

---

Town of Colonial Beach 2009 Comprehensive Plan

---

# Chapter 6

# Environmental

# Addendum

---

A Reproduction of the Environmental Addendum Included in the  
1999 Comprehensive Plan.





## **Waterfront Access**

### *Overview*

The Year 2020 panel of the Chesapeake Bay Executive Council reported that the population of the Tidewater region is projected to increase by 1.5 million in the next thirty years. Much of this growth will be concentrated at or near the shorelines and waterways of the Bay and its tributaries. Development pressure in and around waterfront areas threatens valuable natural resources which are critical to the life of the Chesapeake Bay. The increase in demand for waterfront property has driven up the price and made public acquisition of these lands difficult, and in some cases even impossible. For this reason alone, it is critical that the Town of Colonial Beach maintain, improve, and preserve all of the public lands which provide waterfront access. Preserving the quality of the Potomac River, Monroe Bay and other tributaries of the Chesapeake Bay is a high priority in Colonial Beach. Due to the demand for, and environmental sensitivity of, waterfront land it is critical that Colonial Beach establish policies and strategies to ensure public and private access which promotes water quality. The following sections discuss activities which are extremely important and require special attention.

### ***Boating Activities***

As of July, 1999, 140,410 boats were registered in the Tidewater region. Of this number 3,485 boats, approximately 2.4%, were registered in Westmoreland County. Due to its location adjacent to the quiet waters of Monroe Bay, Colonial Beach is, and will continue to be, a popular summer resort community for boating enthusiasts. The increased number of boaters creates an added demand for public and private boating facilities. The increase of boating related activity has a positive impact on the local economy; however, if not handled properly it can have a negative impact on the water quality of Monroe Bay, Potomac River, and surrounding waters.

Poorly designed boat facilities, improper storage of fuel and sewage, toxic bottom paints, dredging, and increased boat traffic have adverse effects on Colonial Beach's water resources. The Town should work cooperatively with the federal and state agencies in providing improved public/private facilities, boater education, and enforcement.

### ***Recreational Fishing***

Recreational fishing is a very popular sport among many Colonial Beach visitors and residents. The Department of Game and Inland Fisheries estimates that over 1 million recreational anglers fish in the tidal waters of Virginia each year. Each recreational angler is estimated to spend between \$50.00 and \$100.00 dollars per day; these figures add up to approximately \$492.8 million; annually creating 15,662 jobs with a payroll of \$216.6 million. Although there is no specific data on the impact of recreational fishing on the local economy, judging from the boat traffic on Monroe Bay and Potomac River during the summer season and striped bass "rockfish" season, there can be no doubt as to its positive effect on the Town's economy. The Potomac River Fisheries Commission, a bi-state authority (Maryland and Virginia) regulating fishing activities in the Potomac River, reports that striped bass permits grew from 5600 in 1991 to 6600 in 1992. As the Town's population expands so will the demand for piers, community open spaces on the water (bank fishing), boat ramps, and marinas. In order to adequately address this demand, the Town must promote centralized public access points designed to accommodate a large number of people and improve water quality. Numerous and scattered facilities will increase the potential for poor design and maintenance leading to a decline in water quality.

### ***Commercial Fishing***

The commercial fishing industry is important to the economy and to the culture/history of Colonial Beach. The Virginia Marine Resources Commission estimates that 723 million pounds of seafood are landed in Virginia waters each year, contributing \$422 million to the economy. Of all the oysters harvested on the Potomac River during the 1998-1999 season, 20 percent were "landed" (brought ashore) in Colonial Beach. The watermen are not only an economic asset to the Town, but because of their unique and demanding trade have helped shape Colonial Beach's image as a small picturesque fishing village. Colonial Beach should encourage the commercial fishing industry by promoting seafood "landing" marinas such as Curly's Packing House and try to protect such waterfront areas from residential development. The decline of the commercial fishing industry and the loss of the waterman in Colonial Beach would be a severe, blow not only to the economy but also to the culture of Colonial Beach.

### ***Passive and Active Recreation Waterfront Access Points***

The Town also enjoys numerous opportunities for passive and active waterfront recreation. Although numerous waterfront access points exist in Town, many are in the state of disrepair and need improvement.

The number one asset in the Town is the public beachfront/boardwalk area. The boardwalk, town pier, and beachfront are inextricably linked and together provide a multitude of recreational opportunities. The beachfront provides an area for swimming, volleyball, sunbathing, and numerous other activities. The town pier accommodates fisherman, crabbers, and people just taking a stroll down the boardwalk. The revitalized boardwalk with its shops and stores would provide a place to walk and enjoy the beautiful view of the Potomac, to eat, to shop, or just relax. A community park would provide some green space for picnicking and other recreational activities. This entire area, if developed properly, is a "gold-mine" of both passive and active public waterfront access and recreation. Other passive and active recreational opportunities and waterfront access can be found at Castlewood Park/Beach (with an adjacent public boat ramp), Robin Grove Park, and Beach Avenue Community Open Spaces. A list of all of these facilities and their characteristics is provided in the *Parks and Recreation* section of the Comprehensive Plan.

Colonial Beach must promote a controlled number of jurisdictionally distributed, properly designed and maintained facilities. These "central/community" public access points should be designed to accommodate a large number of users while minimizing the impact on water quality in Monroe Bay and the Potomac River. By providing these "central/community" access points the Town will be encouraging the public to experience firsthand the importance of water quality in Colonial Beach by fishing, swimming, and similar water related activities.

At the present time, Colonial Beach residents enjoy exceptional access to the local waterfront and major waterways. No additional access points are needed or desirable at this time. Instead, it is expected that future demands and expansions can be reasonably accommodated at existing facilities. Continued improvements should be focused on the Town's marinas, boat ramps, beaches and waterfront parks so that citizens can continue to enjoy water-related activities while also protecting the area's valuable marine resources.

## *Public Waterfront Access Inventory*

Colonial Beach is fortunate to have a large number of public waterfront access areas. Unfortunately, a majority of these public access areas are in need of physical improvement to enhance both their aesthetic and environmental quality. Through the Comprehensive Planning process Colonial Beach hopes to identify the existing problems and recommend policies which will improve and develop existing waterfront areas.

### ***Beach Avenue Open Space***

The Beach Avenue open space is a very narrow stretch of land along the Potomac River stretching from 9th Street northward to 12th Street. A few park benches exist which are in poor condition. These spaces are intended to be used as scenic/picturesque lookouts of the Potomac River. However, poor landscaping and dilapidated park benches limit its use.

The problems in this area are:

- Shoreline erosion is of serious concern - the width of the bank has decreased dramatically and is causing the loss of trees along the bank. Hurricane Isabel accelerated this deterioration and has left even less area that what existed prior. Rip-rap or other protective measures must be taken in the immediate future in order to preserve Beach Avenue and the open space.
- Poor landscaping and maintenance.
- Benches are inadequate.

### ***Central Public Beach***

The central public beach is located in the downtown area stretching for approximately one mile along the Potomac River. There are two restrooms and the public beach serves as an area for swimming, sunbathing and relaxing.

The problems that exist in this area are:

- The entire stretch of public beach has erosion problems which severely impact the width and capacity of the beach.
- Storm water drainage pipes empty right onto the beach and therefore exacerbate the erosion problems. Rainwater causes drainage ruts through the sand washing more sand into the River.
- Concrete along banks increases runoff and causes drainage ruts to form along the beach.

### ***Castlewood Beach***

Castlewood Beach is a small stretch of beach located at the southern tip of town commonly referred to as the Point. There are public restrooms and a small picnic area and playground located across the street. The beach is used for swimming, sunbathing and relaxing.

The problems that exist in this area are:

- As with the other beaches, erosion problems have severely impacted the width and capacity of the beach.

### ***Public Boat Ramp***

The boat ramp which is maintained by the Potomac River Fisheries Commission located adjacent to Castlewood Park at the southern tip of the Town, is located on Monroe Bay which provides direct access to the Potomac River. There are two ramps for launching small to mid-size boats. Parking is located adjacent to the boat ramp.

The problems at the boat ramp are as follows:

- There is occasional inadequate parking for the number of boaters.
- Lack of landscaping and buffering around the ramp and parking areas - increases non-point source pollution run-off.
- Ramp is in poor condition.

### ***Town Pier***

This 300 foot pier located at the end of Hawthorne Street on the Potomac River was rebuilt in the year 2004 after being destroyed by Hurricane Isabel. The pier is used for fishing, viewing the river and relaxation.

The problems at the boat ramp are as follows:

- Parking facilities are inadequate.

### ***Policy Recommendations***

1. *All of the public waterfront access points need to be protected from the destructive forces of shoreline erosion.*
  - A shoreline erosion control plan should be completed which would identify and rank (in order of need) the areas to be protected.
  - Technical assistance should be obtained from state agencies (Shoreline Erosion Advisory Service, Virginia Institute on Marine Science, etc..) in deciding the most appropriate erosion control device.
  - Establish communication and coordination between the town and private waterfront landowners in regards to erosion control. Often the erosion control device one person implements may have an adverse impact on neighboring waterfront property.
  - Storm water outfall structures that presently empty directly on the public beach need to be relocated.
2. *All of the public waterfront access points could be aesthetically and environmentally improved through landscaping.*
  - Planting trees, shrubs, marsh and beach grasses, flowers and the like could improve the water quality by reducing impervious cover/storm water run-off and filtering run off. Landscaping also makes these waterfront areas more attractive to the public and increases their appreciation of the natural environment.
3. *The use of Best Management Practices should be required for any development in order to reduce the pollutant loadings in the surface run-off.*

4. *Parking areas should be designed for both practicality and environmental quality.*
  - Parking areas should be designed to minimize run-off - the use of porous surfaces, vegetation and BMP's can greatly improve water quality.
5. *All public waterfront access areas need additional or improved facilities.*
  - The addition of park benches, lighting , sidewalks, bathroom and shower facilities and other amenities could make these areas more attractive to the public.

## **Shoreline and Stream Bank Erosion**

### *Shoreline Erosion*

Three causes of shoreline erosion can be observed within the Town of Colonial Beach:

1. Wave action generated by storms and boat wakes.
2. Inadequate outfall location and design.
3. Tidal effects and rain runoff on unprotected banks.

Colonial Beach, flanked by the Potomac River to the east and Monroe Bay to the west, has always had to battle shoreline erosion. Shoreline erosion is a natural and continuing process principally caused and exacerbated by wave action and shoreline run-off. Generally, property along the Potomac River is the most susceptible to erosion. This is largely due to the exposed north-south orientation of the town's riverfront which leaves it vulnerable to major storms approaching from the northeast to southeast sector. In particular, tropical storms and northeasters passing through the area often bring high winds, elevated water levels and intense rainfall to the Potomac shoreline. These larger storm events can cause localized flooding, beach erosion and washouts of unprotected bluffs and embankments. Erosion of the Town's public beaches is increased by improperly designed and located Storm water outfall structures. The high exit velocity of the storm water pushes sand directly in the Potomac River. In recent years, public beaches along the Potomac River have undergone extensive evaluation and repair in order to preserve this very valuable public resource.

Areas along Monroe Bay are better shielded from high intensity storms. One primary factor is "fetch", or the overwater distance across which the wind blows. Since Monroe Bay is relatively narrow, the wind generates only low to medium intensity wave action against the tidal shore. However, serious erosion problems also exist along parts of Monroe Bay, due to the cumulative effects of rain runoff, tidal action and boating activity. Upland runoff and tidal action causes slow weathering of the Bay's shoreline and gradually leads to slumping. If left unchecked the loss of soil around trees and other vegetation eventually causes their death and the erosion problem is exacerbated.

Wave energy from boat wakes is another persistent problem, particularly where the navigation channel lies near the shoreline. In recent years, a number of marinas have located or expanded on Monroe Bay, leading to increased use of local waters by small boats. These smaller craft can now navigate the more isolated, upper reaches of Monroe Creek, which are more susceptible to erosion. In addition, interior tidal waterways are often overlooked by the Coast Guard, which is chiefly responsible for enforcement of marine speed limits and no-wake zones.

### ***Erosion Control Measures***

Measures to control shoreline erosion include bulkheading, rip-rap, and natural vegetation such as marsh grass and switchgrass. Unfortunately, many sections of shoreline in Colonial Beach have been the sites of ineffective and harmful erosion control measures. Dumping of broken pavement, discarded concrete, old tires, abandoned vehicles, and other inappropriate items have been used to battle shoreline erosion. These methods are not only ineffective but are unattractive and environmentally unsound.

In medium to high energy areas, properly installed bulkheading or rip-rap will be the most effective means of controlling erosion. Choosing the best design solution will depend on the characteristics, such as bank height, intensity of wave action and other shoreline features. Private landowners should be encouraged to obtain free technical assistance from the Shoreline Erosion Advisory Service (SEAS) as alternative types of structures are evaluated and installed. In areas which see very little wave action or run-off and Storm water run-off, the establishment of marsh grass or other surface-rooted vegetation may be enough to effectively retard erosion.

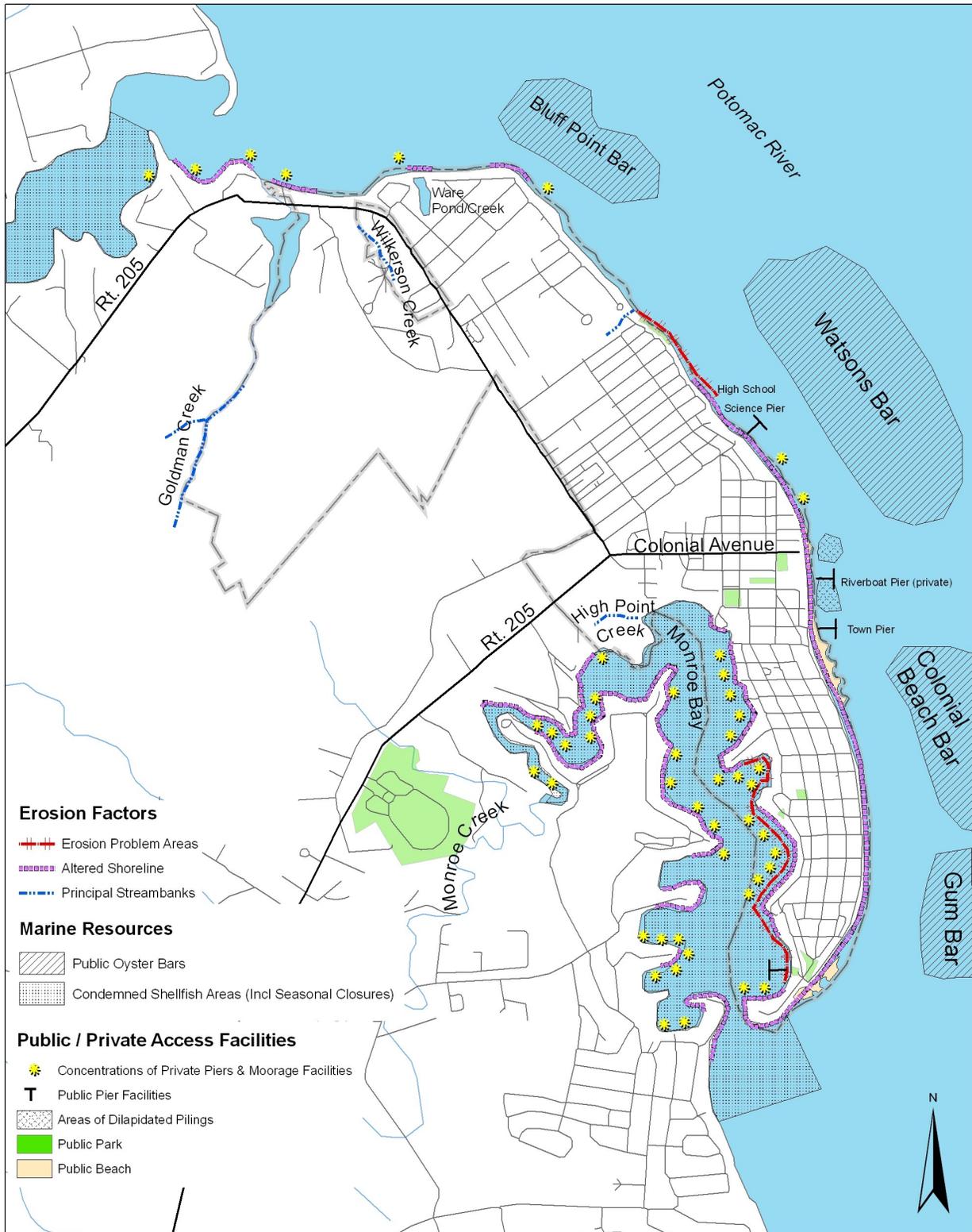
### ***Existing Shoreline Conditions***

Map Exhibit X I (Shoreline Management Factors) indicates the extent of altered shoreline in the Colonial Beach area. This information is based on generalized sources and should be used for planning purposes only. Also illustrated on the map are other shoreline features such as major erosion areas, water access and marine resources. Together, these factors permit a comprehensive view of the Colonial Beach shoreline and provide an opportunity for its future management.

As reflected on the map, much of the Colonial Beach shoreline has been altered or stabilized over the years. The northernmost section of Town (Potomac Beach/Bluff Point area) remains largely unprotected, with most shoreline consisting of fairly steep bluffs and narrow tidal beaches. Most of this shoreline is in private ownership and experiencing minor to moderate levels of erosion. The most severe problem in this area is on public shoreline along Beach Avenue between 9th and 12th Streets. Due to recent washouts from storms, erosion here is presently endangering utility poles and the bluff face adjoining Beach Avenue. If corrective action is not taken, a section of the roadway will eventually be undermined and lost. Until such time that the road becomes actually endangered, VDOT has indicated it is the Town's responsibility to stabilize the property. Accordingly, the Beach Avenue shoreline is designated as one of two priority areas for action in the Comprehensive Plan.

The public shoreline from Central Beach south to Castlewood Beach has been extensively stabilized in recent decades. Major improvements have included a gabion revetment along endangered segments of Irving Avenue (1980); offshore breakwaters, groins and beachfill at Central Beach and Castlewood Beach (1981); and two more recent beach replenishment projects (1994, 1998) undertaken by the Town and Virginia Public Beach Board. Much of this sustained damage in 2003 from Hurricane Isabel, but has since been repaired and re-enforced beyond the original standard. While the beaches remain vulnerable to erosion from major storms, it is the Town's intent to minimize future losses through smaller, more frequent beach replenishment projects.

Although altered to a large degree, much of Monroe Bay's shoreline should be considered "unmanaged" with several areas of rubble rip-rap, fringe marsh and eroded beach interspersed with the stabilized areas. The greatest concentration of private piers and boating activity is centered between Winkidoodle Point and Gum Bar Point on the Town side of Monroe Bay. This is also the area where the most serious erosion problems are found and represents a second priority area designated in the Plan. Both public and private properties are experiencing erosion, with the most severely eroded segments sited along Monroe Bay Avenue and at Robin Grove Park. The protective structures along Monroe Bay vary widely



# Shoreline Management Factors



in terms of age, condition and effectiveness. Most of the existing rip-rap materials are of a poor grade and offer limited erosion protection. Some of the bulkhead emplacements are aging and possibly nearing the end of their expected life span. However, no site inspections were conducted for individual structures, therefore none are confirmed as endangered. The Town has recently taken steps to address these and other erosion problem areas through the use of shoreline maintenance agreements.

### ***Shoreline Maintenance Agreements***

In 1998, the Town substantially amended its Pier Ordinance and incorporated new provisions for Shoreline Maintenance Agreements. The purpose of the maintenance agreements is to protect the Town's shoreline property from erosion at no expense to the Town without curtailing the rights of local citizens who currently enjoy and use the waterfront for recreational purposes. Five (5) year leases and permits are issued to pier owners and applicants. Shoreline Maintenance Agreements are placed out for public bid for a forty (40) year term, with the successful bidder agreeing to rip rap or construct another type of approved sea wall along the entire length of the subject property. Successful bidders are also responsible for maintenance of the shoreline and completed protection structures over the term of the forty year agreement. The Shoreline Maintenance Agreements are a mechanism intended to address public shoreline with serious erosion problems only. This method should not be construed as an optimal solution for protecting areas of low wave energy which may be protected by non-structural erosion control measures.

### ***Summary of Shoreline Erosion Problem Areas***

1. Town owned property along the Potomac River on Beach Avenue requires immediate attention.
2. Shoreline of Monroe Bay from the 600 Block South to Colonial Beach Yacht Center. Almost all of this shoreline is owned by the Town of Colonial Beach and needs immediate attention.

### ***Stream Bank Erosion***

As indicated on Exhibit X J, four(4) streams were evaluated for potential erosion problems. These include Goldman Creek, Wilkerson Creek, High Point Creek and the 12th Street drainageway. All of the creeks feature natural, unmanaged stream banks and are well protected from erosion by fringe marsh and other wetland vegetation. Of these, only Goldman Creek is considered marginally navigable by small craft, hence boat wakes are not a factor in these waterways. High Point Creek is quite limited in length and intermittent in its upper reaches. It is also notable for vigorous marsh growth at its confluence with Monroe Bay, due to nearby sewage plant effluent. The basically stable condition of these small waterways may change if urban development occurs nearby. It is important that stream bank erosion be considered in any development plan for these areas.

Unlike the three creeks, the 12th Street drainageway has required extensive stabilization measures in recent years. Improvements have consisted of major rip-rap installations, check dams and other erosion/sediment controls. This drainageway clearly illustrates the rapid changes that can occur in a stream's function and hydrology as the surrounding area becomes urbanized. At present, the 12th Street facility drains a portion of the partly developed Classic Shores/Riverside Meadows area. This is an area suitable for future infill development and designated for residential use in the Plan. As development occurs, it is important that the capacity of this drainageway be closely monitored and improved in accordance with any future Storm water demands. On larger projects, such as townhouse and apartment developments, the Town should require use of on-site retention or other best management practices (BMPs). This will help reduce Storm water loading in the 12th Street facility as well as support stabilization efforts on nearby Beach Avenue.

### ***Urbanization***

Aside from the natural occurring processes, urbanization of Colonial Beach has had a profound effect on watershed hydrology and water quality of the receiving bodies of water. Rooftops, driveways, roadways, and other impervious areas that are a direct result of urbanization contribute to greater volumes of runoff and less infiltration. Trace metals are common components of urban development. Roofs, buildings, pipes, paints, wood preservatives, automobiles, fertilizers, etc., all contain elements that eventually enter the aquatic system and degrade water quality. The removal of natural vegetation exacerbates the problem with pollutant runoff. Trees and other vegetation reduce the erosive effects of rain by "de-energizing" the force of the raindrop, natural depressions allow water to temporarily pond and infiltrate into the soils, and vegetative cover acts as a natural filtration system removing pollution by either biological uptake or through attenuation.

Shoreline development and the additions of piers and other water dependent structures add to the degradation of water quality by the removal of natural vegetation and the discharge of pollutants directly into the receiving waters. The pollution sources are in such close proximity to the water that no buffers are left to reduce the pollutant loadings.

#### **Impacts of Urbanization**

The overall net effect of urbanization is the increase of pollutant levels in Monroe Bay, the Potomac River, and other tributaries. High levels of suspended solids increase turbidity levels thus reducing light penetration and limiting prey capture for sight feeding predators. Increased sediment load chokes waterways, clogs gills/filters of fish and aquatic invertebrates, reduces spawning and juvenile fish survival as well as overall fish population. Bacteria levels in uncontrolled urban run off can exceed public health standards for water contact recreation.

### ***Pier Densities***

Piers, docks, and water dependent developments all add to the degradation of water quality. Waterfront community development is desired due to the close proximity of water related activities. Proper planning through education, adoption of ordinances and subsequent enforcement all contribute to healthy onshore and offshore environments.

As shoreline areas are revitalized, the Town should target the removal of deteriorated pilings and other pier remnants. Two particular areas are indicated on Exhibit X: (1) the former ferry crossing area at Potomac Beach, and; (2) the former gambling piers north of Central Beach. While not mapped, other deteriorated piers and wharves are found along Monroe Bay and should be removed or replaced in accordance with the Town's pier ordinance.

### ***Marine Resources***

As reported earlier in the Plan, Colonial Beach has long supported a commercial fishing industry. In 1931, the Army Corp of Engineers (COE) completed its first navigation project in Monroe Bay to support the local fishing industry. The improvements included a navigation channel 8 feet deep and 100 feet wide at the entrance (Gum Bar Point) and a channel within Monroe Bay 7 feet deep and 100 feet wide to a turning and anchorage basin 500 feet wide on the downstream side of Robin Grove Point. Over the years, minor maintenance dredging and entrance improvements have been made to the navigation channel. A terminal groin at Castlewood Beach was designed to reduce future shoaling in the entrance channel. Extensive shoreline improvements have also been made at the Colonial Beach Yacht Center, located at the southern tip of Gum Bar Point. Future expansion of the marina and additional stabilization measures are planned at this location.

Communication with Potomac River Fisheries Commission reveals that there are several public oyster bars offshore of Colonial Beach (see Exhibit X). From north to south, these include Stony Point, Bluff Point, Watsons Bar, Gum Bar, Green Hill and Old Farms. The Colonial Beach bar is currently unproductive but has potential for rehabilitation. In addition to these, there are many privately leased bars south of Gum Bar Point to Mattox Creek. While oyster harvesting has generally declined in recent years, the Colonial Beach area still supports a small yet viable oyster industry. This includes a small fleet of oyster boats, several commercial wharves and one packing house based at Monroe Bay. Possible impacts on this industry should be considered as shoreline projects are planned and evaluated in future years.

While area wetlands and shorelines support a wide variety of marsh plants, the near-shore areas of Colonial Beach have not historically supported submerged aquatic vegetation (SAV). Headwater portions of Monroe Creek and other nearby streams serve as finfish spawning and nursery areas. Further discussion of marine life and wetland resources may be found in the physiographic conditions section of the Plan (Chapter One).

### ***Condemned Areas***

At the present time, all of Monroe Bay north of Gum Bar Point is condemned by the Virginia Department of Health for the direct marketing of shellfish. In addition, there is a seasonal restriction (May 1-October 31) for a small portion of Monroe Bay just downstream of Gum Bar Point. This seasonal closure area was recently reduced from 694 acres to 69 acres in recognition of the mostly transient boat traffic passing through the area. The initial condemnation order has been in effect since 1931. Condemnation is expected to remain in effect indefinitely north of Gum Bar Point.

### ***Conclusions***

Erosion is an inherent and never ending fact of waterfront areas such as Colonial Beach. The Town must take a proactive role in planning and developing methods and a schedule to combat erosion. Eroding shorelines threaten existing roadways and park land and therefore need to be addressed immediately in order to prevent larger more expensive problems in the future. The Town must develop policy to balance urban development and water quality -- Colonial Beach is a town dependent on the health of the Potomac River, Monroe Bay, and all surrounding tributaries and therefore cannot sacrifice long term prosperity for short term gains.

### ***Policy Recommendations***

1. The Town must establish a strategic plan to prioritize the problem areas and implement correct shoreline erosion control devices (rip-rap, bulkhead, etc.) By establishing a prioritized list and a plan of action the Town can effectively plan and budget the needed capital expenditures.
2. Private waterfront landowners should be made aware of the free technical assistance available to them concerning shoreline erosion control devices. Technical assistance will allow the private landowner to choose the most appropriate erosion control device. Inappropriate erosion control measures may often exacerbate the erosion problems of neighboring shoreline property; therefore, technical assistance will help to provide coordinated erosion control measures.
3. Town officials and private landowners should take a more active role in the Public Hearing process of the Westmoreland County Wetlands Board for all applicants within the Town limits or those on neighboring shorelines.

4. Zoning controls on piers, marinas, and other water related development should be considered. The density of development along Monroe Bay and the Potomac River is critical to the aesthetic and environmental quality of the Town.

## **Urban Development and Water Quality**

A basic understanding of the relationship between Colonial Beach's natural environment and potential forms of urban development is important. This account should prove helpful in making sound environmental planning decisions, as well as assisting on a day-to-day basis with the site plan review process.

In Colonial Beach, as in other Tidewater communities, there is a direct and intimate relationship between land and water. Through the natural forces of wind, rain, and gravity, pollutants will enter the water unless barriers and filters are present. Land uses can generally be divided into two basic categories: those that protect water quality (forests, permanently vegetated fields, wetlands); and uses that cause water quality to deteriorate (most forms of human activity, whether urban or rural/agricultural).

Most land use activities involve alteration of the land, such as paving, digging, clearing or grading. Any one of these activities will alter the natural water retention characteristics of the land, causing polluted water to reach groundwater, streams and rivers, and eventually the Potomac River and Chesapeake Bay. The extent of degradation depends on a variety of factors, including proximity to water resources, the type of development activity and the site-specific characteristics of the disturbed land.

### *Impacts on Water Quality*

Generally, development will strip the land of the absorbing capacity of its vegetative cover and replace it with impermeable (paved) surfaces which prevent water from seeping into the soil. This allows pollutants to enter the waterway. It also increases Storm water flow and velocity into storm sewers and streams. The higher velocity scours the surface of the landscape, increases stream bank erosion, and carries soils and other pollutants for direct deposit into water courses. Large volumes of Storm water in the drainage system can increase the load on the treatment facility because of infiltration, causing Storm water to combine with sewage and overflow directly into the waterways.

All development projects, whether for residential, commercial or public use, alter the natural vegetation, slope, and water retention characteristics of the land. Three major types of pollutants can result from development: sediments, nutrients, and toxics.

#### ***Sediments***

Sediments are eroded soils and other solid materials that are transported into waterways or which are subsequently re-suspended from river beds or bottomlands. The presence of sediments give water an unclear (turbid) appearance. Turbid water blocks sunlight which is critical to many forms of aquatic life and can clog the gills of small fish and invertebrates. Turbidity can also cause water temperature to rise to the point where it is no longer sufficient to support habitats, and species of plant and animal life.

#### ***Nutrients***

Nutrients such as nitrogen and phosphorous are essential for plant growth. However, in excess, they can

degrade water quality and destroy aquatic habitats. Excessive phosphorous levels, are an example of nutrient overloading. Too many nutrients spur the growth of algae which interfere with light penetration, contributing to low oxygen levels, and altering food and resources available to other organisms. Disruptions to the food chain in turn impact fish, waterfowl and other plant and animal life dependent on the waterway's ecological system.

### ***Toxics***

Toxic substances, such as chemicals and heavy metals, that are released into the Potomac River and its tributaries can severely damage life forms, especially in their early growth stages. Shellfish and finfish are especially susceptible to toxic contamination, which can accumulate in the higher orders of the food chain and can pose a potential health threat with their consumption. Common toxics in everyday use include fertilizers, pesticides, automotive batteries, and other industrial and agricultural products.

### ***Point and Non-point Source Pollution***

Historically, regulatory programs have focused on sources of pollution such as effluent outfalls from factories and sewage treatment plants. These sources of pollution were easily recognized and regulated with modern engineering methods available to reduce discharge pollutants. In spite of the progress in reducing point source pollution, water quality problems have persisted.

Non-point source pollution often can have a far greater impact on water quality. Studies have shown that Storm water runoff from urban and agricultural areas contain a substantial amount of pollutants that exceeds the amounts from regulated point sources. Common nonpoint pollutants include fertilizers (nitrogen, phosphorous), pesticides, animal wastes, heavy metals, motor oil, sediment and other organic material.

### ***Development Activities Contributing to Pollution***

Various activities associated with development will have a direct impact on water quality. The principal contributing actions are summarized below:

#### ***Clearing Land***

Improper conversion of land to a more intensive use can cause changes in soil stability and slopes, vegetative cover, and site hydrology. Soil erosion is often experienced on cleared land. Inappropriate soil compaction (frequently caused by construction equipment) compounds this problem by leaving the soil too dense for adequate water and oxygen supplies to support the growth of soil-stabilizing plants.

Recontouring or filling land contributes to poor water quality. Altering wetlands or marshes by filling or restructuring will adversely affect vital breeding grounds and habitats. The practice of creating a "neat edge" between land and water with bulkheads and retention walls effectively replaces the natural wetlands transition zone and tends to magnify problems associated with shoreline erosion. Tidal wetlands and marshes also serve as buffers to wave action against the shoreline.

Non-contiguous wetlands play an important role when located below areas of upland disturbance by slowing Storm water and permitting sediments and runoff to filter and drain before reaching main water courses. However, wetlands are limited in their capacity to absorb excessive amounts of sedimentation and nutrients from poor land clearing practices, and can become ineffective in their natural cleansing abilities.

The process of erosion is directly related to the removal of vegetation. Excessive clearing will result in greater probabilities of erosion. Also, new vegetation such as lawns and transplanted trees and shrubs, are treated with fertilizers and pesticides. Further, this vegetation is less successful at retarding runoff than the natural vegetation it replaced. This is especially true for forested cover, which is of extreme importance in handling the movement of nutrients from the landscape into streams.

### ***Construction of Impervious Surfaces***

An increase in the amount of impervious surfaces is a natural consequence of land development. Surfaces such as roofs, sidewalks, roads and parking lots collect water and speed its movement instead of allowing it to filter through vegetated soil. Roads and parking areas, in particular, accumulate nutrients and toxic materials such as lead, copper, zinc, asbestos, deicing chemicals, oil and grease from motor vehicles, as well as decaying vegetation and animal wastes.

### ***Discharges of Toxic Materials***

In addition to automotive-related pollution, development provides many other opportunities for toxic contamination. Toxic materials can originate from pesticide use, detergents, accidental chemical spills, as well as paints, solvents and fuel which are often disposed of in storm sewers. Construction and maintenance activities associated with lower density land uses are also a source of pesticides because of the use of weed and insect controls. Such substances can impact local ground and surface water, limiting local use (recreation/water supply).

### ***Inadequate Wastewater Treatment***

Inadequate treatment of sewage represents a major problem in water quality. Onsite systems (septic tanks) can release nutrients into groundwater if improperly installed or maintained. Failing septic systems, which may go unnoticed for extended periods of time, can constitute a serious health problem. While preferable to on-site treatment, off-site sewage treatment facilities may not remove all nutrients prior to discharge. Many treatment plants require additional techniques (tertiary) to remove certain types of pollutants. In order to combat the adverse effects of onsite systems, the Town has had a mandatory sewer connection ordinance in place for many years. This ordinance requires property owners to employ the Town wastewater treatment system, and to remove private septic tanks. The Town should continue to pursue compliance with this ordinance by requiring the connection of all new construction to the municipal sewage system, as well as enforcing the ordinance against existing structures when the use of an onsite system is discovered.

### ***Storm Water Run-off***

Storm water run-off from urban and industrialized areas often contains large quantities of pollutants that are found in waste water discharges and cause similar water quality concerns. These pollutants include heavy metals, pesticides, herbicides, and organic compounds such as fuels, waste oils, solvents, lubricants, and grease. Urban and industrial storm water is discharged through conveyances (ditches, channels, pipes, etc...) and therefore considered point sources under the Clean Water Act and subject to regulation through the National Pollutant Discharge Elimination System (NPDES) permit program.

The storm water regulations define 11 categories of industrial activities that are required to apply for storm water permits. Any industrial facility covered by these regulations that discharges storm water associated with industrial activity through any point source must apply for an NPDES storm water permit. The permit only covers storm water discharges from point sources and does not cover "sheet" flow.

The State Water Control Board administers the federal program under the State VPDES permit program. The EPA requires that permits for industrial storm water discharges include a pollution prevention plan

be developed for each facility. The pollution prevention plan describes how facilities will manage their storm water to keep pollutants from getting into the run-off as well as how the facilities will keep contaminated storm water runoff from getting into the waters of the state to the maximum extent practicable.

### ***Boating***

Recreational and commercial boating and fishing is a very important industry to the Town. Watermen depend on their vessels for harvesting fresh crabs, rockfish, and other seafood vital to the local economy. Residents and visitors alike also enjoy the Potomac River and Monroe Bay for fishing, waterskiing, sailing, and numerous other water sports. Although boating's influence on water quality pales in comparison to that of other non-point sources, its impact on water quality should not be overlooked. The growing popularity of boating as a recreational activity enhances this concern. Between 1970 and 1990 the number of boats registered in Westmoreland County increased by 64.8% going from 1,928 boats to 3,178 boats (Department of Game and Inland Fisheries Data).

One potential threat to the water quality from recreational and commercial boats is sewage discharge. Although the effect of a single boat may seem insignificant, when multiplied by the large number of boats that use the waters in and around Colonial Beach throughout the year, it can become very significant. Less than 20% of the estimated 200,000 boats that use the Chesapeake Bay at various times are of a size large enough to have an installed toilet on board (Recreational Boat Pollution and the Chesapeake Bay Report to the Chesapeake Bay Executive Council January 8, 1991). The remainder of the boaters are reliant on portable toilets or the availability of onshore facilities. Vessel discharges pose the greatest threat to water quality in places where boats congregate, such as marinas. These sites are located in the quiet protected waters of Monroe Bay -- an ecologically fragile area with restricted circulation (areas slow to flush themselves of contaminants). The Health Department requires all marinas to have both pump-out facilities and dumping stations for portable toilets. Exceptions are made for those marinas which cater to only small boats or transient visitors. The Health Department makes yearly inspections to ensure these requirements are satisfied.

Additionally, the Clean Water Act makes it mandatory for every boat with an installed toilet to have a Marine Sanitation Device (MSD). There are three types of MSDs. Types I and II treat the raw sewage on board and then discharge treated sewage into the water. Type I has proven to be unreliable and often ineffective in treating the sewage. Type II facility requires a great deal of power to operate and therefore are very seldom seen on recreational boats. MSD type III is a holding tank for raw sewage which must be pumped out periodically. The Coast Guard is charged with enforcing this ordinance.

Some recreational boaters may be uneducated on the harmful effects of waste discharges, increasing the likelihood of improper emissions. . A concentrated public awareness and education effort, greater enforcement, and more facilities can help to reduce such practices.

### ***Conclusion***

All of the above noted pollutants have a profound negative effect on the health of Monroe Bay, Potomac River and all connected waterways in and around Colonial Beach. The Town's livelihood depends on the health of its surrounding waters and therefore the Town must work cooperatively with state and federal agencies in protecting the health of the state's waters.

### ***Policy Recommendations***

1. The Town should work cooperatively with the State Water Control Board, EPA, and other regulato-

ry agencies who oversee storm water discharge in order to achieve the best possible water quality in Monroe Bay and the Potomac River.

2. The Town should take an active role in ensuring that all industrial and heavy commercial industries subject to the storm water regulations are filing the appropriate permits.
3. The Town must work cooperatively with state and federal agencies in providing public education programs which discuss the problems and effects of boat waste discharge and point - source pollution.
4. The Town must encourage marinas to make pump-out facilities more accessible and easier to use.
5. The Town must work cooperatively with the Department of Health, the State Water Control Board, and the Coast Guard to ensure proper enforcement and penalty for those who ignore boating laws.

## **Environmental Legislative Control Measures**

State, federal and local governments have all enacted various legislative control measures to stabilize and improve environmental quality. The intent of the following discussion is to highlight the major legislative acts and programs that pertain specifically to improvement of water quality, both locally and in the greater context of the Chesapeake Bay.

### *Wetlands Regulations*

Two major legislative acts protect wetlands from alteration, destruction or potential misuse: the Clean Water Act of 1972, and the Chesapeake Bay Preservation Act of 1989. The Bay Act is discussed initially in regard to wetland management, then more fully on subsequent pages.

### *Federal*

The major federal regulatory tool governing activities in wetlands is Section 404 of the Clean Water Act. Jointly administered by the U.S. Army Corps of Engineers (COE) and the Environmental Protection Agency (EPA), Section 404 establishes a permit program to regulate "discharges of dredged or fill material" into waters of the United States, including most wetlands (tidal and non-tidal). The U.S. Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) have important advisory roles in the permit review process.

It should be noted that Section 404 is not a comprehensive mechanism for wetlands protection. Activities such as drainage and groundwater pumping are often conducted without discharging dredged or fill material, and thus are not regulated under Section 404. Moreover, some COE districts do not consider isolated (non-contiguous) wetlands to be under federal jurisdiction if they do not affect interstate commerce. As a result, a broad range of supplementary and complementary programs have been enacted at the federal, state and local level to further protect wetland resources.

One such federal statute is the "Swampbuster" provision of the Food Security Act of 1985. This legislation reverses federal policy that once encouraged agricultural draining of wetlands for conversion into

farmland. The "Swampbuster" provision also enabled the USDA Soil Conservation Service (S.S.) to participate more fully in making federal wetland determinations.

In order to merge wetland definitions and identification methods, the four chief federal agencies (COE, EPA, FWS, S.S.) adopted a single manual in 1989 entitled "The Federal Manual for Identifying and Delineating Jurisdictional Wetlands". This manual is used to identify jurisdictional wetlands subject to Section 404 and the "Swampbuster" provision of the Food Security Act. The manual recognizes that all federal wetland definitions are conceptually the same; and they each include three basic elements:

1. Hydrophytic Vegetation
2. Hydric Soils
3. Wetland Hydrology

While specific criteria related to these three characteristics are currently under federal review, they will continue to be the overall determinants of a jurisdictional wetland. A revised federal manual, which proposes to narrow the definition of a wetland, has not yet been approved and is contingent on the review of newly appointed federal officials.

The U.S. Fish and Wildlife Service has produced National Wetland Inventory (NWI) Maps which identify the size, shape and type of wetlands in accordance with NWI specifications. These maps are presently available for most of the continental United States. NWI maps are particularly useful since they utilize standard 1:24,000 topographic maps (USGS) as base maps to depict wetland data. NWI maps can generally be used delineate wetland boundaries on particular parcels; however, in urbanized areas where smaller lot sizes and higher land values are present, more detailed mapping or individual field inspections may be needed to resolve wetland boundary disputes.

### *Erosion and Sediment Control Ordinance*

In accordance with State mandate, the Town has had in place for several years an Erosion and Sediment Control Ordinance (the "Ordinance") which outlines the requirements for controlling and reducing runoff resulting from development. Although the State requires that only those land disturbing activities of five thousand (5,000) square feet or greater be subject to the safeguards of an Erosion and Sediment Control Ordinance, the Town has taken the initiative to reduce the local requirement for compliance to land disturbing activities of only twenty-five hundred (2,500) square feet. Although the Town's Ordinance states that the Building Official is responsible for administering the Ordinance, the Town is in the process of ensuring that additional officials, including the Zoning Administrator, are certified in reviewing erosion and sediment control plans, as well as inspecting implemented control measures.

Additionally, the Town plans to initiate the publication and distribution of an Erosion and Sediment Control Guide. This pamphlet will be designed to aid both the general public and the developer in understanding the necessity, processes and requirements associated with erosion and sediment control plans. Such a document will also aid in educating the general public on the importance of erosion and sediment control regulations and the role such requirements play in ensuring and improving the quality of State waters for future generations.

### *State and Local*

Unlike a number of other states, the Commonwealth of Virginia has not enacted a comprehensive wetland regulatory program. The Virginia Wetlands Act of 1972 extends protection only to tidal wetlands. Non-tidal wetlands in Virginia remain under federal jurisdiction as provided for in Section 404 of the

Clean Water Act. All states including Virginia; however, have been given review and certification authority by Section 401 of the Clean Water Act over "any federal license or permit that may result in a discharge to waters". Section 401 is an important provision that allows states to deny or condition the issuance of federal permits in order to protect state water quality.

Development control to protect tidal wetlands in Virginia is a joint responsibility of the Commonwealth and its local governments. The Virginia Marine Resources Commission (VMRC) is the lead agency for the program. Other state agencies participate in the review of wetland permits: the State Water Control Board (SWCB), the Department of Transportation (VDOT), the Institute of Marine Science (VIMS) and the Department of Conservation and Historic Resources (C&HR).

Local governments are allowed to establish and administer their own regulatory programs through local Wetlands Boards and ordinances which conform to the model state legislation. The Washington Magisterial district, which encompasses Colonial Beach, is represented on the Westmoreland County Wetlands Board. This Board is charged with protecting wetlands from unreasonable intrusion by development and enforcing violations of the state Wetlands Act. The Wetlands Board may also help develop mitigation measures that minimize damage to wetland resources. Decisions by the local board are subject to final review by VMRC, which may accept or overturn the local decision.

### ***Wetlands Permitting and Enforcement***

Because a variety of federal, state and local agencies are involved in wetlands regulation, a joint permitting process has been established to improve interagency coordination and reduce the time involved in obtaining a permit. VMRC assigns a processing number to the proposed project, which is used by all of the regulatory agencies. Copies of the application are then forwarded to the Corps of Engineers and to the local Wetlands Board for processing. Site inspections are usually required by each of the reviewing agencies prior to issuance of a permit. The permitting process includes procedures for public hearings and appeals.

Both VMRC and the local Wetlands Boards are empowered to issue stop work orders to enforce the Virginia Wetlands Act. The state courts, through an injunction, may also direct that the wetland be restored to its natural condition, in addition to imposing a fine. Under federal law, similar enforcement actions may be taken administratively by either the COE or EPA to prevent illegal discharges in wetlands. EPA has final veto power over any Corps-issued permit and makes the final determination.

### ***The Chesapeake Bay Preservation Act***

With the passage of the 1989 Chesapeake Bay Preservation Act (the Bay Act), local governments were charged with the responsibility of adopting land use regulations protecting wetlands and adjacent buffer areas. Unlike regulations enforced by VMRC or the Corps, the Bay Act requires establishment of 50 to 100 foot buffers around all tidal and contiguous non-tidal wetlands. Also, the Bay Act does not allow for mitigation techniques such as replacement wetlands as currently permitted by VMRC and the Corps. The Bay Act, however, does grant local governments greater flexibility in determining the protection given to isolated (non-contiguous) wetlands, which can often be more difficult to identify. Once isolated wetlands have been mapped and identified, they are usually included in a locality's designated Resource Management Area (RMA).

Beyond regulations concerning wetlands, The Chesapeake Bay Preservation Act embraces far-reaching goals for protection of water quality. The following discussion broadly describes the intent and scope of the Bay Act.

### ***The Chesapeake Bay Preservation Act***

The Chesapeake Bay has long been recognized as a vital resource to residents of Tidewater Virginia, providing important economic and social benefits for area residents, as well as important ecological benefits for a wide variety of plant and animal species. The Chesapeake is our nation's largest (2,500 square miles) and most productive estuarine bay, accounting for over 20 percent of the oysters and 50 percent of the blue and soft-shelled crabs caught in the United States. It is surpassed only by the Atlantic and Pacific Oceans, in terms of U.S. seafood production each year.

An explanation of the Bay's productivity lies in the fact that it is an estuary - "a semi-enclosed coastal body of water that has a measurable salinity gradient from its freshwater drainage to its ocean entrance." While the Bay's salty environment is stressful to many plant and animal communities, those that do survive here flourish. The constant inflow of freshwater and the tidal circulation of organic materials contribute greatly to the Bay's productivity, and the marshlands and shoreline wetlands provide a critical foothold for a variety of aquatic life.

It has been universally recognized that water and water-borne pollutants drain to the Bay from a very wide area. Eight (8) major drainage basins empty into the Chesapeake; the three largest being the Susquehanna (NY, PA), the Potomac (MD, VA), and the James (VA). Pollutants entering the 150 tributaries of the Bay have negative impacts on local water quality, as well as cumulative impacts on water quality in the Bay. As a result, local governments, as well as state and regional agencies, must play a cooperative role in reducing further degradation of Bay water quality, and the threats to its future health and vitality.

### ***Overview of the Chesapeake Bay Preservation Act***

The Commonwealth of Virginia adopted the Chesapeake Bay Preservation Act in September of 1989 to fulfill provisions of an interstate regional agreement made in 1987 between the states of Virginia, Maryland, Pennsylvania and Washington D.C. The Bay Act mandates all Tidewater Virginia localities to establish programs, plan and ordinances to protect and improve Bay water quality. Colonial Beach is one of 89 jurisdictions (46 cities and counties, 43 towns) affected by the Bay Act. All of these communities border tidal waters, such as the Potomac River, Chesapeake Bay, or their tributaries; and have a considerable, cumulative impact on water quality.

The Bay Act provides the legal basis for a comprehensive approach to addressing the chief sources of pollution to the Chesapeake Bay. It requires the designation of environmentally sensitive areas needing protection, due to their essential function of slowing and filtering run-off, recharging groundwater and protecting state water quality. The Bay Act mandates that localities adopt development performance criteria to guide development in their respective communities. These criteria serve to limit impermeable surfaces and control run-off; establish set-backs and buffer areas to minimize disturbance to shorelines, designated wetlands, and vegetated areas; and restrict development on and in the water for water related facilities.

### ***The Chesapeake Bay Preservation Area Ordinance***

The Bay Act legislation requires localities to establish programs to ensure compliance with the established goals set forth in the Bay Act. The initial program includes a comprehensive inventory of the environmental characteristics of the locality, the identification of environmentally sensitive areas and their designation as such in officially adopted protection districts (comprised of Resource Protection Areas, Resource Management Areas and Intensely Developed Areas). The second component of the program includes adoption of performance criteria for guiding site development, and the provisions of non-point source pollution standards to protect state water quality. The Chesapeake Bay Ordinance was revised

with assistance from the Chesapeake Bay Local Assistance Department (CBLAD) and adopted in December of 2003.

After preliminary environmental inventories were conducted in Colonial Beach, a designation was made of the following Chesapeake Bay Preservation Area Districts:

Resource Protection Areas (RPAs) were buffer areas consistent with the Bay Act and included tidal shores, tidal wetlands, non-tidal wetlands connected by surface flow and contiguous to tidal wetlands and tributary streams, and a 100 foot wide buffer area located adjacent to and landward of the aforementioned features and along both sides of any tributary stream.

Resource Management Areas (RMAs) were intended as buffer areas outside the RPAs wherein environmental factors are still significant to warrant state water quality protection. These include areas where development impacts should be mitigated by design guidelines and performance criteria. Included are flood plains, highly erodible soils including steep slopes, highly permeable soils, hydric soils, and isolated non-tidal wetlands not included in the RPA.

Since preliminary assessments revealed that the majority of Town included one or more of these environmentally sensitive features, the Town Planning Commission recommended designation of all land not designated an RPA to be classified a Resource Management Area (RMA). This would impose identical site development and performance criteria standards fairly and uniformly upon all new development in the Town.

Although future opportunities may present themselves, the Town refrained from designating any areas of Town as an Intensely Developed Area, in accordance with the definition below:

Intensely Developed Areas (IDAs) are areas already developed where redevelopment can be expected and will usually take the form of infill construction. Four criteria must be satisfied for IDA designation: 1) development has significantly altered the natural vegetation of the site; 2) the site has more than 50 percent impermeable surface; 3) public sewer and water has been constructed and currently serves the area; and, 4) housing density is equal to or greater than four dwelling units per acre. IDA designation allows a reduction of the buffer areas and more intensive development of the site when run-off and other impacts can be successfully mitigated.

If it so chooses, the Town can adopt IDA sites in the future. However, it should be noted that in order to qualify for IDA designation the area must have met the above stated criteria as of the date the Town incorporated the requirements of the Chesapeake Bay Preservation Act into its Zoning Ordinance. As time continues to pass since such incorporation, proving that the then existing conditions qualified these sites as potential IDAs may become increasingly problematic.

Possible candidates would include any abandoned marina/seafood processing sites or paved parking areas near the water. The S.S. soil survey may be used as a general guide to "urban land" within the town (land defined as 85 percent or more impervious cover). If these lands become unused for their present purposes and are proximate to water resources, potential benefit can be realized if redeveloped appropriately per IDA criteria.

### ***Land Use and Development Performance Criteria***

The Town has evaluated, analyzed and modified the model ordinance provided by the Chesapeake Bay Local Assistance Department. The Town adopted criteria for land use developments in the RPAs and RMAs. Sections of the ordinance provide for site plan review to control non-point source pollution and

best management practices for development. Criteria addresses development siting and set backs, buildable areas, impermeable surfaces, buffer vegetation and landscaping and shoreline and wetlands protection. Water quality impacts assessments are required for major developments (defined as over 2,500 square feet of land disturbance).

### *Local Approaches to Water Quality Protection*

The Town of Colonial Beach employs a number of approaches to protect and enhance water quality. General guidance is given by the Town's adopted environmental goals, objectives and strategies; and by the specific land use designations shown on the Future Land Use Plan. Specific performance criteria and implementation mechanisms for protection of water quality are provided for in the Town's local CBPA, Floodplain, Subdivision and Zoning Ordinances. The Town also complies with local, state and federal guidelines concerning wetland protection and management, a major aspect of water quality.

The following general concepts and approaches to water quality protection are utilized throughout the Town's various land use ordinances. Copies of these ordinances are available at the Town Hall. A summary of the major concepts are provided on the following page and in the section entitled Implementation Strategies and Policies:

#### ***Performance Standards***

Standards that regulate land use activities by setting limits on the amount of disturbance a particular development may cause rather than defining what that land use might be.

#### ***Buffer Strips***

A strip of land, usually left in or returned to native vegetation, that protects an area from adjacent or nearby land uses by filtering sediment and runoff along rivers and streams.

#### ***Setbacks***

The minimum distance a building or other development must be from a watercourse or sensitive area.

#### ***Density Requirements***

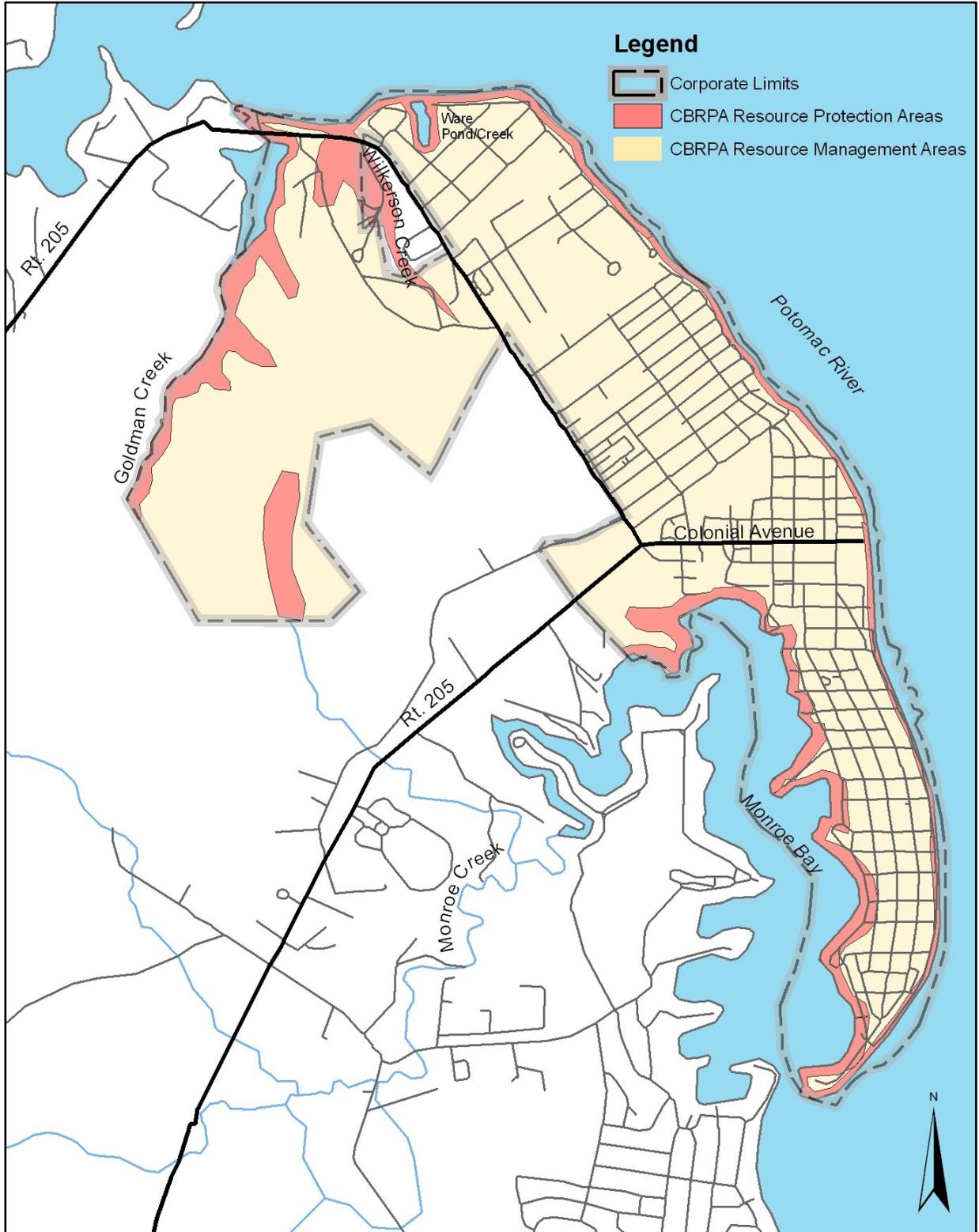
Requirements that govern the average number of families, persons, or housing units on a parcel of land. Density requirements can be flexible, and when combined with cluster development, can help maintain open space by permitting higher densities in one area as a tradeoff for lower densities and open space in other areas. Density limits for water quality protection tend to encourage large lot zoning, although cluster development could also result.

#### ***Storm Water Management***

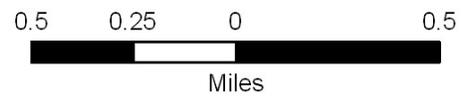
Specially developed criteria that address Storm water runoff by limiting the amount of impervious surfaces (parking lots), or by using retention basins, porous pavement or created wetlands or ponds to slow and filter runoff.

#### ***Best Management Practices (BMP's)***

Special practices that make use of filter strips, no-till farming, retention basins and any number of other management techniques that are successful in limiting or controlling land disturbing activities. Specialized BMP's have been developed to guide forestry, agricultural, and urban development practices.



**Chesapeake Bay Resource Protection Act Areas**



## **Town of Colonial Beach Shoreline Erosion Control Guidelines**

### *Introduction*

The following guidelines were developed for shoreline properties, at the request of the Town of Colonial Beach Erosion Commission, by the Shoreline Programs Bureau of the Department of Conservation and Recreation, Division of Soil and Water Conservation. These guidelines address setbacks, buffers and nonstructural and structural shoreline erosion control measures. Historical average shoreline erosion rates, anticipated average storm conditions and requirements of the Erosion and Sediment Control Ordinance of the Town of Colonial Beach (Chapter 6), Westmoreland County Wetlands Zoning (Chapter 16) and Chesapeake Bay Preservation Area Overlay District of Colonial Beach (Article 22) have been taken into consideration. Please see Table 1 for a sequence of events and permits needed for shoreline structures and projects.

### *Setbacks and Buffers*

Building setbacks are based on the physical conditions of the site, such as bank height and shoreline erosion rate. The setback moves inland as the shoreline retreats. The Chesapeake Bay Preservation Area Overlay District requires a 100-foot vegetated buffer. The buffer is specified to be adjacent to and landward of the Resource Protection Area (RPA) components. The distance a building should be constructed from the base of the bank should be the larger of either the 100-foot vegetated buffer or the building setback for shoreline erosion control. For more information, contact the Town of Colonial Beach Zoning Administrator.

#### ***No Shoreline Erosion Control Planned***

1. In accordance with the Chesapeake Bay Preservation Area Overlay District, a 100-foot buffer is required in new subdivisions and land developments. Encroachment into the buffer will be determined by the Town on a case by case basis.
2. The following building setback allows for shoreline erosion where no shoreline erosion control structures are planned for the subdivision or lot. The building setback is based on the bank height, shoreline erosion rate and design life of the building is assumed to be 50 years. The building setback is measured landward from the base of the bank. The recommended building setback is:

$$\text{Building setback (ft)} = 25 \text{ ft.} + (\text{bank height} \times 2) + (\text{annual shoreline erosion rate} \times 50 \text{ years})$$

#### ***Shoreline Erosion Control Planned***

1. The Chesapeake Bay Preservation Area Overlay District requires a vegetated buffer of 100 feet, as discussed above. Encroachment into the buffer will be determined by the Town on a case by case basis.
2. The building setback between a shoreline erosion control structure installed along the bank (i.e. riprap revetment or bulkhead) and a building is site specific and depends on the bank height. The building setback is measured landward from the base of the bank. In addition, the assumption is made that the shoreline erosion control structure will be properly maintained. As a minimum, the building setback should be:

$$\text{Building setback (ft)} = 25 \text{ ft.} + (\text{bank height} \times 2)$$

**Table 1—Sequence of Events and Permits Needed for Shoreline Structures and Projects**

<b>Project Phase</b>	<b>Tree cutting/vegetation removal in RPA or buffer, or establishment of vegetation shore erosion control measures</b>	<b>Land disturbance* in RPA or buffer or installation of shoreline structures or erosion control projects</b>
Planning	Contact SEAS+ if advisory assistance is desired for a shoreline erosion problem. Property owner will be sent a SEAS report.	Contact SEAS+ if advisory assistance is desired for a shoreline erosion problem. Property owner will be sent a SEAS report. Contact Zoning Administrator before submitting wetlands permit applications. Staff will review permit applications and provide information on further code requirements
Approvals or Permits Needed	Contact Zoning Administrator for permission before tree cutting/vegetation removal, or before vegetation shore erosion control measures are planted. Provide Zoning Administrator with SEAS report, if obtained.	Submit wetlands permit application to the Virginia Marine Resources Commission (VMRC). Attach SEAS report if available. VMRC will send a copy of the application to the Westmoreland County Wetlands Board. Obtain all wetlands permits needed from the Westmoreland County Wetlands Board, VMRC, Army Corps of Engineers, Health Department or State Water Control Board. Contact Zoning Administrator to determine if building permit will be required. Submit evidence of wetlands permits to Zoning Administrator.
Implementation	Removal of vegetation or planting of vegetative shore erosion control measures. Inspections may be made by Town personnel.	Land disturbance or installation of shoreline structures must be according to conditions of all permits. Inspections may be made by Town or wetlands regulatory agency personnel.
Maintenance	Establish and maintain ground covers to prevent soil from eroding. Maintain vegetative shore erosion control measures through replanting. If the plants fail to protect the property, contact SEAS and Zoning Administrator.	If a shoreline erosion control measure develops problems or fails, contact SEAS and Zoning Administrator for assistance. New permits may be needed to correct the problem.

\* bank grading or filling

+ SEAS (Shoreline Erosion Advisory Service) is a branch of the Shoreline Programs Bureau

## *Non-Structural Erosion Control Measures*

### ***Vegetative Shore Erosion Control and Maintenance***

1. The establishment and maintenance of vegetative shore erosion control (i.e. marsh grasses) shall be considered as the first choice for shoreline erosion control in low energy areas with adequate salinity and site conditions. For freshwater tidal creeks, structural erosion control measures may be needed if freshwater wetlands vegetation is not present or does not provide adequate protection.
2. Marsh grass planting specifications are site specific. Advisory assistance is available from the Virginia Department of Conservation and Recreation (SEAS) at (804) 642-7121.

### ***Tree Cutting and Trimming***

Trees and shrubs may be cut or trimmed to reduce the weight bearing on eroding banks or allow sunlight to promote wetlands vegetation growth. The Chesapeake Bay Preservation Area Ordinance provides guidelines on vegetation removal in the RPA and buffer area. Before cutting trees or removing vegetation, contact the Town of Colonial Beach Zoning Administrator.

### ***Site Vegetation Improvement and Revegetation***

1. Indigenous upland vegetation on stable banks should be maintained and improved according to the guidelines in the Chesapeake Bay Preservation Area Overlay District. Additional assistance is available from the Virginia Cooperative Extension Agent and the 1992 Virginia Erosion and Sediment Control Handbook.
2. Bank revegetation is required following tree removal and bank grading activities. Standard and Specification 3.32 (Permanent Seeding) and 3.35 (Mulching) of the 1992 Virginia Erosion and Sediment Control Handbook should be followed to stabilize the bank against erosion. Any variation in vegetation should be in accordance with Standard and Specification 3.37 (Trees, Shrubs, Vines and Ground Covers) of the Handbook. It is also recommended that the Virginia Cooperative Extension Agent be contacted for specific vegetation assistance.

### ***Bank Grading***

If bank grading is determined to be necessary for shoreline erosion control, banks should be graded to 50% or 2:1 (horizontal/vertical) slope or flatter. Slope lengths greater than 75 feet may require runoff controls, as discussed in Chapter 6 of the 1992 Virginia Erosion and Sediment Control Handbook. Slopes steeper than 50% (2:1) will require an engineering analysis certifying slope stability. Land disturbance in the RPA or buffer area may require a plan of development, as specified in the Chesapeake Bay Preservation Area Overlay District. Contact the Zoning Administrator to determine if a plan of development will be required. All required wetlands permits from federal, state and local agencies must be obtained and submitted to the Zoning Administrator before land disturbing activities commence.

### ***Shoreline Erosion Control Structures***

Minimum design criteria are provided in the following section for riprap (large rock) revetments, wooden bulkheads, riprap wedges for an eroding marsh fringe, groins and gabion structures. The term “riprap revetment” refers to a facing of stone installed to protect an embankment. A bulkhead is a wall designed to retain soil and protect the land against wave attack. A riprap wedge is designed to protect an eroding marsh fringe from further undercutting. Groins are designed to trap and retain sand moving along the shore. A gabion is a patented wire basket which is filled with rock to create a protective structure. The guidelines provided are based on average storm conditions. Extreme storm conditions may damage structures.

There are alternative shoreline erosion control methods and materials to the structures discussed above. As with all structures, design is site specific and should be based on sound technical advice. For information regarding shoreline erosion control, contact:

Department of Conservation and Recreation, Division of Soil and Water Conservation  
Shoreline Programs Bureau  
P.O. Box 1024  
Gloucester Point, VA 23062  
(804) 642-7121

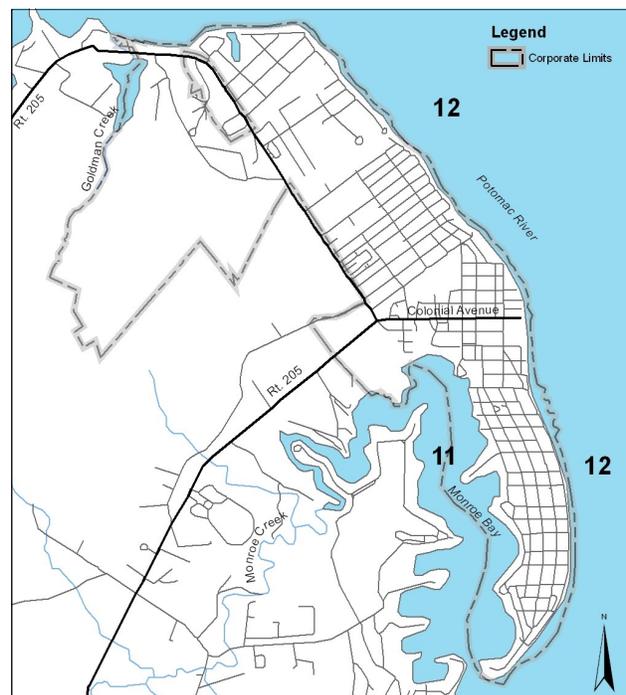
All required wetlands permits from federal, state and local agencies must be obtained and submitted to the Zoning Administrator before land disturbing activities commence. Land disturbance in the RPA and buffer area may require a plan of development as discussed in the Chesapeake Bay Preservation Area Overlay District. Contact the Zoning Administrator for information about required permits.

### ***Wave Energy Categories***

The minimum design criteria for riprap revetments and bulkheads were developed for shoreline “reaches” based on the tide range and anticipated wave energy at the shore. The term refers to a section of shoreline exposed to similar wave conditions and having the same approximate erosion rate throughout. The shoreline reaches identified in the publication Shoreline Situation Report: Westmoreland County were divided into high and low energy categories based on anticipated average storm conditions. The entire report is available in the Zoning Administrator’s office. Use the map provided in Figure 1 to locate the appropriate reach number for a particular property.

After using Figure 1 to determine the reach number for a particular property, consult Table 2 to determine the design wave height and recommended structure height. The recommended structure height assumes a bank height equal to or higher than the structure height. If the bank height is lower than the recommended structure height, the structure height should equal the bank height.

**Figure 1. Reach Numbers for Town of Colonial Beach**



**Table 2—Design Wave Height and Recommended Structure Height**

Wave Energy Category	Reach No.	Reach Name	Design Wave Height (ft)	Minimum Structure Height (Riprap or Bulkhead)~
Low	11	Monroe Bay Shoreline	1	+6 MLW
High	12	Potomac River Shoreline	4	+10 MLW

Note ~ The minimum structure height applies for sites where the bank height exceeds the structure height. If the bank height is lower, the structure height should equal the bank height.

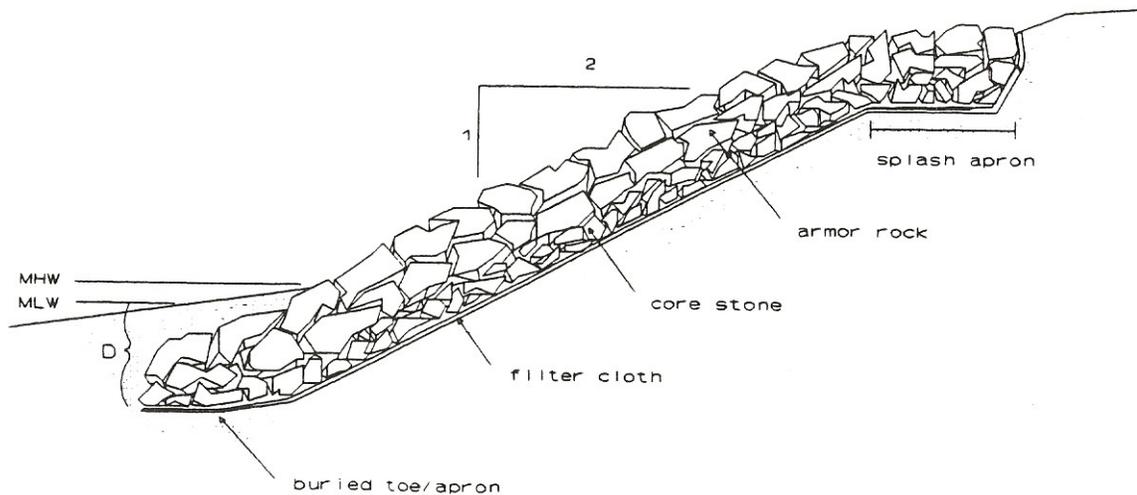
**Minimum Design Criteria: Riprap Revetment**

Minimum design criteria for riprap revetments are provided in Table 3. Riprap revetments should be installed landward of the mean high water position and avoid encroachment into wetland areas. The following example demonstrates the use of Table 3 for determining minimum design criteria for a specific site. Figure 2 illustrates the cross section of a typical riprap revetment.

Example: Consider a piece of property located on the Potomac River in reach 12. Table 2 classifies the property as high energy. From Table 3, select the following design criteria for high energy for reach 12:

- The structure height should be 10 feet above the mean low water elevation or equal to the bank height, if the bank height is lower.
- The slope of the structure should be 2:1 (horizontal/vertical) or flatter.
- The minimum armor rock weight should be 300 pounds.
- The depth of the buried toe should be a minimum of 4 feet below the mean low water elevation or a riprap apron 8 feet wide can be buried 1 foot below the mean low water elevation.
- The minimum width of the splash apron behind the structure should be 8 feet.
- Filter cloth should be used under and behind the structure.

**Figure 2. Representative Cross Section: Riprap Revetment**



**Table 3—Design Wave Height and Recommended Structure Height**

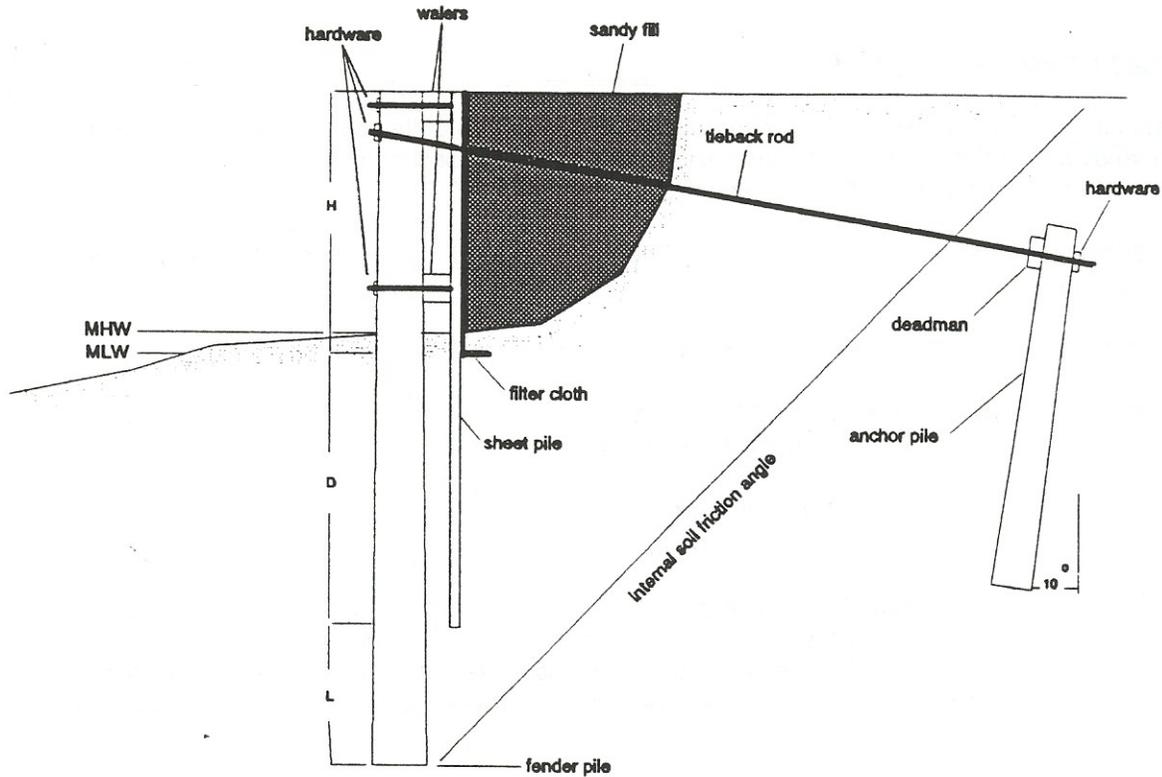
Wave Energy Category	Reach No.	Reach Name	Riprap Structure Minimum Height ~	Slope (h/v)	Armor Rock Weight (lbs)	Armor Rock Layers	Depth of Buried Toe or Riprap Apron Width (ft)	Splash Apron Width (ft)	Filter Cloth
Low	11	Monroe Bay Shoreline	6 MLW	2:1	30	2	1 ft below MLW or 2 ft apron	2	Yes
High	12	Potomac River Shoreline	+10 MLW	2:1	300	2	4 ft below MLW or 8 ft apron	8	Yes

**Minimum Design Criteria: Bulkhead**

The guidelines provided below have been developed for wooden bulkheads. Bulkheads should be installed landward of the mean high water position and avoid encroachment into wetland areas. The bulkhead should incorporate the following construction practices.

- Bulkhead dimensions are site specific. The recommended minimum heights are provided in Table 2 on page 7.
- All timber must be salt-treated or creosoted to the following levels:
  - Salt-treatment: 1.5 lbs./cu. ft. CCA (minimum)  
2.5 lbs./cu. ft. CCA (optimum)
  - Creosote: 16 lbs/cu. ft. (minimum)  
20 lbs/cu. ft. (optimum)
- For a bulkhead located landward of the mean low water position, at least half of the sheet pile should be installed below the mean low water elevation. For a bulkhead located channelward of the mean low water position, at least half of the sheet pile should be installed below the bottom. The minimum sheet pile lengths do not allow for the erosion (scour) that may occur in front of the bulkhead.
- All sheet piles must be installed vertically. Tongue-and-groove, shiplap or Wakefield lap construction techniques are recommended.
- The fender pile must be 2 to 4 feet longer than the sheet pile. It is recommended that all piles be installed with the largest end down.
- All horizontal walers (stingers) must be anchored to the fender piles with galvanized hardware. Walers may be connected by lapping and bolting at fender piles.
- A layer of filter cloth must be placed against the landward side of the sheet pile before backfilling and extend down to the mean low water elevation. Woven filter cloth stabilized against ultraviolet light should be used.
- The bulkhead must be anchored to the bank by a tieback system. Galvanized rods and anchor piles usually compose the tieback system. The anchor piles must be located behind the internal soil friction angle of the wall. In general, a tieback rod longer than the length of the sheet pile satisfies this criterion (Figure 3). Deadman crossbeams bolted to the anchor piles can increase anchorage strength.
- The back fill must be a clean, good-quality sandy soil. Fill must be compacted over the anchor piles before backfilling against the bulkhead.

**Figure 3—Representative Cross Section: Bulkhead**



*Notes*

H - Height of sheet pile above MLW

D - Depth of sheet pile below MLW. (D should be equal to or greater than H)

L - Represents the difference in length between the sheet and fender piles (minimum of 2 to 4 feet)

MLW - Mean Low Water

MHW - Mean High Water

a. All hardware (bolts, nuts, washers, etc.) must be galvanized.

b. Large end of all piles should go into ground.

c. All wood must be pressure treated to a minimum of 1.5 lbs/ft of CCA or have a minimum creosote level of 16 lbs/ft.

d. The length of the tieback rod must be equal to or greater than the length of the sheet pile.

e. Filter cloth must extend to at least MLW elevation.

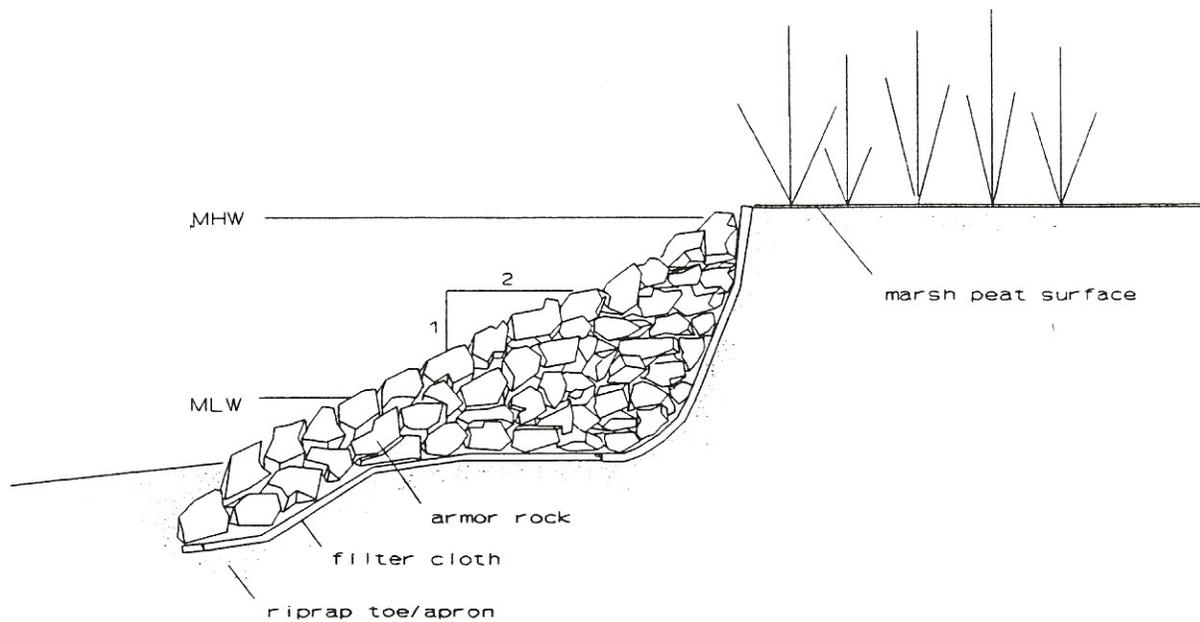
f. Fill must be free of debris and a good quality, sandy soil.

**Minimum Design Criteria: Riprap Wedge for an Eroding Marsh Fringe**

A riprap wedge is designed to protect an eroding marsh fringe from further undercutting. The structure is suitable for protecting eroding marsh shorelines in Town of Colonial Beach.

The design criteria for a riprap wedge are similar to the design criteria for a riprap revetment. The rock size, slope, toe/apron depth can be found in Table 3. The height of the riprap wedge should not exceed the height of the marsh peat surface so tidal flow into the marsh will not be restricted. However, the low elevation of the structure allows overtopping by storm waves and may result in damage to the structure or erosion of the marsh. The structure should be installed against the marsh peat scarp as shown in the cross section in Figure 4.

**Figure 4—Representative Cross Section: Riprap Wedge for an Eroding Marsh Fringe**



**Minimum Design Criteria: Groins**

Groins are designed to trap and retain moving sand in the littoral zone. The design of groins is site specific and depends on the sediment supply, beach slope, nearshore conditions, wave climate, currents and other factors. Low profile groins are recommended. A low profile groin has a maximum offshore height equal to the mean low water elevation. From this point, the top should rise shoreward with a slope of 10:1 (horizontal/vertical) or flatter until it reaches an elevation of 2 feet above the mean low water elevation. The structures can be constructed of timber, riprap or other materials. Generally the spacing between adjacent structures should be twice the length of the groin. Normally the maximum groin length permitted is a length equal to 48 feet channelward to the mean high water position.

**Minimum Design Criteria: Gabions**

Gabions are patented wire baskets which are filled with rock to form protective structures. All gabions used must be PVC coated. Gabions can be used to build retaining walls, groins and breakwaters. The design of a gabion structure is site specific and should be based on sound technical advice.