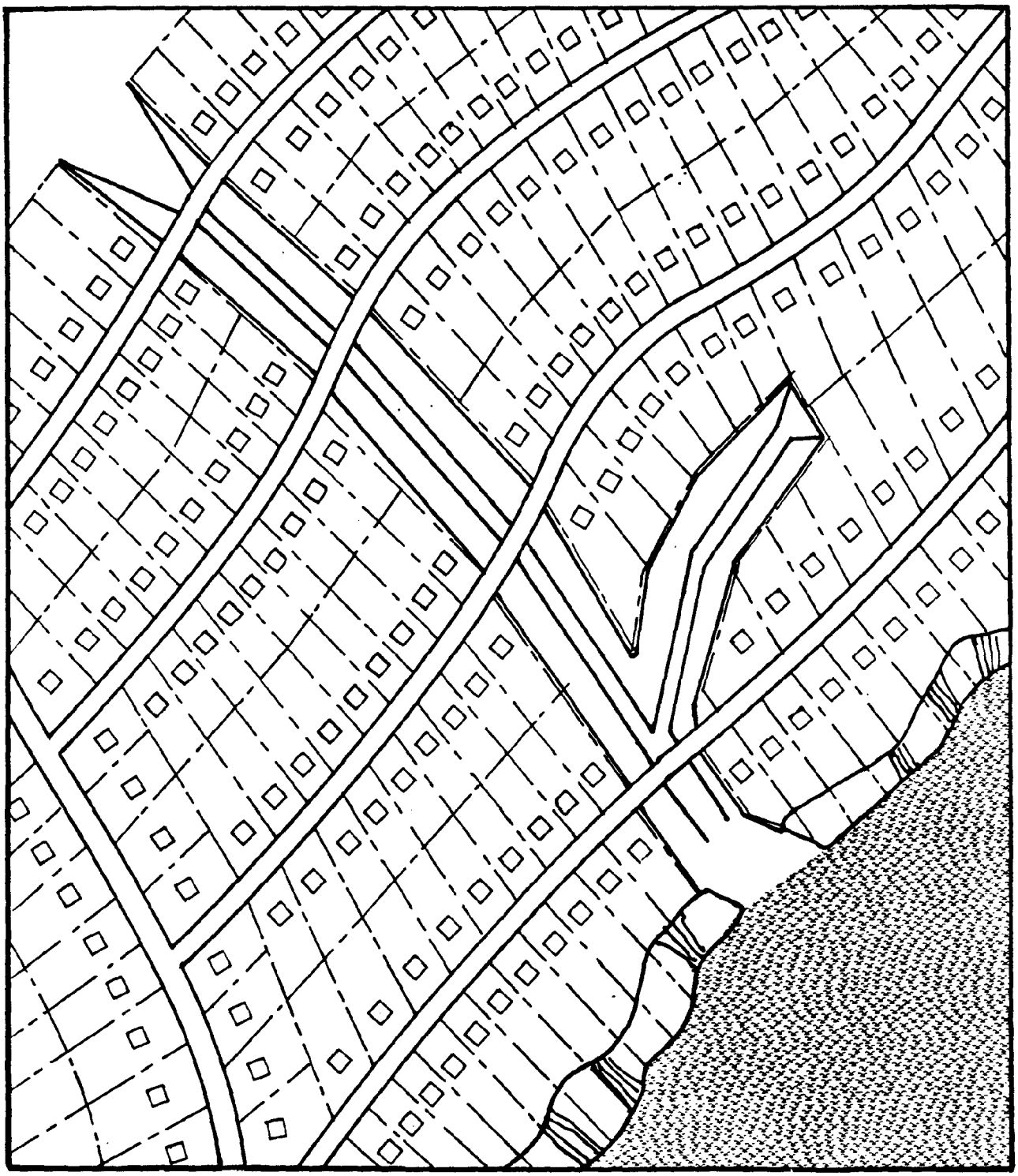


Figure 2 SCAR ACRES

Existing zoning: DR 3.5
Acres: 53.8
Allowable density: 188 units
Proposed density: 169 units

1. The loamy and clayey soils (LyB) would be developed and the potential for structural damage would exist unless special construction techniques are included.

2. The Fallsington soils (Fs) would be developed without adequate attention to their high water table and poor drainage. This could result in flooded basements, ponding in yards, and cracked walls and sidewalks. It would also alter the base flow (or amount of water held underground feeding the stream) resulting in a more extreme flow variation from seeps and springs.

3. The alluvial soils or floodplain areas of small watersheds (Av) would be partially or completely filled or otherwise severely altered. If completely filled, the stream would be piped. This would compromise all of the functions of floodplains detailed above as well as create development-related problems such as flood hazard or structural damage. In addition, the biological and aesthetic values of the stream would be lost.

4. If the steep Sassafras and Joppa soils (SsE) were cleared of trees or other vegetation as part of the development process, the adjacent wetland would likely be severely impacted by the resulting erosion and sedimentation and the unbuffered stormwater flows from the development.

5. The effect of all of this on the tidal marsh (Tm) would be one of severe disruption. The tidal marsh's capacity to assimilate sediments and other pollutants would be overwhelmed due to the altered nature of the upland flows in both a qualitative and quantitative sense. Compounding this problem would be the introduction of new pollutants introduced with development which would be found in the storm-water flowing from the site.

The paradox here is that after development, the functions of natural sysems, characterized in part by the soils, are even more critical in order to mitigate the impacts of development. Yet, these natural systems tend to be impaired, if not destoryed, by the development process itself. Figure 2 depicts a residential subdivision which ignores specific site limitations and opportunities with respect to soil characteristics.

Developments which take place consistent with soil limitations result in fewer problems for the developer, future residents of the site, the local government, and the public in general (see Figure 3). Oftentimes, the site can accomodate the same or greater density of development at a lower cost through better design, including clustering as in this example. The aesthetic values of developing in concert with soil limitations are impressive. The developable areas of the site would be buffered by retaining the problem soils in a natural state. These same open space areas serve as habitat for local wildlife. Indeed, these linear interconnected natural areas make ideal habitat for many types of wildlife which would otherwise be eliminated from the neighborhood.

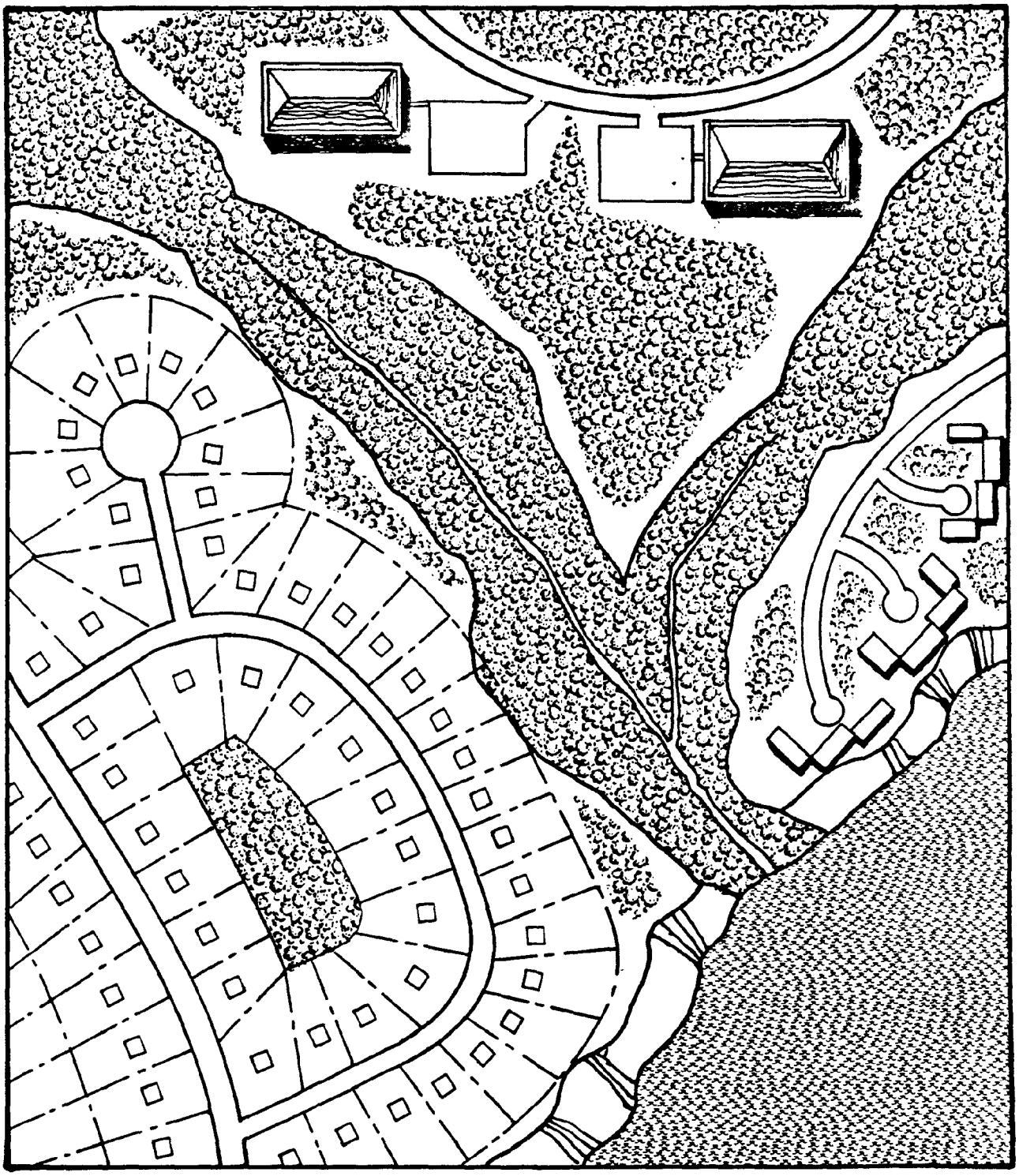


Figure 3 PRISTINE PASTURES

Existing zoning: DR 3.5
Acres: 53.8
Allowable density: 188 units
Proposed density: 188 units
56 Individual homes
66 Townhouses
66 Condominiums

By the utilization of soil information as provided by the Soil Conservation Service (SCS) and published in county soil surveys, various advantages are achieved including the following:

1. Development is restricted on sites physically unsuited for such development.
2. A basis is provided for requiring the necessary development design practices on those sites with serious physical limitations for development.
3. A rational basis is provided for the establishment of buffer areas with respect to the county's water resources including public water supply reservoirs and their watersheds, estuaries, streams, wetlands, and shorelines.
4. Flooding and the degree of destruction from flooding is reduced.
5. Critical wildlife habitat is preserved.
6. A rational basis is provided for the maintenance of permanent open space.
7. Erosion and sedimentation are reduced by preventing development on slopes generally greater than 25%, limiting development on slopes between 15% and 25%, and maintaining natural buffers between development and the county's waterways.
8. The volume and impact of stormwater is reduced and base flow maintained.
9. Subdivision design compatible with the natural features of a site is encouraged.
10. And a much greater use of clustering in density zoning classifications is encouraged.

Comprehensive Application of Soils Data

The use of soils data as part of an overall system for determining specific land use decisions avoids many of the problems associated with individualized and often arbitrary standards. A more rational land use is derived by using a soils approach since a number of basic considerations are served simultaneously. The soils approach simplifies land use regulations, reduces review time, and fosters consistency in the use of land.

Table 1 lists development limitations of soil types in the Baltimore Metropolitan Area. These soils are representative of soils throughout the Maryland coastal area. (Figure 4 shows these categories applied to the previous example.)

Development-restricted refers to those soils which are subject to flooding, have slopes generally over 25 percent and are excessively wet or poorly drained, located at heads of streams. These conditions preclude the potential for development. Development-limited soils include those soils which have characteristics including high water table, poor natural drainage, subsoil shrinkage, and instability. These soils require special construction techniques. (Development-limited souls could also include soils with slopes between 15-25 percent.)

To provide some insights into the acreages involved within each classification, data from Baltimore County have been developed. (This data represents both the coastal and piedmont areas of the county.) Of the undeveloped land in Baltimore County, 205,797 acres, or 73 percent, contain few limitations for development; 8,845 acres, or three percent, have limited potential for development and, 67,597 acres, or 24 percent, of its land area is development-restricted. Twenty-six percent of the county is already developed.

A soils approach as a tool to assure optimum land use can be applied to various regulatory documents already in existence in most Maryland counties. Particularly beneficial

TABLE 1

DEVELOPMENT LIMITATIONS OF SOIL TYPES
BALTIMORE METROPOLITAN AREA*

Development-Restricted[1]

Alluvial land (Av)
Baile (BaA, BaB)
Brandywine (ByE)
Chrome (CoE3)
Coastal Beaches (Ct, Ce)
Codorus (Cu, Ch)
Collington (CoE)
Comus (Cv, Cr)
Croom (CsE)
Dunning (Du)
Edgemont (EgE)
Fallsington (Fa, Fs)
Glenville (GnA, GnB, GuB)
Hatboro (Hb, Ha)
Howell (HyE)
Iuka (Iu)
Legore (LfE, LeE)
Lindside (Ls)
Loamy & Clayey land (LyE)
Manor (MdE, MhE)
Marr (MfE)
Melvin (Mh, Mo)
Mixed Alluvial land (Mt)
Manmouth (MvE)
Muirkirk (MyE)
Neshaminy (NsE)

Development Restricted[1] contd.

Bibb (Bm)
Relay (RsE)
Sassafras, (SaE, SsE)
Stony land steep (St)
Swamp (Sw)
Tidal Marsh (Tm)
Westphilia (WaE3)

Development-Limited[2]

Barclay (Br)
Christiana[+] (CcB2, CcC2) Anne Arundel Co.
(CmB, CmC2, CdC3) Baltimore County
Colemanton (Ck, Cm)
Elkton (Ek, Em, En, Eo)
Kelly (KeB2, KuB, KeC2, KsC)
Kinkora (KrA, KrB) Harford County only
Linoir (LmC2, LnC3, Llb, LmB, LoB)
Baltimore County only
Leonardtown (Lr)
Loamy and Clayey land (LyB, LyD)
Osier (Os)
Othello (Ot)
Pocomoke (Po)
Shrewbury (Sr), (Ss)
Watchung (WaA, WaB, WcB)
Muirkirk (MyB, MyC, MyD)
Muirkirk Urban Land Complex (MzB, MzD)

---

[1]Subject to flooding, excessive slope, excessive wetness at heads of streams.

[2]High water table, poor natural drainage, subsoil shrinkage, instability.

*Developed using soil data available through the Soil Conservation Service, U. S. D. A.

+Some symbols are the same for different soils, depending on the county in which they occur. In these cases, the counties to which the symbol applies (in Baltimore, Anne Arundel and Harford counties) are noted.

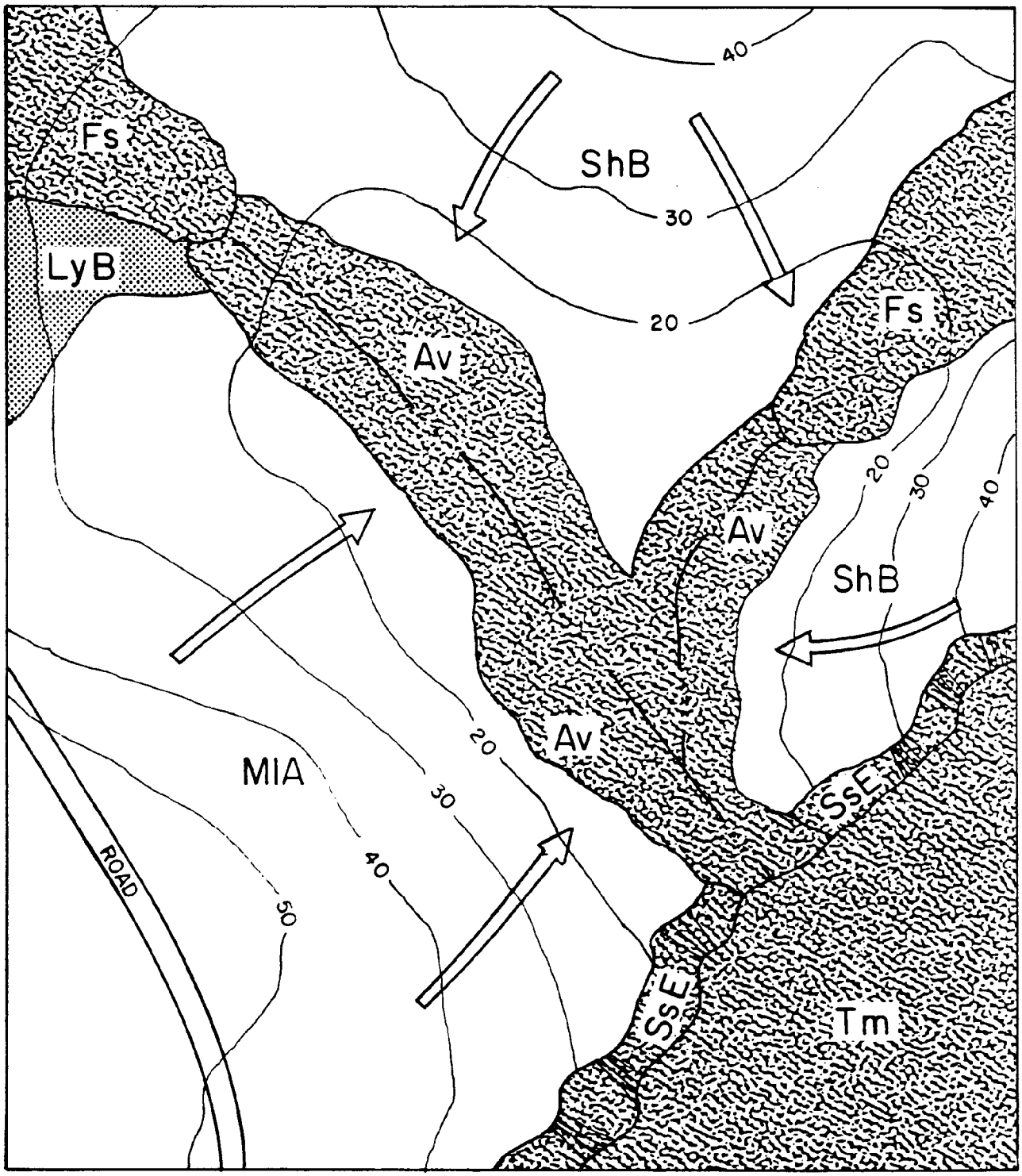



Figure 4 SUGGESTED GROUPING OF SOIL TYPES

- Development-Unrestricted (Refer to zoning for proper use)
- Development-Limited (Specific problems to be addressed before development
- Development-Restricted (Development allowed only when compatible with sensitive area)

application can be achieved through subdivision and zoning regulations. Additional application can be made through the building code, grading permit, and various health-related requirements. Soil information is also useful in public acquisition, provision of tax incentives (or disincentives), and the development of special regulations. Farm soil and water conservation plans already rely heavily on soil information.

With respect to the subdivision process, it is recommended that development plans submitted to local governments be required to contain all of the soil types of the subject tract as illustrated in Figure 1. In the case of density zoning, the full density can be calculated from the developable and development-limited soils, while no density can be utilized from the portion of the site with soils classified as development-restricted. All development must be located on the developable and, where approved, development-limited soils.

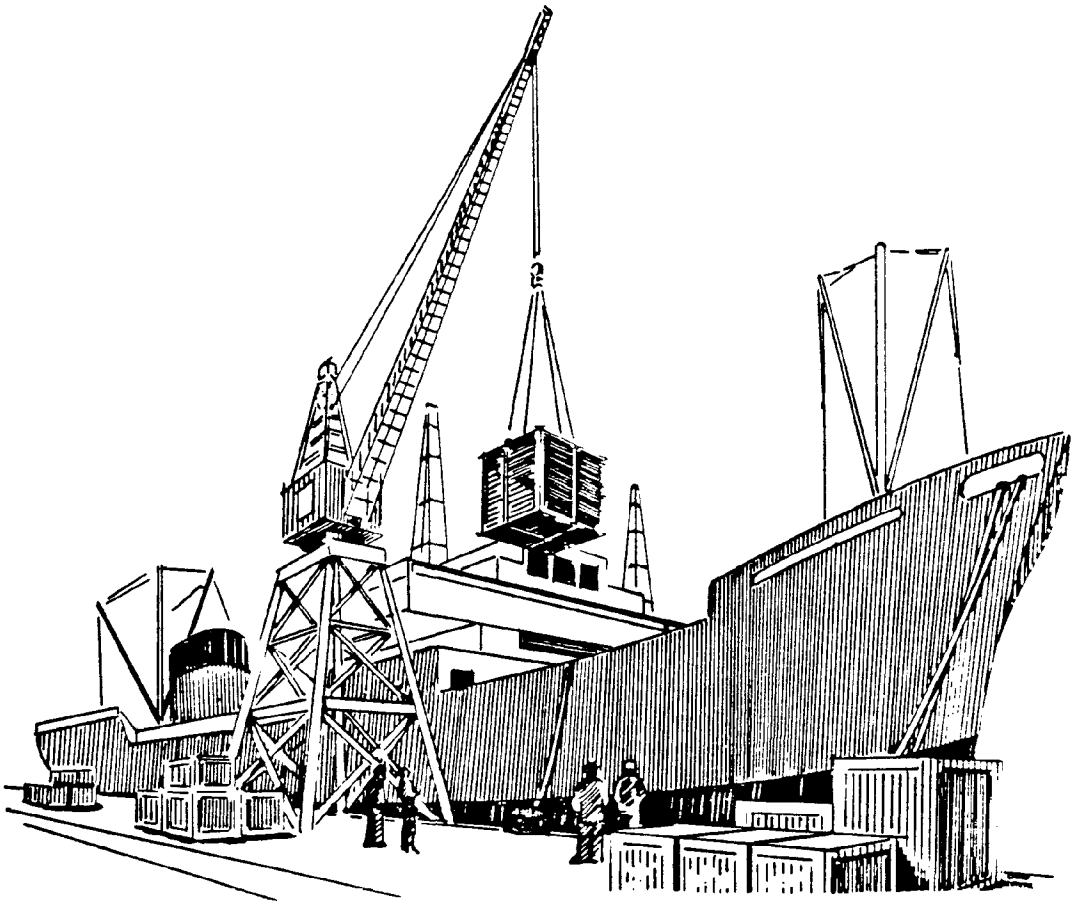
In cases involving development on development-limited soils, special techniques or siting practices would be necessary. For example, high water table areas would require special sewage handling and exclusion of basements; unstable soils would require stone buffers surrounding the foundations. Development-limited areas would receive conditional approval for development through the subdivision process. Conditional approval would be noted on the plan at the subdivision processing stage and must be made known to any perspective purchaser by including a notation on the deed. Such conditions must be carried forward to the building permit stage. The local agency responsible for permits and inspections must assure they are adequately addressed. Unless adequate techniques can be formulated to the satisfaction of the approving agency, development would not be allowed.

In the case of development not involving density zoning, the same requirements would exist as with density zoning except that the minimum lot size or the required buildable area would have to be satisfied outside of those soil types where development is restricted, although a lot could include these areas. In cases where neighborhood, community, or jurisdictional needs would be served, the non-developable areas of a site could be required to be dedicated to a community association or to the jurisdiction.

A developer would have the right to submit technical soil data acceptable to both the Soil Conservation Service and the local government engineering agencies if the accuracy of the Soil Conservation Service data is questioned. If both the Soil Conservation Service and the local government engineering agencies concur with the developer's claim, the soil data as provided by the developer rather than the soil survey would be binding.

As indicated, the soils information can be used in conjunction with the zoning process as well as the subdivision regulations. Zoning districts can be established utilizing soil attributes. For example, alluvial soils can form a basis for a floodplain zoning classification in the absence of more detailed hydrologic information; and prime and productive agricultural soils can form a basis for an agricultural zone. Prime development land can be identified relative to physical site conditions. A combination of both subdivision and zoning techniques might be the best approach.

The use of detailed soils information in making land use decisions is not new albeit past applications on a large overall scale have been limited. The particular concept proposed in this report represents a new approach to an old issue; how to comprehensively, effectively, and uniformly achieve sound land use decisions. That is, decisions which help the private development sector, future residents, and the public in general.



# CHAPTER IV

# GUIDELINES FOR PROTECTION

CHAPTER IV

## GUIDELINES FOR PROTECTION OF SENSITIVE AREAS AND DEVELOPABLE LAND

This chapter identifies specific problems related to the four coastal resource categories described in Chapter II, describes current regulatory authorities and mechanisms, and proposes policies to address these problems and the regulations which could be revised to implement them.

The soils approach described in the previous chapter unifies many fragmented attempts to regulate development. The approach is valuable, showing large tracts of land capable of development and sensitive areas essential to the maintenance of natural systems to be considered when planning for public facilities or reviewing development proposals. While it addresses wetlands, floodplains, heads of streams, and unstable soils specifically, it also addresses prime development lands, significant environmental resources, and basic natural systems in an integrated fashion.

This chapter shows where the soils approach can be used with respect to the coastal resource categories and where additional measures are needed to address specific problems not related to soils.

### Upland Resources

Upland resources include prime and productive agricultural lands, commercial deposits of sand and gravel, prime development sites and significant environmental resources. The soils approach is especially valuable in comprehensively locating use of these last two upland resources. Appropriately developed areas should retain the natural systems and wildlife which existed before development and should minimize the need for public works improvements.

Prime and productive agricultural lands represent a highly important local and natural resource. In addition to producing food and fiber, prime and productive agricultural lands serve as

TABLE 2

SUGGESTED MECHANISMS TO ADDRESS VARIOUS LAND USE AND RELATED PROBLEMS WITHIN COASTAL AREA[1]

| PROBLEMS \ MECHANISMS | Building Codes | Capital Investment Programs | Grading Permits | Health Regulations | Historical/Archeological Regulations | Purchase (Fee simple or easement) | Requirements for Septic Systems and Wells | Sediment Control Regulations | Sewer and Water Plan | Special Regulations[2] | Stormwater Management Regulations | Subdivision Regulations | Monetary Incentives or Disincentives (taxes, fines, etc.) | Tree Preservation Regulations | Zoning | Farm Soil and Water Conservation Plans |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Upland Resources | | | | | | | | | | | | | | | | |
| Loss or Conversion of Prime and Productive Farmland | | | | | | X | | | X | | | X | X | | X | |
| Loss of Commercially Important Sand and Gravel Extraction Sites | | | | | | X | | | X | X | | X | X | | X | |
| Loss or Underutilization of Prime Development Lands | | X | | | | X | | | X | | | X | X | | X | |
| Inadequate Protection of Significant Environmental Resources | | | X | | | X | | X | X | X | X | X | | X | X | X |
| Shoreline Resources | | | | | | | | | | | | | | | | |
| Shore Erosion | X | | | | | X | | | | X | | X | | | X | X |
| Adverse Impacts of Bulkheads | X | | X | | | | | | | X | | | | | X | |
| Tidal Flooding | X | | X | | | | | | X | X | | X | | | X | |
| Wetlands Destruction | X | | X | | | X | | | | | | X | | | X | X |
| Lack of Adequate Buffers | X | | X | | | | | | | | | X | | | X | X |
| Stormwater Discharges into Wetlands | | | | | | | | | | | X | X | | | | X |
| Reduction of Shoreline Aesthetics | | | | | | X | | | | X | | | | X | | |
| Watercourses and Tidal Waters | | | | | | | | | | | | | | | | |
| Inadequate Watercourse Buffers | X | | X | | | X | | | | | X | | | | X | X |
| Riverine Flooding Impacts | X | | X | | | X | | | | | | X | | | X | |
| Culverting or Piping of Watercourses | X | | X | | | X | | | | | | X | | | X | |
| Discharge from Malfunctioning Septic Systems | X | | | X | | | X | | X | | | X | | | X | |
| Destruction of Springs and Seeps | X | | X | X | | | | | | | | X | | | X | X |
| Malfunctioning Sewage Disposal, Treatment and Conveyance Systems | | X | | X | | | | | X | X | | | | | | |
| Indiscriminate Dumping of Polluting Substances | | X | | | | | | | | X | | | X | | | |
| Uncontrolled Stormwater | | | | | | | | X | | | X | | X | X | | X |
| Floodplain Disturbances or Modifications | X | | X | | | X | | X | | | X | X | X | | X | X |
| Disturbance of Steep Slopes | X | | X | | | X | X | X | | | X | X | X | X | X | X |
| Excessive Soil Erosion and Sedimentation | | | X | | | | | X | | | X | X | X | X | X | X |
| Groundwater Pollution | X | X | X | | | X | X | X | | | X | X | | X | X | X |
| Cultural Resources | | | | | | | | | | | | | | | | |
| Loss of Historic Landmarks and Archeological Sites | X | | X | | X | X | | | | | | X | X | | X | |

[1] Adequate design and maintenance of any man-made controls or improvements is essential to minimize impact to coastal resources. These considerations must be the basis of all modification to the above mentioned mechanisms.

[2] Special regulations include those regulations designed for a specific and usually single-minded purpose and would include subject areas such as historical preservation which are not normally included within other regulations.

an important component of open space. With the high cost of transportation, it is becoming increasingly important to be able to grow farm produce locally. Factors which continue to impact prime and productive agricultural land include: (1) continued loss from urban encroachment; (2) excessive erosion; and, (3) lack of adequate buffers from adjacent conflicting land uses.

Coastal areas within the Baltimore Metropolitan area contain commercially valuable sites of sand and gravel. This is a site-limited and quite valuable resource. The cost of sand and gravel and related products is based in part on transportation costs. Therefore, it is particularly important to protect the resource locally. Unfortunately, however, some areas of commercially important sand and gravel have been lost. Factors which are having an adverse impact on this important resource at the present time include: (1) continued loss from urban encroachment; and, (2) public or neighborhood opposition based on past industry problems including excessive erosion and sedimentation, air pollution, noise, and lack of adequate reclamation.

Prime development land is an important community resource which can be characterized as land which because of its location, physical nature, access and/or availability of public services, is ideal or in demand for a particular type of development or development in general. Frequently, prime industrial or commercial locations are utilized for residential development. Of particular importance is the need to reserve or protect sites with deep-water access for port-related industries. Additionally, prime water-related recreational sites are often lost to other uses. The best use of these sites is of frustrated by improper zoning designation, underutilization, poor site design and unnecessary regulatory constraints.

Significant environmental resources can be described as particular components of the natural environment which are distinguished because of an unusual quality such as size, age, or wildlife value. Endangered or rare species habitats are included in this category. The maintenance of these resources enriches the lives of local residents and preserves these resources for future generations. Problems which affect significant natural environmental resources include: (1) lack of information with respect to distribution and other critical data; (2) failure of development through design or density to be compatible with significant natural environmental resources; and, (3) lack of consideration with respect to preserving these areas as part of an overall natural system.

In general, few local governments in Maryland have effectively protected these four basic upland resources. Some limited success has been achieved through zoning in protecting prime development sites and productive agricultural land. However, very little has been accomplished in the way of minimizing conflicts with mineral extractive sites and unique environmental resources.

Upland resources, by their nature, are best suited to management by the soils approach as described in Chapter III. Other steps to take to protect these resources are listed below:

1. Utilize data on significant wildlife habitat areas correlated with soils information available for most counties in Maryland, to specify locations and descritpions of the various land-related resources.
2. Determine existing and future threats or conflicts with these land resources.
3. Apply various land use controls and other techniques to addequately protect resources.

Table 2 illustrates the specific mechanisms which may be used to protect these resources.

## Shoreline Resources

The shoreline is an area of very intense activity, both natural and man-made. The shoreline provides a dynamic edge where biological productivity is high and so is the deamnd for human use. Shore erosion and flooding are natural occurances to coastal systems; however, human use is usually in conflict with these processes. The soils approach is used to integrate uses of the shoreline, protect wetlands specifically, and direct development to suitable soils.

Areas of severe shore erosion represent a potentially serious problem with respect to nearby development. Fortunately, the problem of severe shore erosion is not widespread, although over half of the Bay's 3,190 miles of shoreline has some degree of erosion problem. The process of shore erosion is a natural one and cost-effective methods of preventing or significantly reducing the problems are often difficult to achieve. In addition, some shore stabilization practices have accelerated shore erosion in adjacent areas.

The most common stabilization practice is the use of bulkheads. Bulkheads are permanent structures constructed of treated wood, stone, masonry or metal materials. Bulkheads are built to prevent shore erosion. Most bulkheads tend to deteriorate over time. Rather than replacing the structure where it exists, a new bulkhead is often constructed beyond the existing one. (The area between the old and new bulkhead is filled.) In some areas of the Bay, virtually entire shorelines are bulkheaded. Major adverse impacts relating to bulkheads are that the natural shoreline, including its function of absorbing wave energy, is substantially destroyed, public shore access is reduced (because the intertidal area owned by the state is reduced), and the water surface area of the estuary declines.

In order for a shore erosion structure to be built or replaced, a Wetland Permit and a Section 10 Regular or General Permit is required from the State of Maryland and the U. S. Corps of Engineers, respectively. The State of Maryland, in processing a permit application, must consider Maryland law regarding the inherent rights of property owners to protect their property and to reclaim the portion of a property lost to shore erosion since 1972. The Corps of Engineers does not have a similar requirement for issuing its permit. If a shorefront property owner uses riprap - a sloping structure of loose stone construction which has less adverse environmental impact - he can avoid the lengthy Corps of Engineers permit process by fulfilling some general conditions.

Significant land areas along the Bay's shoreline are subject to tidal flooding. Storms of record in the Baltimore metropolitan area have been used to establish an elevation between six and 11.5 feet (depending on the jurisdiction) as the 100 year tidal floodplain elevation.

Unfortunately, to varying degrees, some development has already occurred within this flood zone. With respect to loss of life and property damage, tidal flooding is, perhaps, the most serious coastal-related problem. Areas subject to tidal flooding contain all tidal wetlands and, in general, areas of high water table. They function as important natural areas between the shoreline and coastal upland areas.

Wetlands, or more specifically in this case, tidal marshes, are important components of the land-water edge. Wetlands possess a number of important valuse including those of a biological, hydrological, recreational, aesthetic, and economic nature. They also play a dominant role in pollution abatement.

Wetlands are currently receiving impacts from:

1. Legal and illegal filling, dredging, and draining
2. Sedimentation
3. Stormwater discharges
4. Disruption
5. Incompatible adjacent land uses

The Maryland Wetland Act passed in 1970 has reduced the destruction of wetlands from filling, dredging, and draining. This Act prohibits the direct alteration of state wetlands unless a license has been issued by the State Board of Public Works. Local governments in Maryland generally do not have regulations protecting wetlands.

Shoreline resources can be protected in a number of ways. The Coastal Resources Division, Tidewater Administration, Department of Natural Resources has inventoried areas experiencing erosion along the Chesapeake Bay shoreline. Using this data or similar data from some other source, it is possible for a local government to determine problem areas. The employment of riprap or other types of sloping shore erosion structures along an eroding shoreline is an alternative to bulkheading. This method is more consistent with maintaining the natural shoreline and usually does not substantially reduce the surface water area of an estuary. In addition, it provides a habitat for various forms of marine life.

Policies that should be considered with respect to the management of shorelines include:

1. Prevent structures from being constructed in areas adjacent to shore erosion where, given the erosion rate and the life of the structure, the structure would be imperiled.

2. Maintain natural vegetation in areas of severe shore erosion.

3. Prohibit bulkheads in those areas presently undeveloped or where natural shorelines still dominate.

4. Discourage structural approaches along essentially natural shorelines by encouraging riprap or some other "natural" form of protection.

5. Promote a comprehensive approach to shore erosion problems, developing management approaches for entire reaches of shoreline rather than on a case-by-case basis.

6. Establish standards for bulkhead placement and construction including maximum distances of bulkhead from shorelines.

7. Discourage residential and non-water related commercial or industrial uses in areas prone to tidal flooding.

8. Reserve sites which are distinguished by having access to deep water channels or other significant locational factors (such as rail access) for specific water-related uses provided, of course, that certain protective features are included in their development plans to protect them from the effects of tidal flooding.

9. Prohibit subdivision of land for residential development in the tidal floodplain. Residential development on existing parcels could be permitted provided the first floor elevations are above the flood elevation would allow the unobstructed flow of water generated by tidal flooding.

10. Prohibit the extension of public utilities into the tidal floodplain except where justified by concentrations of existing development. In such cases, utilities should be sized only to meet existing needs.

11. Prohibit grading, including filling practices to achieve elevations above tidal flooding.

12. Provide local government assistance to the State of Maryland in the enforcement of the State Wetlands Act. Local enforcement or inspecting staffs would be trained to spot and report violations of this Act.

13. Initiate or strictly enforce (if already enacted) local controls over locally generated polluting substances including sediments. Such controls should be refined to increase their effectiveness. Stormwater should not be allowed to be discharged directly into wetlands.

14. Wetlands should be adequately buffered. Natural vegetation should be maintained adjacent to all wetlands. The size of the buffer area would depend on slope, type of adjacent land use, soils, and other criteria. The Buffer Area Study undertaken by the Coastal Resources Division, Tidewater Administration, discusses the use of buffer areas under differing conditions.

15. Wetlands protection efforts should become a part of local open space programs, including those involving acquisition.

Specific regulations could be revised or established as shown on Table 2 (page 22), to implement the above policies.

Watercourses and Tidal Waters

Except for air, water is the most critical resource with respect to sustaining life. Within the watersheds of the Chesapeake Bay, extreme variations exist with respect to water quality. The overall quality of the water flowing into the Bay from the land is the basic factor in determining the health of this large estuary. Floodplains, heads of streams, and areas of high water table are important to the storage and release of waters to coastal areas. The soils approach is important in protecting these water-related resources.

Water quality degradation is often the result of: poor land use practices including overdevelopment, development of steep slopes or other unsuitable areas; lack of suitable stream buffers; inadequate erosion and sediment control; disturbance or alteration of floodplains, springs and seeps; and, channel modifications. Stormwater management programs do not require sufficient on-site infiltration. In addition, the farm community often does not implement best management practices with respect to water quality impacts.

Illegal dumping, poorly located or operated waste dispsoal facilities, and malfunctioning septic tanks and sewage systems add to the pollutant loads. Recreational and commercail craft in overcrowded conditions also contribute to the problem.

Numerous programs and regulatory measures dealing with water quality exist at all levels of government. These programs include:

1. The establishment of water quality standards for the waters of Maryland.

2. Various State permits including:
   a. Waterway Construction Permit
   b. Toxic Materials Permit
   c. Surface Mine Permit and License
   d. National Pollutant Discharge Elimination System Permit
   e. Hazardous Waste Certificate
   f. Oil Operation and Handling Permit
3. River Basin Planning (303[e])
4. Areawide Water Quality Planning (208)
5. Sewer and Water Facilities Planning (201) including County Water and Sewer Plans
6. Sediment and Stormwater Management Programs
7. Standards and Criteria for Septic Systems and Wells
8. Solid and Hazardous Waste Programs

The following policies should be included in attempts to resolve water quality related problems:

1. Land use planning efforts should involve greater efforts to tailor development to the natural character of the land. In some cases, this would imply no development.
2. Prohibit development on slopes 25 percent or greater.
3. Limit development on slopes of 15%-25% to respond to soil suitability and provide adequate buffers.*
4. Prohibit development or alteration (including filling) of the 100 year riverine floodplain.



* For details on the uses and need for buffer areas, see the Coastal Resources Division (Tidewater Administration) Buffer Area Study.

5. Prohibit development or alteration (including filling) of heads of stream areas containing predominantly wet soils and freqently containing springs or seeps.

6. Limit stream channel modifications to public health or welfare related projects where compelling justification exists.

7. Improve the effectiveness of sediment control practices by emphasizing erosion control along with a more vigorous and strengthened enforcement and penalty procedure.

8. Improve stormwater management programs by advocating plans with greater emphasis on infiltration.

9. Provide stiff penalties as a deterrent to dumping polluting waste. In addition, provide conveniently located, environmentally safe dumping sites.

10. Require all landowners, including farmers, to put in place those management practices necessary to prevent degradation of water quality.

11. Through 208 and 201 planning programs, develop ways and means of correcting present deficiencies in private and public sewer systems and providing future systems which will assure water quality protection. This would include the planning of utility extensions which are most likely to promote land use patterns and densities which are more consistent with environmental protection and enhancement.

12. Minimize pollution from boating activity by appropriate marine location criteria and design standards consistent with maintaining water quality, providing safety to bathing beaches, and buffering wetlands and other important natural areas sensitive to impacts of boating.

13. Limit dredging to essential private and public projects. Provide conveniently located and environmentally safe dredge material disposal sites of adequate capacity. Where feasible, consider the recycling of dredged material.

14. Protect groundwater by maintaining aquifer recharge areas, protecting aquifers from pollution, avoding overpumping and saltwater intrusion.

Table 2 (page 22) illustrates the mechanisms which can be used by local government with respect ot the various water quality related problems specified above.

Cultural Resources

Due to the fact that coastal areas were among the first settled and developed, they contain significant historical and archeological resources. From a cultural basis, it is desirable to identify and protect these resources in order that the present and future generations can better understand and appreciate the past and be enriched by it. All too often historical landmarks are lost or compromised by demolition, neglect or structural conversion. Archeological sites are most frequently lost or destroyed because their location was unknown, components were stolen, or the site's owners did not care to preserve or protect the site. Few coastal jurisdictions have regulations protecting cultural resources.

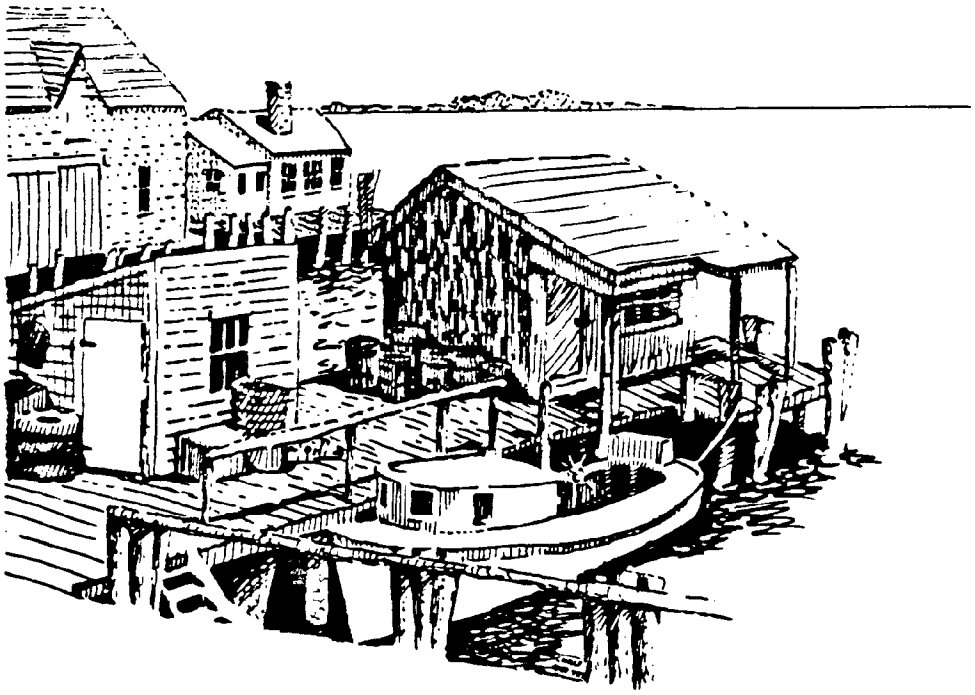
The following policies are recommended as means of protecting cultural resources:

1. Complete surveys/inventories should be taken and maintained.

2. Public education programs should be initiated.

3. Incentive and regulatory programs for these cultural resources should be developed and maintained. This would include historical structures, individual landmarks and archeological sites. Other unique cultural and physical features such as rock formations and vistas could also be protected if desired.

A number of mechanisms can be utilized to implement a preservation interest (see Table 2, page 22).



# APPENDIX

# APPENDIX

## IMPACTS TO SENSITIVE RESOURCES OF THE COASTAL ZONE

### PREFACE

Participation in the Federal Coastal Zone Management Program dictates that coastal resources be utilized in a manner which optimizes their benefits while being compatible with maintaining irreplaceable cultural resources, and a healthy and productive natural environment. The following descussion attempts to demonstrate the nature of coastal resources and to introduce a management approach consistent with the goals of the Coastal Zone Management Program.

### The Intrinsic Nature of Coastal Resources

Wise resource management decisions consider the fundamental interrelationships between the resources being managed and their surroundings. For instance, non-living resources (such as historical and archeological sites and mineral resources) which are generally static in time and space should be managed differently than living resources and natural physical systems. Living resources are dynamic and thus dependent on each other and non-living resources. Land use decisions which are made both within and beyond the boundaries of the "coastal zone" can have significant impacts on both living and non-living coastal resources.

Costs and benefits of changes to dynamic environmental resources, although recognized by many, are not readily quantified. Consider the management of a business enterprise; the successful manager knows his inventory, his production costs, his sales, and his potential income. He attempts to optimize his gains within the constraints of the current economic environment. Production costs are dependent on many factors:

the price of packaging, assembly, labor, etc. for the determination of the final cost of the product. Although many factors may be involved, the costs are readily determined and identified with their source. Unlike a business, the interacting component costs are never totally identifiable. The components of living systems are synergistic, thus making analysis of natural production systems exceedingly complex. The level of biological productivity is a function of the physical stability, age, available energy, and nutrients available to the community. The manner in which a bio-community responds to physical environmental changes is beyond the predictive capabilities of the resource manager. This response has been programmed into these living organisms during evolutionary time. The role of the natural resource manager is to manage the physical constraints (to the degree possible) or community species composition to promote the development of the desirable biological resources or environmental amenities. For optimum management of biological resources, the interrelatedness of these living resources to the surrounding environment must be recognized and addressed by any successful management approach.

What are "Sensitive" Resources?

Within the spectrum of coastal resources, there occur particular resources which, due to their location or natural function, are particularly susceptible to loss or degradation. These areas may be referred to as "sensitive" due to their potential for change both from human and naturally occurring impacts.

Impacts to historical and archeological sensitive areas may result in a loss of irreplaceable cultural resources. For other areas, it may mean significant reduction of biological productivity. Changes in some of these elements are indicative of the local health of the coastal biological resources. Impacts to sensitive areas are observed when disturbances (beyond

the naturally occurring environment fluctuations) occur at a greater frequency. Man-related activities which result in changes in the erosion rates within floodplains and along shorelines, sedimentation rates at intertidal areas, and loss of biotic components of the environment are examples of man-induced impacts to sensitive areas.

In some cases, the naturally occurring fluctuation in size and distribution of a particular resource are not known, despite the recognized importance of that particular component to the local biological productivity. This is the circumstance with submerged aquatic vegetation in the Bay. The loss or decline of vegetated areas will undoubtedly result in a local decline of the living resources which depend on this vegetation for their existence. The causes of decline are currently under intensive investigation. It is likely that there are a number of causes involved.

Management of sensitive areas requires that one should: (1) formalize conservation procedures for static sensitive coastal resources; and, (2) manage the dynamic, physical components of the environment (in order to maintain physical stability) by buffering the impacts of coastal resources utilization on the living dynamic components of the coastal resources.

What Determines Biological Community Health and Productivity?

All land-use actions which affect upland water flow patterns or the chemical characteristics of the waters can potentially affect the Bay's living resources. Aquatic community changes will occur if the upland changes result in deviations which exceed the tolerance ranges of the organisms living there. For example, sediment which is deposited in the tidal waters may first reduce the amount of light penetrating the waters, thus limiting the diversity and abundance of the aquatic plant community. Suspended silts may interfere with the physiological functioning of animals and plants. Shifting sediment may sufficate germinating plants and fish eggs, thus decreasing local reproduction success. Muddy waters are

readily visible. But what of the not-so-readily-visible such as: chemicals in solution? Dissolved chemicals can be just as influential on biological community structure. Impacts can occur at very small concentrations, particularly if the community organisms have not experienced these selection pressures during evolutionary time. Impacts can be much more widespread if the source is relatively constant and the chemical remains suspended in solution. Consider the heavy metals which have been deposited in the Baltimore Harbor. Chemical impacts can be much more permanent than sediment impacts per se. Once deposited in harbor sediments, certain chemicals can effectively prohibit vegetation establishment. Some Bay organisms are sensitive to relatively "invisible," widespread, low concentrations of man-induced chemicals. Consider chlorine, a known "sterilant" commonly added to the discharge waters of wastewater treatment plants throughout the Bay's watersheds, which is used to kill pathogens found within the discharge. Fish eggs of some species are sensitive to concentrations equal to currently approved discharge rates. Consider herbicides used in many agricultural and suburban horticultural practices used to alter plant community composition at various times during the growing season. These chemicals can reach the water resources and have a similar effect on the aquatic plant communities. Sensitivity of the resources varies with the growing season, reproductive stage, and the pressure of additional stresses. Environmental and physiological stresses may not be the direct cause of a particular species decline. Just as in human health, environmental stresses and pollution may lower the resistance of particular species to existing pathogens.

Under some circumstances, the total biological productivity may not be reduced. However, instread of "growing roses", we are cultivating weeds. Under these conditions, less desirable species predominate within the environment. For instance,

instead of shellfish, one may find tubifex worms. Keep in mind that a sewage treatment plant is a very biologically productive environment.

The question remains, however, what level of biological community complexity should we set as our management goal? The human benefits derived from a diverse biological environment are numerous. Increased vegetational diversity results in a more aesthetically pleasing environment. It promotes quality recreational experiences and allows a greater variety of recreational opportunities such as fishing, hunting, boating, and passive activities. It permits the production and harvest of renewable natural resources such as shellfish and fishery resources. It increases the stability of our physical environment by buffering storm tides, stabilizing floodplains, and modifying wind actions. Perhaps, most importantly, by taking positive steps toward enhancing our natural environment, we will also be instilling a realistic attitude toward the natural environment upon which we are ultimately dependent.

What are the Major Management Components of the Coastal Region?

When managing coastal environmental resources, particular types of impacts can be associated with various features. These features are the uplands, watercourses, the shoreline, and the tidal waters. The biological health of the Bay is dependent on the physical stability and balance of these components of the coastal environment.

Disturbance to soils in upland areas may drastically alter the character of receiving waters both through changes in sedimentation rates and water flow regimes. The combined impacts from various disturbances which occur within a watershed may be significant. Management practices such as herbicide application, poor landfill practices, and land drainage pattern alteration can limit the biological productivity of receiving water bodies. The coastal aquatic area eventually receives impacts from all upland development.

Alterations to watercourses and water quality may have an impact on coastal resources. Induced environmental instability by direct additions of pollutants and stormwater disturbances will degrade the aquatic environment.

The shoreline is the access point for recreational and commercial opportunities; it is in demand for residential homesites, especially where access exists to boatable waters. The natural stability of the shoreline areas is vital to the stability of the aquatic biological resources. The maintenance of natural shoreline vegetation is desirable since the vegetation buffers land impacts on water and water impacts on land, literally a "living bulkhead" moving to adjust for changes in physical impact intensity.

And, finally, the tidal waters themselves may be the site of impacts -- dumping of pollutants, intense boating activity, and dredging and filling activity, to name a few.

Public Perception of Coastal Environmental Resource Impacts

Natural resources which can be found within urban areas are managed mostly for their impact on health, safety, and general welfare. Off-site impacts on natural resources have traditionally been addressed only when there are significant impacts on the physical health, physical safety (risk), or direct economic welfare to the human community. Because loss of environmental benefits are not immediately visible in our economic analysis, does not mean that significant impacts are not occurring. Impacts are most difficult to perceive when they are separated from the source of the impact by time or distance. Impacts on the aquatic resources of a large water body, such as the Chesapeake Bay and tributaries, are prime candidates for environmental abuse due to its size and buffering capacity. Water quality impacts by their inherent nature, may have their greatest cumulative impact at some distance from the origin of the impact.

Intense development of upland areas without regard for adverse environmental impacts and poor agricultural paractices may together have the greatest combined impact on coastal waters. Changes in water flow, sediment load, and water quality are significant -- causing radical changes to the aquatic community. But these changes are not readily perceived by the landowner - miles away. The natural processes of water purification along the length of a stream are beneficial but, if land-use impacts exceed the natural abilities of the stream to clean itself, the impacts reach the tidal waters. In this way, minor upstream impacts become diluted in the muddy waters of other minor impacts and the source of the problem becomes unclear.

Time has a way of hiding the impacts from their sources. The buffering ability of water bodies (that is: to accommodate stress without major aquatic community changes) extends the time interval between impact occurrence and when a readily visible influence is apparent. Land-use practices performed for years may suddenly cause changes when the intensity of use within the watershed increases beyond the capacity of the existing natural system to accommodate it. Time may hide the source from the impacts in another way. Due to the migratory nature of some of the Bay's highly-valued fishery resources, economic impact may not be visible for years after we exceed the tolerance threshold for particular fish species. For instance, some fishes which spawn in the Chesapeake Bay may decline in significant numbers when young and most sensitive, but since these fish normally move to the ocean water where they develop for several years, population impacts may not be known for several years when that age-class of fish fails to return to the Bay waters to spawn.

SUMMARY

By monitoring sensitive resources, we can determine the quality of our human environment. The intangible nature of many of these resources' benefits and the dynamic nature of their origin preclude these resources from being managed easily in the traditional economic sense. Management of these resources must reflect their relationships with other regional resources. By comprehensively regulating human impact on natural systems, these systems will continue to function and to support and enhance our existance while limiting public expenditure to correct problems caused by human activity.

REGIONAL PLANNING COUNCIL