

II. SHORELINE AREA MANAGEMENT

The general purpose of the Shoreline Area Management Plan is to control urbanization and its effects along Stafford County's streams and rivers and within their watersheds. These areas have been identified as being important to both the preservation of scenic qualities and resource-based industries along the shoreline as well as to the protection of water quality. Water quality protection is to be achieved through the management of land uses in environmentally constrained areas.

This plan is guided by six goals, which in turn support the goals of the Comprehensive Plan. Objectives lay out the strategies for achieving these goals. The goals and objectives provide the Shoreline Area Management Plan with ends and the means by which they can be achieved. The following sections of the plan will:

- o Define the subcategories of the shoreline management area;
- o Establish the management framework for the plan;
- o Analyze the relationship between land use activities and water quality; and
- o Establish guidelines based on the analysis for implementing land use controls or other regulations which support the plan's goals and objectives.

SHORELINE AREA SUBCATEGORIES

Phase I of the Shoreline Area Management Plan includes a substantial mapping effort which identifies and inventories the features of the shoreline area and the upland areas. Proper management of these areas is important to the preservation of the character of the shorelines and the protection of water quality in the streams and rivers. Nine overlay maps were prepared: six which inventory existing conditions and three which describe opportunities and constraints to future development of the shoreline area. The existing conditions series includes:

- o Land Use/Land Cover,
- o Tidal and Nontidal Wetlands,
- o Shoreline Conditions,
- o Ownerships
- o Soils, and
- o Sensitive Habitats.

The series on opportunities and constraints includes:

- o Environmental Resources to be Protected,
- o Environmentally Constrained Areas, and
- o Potentially Developable Areas.

To provide a foundation for the Shoreline Management Area subcategories, the Shoreline Area Management Plan combines the information collected through the generation of the overlay maps with the land use categories from the land use Plan. The two land use categories most important to shoreline management are the Land Management Overlay and the Resource Protection area. These two categories are expanded in this plan to include the components identified in the initial mapping phase.

Each of the mapping efforts for the Land Use Plan and Phase I of the Shoreline Area Management Plan project leave portions of the Shoreline Management Area unmapped. The Phase I mapping exercise limited the identification of features to those within 500-feet of either side of streams and rivers, and the land Use Plan map does not identify all of the streams which are included in the Shoreline Management Area. The mapping exercises do; however, carefully define each of the components. Subsequent mapping efforts within the Shoreline Management Area, whether performed by the County or by developers through the project review and approval process, can and should utilize the adopted component definitions identified within each of the subcategories.

The Shoreline Area Management Plan recognizes three subcategories for the shoreline management areas:

- o **Resource Protection Area.** This is essentially the same area identified in the Land Use Plan. It includes all rivers, major runs, and perennial streams shown on the USGS 7.5 minute series quadrangle topographic maps; tidal shores; floodplains; all wetlands; and steep slopes along these areas. Under the Shoreline Area Management Plan, this area will also include a vegetated buffer 100-feet wide (or 50-feet where the drainage is away from the stream or river) adjacent to and landward of the other Resource Protection Area components.
- o **Land Management Area.** In addition to these areas included in and mapped as the Land Management overlay in the Land Use Plan, this area includes highly erodible soils (including any associated steep slopes not included in the Resource Protection Area), highly permeable soils, and nontidal wetlands not included within the Resource Protection Area. It is adjacent to the Resource Protection Area.
- o **Potentially Developable Area** - there are certain places within the Resource Protection and Land Management Areas where development has already occurred and public utilities are available. The Potentially Developable Area overlays the Resource Protection or

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Land Management Areas where they intersect with the Growth Area defined in the Land Use Plan and where one or more of the following conditions exist:

1. The developed area contains greater than 50 percent impervious surface;
2. The area is served by public water and sewer;
3. Where the predominant land use is residential, the housing density is equal to or greater than four dwelling units per acre.

Permitted land uses in the Resource Protection Area are limited to water dependent facilities. Those land uses listed in the Zoning Ordinance and permitted under the appropriate zones, are permitted within the Land Management and Potentially Developable Areas so long as they can meet the objectives of the Shoreline Area Management Plan.

MANAGEMENT FRAMEWORK

Land uses each can be characterized by a set of activities which have the potential to release or generate nonpoint sources of water pollution. Some activities, such as clearing vegetation, occur during the construction phase of land development and are common to a wide range of land uses. Other activities are associated with an ongoing land use. The concerns of this plan are activities that occur on sensitive lands on or near the shoreline of the County's rivers and streams. The purpose of this plan is to create a management framework that systematically identifies the sources of nonpoint water pollution and prepares guidelines to reduce or eliminate their impacts. The development of a management framework for the Shoreline Management Area is a five step process:

1. Designation of land uses occurring in the Shoreline Management Area. This step is accomplished in the County's Land Use Plan, adopted in July, 1988, and in latter sections of this plan.
2. Identification of potential nonpoint pollutants and activities associated with each of the land uses recommended by the Land Use Plan.
3. Relating land use activities to each of the components of the Shoreline Management Area, as defined in this plan.
4. Formation of guidelines for land use activities in each Shoreline Management Area component.
5. Conversion of guidelines to amendments to the zoning, subdivision, and wetland regulations.

This section deals with steps 2-4 of this process. Figure 1 illustrates the relationship among these steps.

Identifying the Shoreline Area

The Land Use Plan identifies and delineates the three area subcategories of the shoreline management area. The definitions of those areas are refined within this plan, and may be found in the preceding section. The three shoreline area subcategories are:

- o The Resource Protection Area,
- o The Land Management Area, and
- o The Potentially Developable Area.

Building the Framework

The management framework is built around Stafford County's desire to preserve shoreline areas as a resource and to protect water quality and sensitive environmental components, which if improperly developed could degrade water quality. The foundation of the framework rests in the knowledge that certain land use activities in environmentally sensitive areas can generate nonpoint pollutants, lead to shoreline erosion, or destroy valuable habitat areas. The following sections create the framework by:

- o Describing types of nonpoint pollution,
- o Describing land use activities that generate or release nonpoint pollutants,
- o Describing the various land use categories in the Land Use Plan,
- o Describing the relative importance of the shoreline area components, and
- o Describing the activities associated within land uses, determining the sensitivity of shoreline area components to activities, and determining the compatibility of land uses with shoreline area components.

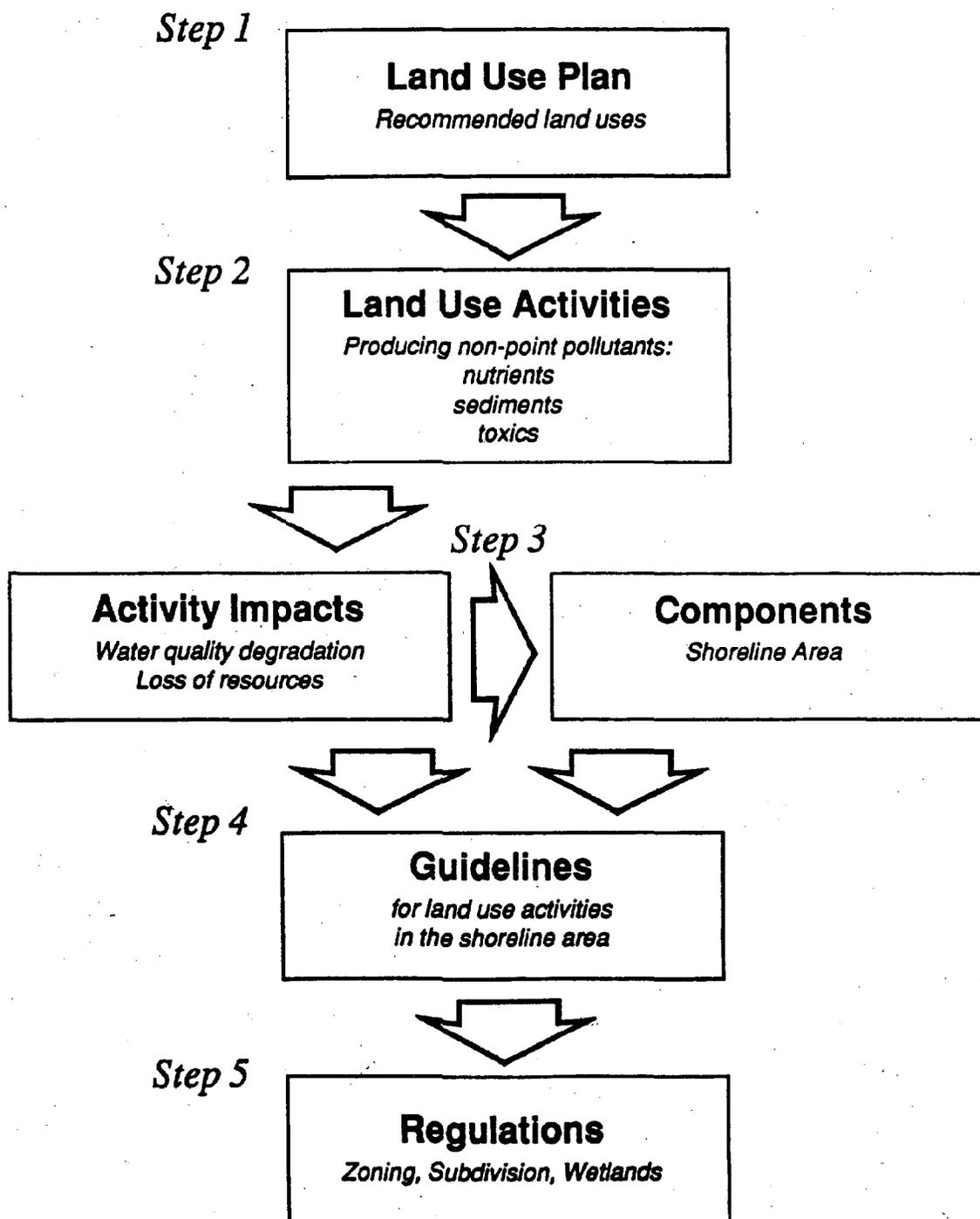
Nonpoint Pollutant Types

There are three basic types of pollutant associated with land use activities which can degrade water quality: sediments, nutrients, and toxics.

Sediments in water come from two sources: from areas vulnerable to erosion from overland stormwater flow and from eroded stream and river channels. Land disturbing activities can leave surface areas exposed leading to erosion. Increases in stormwater flow from impervious surfaces can cause streams to erode their channels resulting in sedimentation

Figure 1

Stafford County Shoreline Area Management Plan Framework



downstream. This sedimentation can smother productive habitat areas. The sediment particles themselves can carry excess nutrients into water bodies, obstruct sunlight from reaching submerged aquatic vegetation, raise water temperature, and suffocate aquatic animal life.

Nutrients in excessive levels, principally phosphorous and nitrogen, are responsible for algal blooms which degrade water quality by depleting the dissolved oxygen essential for other organisms. These algal blooms also have some effects similar to sediments by blocking sunlight and raising water temperature. Agricultural and lawn fertilizers, septic systems, and road runoff are common sources of nutrients.

Toxic substances introduced into water bodies can, even in minute quantities, have a disastrous effect on animal and plant life. Many toxic substances particularly metals, persist in the environment by cycling through the food chain and eventually reaching humans. Most releases of toxics occur where they are applied, disposed of, or stored.

Land Use Activities that Generate or Release Nonpoint Pollutants

The three major categories of pollutants are released due to activities in urban, suburban, and rural areas. These activities can be broadly categorized as development related and agriculture related. This plan considers eleven activities.

Cultivation/Tillage. Conventional cropping practices can leave disturbed soils exposed without vegetation for periods during which stormwater can cause erosion and sedimentation.

Pasture. Pasture areas can be an asset to water quality if they are properly managed and maintained with a vegetated cover. However, where large numbers of animals are allowed in streams or on steep slopes, they can cause erosion and lower water quality.

Dairies and Feedlots. These activities involve high concentrations of animals, most often cattle, which produce large quantities of waste. They are often located on large expanses of either impervious surface or exposed soils. These operations can increase stormwater flows, and increase nutrients and sediment levels delivered to water bodies.

Fertilizers and Pesticides. If these substances are applied in the wrong concentration, at the wrong time, or too close to water bodies, the result can be excessive amounts of them in streams, rivers, and the Bay. Improper storage and handling of these substances can also result in their release into water bodies with harmful effects to water quality.

Vegetation Clearing. The clearing of vegetation is needed for a variety of land uses. Land development includes clearing of vegetation in preparation for construction. Exposed soils are subject to erosion resulting in sedimentation of water bodies.

Soil Grading/Dredging and Filling. These activities are combined because they each involve disrupting areas of soil and sediment, exposing them to erosion or direct resuspension in the water column. They each can lead to turbidity in water bodies, the disruption of habitat, and, where dredging is involved, the resuspension of previously deposited nutrients and toxic materials.

Mining. The principal mining operations of direct concern to water quality in the Bay and its tributaries are sand and gravel operations which recover materials along streams and rivers or from abandoned river terraces and benches. The sand and gravel are removed, sorted, and washed creating a potential for releasing large amounts of fine particles to surface waters.

Creation Of Impervious Surface. Most land development results in the creation of impervious surfaces such as rooftops, sidewalks, roads, and parking areas. These areas inhibit the infiltration of stormwater into the ground. Resulting increases in surface flows during storms erode soils and change stream profiles. Roads and parking areas accumulate toxic substances and nutrients which are carried by stormwater into water bodies.

On-site Wastewater Treatment. All types of individual, or community on-site wastewater treatment techniques can potentially impact water quality. Even well-designed, properly installed septic systems can release nutrients, primarily nitrates, to groundwater which makes its way to surface waters of streams and rivers.

Solid Waste Disposal. This activity is intended to include all types of solid waste disposal including but not limited to landfills. Surface water quality problems associated with solid waste disposal can occur directly and indirectly. Wastes discharged directly into water bodies (including wastes from ships and boats) have a negative impact on water quality if they contain nutrients, and toxic materials. Wastes disposed of on land can directly affect surface water quality if washed into water bodies or they can reach surface waters indirectly through groundwater.

Toxic Substance Storage/Disposal. When toxic substances are released into the environment, they have the potential for degrading water quality. Normal usage of these materials involves releases into the environment. Mishandling these products during normal usage can damage environmentally sensitive areas. Areas where they are disposed of or stored are particularly vulnerable to releases due to the concentrations of materials involved.

Land Use Categories, Land Use Plan, 1988

The County's Land Use Plan adopted in 1988, defines and maps 14 land use categories:

Urban residential	Institutional
Suburban residential	Transitional
Mobile home	Rural Residential
Urban commercial	Rural Commercial
Office	Agriculture
Light industrial	Park
Heavy industrial	Resource Protection

Appendix 1 contains definitions for the above listed categories.

Shoreline Area Components

These components are environmentally sensitive to certain types of land uses and their associated activities. This sensitivity results from a component's status as a sensitive receptor, a pathway for pollutants, or as a potential source of pollutants.

Tidal Shore. These are lands contiguous to a tidal body of water between the mean low water level and the mean high water level. This component is potentially sensitive as receptor of pollutants, it is the last link in the nonpoint pollution pathway in tidal areas, and if disturbed it can act as a source of pollution to water bodies.

Tidal Wetland. These are vegetated and nonvegetated wetland areas as defined in section 62.1-13.2 of the Code of Virginia. Tidal wetlands are principally sensitive as receptors of nonpoint pollutants from land use activities. Disrupting wetlands eliminates or impairs their ability to filter nonpoint pollutants from surface waters.

Non-tidal Wetland. Non-tidal wetlands are those other than tidal wetlands that are inundated or saturated by surface or ground water at a frequency and duration sufficient support, and that under normal circumstances do support a prevalence of vegetation typically adapted for life in saturated soil conditions, as defined by the U.S. Environmental Protection Agency pursuant to Section 404 of the federal Clean Water Act, in 33 C.F.R. 328.3b, dated November 13, 1986, as amended. The nontidal wetlands component is sensitive to the same types of disruption as tidal wetlands. Nontidal wetlands can be more difficult to identify than tidal wetlands, so they must be carefully defined.

Buffer Areas. These are vegetated areas immediately upland from shorelines and wetlands whose function is to protect water quality features from upland land uses. They accomplish this best when they are maintained in indigenous vegetation thick enough to filter non-point pollutants from

stormwater. Indigenous vegetation is recommended due to its lower maintenance needs over exotic vegetation, which might require pesticides and supplements of water and fertilizers. Buffer areas are linear features of set widths which should not be disturbed.

Floodplains. Floodplains include all lands that would be inundated by flood water as result of storm event of a 100-year return interval. Floodplains are an important link in the pathways to surface water bodies. At least a portion of all waterfront uses are in the floodplain, and agricultural uses are often found there, so there are many opportunities for pollution to reach water bodies from activities in floodplain areas.

Steep Slopes. These include slopes which have a grade steeper than 15 percent. When disturbed, steep slopes are easily eroded; fertilizers and pesticides applied on steep slopes are more easily washed downslope and into waterways.

Highly Permeable Areas. These areas have a significant potential to transmit water through the soil profile. Highly permeable soils are identified as any soil having a permeability equal to or greater than six inches of water movement per hour in any part of the soil profile to a depth of 72 inches (permeability groups "rapid" and "very rapid") as found in the "National Soils Handbook" of July, 1983 in the "Field Office Technical Guide" of the U.S.D.A. - Soil Conservation Service. Soils of this type are sensitive due to their ability to rapidly transmit pollutants to ground water. When polluted groundwater recharges surface water bodies, such as streams and rivers, it often carries those pollutants with it.

Highly Erodible Areas. These are soils with an erodibility index (EI) from sheet and rill erosion equal to or greater than eight. The erodibility index for any soil is the product of the formula $RKLS/T$, as defined by the "Food Security Act (F.S.A.) Manual" of August, 1988 in the "Field Office Technical Guide" of the U.S.D.A. - Soil Conservation Service, where K is the soil susceptibility to water erosion in the surface layer; R is the rainfall and runoff factor; LS represents the combined effects of slope length and steepness; and T is the soil loss tolerance factor.

Highly erodible soils represent potential sources of non-point pollution as sediments and as vehicles for nutrients, pesticides, toxics, or other pollutants which attach themselves to soil particles.

Shoreline Area Management Analysis

After the major factors have been defined - land uses, land use activities, and shoreline area components - they can be matched against each other so that potential impacts can be traced from the causative land use to the sensitive shoreline resource on which the land use is located.

Land Use - Activity Analysis

Figure 2 is the Land Use/Activity matrix. It displays the activities that are likely to occur as a result of the principal land uses in each of the Land Use Plan's land use categories. If an activity is regulated in the Shoreline Area Management Plan, its regulation will apply to any land use in which it is likely to occur. Figure 2 establishes this connection.

Shoreline Area Component - Activity Analysis

The activities affecting water quality through nonpoint pollution generation and release and the components of the Chesapeake Bay Protection Area are related to each other in Figure 3. This figure shows those areas where direct impacts of certain activities are too high to allow the activity and areas where indirect impacts of certain activities are beyond those which can reasonably be expected to be managed. The figure also shows areas where there should be both a limitation of the activity and a management of impacts, and finally those areas where there is no need to limit the activity but there should be management of the activity's impacts.

In the section below, the sensitivity of each shoreline component to the various nonpoint source generating activities is discussed.

Shoreline Area Component Sensitivity to Land Use Activities

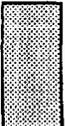
Tidal Shore. Because the definition of tidal shore specifically includes only the intertidal zone, all activities are prohibited except for three categories. Vegetation clearing and grading, dredging, or filling can occur where necessary to accommodate water dependent facilities or to stabilize an erosion situation where absolutely necessary. An impervious surface may be necessary for a water dependent use such as a boat ramp. Wherever such activities are permitted, they should be conducted with Best Management Practices (BMP) appropriate to the activities to protect water quality.

Tidal and Nontidal Wetlands. Activities in these areas are generally prohibited. Some clearing of vegetation could be allowed as part of an overall, approved plan to manage the resource. For instance, salt hay could be harvested from certain wetlands since this does not involve complete removal of vegetation.

Buffer Areas. Essentially, buffer areas are off-limits to land uses. Pastures in buffer areas can be allowed if a thick vegetative cover remains.

Figure 2. Stafford County Land Use / Activity Matrix

Land Use	Activity												
	Cultivation/ Tillage	Pasture	Dairies/ Feedlots	Fertilizer/ Pesticide Application	Vegetation Clearing	Soil Grading	Mining	Create Impervious Surface	Wastewater Treatment Onsite	Solid Waste Disposal	Toxic Material Storage/ Disposal		
Resource Protection													
Agricultural													
Rural Residential													
Transitional													
Suburban Residential													
Mobile Home													
Urban Residential													
Rural Commercial													
Urban Commercial													
Light Industrial													
Heavy Industrial													
Office													
Institutional													
Park													



= Activity could occur as a result of principal uses in Land Use category

Figure 3. Shoreline Area Component / Activity Matrix

Shoreline Area Component	Activity										
	Cultivation/ Tillage	Pasture	Dairies/ Feedlots	Fertilizer/ Pesticide Application	Vegetation Clearing	Soil Grading - Dredging/ Filling	Mining	Create Impervious Surface	Wastewater Treatment Onsite	Solid Waste Disposal	Toxic Material Storage/ Disposal
Tidal Shore	X	X	X	X			X		X	X	X
Tidal Wetland	X	X	X	X		X	X	X	X	X	X
Nontidal Wetland	X	X	X	X		X	X	X	X	X	X
Floodplain			X						X	X	X
Steep Slope: > 15%	X	X	X			X		X	X	X	X
Highly Permeable Area									X	X	X
Highly Erodible Area											
Buffer Areas	X		X			X	X	X	X	X	X

 = Impact too high to allow activity

 = Limitation on activity; management of impacts

 = No limitation on activity; management of impacts

The application of fertilizers should only be used to establish the vegetative cover, and only in quantities which cannot be carried away from the site.

Vegetation removal should be limited to that required as part of approved BMPs to enhance the vegetative cover in the buffer or to construct access to water dependent uses.

Impervious surface needed for or to access water dependent uses are allowed.

Floodplain. The soil characteristics of the floodplain often make it ideally suited for crop and pasture land. These activities should be allowed in the floodplain so long as some protection measure is in place, such as a buffer area, and/or a management practice is utilized to assure that excess fertilizers and pesticides do not enter the adjoining water body.

Vegetation clearing should be limited to the removal of nuisance species where necessary. Clearing large portions of wooded areas from floodplains could alter their flood handling characteristics and allow flooding to damage downstream development. Even the effect of vegetation clearing to make way for crops or pastures should be carefully considered in an approved farm management plan.

Soil grading, dredging/filling, and mining are activities with effects in the floodplain similar to those in the tidal shore area, although the potential for release of pollutants may be somewhat lower in the floodplain. These activities should be kept to a minimum and their impacts managed with appropriate BMPs. Reclamation of mined areas along the edges of water bodies should be designed to restore the area equal to its original or to an enhanced state.

Occasionally it is necessary to construct a road through a floodplain, but impervious surfaces should be minimized, including structures. Dwellings generally are not allowed in the floodplain. Their associated impervious surfaces should also be minimized.

On-site wastewater treatment, solid waste disposal, and toxic material storage/disposal are prohibited.

Steep Slopes. Most activities on steep slopes should be prohibited. Fertilizers and pesticides can be applied as necessary to maintain sound vegetative cover so long as excessive amounts, which may end up in water bodies, are not used.

Vegetation clearing is only allowed to manage the indigenous vegetation.

Mining of steep slopes can be allowed where it would involve removal of the slope during mining so long as the reclamation plan specifies the immediate stabilization of the disturbed areas.

Highly Permeable Areas. No special limitations in these areas should be imposed on cropping or pasture activities which do not involve the application of nutrients or pesticides.

It should be recognized that these areas represent considerable potential for groundwater pollution and therefore fertilizers and pesticides should not be applied in quantities that could enter the groundwater.

Dairies and feedlots should not concentrate animals on portions of their sites which are highly permeable. These areas should be reserved for less intense aspects of the operation.

Vegetative clearing, soil grading, and mining hold no special concern in pervious areas; however, the typical impacts associated with those activities should be managed with appropriate BMPs

Creation of impervious surfaces is not a concern if the excess runoff is uncontaminated with oil residues and other vehicular pollutants and is readily infiltrated.

On-site wastewater treatment, solid waste disposal, and toxic material storage and disposal present too great a risk to water pollution and should be prohibited.

Highly Erodible Areas. No-till methods should be used to prevent soil loss in highly erodible areas. Pasture areas should be managed so that vegetative cover is maintained throughout and that animal paths do not erode into gullies.

Dairies and feedlots should not concentrate animals on portions of their sites which are highly erodible. These areas should be reserved for less intense aspects of the operation.

Fertilizers and pesticides should be applied only in amounts necessary to maintain sound vegetative cover.

Vegetation clearing should be done selectively with care taken not to denude any areas, and then only as an effort toward enhancing the indigenous vegetation.

Soil grading should be done only when absolutely necessary and avoided whenever possible. Should grading be necessary the appropriate BMPs should be utilized.

Mining may remove erodible areas. Other mining activities should avoid these areas, or use BMPs where necessary. Reclamation plans should call for the stabilization of these areas.

When constructing impervious surfaces on erodible areas, the appropriate BMPs should be utilized. Impervious areas should be graded so that concentrated stormwater is not directed onto highly erodible areas.

Except for taking the normal erosion and sedimentation precautions during the construction phase, on-site wastewater treatment, and solid waste disposal should not present special problems in these areas, since materials are placed beneath the erodible horizon.

Shoreline Area Component Sensitivity to Land Use.

The purpose of the comparison represented by the matrix in Figure 4 is to summarize which land uses are incompatible with the Shoreline Area components, which ones might be allowed under certain conditions, and for determining where compatibility between the two exist but management of the activity is still desirable.

The first column in the matrix indicates that the most favorable comparison occurs between the Resource Protection land use category and the CBPA components. This is as it should be since the Resource Protection area is designed as a limited use, conservation area. Any limited uses which are allowed should be managed to protect the sensitive areas and to prevent water quality from degradation according to the guidelines presented above.

The matrix indicates that most of the land uses, as defined by their principal activity, are incompatible with the most of the components. The exceptions lay within the Highly Permeable and Erodible Areas. These areas consist of soils of limited areal extent. For this reason, it is often possible to design a site so that these features are avoided where necessary or, by utilizing best management techniques, to mitigate the effects of the land use on those areas.

III. RECOMMENDED DEVELOPMENT GUIDELINES FOR LAND USE ACTIVITIES IN THE SHORELINE AREA

Based on the analysis of the previous section, land use activity guidelines are established that indicate the degree an activity should be controlled based on the sensitivity of the resources along the shoreline. Guidelines for water quality protection in the shoreline area are organized by land use activity; they address restrictions and conditions specific to an activity proposed for one or more shoreline components; where guidelines conflict due to co-occurrence of components, the more restrictive guideline applies.

Figure 4. Stafford County Shoreline Area (CBPA) Component / Land Use Matrix

Shoreline Area Component	Land Use													
	Resource Protection	Agricultural	Rural Residential	Transitional	Suburban Residential	Mobile Home	Urban Residential	Rural Commercial	Urban Commercial	Light Industrial	Heavy Industrial	Office	Institutional	Park
Tidal Shore		X	X	X	X	X	X	X	X	X	X	X	X	
Tidal Wetland		X	X	X	X	X	X	X	X	X	X	X	X	
Non-tidal Wetland		X	X	X	X	X	X	X	X	X	X	X	X	
Floodplain			X	X	X	X	X	X	X	X	X	X	X	
Steep Slope: > 15%		X	X	X	X	X	X	X	X	X	X	X	X	
Highly Permeable Area														
Highly Erodible Area														
Buffer Areas			X	X	X	X	X	X	X	X	X	X	X	



= Land use incompatible; not allowed in CBPA component



= Land use generally incompatible; conditional uses allowed with management of impacts



= Land use compatible; management of impacts

Tillage/Cultivation

- Guidelines:*
- o These activities should not occur in tidal shore, tidal or non-tidal wetlands, steep slope, or buffer area components.
 - o Agricultural Conservation Plans approved by the Soil and Water Conservation District should specify the management techniques to be utilized for these activities in floodplain and highly permeable and erodible areas. These techniques should prevent the transmittal of pollutants to surface or groundwater.
 - o Land upon which agricultural activities are being conducted, including but not limited to crop production, pasture, and dairy and feedlot operations, shall have a soil and water conservation plan that accomplishes water quality protection approved by the local Soil and Water Conservation District by January 1, 1995.

Pasture

The guidelines from Tillage/Cultivation also apply to pastures.

- Guidelines:*
- o Pasture activities are allowed in buffer areas where pasture vegetation already exists.
 - o Agricultural Conservation Plans should indicate the techniques required for maintaining vegetation in the buffer area in a state which allows it to function as intended.

Dairies/Feedlots

The guidelines from Tillage/Cultivation also apply to pastures.

- Guidelines:*
- o These activities should be prohibited from all components except highly permeable and erodible areas.
 - o High Animal concentrations and nutrient-rich runoff should not be permitted in highly permeable or erodible areas.

Fertilizer/Pesticide Application

Guidelines:

- o These activities should be prohibited in tidal shore, tidal wetland, and non-tidal wetland areas.
- o Application of these substances should be limited in the floodplain to that absolutely necessary for agricultural activities. Activities should be selected for their minimal requirements of these substances. Application techniques should be selected which will minimize the threat of water pollution.
- o Application of these substances in the remaining components should be limited to amounts that are necessary to maintain a thick vegetative cover, but performed in a manner so that none leave the site.

Vegetation Clearing

Guidelines:

- o Development design and construction shall minimize the site area disturbed.
- o No more land shall be disturbed than is necessary to provide for the desired use or development.
- o Indigenous vegetation shall be preserved to the maximum extent possible consistent with the use and development allowed.
- o Evidence of all wetland permits required by law must be submitted to the County prior to authorization clearing of vegetation.
- o All development exceeding 2,500 square feet of land disturbance shall be accomplished through a plan of development review process consistent with 15.1-491(h) of the Code of Virginia.
- o Any land disturbing activity that exceeds an area of 2,500 square feet (including construction of all single family houses, septic tanks and drainfields, but otherwise as defined in 10.1-560 of the code of Virginia) shall comply with the requirements of the local erosion and sediment control ordinance.
- o Except in highly permeable and tidal shore areas, vegetation clearing should be limited to that necessary to best manage and enhance the quality of stormwater runoff.

- o Clearing in highly permeable areas is allowed as long as the disturbed area is replanted as soon as possible. Vegetation should be retained which can trap or absorb pollutants which may otherwise be introduced into the groundwater. Where it cannot be retained, vegetation which can trap or absorb pollutants should be replanted after the construction phase.
- o Clearing in tidal shore areas should be limited to that required to carry out approved soil grading-dredging/filling operations needed by water-dependent uses.

Soil Grading - Dredging/Filling

Guidelines:

- o No more land shall be disturbed than is necessary to provide for the desired use or development.
- o All development exceeding 2,500 square feet of land disturbance shall be accomplished through a plan of development review process consistent with 15.1-491(h) of the Code of Virginia.
- o Any land disturbing activity that exceeds an area of 2,500 square feet (including construction of all single family houses, septic tanks and drainfields, but otherwise as defined in 10.1-560 of the code of Virginia) shall comply with the requirements of the local erosion and sediment control ordinance.
- o Evidence of all wetland permits required by law must be submitted to the County prior to authorization clearing of vegetation.
- o Development design and construction shall minimize the site area disturbed.
- o These activities should be prohibited in tidal and non-tidal wetland, steep slope, and buffer area components.
- o These activities should be limited to appropriately sited water-dependent uses in tidal shore areas.

- o Soil grading, dredging, and filling activities should be limited in the floodplain to those associated with water-dependent uses, permitted uses associated with water dependent uses, or those associated with public transportation facilities which cannot be relocated. In all such cases, these activities should be minimized to the extent possible in the floodplain.
- o Where otherwise permitted soil grading, dredging, and, filling should be conducted using appropriate BMPs to prevent off-site erosion. When the activities been terminated, the site should be stabilized, preferably with indigenous vegetation.

Mining

Guidelines:

- o Mining should be prohibited from the tidal shore, tidal and non-tidal wetland and buffer area components.
- o In the floodplain, mining should be conducted utilizing appropriate BMPs to prevent the degradation of water quality. Disturbed areas should be reclaimed so that they are permanently stabilized by grading and planting or seeding with indigenous vegetation.
- o Mining should avoid steep slopes, or remove them. If mined they should be quickly stabilized in the reclamation process.
- o Mining activities in highly permeable areas, such as sand gravel deposits, should be conducted so that pollutants from machinery cannot be infiltrated into the groundwater.
- o Mining activities in highly erodible areas should be conducted with appropriate BMPs which will protect against off-site erosion.

Creation of Impervious Surfaces

Guidelines:

- o Land development shall minimize impervious cover consistent with the use or development allowed.
- o Impervious surfaces shall be limited to those absolutely required for the development. Road lengths should be shortened and structure footprints kept as

small as possible. Parking should be within the principal structure wherever possible; if outside, requirements for impervious surfaced parking lots should be reduced.

- o Pervious surfaces which accomplish improvements in water quality and perform the intended function of conventional impervious surfaces shall be utilized wherever and whenever possible.
- o Structure footprints should be reduced by increasing the number of stories in the structure, so long as the structure height complies with the maximum allowed in that zone.
- o Clustering shall be mandatory.
- o Impervious surfaces should not be permitted in the tidal or non-tidal wetland, on steep slopes, or in buffer area components.
- o Minimal impervious surfaces can be allowed in tidal shore areas where they are associated with water dependent uses.
- o Runoff from impervious surfaces in the floodplain should be recharged close to where it falls as precipitation. Stormwater from contaminated surfaces should not be directed for infiltration to highly permeable areas where it is determined that groundwater contamination could occur.
- o Runoff from impervious areas should not be directed onto highly erodible areas where it can be avoided. If unavoidable, runoff to erodible areas should be limited to sheet flows onto vegetated areas.
- o Stormwater management guidelines:
 1. For development, the post-development nonpoint source pollution runoff load shall not exceed the predevelopment load based upon average land cover conditions;
 2. Redevelopment of any site that did not have best management practices incorporated into its existing development shall a 10% reduction of non-point source pollution in runoff compared to the existing runoff load from the site. Post-develop-

ment runoff from any redevelopment site that did incorporate best management practices into its existing development shall not exceed the existing load of nonpoint source pollution in surface runoff. These criteria shall apply to redevelopment whether or not it is located within a Potentially Developable Area.

3. The following are options which may be used by the County in developing a stormwater management program for redevelopment:
 - a. Incorporation on the site of best management practices that achieve the required control;
 - b. Compliance with an adopted regional stormwater management program, which could be adopted by the County, incorporating pro-rata share payment pursuant to the authority provided in 15.1-466(j) of the Code of Virginia that results in achievement of equivalent water quality protection.
 - c. Compliance with the state or local program of stormwater discharge permits pursuant to 402 (p) of the federal Clean Water Act, as set forth in 40 C.F.R. Parts 122, 123, 124, and 504, dated December 7, 1988 as amended.
 - d. For a redevelopment site that was completely impervious as originally developed, restoring a minimum 20% of the site to vegetated open space.
4. Any maintenance, alteration, use, or improvement to an existing structure not changing or affecting the quality of surface water discharge, as determined by the County, may be exempted from the stormwater management requirements.

On-site Wastewater Treatment

- Guidelines:*
- o On-site wastewater treatment facilities should be prohibited from all Shoreline Area components except highly erodible areas.

- o Where highly erodible soils are found to be suitable for on-site wastewater treatment facilities, they should be allowed. Care should be exercised during the construction process to prevent sediments from entering the resource protection areas components.

Solid Waste Disposal

- Guidelines:*
- o Solid wastes disposal should be prohibited in all Shoreline Area components with the exception of highly erodible areas.
 - o Where highly erodible areas are otherwise found to be suitable for solid waste disposal, care should be exercised during the land disturbing phase to prevent erosion. The site should be permanently stabilized when activities have been completed by proper grading and revegetation with indigenous plants.

Toxic Material Storage/Disposal

- Guidelines:*
- o Toxic material storage and/or disposal should be prohibited in all Shoreline Preservation Area.

Best Management Practices

- Guidelines:*
- o Where the best management practices utilized to eliminate or reduce water pollution in the Shoreline Preservation Area require regular or periodic maintenance in order to continue their functions, such maintenance shall be ensured by the local government through a maintenance agreement with the owner or developer or through some other mechanism that achieves an equivalent objective.

Guidelines for Resource Protection Areas

- o Any proposed development allowed in the Resource Protection Area shall be required to submit a water quality impact assessment prior to the approval of any site plans.
- o Site Plans may be approved only for water-dependent development or for redevelopment.
- o Site Plans for new or expanded water-dependent facilities may be approved provided that:

- It does not conflict with the Comprehensive Plan.
 - It complies with the requirements in the previous section.
 - Any nonwater-dependent component is located outside of Resource Protection Areas;
 - Access will be provided with the minimum disturbance necessary. Where possible, a single point of access will be provided.
- o Redevelopment shall conform to applicable stormwater management and erosion and sediment control requirements for the Shoreline Area.
 - o Required buffer areas shall consist of indigenous vegetation provided it is of a type and quantity to accomplish the required improvements to stormwater runoff quality. Where such natural vegetation does not exist, appropriate vegetation shall be established.
 - Indigenous vegetation shall be preserved to the maximum extent possible, with the following exceptions:
 - 1) Trees may be pruned or removed as necessary to provide for sight lines and vistas, provided that where removed, they shall be replaced with other vegetation that is equally effective in retarding runoff, preventing erosion, and filtering nonpoint source pollution from runoff.
 - 2) Any path shall be constructed and surfaced so as to effectively control erosion.
 - 3) Dead, diseased, or dying trees or shrubbery may be removed at the discretion of the landowner, and silvicultural thinning may be conducted based upon the recommendation of a professional forester or arborist.
 - 4) The landward fifty feet of the buffer area may be used for the installation and continued maintenance of best management practices appropriate for the site.
 - 5) On land where the buffer area less than 100 feet wide is allowed due to the drainage pattern, provisions shall be made to ensure that surface runoff is filtered in a manner equivalent to that provided by the buffer area prior to entering state waters.

- 6) For shoreline erosion control projects, trees and woody vegetation may be removed, necessary control techniques employed, and appropriate vegetation established to protect or stabilize the shoreline in accordance with the best available technical advice and applicable permit conditions or requirements;

When the application of the buffer areas would result in the loss of a buildable area on a lot or parcel recorded prior to the effective date, modifications to the width of the buffer area may be allowed in accordance with the following criteria:

- 1) Modifications to the buffer areas shall be the minimum necessary to achieve a reasonable buildable area for a principal structure and necessary utilities;
- 2) Where possible, an area equal to the area encroaching the buffer area shall be established elsewhere on the lot or parcel in a way to maximize water quality protection;
- 3) In no case shall the reduced portion of the buffer area be less than 50 feet in width.

In agricultural lands:

- 1) Existing agricultural activities in the buffer zone area shall maintain, as a minimum best management practice, a 100 foot wide vegetated filter strip. The buffer area is not required for agricultural drainage ditches if the adjacent agricultural land has in place best management practices in accordance with a conservation plan approved by the local Soil and Water Conservation District;
- 2) The agricultural buffer area shall be managed to prevent concentrated flows of surface water from breaching the buffer area and noxious weeds (such as Johnson grass, kudzu, and multiflora rose) from invading the buffer area.
- 3) The agricultural buffer area may be reduced to a minimum without of 50 feet when the landowner has implemented on the adjacent cropland, a program of Best Management Practices that improve water quality in accordance with a conservation plan approved by the local Soil and Water Conservation District; provided that the portion of the conservation plan being implemented for the Resource Protection Area achieves water quality protection at least the equivalent of that provided by the buffer area.

APPENDIX 1.

Land Use Categories in the Stafford County Land Use Plan

Heavy Industrial. Areas designated for manufacturing; fabricating; commercial processing, especially as it related to agricultural processing; mining; excavating; and other land uses which are often water intensive and generally characterized as being a nuisance to less intensive land uses and to the environment. Encourages, but is not limited to, industrial parks.

Light Industrial. Areas designated for clean, non-nuisance industrial uses which are not water intensive and are located near such transportation systems as: railroad lines, major highways, and/or airports. Includes warehousing, wholesaling, manufacturing, and processing operations. Encourages, but is not limited to, planned industrial and office parks.

Urban Commercial. Areas designated for intensive commercial development located within the Growth Area on major arterial roads. Includes, but is not limited to, wholesale, retail, and service commercial uses.

Office. Areas designated for professional offices, located within the Growth Area in close proximity to urban commercial and industrial uses, and which buffer residential uses from more intensive urban uses. Includes, but is not limited to, medical, legal, and financial uses.

Institutional. Areas designated for development which serves a public or social function, often community-wide or regional in nature. Includes, but is not limited to, hospitals, schools, and public buildings.

Urban Residential. High density residential areas, located within the Growth Area in close proximity to urban services and roads capable of handling higher traffic volumes. Permits development at a maximum of seven (7) townhouses or fifteen (15) apartments per acre.

Planned Unit Developments (PUD's). A land use designation which allows an alternative from conventional residential development and encourages innovative housing types. A percentage of commercial and industrial development is permitted as a portion of the project. Specific areas have not been designated on the Land Use Plan (LUP) for this type of development. Such development is encouraged within the Growth Area through a special review process.

Mobile Home. Planned residential communities for mobile homes, located in close proximity to urban services and roads capable of handling higher traffic volumes. Permits development at a maximum density of seven (7) dwelling units per acre.

Suburban Residential. Areas for single family residential development, on public water and sewer and located within the Growth Area. Permits development at a maximum density of three (3) dwelling units per acre.

Transitional. Residential areas adjacent to the Growth Area which allow increased densities from the Rural Residential density when one or both public utilities can be provided, and acts as a transition between rural and suburban areas. Permits residential development at a density of on (1) dwelling unit per acre with one (1) public utility and one (1) private systems, or two (2) dwelling units per with public water and sewer. Where no utility is provided, development density must not exceed one (1) dwelling unit per three (3) acres.

Rural Commercial. Commercial centers located outside the Growth Area which provide convenient commercial services to rural populations. Permits limited service and retail commercial uses.

Rural Residential. Areas which are not served by public utilities, are generally characterized by limited road networks, and have limited access to community facilities. Permits residential development at a maximum density of one dwelling per three (3) acres.

Agricultural. Land with either secondary or prime agricultural soils, and/or working farms, where agricultural or forestal uses are promoted. Permits residential development at a maximum density of one (1) dwelling unit per three (3) acres and also permits ten (10) acre lots on private roads.

Land Management. An overlay category which works in conjunction with the primary land use category for a property. This overlay identifies land which can be developed through the use of specific development standards which assure the protection of the County's drinking water supplies and the aesthetic quality of the riverfronts and major waterways, or which have development limitations due to a predominance of poor soils and/or steep slopes. Development density is mandated by the primary land use classification of the property and its maximum development density.

Resource Protection. Conservation areas which are generally unsuitable for building development due to health and safety concerns and potential threats to environmental resources. Includes, but is not limited to, 100-year floodplains, perennial streams, rivers, wetlands, and extreme slopes adjacent to these areas. Use of this area is ~~not~~ limited to water dependent facilities.

Park. Areas designed for active and/or passive recreational activities.

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