Natural Resources

Goals

The City will:

- Balance land development with environmental preservation so that unique or essential natural resources are preserved in a pristine condition while citizens and businesses are also able to use and enjoy the benefits of high quality natural areas.
- Maintain and improve the quality of the natural environmental systems - air, water, natural habitats and wetlands.
- The City will require the minimization of the impact of development on natural resources to include buffering and screening where appropriate.

Overview

Through a series of public meetings, community surveys, and stakeholder workgroup meetings, environmental protection and rural area preservation were identified among the most important issues for Chesapeake citizens in defining the City's future character. The Planning Advisory Team and City Council recognized these concerns by incorporating goals to enhance and protect the City's Natural Resources in a vision for the City's future.

The Vision Statement for the Future of Chesapeake affirms the importance of the City's natural environment by stressing the important link between the City's future growth and a healthy natural environment. Specifically, the City's vision seeks to achieve the following goals with respect to the environment:

- Link neighborhoods, businesses, recreational and cultural centers and the natural environment through efficient and sustainable multi-modal transportation systems and open space corridors.

- Manage the City's growth to achieve a balance between employment opportunities, an expanding tax base, housing that meets the needs of a diverse population, and a healthy natural environment.

- Make the best use of land resources so that growth will include revitalization and redevelopment as well as development of new areas, in a manner that will preserve rural, historic and environmental assets;

- Chesapeake will be a culturally diverse, economically strong, and environmentally healthy with a quality of life that defines the unique identity of Chesapeake as a destination and a place to live, work and play.

In order to fulfill its resource conservation goals and objectives contained in the City's Comprehensive Plan, the City needs to establish a comprehensive environmental program. The program should incorporate the implementation strategies suggested in this chapter. To properly gauge the success in fulfilling these goals and objectives, a primary component of this program should include a periodic update of the natural resource inventory contained in this Plan and a report on the status of the health of the City's natural resources to City Council to be issued on a periodic basis.

It is critical to provide a strategic approach to land conservation that benefits people, business, wildlife and the environment. Future growth, recreational needs and environmental quality needs should be considered jointly in order to provide a sustainable future land use pattern for the City.

Identifying and Assessing Chesapeake's Natural Resource Infrastructure

Beyond the fundamental understanding that clean air, water, and soil is necessary for good health, Chesapeake citizens and their elected leaders recognize that wise use and careful management of the City's environmental assets is necessary for a good quality of life, thereby ensuring a vibrant future for the City. The City's abundant natural resources create local character, attract and retain commerce, provide recreational opportunities for its residents, and protect public health and safety.

In order to develop a plan on how best to utilize the City's natural resources, it is necessary first to assess the existing conditions of these resources in order to provide a baseline of information.

The first part of this section examines the state of the City's natural resources and identifies opportunities to better enhance and utilize these resources. Finally, this section assesses how the resulting planning principles will fulfill the City's natural resource goals and objectives.

Chesapeake's Landscape

The City of Chesapeake is located in the southeastern tip the Commonwealth of Virginia. The City encompasses approximately 353 square miles and shares borders with the cities of Norfolk, Portsmouth, Suffolk, and Virginia Beach as well as the state of North Carolina. The City is located in the northern extent of what is known as the Southeastern Evergreen Forest Region (DCR, Natural Heritage, 1998), which stretches

from southeastern Virginia along the Gulf Coast to eastern Texas. According to the Natural Heritage Division of the Virginia Department of Conservation and Recreation, this ecosystem is characterized by pine and pine-hardwood communities, along with large areas of swamp land. Examples of typical vegetation found in such areas include Pond Pine, Atlantic White Cedar, Red Maple, Loblolly Pine and Black Needle Rush Marsh. Generally, the City's climate is relatively mild with an average annual temperature of 59.5 degrees Fahrenheit. The area, however, is characterized by hot, humid summers with mild winters. The average summer temperature is 77 degrees Fahrenheit, and the average winter temperature is 42 degrees Fahrenheit. According to the National Atmospheric and Oceanic Administration (NOAA), the average yearly rainfall for the area is 45.74 inches, while average annual snowfall is only 8.2 inches. The prevailing wind is from the southwest with an average speed of 10.5 miles per hour.

The topography of Chesapeake is typical of the Tidewater coastal plain in which the City is located. The terrain is essentially flat and featureless with an average elevation of 12 feet National Geodetic Vertical Datum of 1929 (NGVD). Heavily developed areas along the Elizabeth River, located in South Norfolk and Deep Creek, are approximately 10 feet NGVD and lower. Many large industrial areas are below 10 feet NGVD. Areas of steep slopes are limited to areas along streams, creeks, and river banks. Ground elevations range between sea level along the major navigable waterways to 25 feet above sea level in some of the highland ridges between major watersheds.

The land area in the southeastern part of the City contiguous to the Northwest River is used primarily for agricultural purposes. This area contains large marsh and swamp areas below 10 feet NGVD. A typical feature of the rural landscape of the City of Chesapeake is the widespread use of manmade drainage ditches and canals alongside roadways and property lines.

The average land elevation of the Great Dismal Swamp National Wildlife Refuge is 20 feet NGVD and is not subject to tidal flooding. However, surface drainage is poor resulting in a swampy condition from which the area has derived its name. Although primarily undeveloped in the past, flooding problems have increased in the area surrounding the Swamp as development has occurred.

Geologic Profile

The City of Chesapeake lies east of the Suffolk Scarp, a north-south trending scarp representing one of several successive Pleistocene shorelines in the lower coastal plain geologic province. The resulting land surface consists of primarily near-shore and lagoonal marine deposits punctuated in the east by the Hickory Scarp, another north-south trending scarp. As a result, the City's relief is characterized by low elevations, low relief, and abundant wetland areas. Geologically, portions of Chesapeake are underlain by the Poquoson, Lynnhaven, and Sedgefield Members of the Tabb Formation. These deposits are composed of upper Pleistocene sands, silts, clays and peats deposited on coastal plains east of the Suffolk scarp, and in turn overlie older Pliocene deposits of the Yorktown formation.

Issue One: Soils

Soil characteristics affect the capacity of land to support structures, roads, foundations, and septic systems. Soil suitability is determined based upon degree of wetness, degree of slope, and size and texture of particles in the soil. Information on soils can be used to identify certain areas that need special attention in relation to potential soil problems.

For instance, soils with a high shrink-swell potential are unstable and thus poorly suited for foundations, roadways, and septic drainfields. The shrink-swell ratio, closely correlated with the clay content of a soil, is an important consideration due to changes in moisture content. Highly erodible soils have a high potential for erosion and cause excessive sedimentation in local waterways, thus harming water quality and creating navigational hazards. Highly permeable soils, such as dry, sandy soils, even where slopes are moderate, may be unsuitable for development requiring on-site sewage treatment, such as septic fields. This type of soil allows effluent to move too quickly to provide adequate treatment, and the potential for groundwater contamination is significant.

Information on soil types is a valuable aid in local land use planning and decision-making, as well as site-specific planning and design. Once these problems areas have been identified, more detailed soil analyses can be performed that will yield additional information necessary for site-specific decision-making in relation to which soil types are appropriate for or limiting for certain types of uses or development.

The most recent soil survey for the City is the 2005 City of Chesapeake Soil Survey published by the Natural Resource Conservation Service (NRCS). NRCS has identified no highly erodible soils in the Chesapeake Bay watershed area of the City, excluding stream banks and river banks. Overall, the soils in the City range from peat soils to sandy, silty, and loamy mineral soils with varying degrees of drainage. Somewhat poorly drained to very poorly drained soils tend to predominate in the flat, low-lying landscape throughout the City. A table summarizing the City's soil characteristics and potential development constraints has been included below:

Chesapeake Soil Characteristics

Soil Series Name	Slope	Upper Limits of Water Table (ft)	Infiltration Rate	Use for Dwellings and Small Commercial Buildings	Use for Local Roads & Streets	Use for Septic Tank Absorption Fields	Total Acres	% of Each Soil
Acredale silt loam	0 to 1%	0.0 to 1.0	Very Slow	Very Limited	Very Limited	Very Limited	26,268	11.4
Acredale-Chapanoke complex	0 to 1%	0.0 to 1.0	Slow to Very Slow	Very Limited	Very Limited	Very Limited	2,059	0.9
Acredale-Urban land complex	0 to 1%	0.0 to 1.0	Very Slow	Very Limited	Very Limited	Very Limited	773	0.3
Acredale-Urban land-Chapanoke complex	0 to 2%	0.0 to 1.0	Slow to Very Slow	Very Limited	Very Limited	Very Limited	26	*
Aquents	0 to 2%	0.0 to 0.3	High	Not Rated	Not Rated	Not Rated	269	0.1

Soil Series Name	Slope	Upper Limits of Water Table (ft)	Infiltration Rate	Use for Dwellings and Small Commercial Buildings	Use for Local Roads & Streets	Use for Septic Tank Absorption Fields	Total Acres	% of Each Soil
Arapahoe mucky fine sandy loam	0 to 1%	0.0 to 1.0	Moderate to Very Slow	Very Limited	Very Limited	Very Limited	3,007	1.3
Arapahoe-Urban land complex	0 to 1%	0.0 to 1.0	Moderate to Very Slow	Very Limited	Very Limited	Very Limited	34	*
Bojac loamy fine sand	0 to 2%	4.0 to 6.0	Moderate	Not Limited to Somewhat Limited	Not Limited	Very Limited	958	0.4
Bojac-Urban land complex	0 to 2%	4.0 to 6.0	Moderate	Not Limited to Somewhat Limited	Not Limited	Very Limited	712	0.3
Bojac-Urban land-Wando complex	0 to 3%	4.0 to 6.0	High to Moderate	Not Limited to Somewhat Limited	Not Limited	Very Limited	456	0.2
Chapanoke-Yeopim complex	0 to 3%	1.0 to 2.0	Moderate to Slow	Very Limited to Somewhat Limited	Very Limited	Very Limited	634	0.3
Chesapeake sandy loam	0 to 2%	4.0 to 6.0	Moderate	Not Limited to Somewhat Limited	Not Limited	Very Limited	1,487	0.6
Chesapeake-Urban land complex	0 to 2%	4.0 to 6.0	Moderate	Not Limited to Somewhat Limited	Not Limited	Very Limited	654	0.3
Conetoe-Chesapeake-Tetotum complex	2 to 40%	1.5 to 2.5	High to Slow	Not Limited to Very Limited	Not Limited to Very Limited	Very Limited	509	0.2
Deloss mucky fine sandy loam	0 to 1%	0.0 to 1.0	Moderate to Very Slow	Very Limited	Very Limited	Very Limited	8,635	3.7
Deloss-Tomotley complex	0 to 1%	0.0 to 1.0	Moderate to Very Slow	Very Limited	Very Limited	Very Limited	5,586	2.4
Deloss-Urban land complex	0 to 1%	0.0 to 1.0	Moderate to Very Slow	Very Limited	Very Limited	Very Limited	160	*
Dorovan-Belhaven complex	0 to 1%	0.0 to 0.5	Very Slow	Very Limited	Very Limited	Very Limited	14,643	6.3
Dragston fine sandy loam	0 to 2%	1.0 to 2.5	Slow	Very Limited	Very Limited	Very Limited	1,178	0.5
Dragston-Tomotley complex	0 to 2%	0.0 to 1.0	Moderate to Very Slow	Very Limited	Very Limited	Very Limited	5,480	2.4
Dragston-Urban land complex	0 to 2%	1.0 to 2.5	Slow	Very Limited	Very Limited	Very Limited	782	0.3
Dragston-Urban land-Tomotley complex	0 to 2%	0.0 to 1.0	Moderate to Very Slow	Very Limited	Very Limited	Very Limited	2,193	1.0
Gertie silt loam	0 to 1%	0.0 to 1.0	Very Slow	Very Limited	Very Limited	Very Limited	2,261	1.0
Hyde mucky silt loam	0 to 1%	0.0 to 1.0	Moderate to Very Slow	Very Limited	Very Limited	Very Limited	3,171	1.4

Soil Series Name	Slope	Upper Limits of Water Table (ft)	Infiltration Rate	Use for Dwellings and Small Commercial Buildings	Use for Local Roads & Streets	Use for Septic Tank Absorption Fields	Total Acres	% of Each Soil
Munden fine sandy loam	0 to 2%	1.5 to 2.5	Moderate	Somewhat Limited to Very Limited	Somewhat Limited	Very Limited	3,759	1.6
Munden loamy fine sand	2 to 8%	1.5 to 2.5	Moderate	Somewhat Limited to Very Limited	Somewhat limited	Very Limited	570	0.2
Munden-Urban land complex	0 to 2%	1.5 to 2.5	Moderate	Somewhat Limited to Very Limited	Somewhat Limited	Very Limited	2,020	0.9
Munden-Urban land complex	2 to 8%	1.5 to 2.5	Moderate	Somewhat Limited to Very Limited	Somewhat Limited	Very Limited	57	*
Munden-Urban land-Pactolus complex	0 to 3%	1.5 to 2.5	High to Moderate	Somewhat Limited to Very Limited	Somewhat Limited	Very Limited	344	0.1
Nawney silt loam	0 to 1%	0.0 to 0.5	Very Slow	Very Limited	Very Limited	Very Limited	2,512	1.1
Pactolus loamy fine sand	0 to 3%	1.5 to 2.5	High	Somewhat Limited to Very Limited	Somewhat Limited	Very Limited	552	0.2
Pasquotank silt loam	0 to 1%	0.0 to 1.0	Moderate to Very Slow	Very Limited	Very Limited	Very Limited	727	0.3
Pocaty mucky peat	0 to 1%	0.0 to 1.0	Very Slow	Very Limited	Very Limited	Very Limited	832	0.4
Portsmouth mucky fine sandy loam	0 to 1%	0.0 to 1.0	Moderate to Very Slow	Very Limited	Very Limited	Very Limited	6,762	2.9
Psamments	0 to 10%	2.5 to 5.0	High	Not Limited to Somewhat Limited	Not Rated	Very Limited	1,325	0.6
Pungo-Belhaven soils	0 to 1%	0.0 to 0.5	Very Slow	Very Limited	Very Limited	Very Limited	43,389	18.8
Rappahannock muck	0 to 1%	0.0 to 1.0	Very Slow	Very Limited	Very Limited	Very Limited	1,131	0.5
Tetotum fine sandy loam	0 to 2%	1.5 to 2.5	Slow	Somewhat Limited to Very Limited	Somewhat Limited	Very Limited	2,303	1.0
Tetotum-Urban land complex	0 to 2%	1.5 to 2.5	Slow	Somewhat Limited to Very Limited	Somewhat Limited	Very Limited	349	0.2
Tetotum-Urban land-Chesapeake complex	0 to 2%	1.5 to 2.5	Moderate to Slow	Somewhat Limited to Very Limited	Not Limited to Somewhat Limited	Very Limited	119	*
Tomotley fine sandy loam	0 to 1%	0.0 to 1.0	Moderate to Slow	Very Limited	Very Limited	Very Limited	8,462	3.7
Tomotley-Bertie complex	0 to 2%	0.0 to 1.0	Moderate to Very Slow	Very Limited	Very Limited	Very Limited	5,004	2.2
Tomotley-Deloss complex	0 to 1%	0.0 to 1.0	Moderate to Very Slow	Very Limited	Very Limited	Very Limited	19,987	8.7
Tomotley-Deloss-Urban land complex	0 to 1%	0.0 to 1.0	Moderate to Very Slow	Very Limited	Very Limited	Very Limited	3,034	1.3

Soil Series Name	Slope	Upper Limits of Water Table (ft)	Infiltration Rate	Use for Dwellings and Small Commercial Buildings	Use for Local Roads & Streets	Use for Septic Tank Absorption Fields	Total Acres	% of Each Soil
Tomotley-Nimmo complex	0 to 1%	0.0 to 1.0	Moderate to Very Slow	Very Limited	Very Limited	Very Limited	16,010	6.9
Tomotley-Urban land complex	0 to 1%	0.0 to 1.0	Moderate to Very Slow	Very Limited	Very Limited	Very Limited	1,921	0.8
Tomotley-Urban land-Bertie complex	0 to 2%	0.0 to 1.0	Moderate to Very Slow	Very Limited	Very Limited	Very Limited	1,337	0.6
Tomotley-Urban land-Nimmo complex	0 to 1%	0.0 to 1.0	Moderate to Very Slow	Very Limited	Very Limited	Very Limited	4,149	1.8
Udorthents-Urban land complex	0 to 45%	No data available	No data available	Not Rated	Not Rated	Not Rated	6,566	2.8
Urban land	0 to 5%	No data available	No data available	Not Rated	Not Rated	Not Rated	3,878	1.7
Urban land-Conetoe-Chesapeake-Tetotum complex	2 to 40%	1.5 to 2.5	High to Slow	Not Limited to Very Limited	Very Limited	Very Limited	364	0.2
Urban land-Deloss-Tomotley-Nimmo complex	0 to 1%	0.0 to 1.0	Moderate to Very Slow	Very Limited	Very Limited	Very Limited	1,543	0.7
Wando loamy fine sand	0 to 3%	4.0 to 6.0	High	Not Limited to Somewhat Limited	Not Limited	Very Limited	412	0.2
Weeksville mucky silt loam	0 to 1%	0.0 to 1.0	Moderate to Very Slow	Very Limited	Very Limited	Very Limited	1,165	0.5
Water	-	-	-	Not Rated	Not Rated	Not Rated	7,882	3.4
							230,400	99.9

Source: U.S. Department of Agriculture, Natural Resources Conservation Service, 2005.

The prevalence of poorly drained and somewhat poorly drained soils in the City generate several substantial concerns for the City's future growth and development pattern.

Improving soil drainage is one of the principal management problems in Chesapeake. The somewhat poorly drained and poorly drained soils need extensive improvements in drainage. Many of the deeper, sandier soils in Western Branch and Deep Creek require little artificial drainage, but the gray, finer textured soils near swamps in the southern part of the City need extensive improvements in drainage.

According to the City's 2005 soil survey, between 80 to 90% of the City's soils are considered hydric soils. Hydric soils are one indicator of potential wetland areas. If tidal or nontidal wetland areas found on a site with hydric soils, development of the site may be subject to local, state and federal regulations.

Although many of the soils in Chesapeake may be poorly drained, Chesapeake's favorable climate, extended growing season, and soils make farmland in the City some of the most productive statewide (Virginia Tech, 2001). Advancing septic technology and continued growth pressure on the City raise concerns for future public infrastructure costs as well as providing sufficient land area for the future viability of the agricultural industry in Chesapeake. As a result, soil quality and productivity are not highly discriminating factors for the City, thus other issues become more important in the determination of the City's form.

Well-drained soils are suitable for septic tank use. These soils purify wastewater and make it safe water to use again. Soils containing a seasonal groundwater table are not well-drained. Usually these soils have gray, yellow or pale brown colors (VA Department of Health, February 2004). Most research shows two to four feet of well-drained soil is necessary to clean wastewater.

Environmental health specialists estimate how fast water will move or "perc" by feeling the soil's texture. Soils that perc too quickly can contaminate ground water. Those that perc too slowly can cause sluggish plumbing flow. This can produce sewage overflows.

There must be two to four feet of well-drained soil to remove most bacteria and viruses from wastewater. Virginia requires at least one foot of well drained soil above rock or restrictive layers. Some geologic formations, such as limestone, are especially subject to transporting contaminated water. The physical and chemical nature of the earth's formation determines the degree of hazard. Even a single ridge of rock can cause serious health threats, if a sewage systems is installed too close to it.

New septic technologies are emerging which can be used in areas with high water tables, since they can be situated partially above ground. These new technologies are more compact in size and much more efficient. In some cases, they can remove up to 99% fecal coliform and reduce BOD by 98%. While these new technologies greatly enhance nonpoint source pollution removal efficiency, they may also serve to increase the amount of developable land in the City by eliminating the need for reserve drainfields as well as providing an on-site sewage treatment alternative for land previously unsuitable for septic drainfields

The City should direct incompatible development away from areas which are characterized by poor soils and toward areas where the extension of public sewer lines is planned.

Strategies:

- Soil data review will be coordinated with the local Soil and Water Conservation District or other professional with the required expertise. Areas with poor soils should be identified and mapped, including highly permeable and hydric soils.

- Development review will be coordinated with the Chesapeake Department of Health who will ensure soil suitability for on-site septic systems for new residential development.

- Soil borings should be considered for areas identified as having marginally suitable or unsuitable soils in order to confirm their suitability prior to development.

Issue Two: Water Resources

Although the City currently implements a variety of water quality protection programs, surface water quality in the City continue to show signs of impairment, potentially threatening human and environmental health.

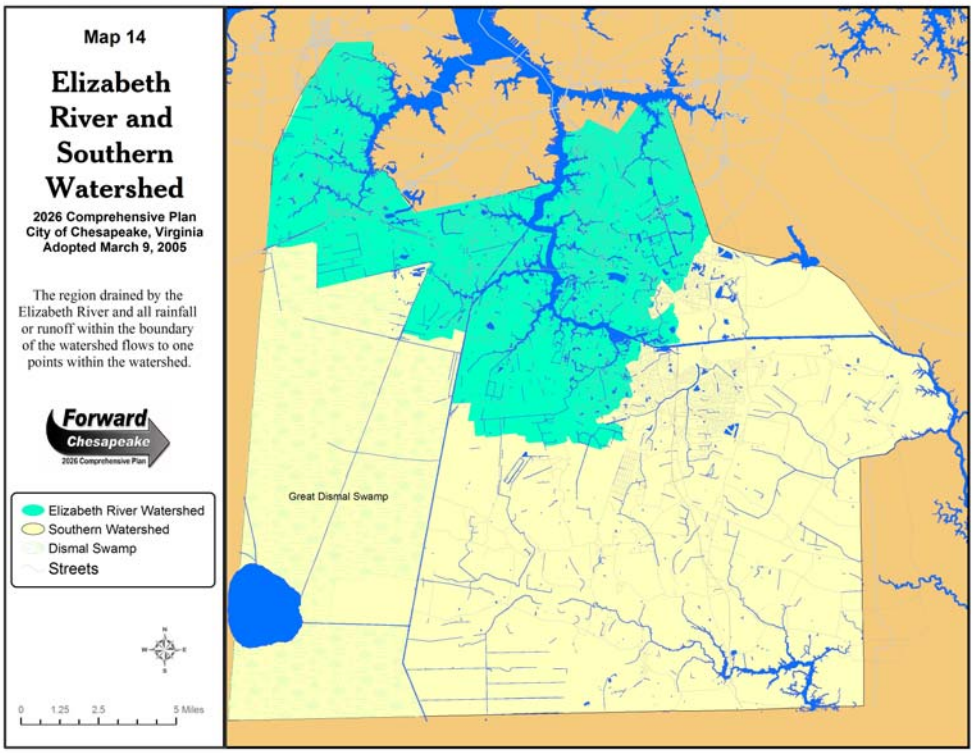
Two major watersheds split the City of Chesapeake – the Chesapeake Bay watershed drains the northern half of the City, while the Southern Watershed Area drains its southern end. The Elizabeth River is the primary river that drains to the Chesapeake Bay watershed area. The Elizabeth River consists of three major branches, including the Eastern Branch, the Southern Branch, and the Western Branch.

The Northwest River and the North Landing River are the major river basins in the Southern Watershed Area and drain south to the Albemarle –Pamlico Sound in North Carolina. In addition, there are two large lakes which lie partially in the City that belong to the Southern Watershed Area, including Lake Drummond lying at the City border with Suffolk, as well as Stumpy Lake on the border with Virginia Beach.

Approximately 92 square miles of the City, or 26%, drains to the Chesapeake Bay. Approximately 261 square miles, or 74%, of the City lies within the Southern Watershed Area. The City's large watershed areas consist of 27 smaller subwatersheds which are listed in the following table.

Chesapeake's Subwatersheds

Code	Subwatershed Name	Watershed Name
BC	Bailey Creek	Western Branch
BK	Berkley Drainage	Eastern Branch
BL	Blackwater Creek	North Landing River
BM	Bells Mill Creek	Southern Branch
CD	Coopers Ditch	Albemarle and Chesapeake Canal
CM	Camden Mills	Southern Branch
CV	Cavalier	Western Branch
CW	Crestwood	Southern Branch
DC	Deep Creek	Southern Branch
DP	Drum Point Creek	Western Branch
EB	Eastern Branch	Eastern Branch
GC	Goose Creek	Western Branch
GL	Gilmerton Canal	Southern Branch
GS	Gum Swamp	North Landing River
HR	Horse Run Ditch East	Albemarle and Chesapeake Canal
IR	Indian River	Eastern Branch
LD	Lake Drummond	Lake Drummond
MC	Mill Dam Creek	Southern Branch
NM	New Mill Creek	Southern Branch
NS	Northside Canal	Albemarle and Chesapeake Canal
OG	Oak Grove	Southern Branch
PR	Pocaty River	North Landing River
SC	Southern Chesapeake	Northwest River
SJ	Saint Julian Creek	Southern Branch
SL	Stumpy Lake	Stumpy Lake
SN	South Norfolk	Southern Branch
SS	Southside Canal	Albemarle and Chesapeake Canal
ST	Sterns Creek	Western Branch



Chesapeake's Surface Water Features

The City of Chesapeake is in a large part defined by its abundant water resources. Upon examination of the City's historical development pattern, it is readily apparent that this existing pattern of development grew up along the shores of its tributaries in order to capitalize on the proximity to the deep water shipping channels, access to other major ports, and access to major regional roadways and economic activity centers. These factors were key to the City's past success and will remain important to its future vitality. As a result, it is important to identify and assess the City's surface water features, in order to fully utilize and preserve one of the City's most vital assets.

Western Branch, Elizabeth River

Location	Between the City of Portsmouth and Chesapeake
Surrounding Land Use	Primarily suburban residential with limited agricultural and commercial uses.
Length	Approximately 20 miles
Average Depth	There are no Federally maintained channels in the Western Branch, however, there is an existing channel that ranges from 18 feet near the mouth to around 9 feet near Drum Point Creek. Near-shore depths range from 1 to 6 feet.
Historical Influences	Formerly agricultural in its surrounding land use, the Western Branch now supports low and medium residential development along its shoreline.
Water Quality	PCBs in fish tissues
Primary Uses	Recreational
Shoreline Conditions	Fully developed shoreline, with approximately 11% of shoreline hardened by bulkhead or riprap revetment. No visible or documented erosion problems.

Eastern Branch, Elizabeth River

Location	Situated between the City of Norfolk, Chesapeake and Virginia Beach
Surrounding Land Use	Primarily industrial shipping/shipbuilding with moderate urban and suburban residential
Length	Approximately 25 miles
Average Depth	Maintained navigation channel of 25 foot to 16 foot depth. Near-shore depths range from 1 to 4 feet during mean low tide
Historical Notes	Heavy industrial use since the early 1900's.
Water Quality	Nutrients, fecal coliform, tributylin, elevated PCBs concentrations in fish tissues. Possible sources of nutrients and fecal coliform include stormwater runoff from the surrounding residential and industrial land uses. Commercial port activities is believed to be the source of tributyltin. The specific source of the elevated PCB concentrations in fish tissue is currently unknown.
Primary Uses	Industrial, commercial and recreational uses
Shoreline Conditions	100% developed shoreline, 95% of which is residential. Approximately 40% hardened with riprap revetment or bulkhead structures. No visible or documented erosion problems.

Southern Branch, Elizabeth River

Location	Northern & Central Chesapeake
Surrounding Land Use	Industrial shipping, military, shipbuilding, urban and suburban residential
Length	Approximately 40 miles
Average Depth	The main channel varies from 35 to 40 feet at mean low tide in the Lower Reach to as low as 25 feet in the Upper Reach. Outside of the maintained navigational channel, the River is relatively shallow with near-shore depths ranging from 1 to 4 feet during mean low tide.
Historical Influences	Industrial development along shoreline since 1600s. Frequent dredging of navigation channels by the Federal government, wetland filling and bulkheading. Construction of dredge spoils disposal site known as Craney Island has impacted flushing characteristics of river.
Water Quality	Nutrients, fecal coliform, poor dissolved oxygen levels, poor benthic index biological integrity (BIBI) score, heavy metals (cadmium, chromium, copper, lead, mercury, nickel and zinc), and organic compounds (PAHs, phthalates, PCBs, and tributlyltin). St. Julian's Annex has recently been added to the National Priority Site List. Possible sources of nutrients and fecal coliform include possible stormwater runoff from the surrounding residential and industrial land uses. Commercial port activities is believed to be the source of tributyltin.

	Sources of the heavy metals include shipyards and stormwater runoff. The primary sources of polynuclear aromatic hydrocarbons (PAHs) include petroleum products, coal, and the incomplete combustion of fossil fuels, creosote, and stormwater runoff. Historical activities, such as the unregulated operation of creosote plants and the unrestricted filling of wetlands are the major causes of degradation of the River.
Primary Uses	Commercial shipping, recreation, segment of the Intracoastal Waterway
Shoreline Conditions	Approximately 10 miles, or 22%, of shoreline is hardened with bulkhead or riprap revetment. No visible or documented erosion problems.

North Landing River

Location	Southeastern Chesapeake
Surrounding Land Use	Agriculture and low density residential
Length	Approximately 77 miles
Average Depth	Depths of range from 5 to 15 feet.
Historical Influences	The Albemarle and Chesapeake Canal was constructed in the 1850's to connect the North Landing River to the Elizabeth River. The same project involved dredging to widen, straighten, and deepen some portions of the North Landing River to the Currituck Sound.
Water Quality	Although water quality is considered generally good throughout the River, recent reports do show some degradation of conditions, including problems with low dissolved oxygen, nutrient levels, and increasing suspended solids.
Primary Uses	Recreational, including boating, hunting and fishing. State scenic river as well as a segment of the Intracoastal Waterway.
Shoreline Conditions	Less than 1% of the River's shoreline in Chesapeake is hardened. The shoreline in Chesapeake is primarily natural No visible or documented erosions problems.

Northwest River

Location	Southern Chesapeake
Surrounding Land Use	Agriculture and forest
Length	Approximately 34 miles
Average Depth	Depths range from 5 to 15 feet
Historical Influences	With the exception of the Northwest River Water Treatment Plant which opened in March 1980, the Northwest River has not been subject to large-scale disturbances. A channel was dredged through the headwaters section in the distant past. A number of other minor ditches and canals also drain into the upper stretches of the River.

Water Quality	General water quality is good, but recent trend analyses show degrading conditions, especially increasing nutrient levels and suspended solids.
Primary Uses	Drinking water supply, recreational
Shoreline Conditions	Approximately 1% of the Northwest River shoreline has been hardened by either riprap revetment or bulkhead. The majority of the River's shoreline is natural with little development. No visible or documented erosion problems.

Lake Drummond

Location	Lake Drummond is located in the Dismal Swamp National Wildlife Refuge on the City's border with the City of Suffolk.
Surrounding Land Use	Dismal Swamp National Wildlife Refuge
Size	Average width of 4.1 kilometers and a surface area of 3,180 acres
Average Depth	Maximum depth of 6.5 feet
Historical Influences	Although it has been determined that the Lake was probably formed about 4,000 years B.C., the nature of its origin and development are unknown. A deep peat burn followed by lateral peat erosion is considered the most likely scenario.
Water Quality	General water quality is good.
Primary Uses	Recreational
Shoreline Conditions	The shoreline of the lake is completely within the Refuge property and is undeveloped. No visible or documented erosion problems.

Stumpy Lake

Location	Straddles the border of Chesapeake and Virginia Beach
Surrounding Land Use	Golf course, residential, forest
Size	278-acre man-made lake
Average Depth	At full capacity the maximum water depth is only 4.35 feet and more than half of the lake is less than 3.3 feet deep.
Historical Influences	The Lake was created around 1910 when the head of Gum Swamp was dammed to provide an emergency drinking water reservoir for the City of Norfolk.
Water Quality	High nutrient loading (nitrogen and phosphorus) and turbidity
Primary Uses	Recreational
Shoreline Conditions	Undeveloped shoreline in Chesapeake. No visible or documented erosion problems.

Albemarle and Chesapeake Canal

Location	Central and Eastern Chesapeake
Surrounding Land Use	Agricultural, residential and forest, with limited industrial and commercial
Size	Approximately 10 miles in length
Average Depth	The channel is maintained at a depth of 12 feet.
Historical Influences	A major component of the Intracoastal Waterway, the Canal consists of a man-made canal constructed in the 1850's to connect the upper part of the North Landing River to the Elizabeth River, a major tributary of the Chesapeake Bay.
Water Quality	According to DEQ, the canal has not been monitored since 1977.
Primary Uses	Commercial and recreational
Shoreline Conditions	Primarily undeveloped shoreline in Chesapeake. No visible or documented erosion problems.

Dismal Swamp Canal

Location	Southwestern Chesapeake from Deep Creek south to the State line.
Surrounding Land Use	Forest, agriculture, and residential with some commercial
Size	13 miles in length within Chesapeake
Average Depth	6.5 feet
Historical Influences	Canal was constructed between 1793 and 1805 to provide an alternative commercial transportation route between Virginia and North Carolina. Today it serves as an alternative route for the Intracoastal Waterway.
Water Quality	No current monitoring information available
Primary Uses	Recreational
Shoreline Conditions	Primarily undeveloped shoreline in Chesapeake. No visible or documented erosion problems.

The Future of Chesapeake's Waterways

As evident by an examination of the City's historical development pattern, water quality, surrounding land uses, and shoreline conditions, the City's Chesapeake Bay watershed has been its most intensely developed area. In the preferred 2026 development pattern, this area is designated for future infill development and redevelopment of existing disturbed areas. Many of the water quality concerns within this area belie its industrial past and reflect historical abuses as well as aging or absent stormwater controls, which may contribute to nonpoint source pollutant loadings.

The City's Southern Watershed Area is still primarily rural in nature. The shorelines of the Northwest River, North Landing River, and Lake Drummond are primarily undeveloped and general water quality is good. Because these water features supply drinking water, wildlife habitat, and recreational opportunities, the City should develop an action plan to protect these valuable resources. Stumpy Lake is an example of a water feature in the SWA facing development pressures as well as their consequent problems, including nonpoint source pollution loadings from surrounding residential and golf course development.

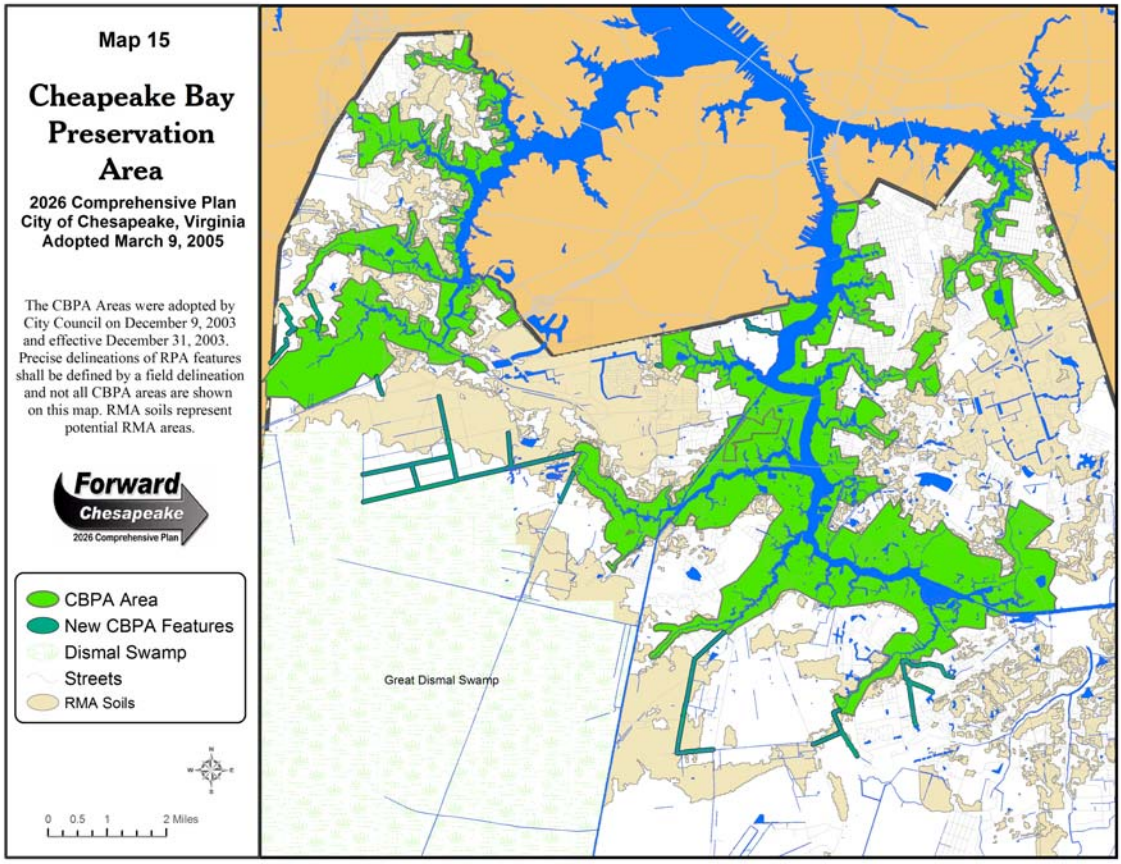
Waterways in the City are subject to a variety of regulatory programs meant to address impacts from surrounding land uses. Rain that flows from the land into a water feature is known as "runoff." Runoff from land surrounding a water feature, such as a creek, ditch, or wetland, can harm water quality if the runoff contains pollutants. Pollution

contained by runoff is known as non-point source (NPS) pollution, since it cannot be attributed to any one specific source. NPS pollution may come from a great many sources, such as residential lawns, driveways, construction sites, and parking lots, just to name a few examples. The biggest NPS pollutants include nitrogen, phosphorus, and sediment. Nitrogen and phosphorus are nutrients and are commonly used as fertilizers to promote plant growth in lawns and agricultural crops. Nutrients may also come from animal waste from yards and pastureland. Nutrients are harmful to water quality, because they promote algae growth which can block sunlight and reduce the amount of dissolved oxygen in a water feature, which animals and plants to need to grow. Sediment can fill in waterways, reduce water clarity and cover bottom habitat. Nutrients may also adhere to sediment particles and enter waterways.

Point source pollution can be attributed to a particular source, such as from an industrial outfall or from a water treatment plant, and therefore can be easily regulated. Point source pollution may contain the same pollutants as NPS pollution sources or may contain other chemicals, depending on their discharge permits issued by the State.

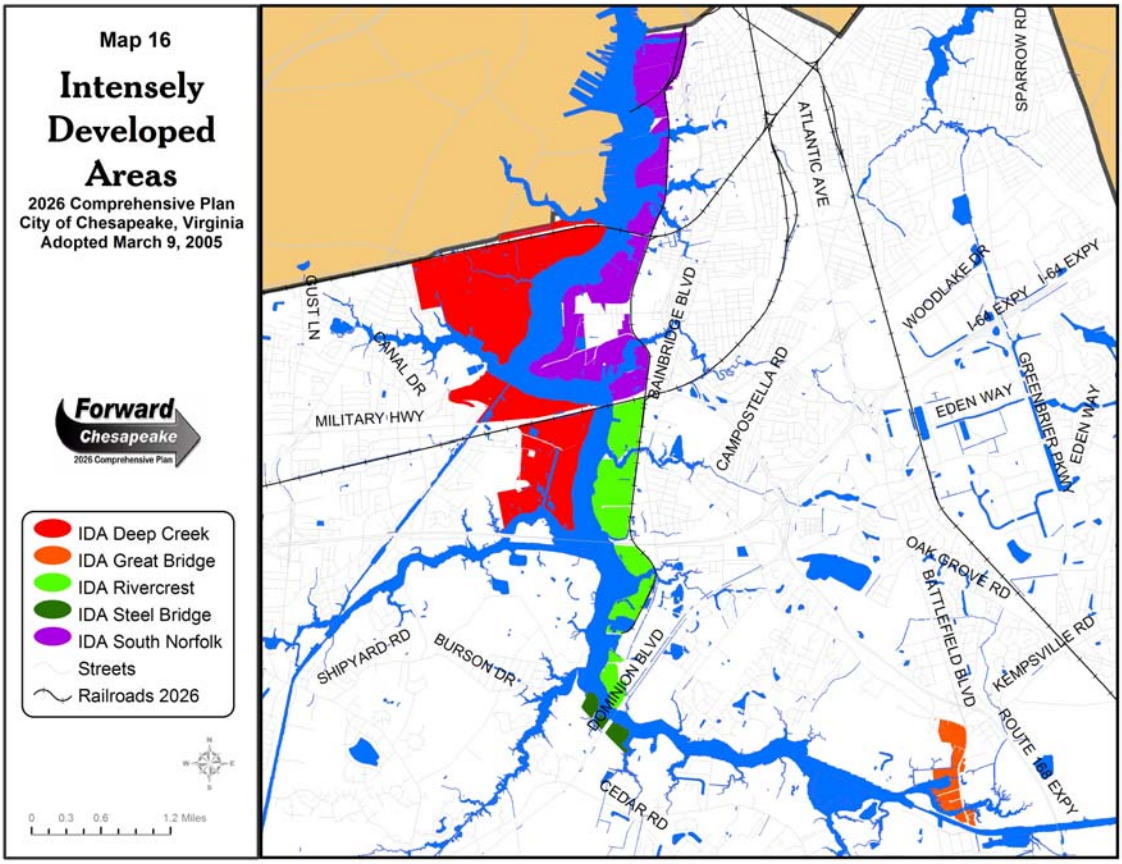
Existing surface water protection programs currently consist of a mixture of local, State, and federal regulations. Generally, the United States Army Corps of Engineers reviews development activities occurring in navigable waters and associated tidal wetlands. The Corps reviews impacts to nontidal wetlands in conjunction with the Virginia Department of Environmental Quality (DEQ). Together with the US Environmental Protection Agency (EPA), DEQ also maintains and monitors varying standards of water quality. Anyone wishing to discharge effluent into local surface waters must first obtain a discharge permit from DEQ. The City's Wetlands Board has jurisdiction over tidal wetlands; and the State's Virginia Marine Resources Commission has jurisdiction over waters and coastal areas located in sub-aquaeous areas, or the bottom of surface water features.

The City also manages development of its waterways in the Chesapeake Bay watershed through the implementation of its local Chesapeake Bay Preservation Area (CBPA) Program, which seeks to address impacts to water quality from surrounding land uses. The purpose of the City's CBPA Ordinance includes preventing a net increase in non-point source pollution from new development, a ten percent decrease in non-point source pollution from redevelopment, and a 40 percent reduction in non-point source pollution from agricultural uses. To achieve this, the ordinance includes performance standards for development, redevelopment, and agriculture. The most common of these performance standards is to preserve or re-establish a 100-foot buffer adjacent to the Resource Protection Areas (RPAs), which include all tidal wetlands, non-tidal wetlands connected by contiguous surface flow and perennial water features. A map showing the location of the City's CBPA areas is included below.



Retention of the 100-foot buffer area is deemed to achieve a 75% reduction of sediments and 40% reduction of nutrients. To maintain their pollutant removal integrity, development in these buffer areas is prohibited. In the City's designated Intensely Developed Areas, encroachment into the 100-foot buffer area is allowed in conjunction with the use of stormwater management Best Management Practices (BMPs) and low impact development techniques. A map of the City's IDAs is included below.

The purpose behind an IDA designation is to focus development activities where development has already been concentrated and is supported by existing infrastructure. In exchange for increased flexibility with buffer requirements offered by an IDA designation, the City's *CBPA Specifications Manual* recommends incorporating methods of improving water quality protection over time. These methods could include: consolidating surface parking, breaking up expanses of impervious cover; and revegetation measures of previously impervious surfaces. These are examples of what is popularly known as "low impact design." These low impact design requirements and others are included in the City's *CBPA Specifications Manual*.



On farmland in the CBPA district, agricultural activities may also encroach into the 50 feet of the 100-foot wide buffer when at least one agricultural best management practice, which in the opinion of the local Soil and Water Conservation District Board, addresses erosion control and nutrient management on the land adjacent to the buffer. Agricultural activities may encroach 75 feet into the required buffer, when agricultural best management practices are in place that address erosion control, nutrient management, and pest chemical control. State regulations require, however, that a soil and water quality conservation assessment be conducted for all agricultural lands within the CBPA district to evaluate the effectiveness of existing practices pertaining to erosion control, nutrient management, and management of pesticides to ensure the protection of water quality.

According to the Virginia Dare Soil and Water Conservation District, there are approximately 27 tracts under cultivation or in pasture in the CBPA district in Chesapeake. All but four of these tracts lie along existing agricultural drainage ditches that are shown as perennial features on the USGS topographic quad maps and are therefore shown as potential RPA features on the City's CBPA maps. Buffer areas are not required to be designated adjacent to agricultural drainage ditches, if at least one best management practice is being implemented on the adjacent land as approved by the VA Dare Soil and Water Conservation District. Little information is currently available on these farms, however, since most of these farmers do not participate in federal cost-share programs.

Another local water quality protection ordinance is the City's stormwater management ordinance which attempts to reduce nonpoint source pollution from stormwater runoff, or rainwater that runs off over land. This ordinance applies to all development greater than 10,000 square feet. Development larger than 10,000 square feet must prepare a stormwater management plan, which describes how existing runoff levels will be maintained or reduced and comply with program requirements. This ordinance also defines substances which are prohibited from entering into the municipal stormwater management system. The City's Public Facilities Manual contains the requirements for stormwater management plans.

The City's erosion and sediment control ordinance also helps to protect water quality by preventing sediment from entering local waterways. Sediment is soil particles carried by rainwater into local waterways. Sediment may contain pollutants as well as reduce the clarity and depth of waterways. The ordinance requires each project over 10,000 square feet in area that lies outside of the CBPA district to submit an erosion and sediment control plan to the Department of Public Works before engaging in any land disturbing activity. Within the CBPA district, a permit is required for all development projects over 2,500 square feet. The City adopted the Virginia Erosion and Sediment Control Handbook as the official City handbook.

Excavation, or mining, activities can be a source of sediment as well as create potential impacts to groundwater. The City's excavation ordinance applies to borrow pits which includes any operation where topsoil, sand, clay, gravel or other materials indigenous to the excavation site, or any combination thereof, are excavated below ground-level and are transported off-site for any purpose. This ordinance requires a conditional use permit. In addition to the requirements of the underlying zoning district, this ordinance requires additional site and geological data, including estimated impacts on surface and groundwater, assumption of legal responsibility for any environmental pollution that results from the proposed activity, as well as an end-use plan which describes restoration activities. The ordinance mandates that all applicable state and federal permits be issued prior to the beginning of the proposed activity.

Floodplain management is another water quality tool that the City has to prevent contaminants from entering local waterways. Flood activity has a potentially detrimental effect on water quality, since the volume and velocity of water associated with floods are of such magnitude that severe erosion is caused, creating non-point source pollution. The City's Floodplain Management ordinance establishes a floodplain district which serves to regulate uses within the floodplain, so that if flooding occurs, it shall serve to fulfill the following goals:

- Protect human life and health.
- Minimize damage to public and private property.
- Reduce public expenditures for both flood control works and flood damage relief.
- Maintain the stability of the tax base, and
- Minimize surface water and groundwater pollution.

The City also attempts to control pollution in general by prohibiting the disposal of garbage, refuse, trash and debris or other solid waste materials anywhere except in a lawful solid waste management facility. The City's Solid Waste ordinance found in Chapter 62 of the City Code also addresses control of weeds, the accumulation of debris, littering, hazardous materials, and regulates solid waste management facilities themselves. All solid waste management facilities shall be designed, constructed, operated, closed and restored in such a manner so as not to pose a present or potential danger to human health or the environment, including pollution of the air, land, surface

water and groundwater. No solid waste management facility may be located in wetlands, groundwater recharge area, or other critical environmental area, unless and until all required permits are obtained from appropriate regulatory authorities.

Despite its bevy of water quality protection programs, the City's local waterways continue to exhibit the impacts of pollution. The 2004 Virginia Water Quality Assessment Report published by the Virginia Department of Environmental Quality (DEQ) identifies waters not in compliance with federal water quality standards and includes those waters on the impaired waters list. The Clean Water Act requires each state to submit a Total Maximum Daily Load (TMDL) Priority List to EPA. Two factors determine whether an impaired stream is a priority, including 1) the severity of the impairment, and 2) the availability of "tools" to develop a TMDL. These tools include such things as availability of data and the interest, cooperation and backing of the affected public. Several stream segments in Chesapeake made the priority impaired waters list, including:

1) Southern Branch, Elizabeth River;
2) Western Branch, Elizabeth River;
3) Eastern Branch, Elizabeth River;
4) Deep Creek, a tributary creek to the Southern Branch;
5) St. Julian Creek, a tributary creek to the Southern Branch;
6) Indian River, a tributary to the Eastern Branch;
7) Northwest River;
8) Indian Creek, a tributary creek to the Northwest River;
9) Pocaty River, a tributary creek to the North Landing River;
10) Albemarle - Chesapeake Canal; and
11) North Landing River.

A TMDL is a special study that identifies all significant sources of pollution, the pollutant contribution from each source, and the necessary pollutant reductions from each source to attain and maintain water quality standards. TMDLs are used as the basis for establishing future pollution reduction levels and the actions necessary to achieve them.

In addition to its reliance on existing and future regulatory protection programs to protect water quality, the City should establish a local program to identify sources of water quality problems as well as feasible means to prevent future contamination.

The City will take a proactive approach to water quality protection by continuing to implement its existing protection program as well as seeking new solutions as additional information and technology become available.

Strategies:

- The City Planning and Public Works Departments will cooperatively undertake a comprehensive assessment of each of the City's sub-watersheds and formulate individual watershed action plans. A schedule for these plans should be developed.

- The City should continue to lend technical and financial support to regional water quality improvement efforts, such as cleaning up contaminated sediments to improve real estate marketability, improve recreational utility, and reduce the potential for transfer of harmful contaminants to humans from edible fish and shellfish. The City should continue to support regional stormwater and nonpoint source pollution public education programs.

- The City will identify opportunities for the creation of wetlands in order to restore some of the Elizabeth River watershed's natural pollutant buffering and flood control capacity.

- The City will identify development techniques which reduce the impact of land use on water quality, including incorporating sound low impact development techniques, such as reducing impervious levels, creation of community water access facilities in lieu of private facilities, and preservation of open space in environmentally sensitive areas, such as CBPA Resource Protection Areas (RPAs). Stormwater best management practices will continue to be required for new development and redevelopment to address runoff.

- The City should encourage the establishment of vegetated riparian buffer areas over time by creating incentives for redevelopment and infill development in the City's highly urbanized areas. The City will pursue funding for purchasing and establishing riparian corridors, in order to provide passive recreational opportunities for City residents, as well as enhance the area's water quality through preservation of floodplains, wetlands, and adjacent buffer areas.

- The City will pursue grants and other funding to undertake a comprehensive study of the City's Elizabeth River waterfront to create a future vision for the area. This study should explore redevelopment opportunities along its waterfront by utilizing DEQ's Brownfields Land Renewal program.

Issue Three: Floodplains

Because of its low relief and extensive waterways, flooding is a real issue of concern for Chesapeake, not only for water quality, but also for the health and safety of its residents. Approximately 43 square miles, or 12%, of the City's area is located in a flood hazard area. As of December 2003, approximately 14% of the City's population lives in a flood hazard area.

Flood events, commonly termed the 10, 50, 100, and 500-year floods, have a 10%, 2%, 1%, and 0.2% chance respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at shorter intervals or even within the same year. To provide a national standard, the Federal Emergency Management Agency (FEMA) adopted the 1% annual chance, or 100-year flood, as the base flood for floodplain management purposes. The 0.2% annual chance, or 500-year flood, is employed to indicate additional areas of flood risk in the community.

The 100-year and 500-year floodplain boundaries are shown on Flood Insurance Rate Maps (FIRM). Floodplains means any land area susceptible to being inundated by flood waters. On FIRM maps, the 100-year floodplain boundary corresponds to the boundaries of the areas of special flood hazards, Zones A and AE. The 500-year floodplain boundary corresponds to the areas of moderate flood hazards, Zone X. Zone X also includes areas outside the 500-year floodplain, areas within the 100-year floodplain where average storm surge depths are less than 1 foot, areas of 100-year floodplain where the contributing drainage area is less than 1 square mile, and 100-year floodplain areas protected by levees.

Tidal flooding elevations of 8 feet National Geodetic Vertical Datum of 1929 (NGVD) has been experienced in all areas contiguous to the Western and Southern Branches of the Elizabeth River and along the Intracoastal Waterway as far south as Great Bridge. The extreme southern part of the City and all areas contiguous to the North Landing and Northwest Rivers are partially protected from tidal flooding by the barrier beach which separates Back Bay from the Atlantic Ocean. Nevertheless, wind surges pushing water levels up to approximately 4 feet NGVD have been experienced in this part of the City.

In the northern part of the City where the source of tidal flooding is the Elizabeth River and its tributary branches, very little development has taken place below an elevation of 6 feet NGVD. However, between 6 feet and 9 feet NGVD, there are numerous residential, commercial, and industrial type structures which in some cases have suffered serious damage during past tidal floods. The land in the southern part of the City remains largely undeveloped and still rural in nature. Very little development exists in the floodplains, consisting of a few farmhouses or farm-related structures.

The main flood season due to hurricanes generally extends from May through November. Nearly 80 percent of all hurricanes occur during the month of August, September and October, and about 40 percent occur in September. The "northeaster" type of storm and the resulting flooding may occur at any period of the year, but they occur most frequently in the winter and spring.

Wave action is responsible for much of the waterfront structural damage and for damage to boats and equipment. Waves are generated by the action of wind on the surface of the water. The City of Chesapeake is not generally exposed to wide reaches of water; however, some wave action higher than the normal could be significant factor particularly at industrial locations adjacent to the branches of the Elizabeth River. Some

of these heavy industrial facilities use potentially hazardous materials. Locations where hazardous or toxic materials are stored, used, processed or disposed are of particular concern in vulnerable areas, because natural hazard events can result in secondary hazards such as toxic substance releases or hazardous material spills.

There are no flood control structures that affect flooding in the study area. The City does have a floodplain management ordinance in Chapter 26 of the City Code. The ordinance requires all development within the floodplain district to have elevated and flood-proofed structures. All site plans and building permits must show the elevation of the 100-year flood as well as topographic information showing existing and proposed ground elevations. All public utilities and facilities, such as sewer, gas, electrical, and water systems shall be located, elevated, and constructed to minimize or eliminate flood damage.

The City will protect its citizens by reducing the risk of flood damage and protecting the natural functions of its floodplains by controlling development in its flood hazard areas.

Strategies:

- Explore funding mechanisms for purchasing floodplain areas to provide flood water storage as well as community open space and passive recreational opportunities.

- Incorporate the recommended ordinance changes included in the City's 2003 Hazard Mitigation Plan as it pertains to development in flood hazard areas.

Issue Four: Groundwater

Although Chesapeake utilizes surface water from outside the City limits for much of its drinking water, a large segment of the population still relies on well water. Groundwater is water beneath the earth's surface and is found in pores of a layer of rock or soil. Groundwater does supply City-owned wells in times of peak demand or during events of saltwater intrusion in the Northwest River water supply. The geologic formation in which groundwater occurs is called an aquifer. Aquifers can either be confined or unconfined. Unconfined aquifers occur where unsaturated porous materials overlie an aquifer.[i] The top boundary of the unconfined aquifer, commonly known as the water table, will rise and fall as the quantity of water in the aquifer fluctuates. The water table generally follows the slope of the land flowing from higher to lower elevations. Unlike confined aquifers, water in unconfined aquifers remains at atmospheric pressure.

Confined aquifers are sandwiched between impermeable or semi-permeable rock or soil formations known as aquitards. The difference in height between the higher and lower portions of a confined aquifer may result in a considerable pressure differential. Artesian wells are a result of a well drilled into a confined aquifer whose pressure causes the water to flow above ground level.

The process by which water is added to an aquifer is known as recharge. Recharge may occur from rainwater infiltration, from seepage from a lake bottoms or stream beds, or from replenishment from overlying or underlying aquifers due to hydraulic pressure differentials. The surface area from which water for an aquifer is collected is called the recharge area. In the eastern United States, where precipitation usually exceeds evapotranspiration, recharge of aquifers generally exceeds discharge. Any removal of water from an aquifer is known as discharge. Discharge points included wells, springs, streams, lakes or wetlands.

Southeastern Virginia, of which Chesapeake is a part, is comprised of one water table aquifer and seven confined aquifers.[ii] Under natural conditions, groundwater flows through these aquifers in a lateral and seaward direction and discharges to a variety of points including springs, streams, lakes, the Chesapeake Bay and the Atlantic Ocean. The region's seven confined aquifers are generally composed of various mixtures of sand, clay, silt, gravel, and shell material. Recharge of local aquifers occurs in several ways, including:

- Infiltration of precipitation on outcrop areas along the Fall Line, located near Richmond;
- Seepage from water-bearing fractures in bedrock along the Fall Line;
- Vertical discharge to and vertical recharge between the confined aquifers;
- Infiltration from surface waters; and
- Vertical flow from the water table aquifer to the confined aquifers.

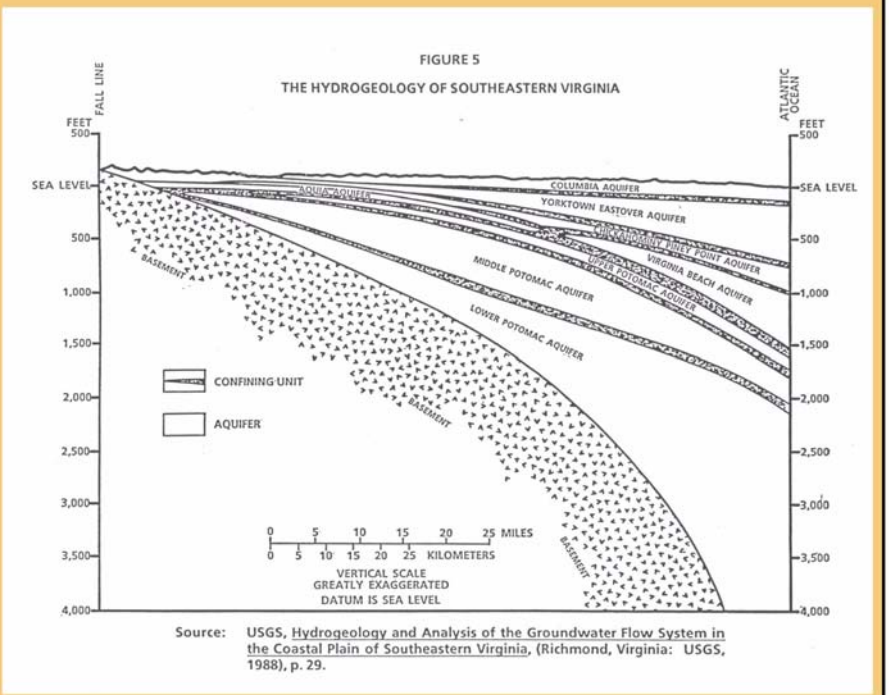
Chesapeake's water table aquifer is known as the Columbia Aquifer. The seven confined aquifers are known as the Yorktown-Eastover Aquifer, Chickahominy-Piney Point Aquifer, Aquia Aquifer, Virginia Beach Aquifer, Upper Potomac Aquifer, Middle Potomac Aquifer, and lastly, the Lower Potomac Aquifer which lies on top of bedrock. The City-owned Western Branch well system and the wells at the Northwest River Treatment plant tap into the Middle and Upper Potomac aquifers. [iii]

Map 17

Diagram of Local Aquifers

2026 Comprehensive Plan
City of Chesapeake, Virginia
Adopted March 9, 2005

This diagram illustrates the hydrogeology of southeastern Virginia.



Source: USGS, Hydrogeology and Analysis of the Groundwater Flow System in the Coastal Plain of Southeastern Virginia, (Richmond, Virginia: USGS, 1988), p. 29.

0 5 10 20 Miles

The quality of groundwater varies by aquifer to a large extent. The Lower Potomac Aquifer is little used, if at all, in the City of Chesapeake due to its deep depth and low quality of water due to high chloride levels. The Middle and Upper Potomac Aquifers contain high levels of sodium, fluoride and chloride. The quality of the Yorktown-Eastover Aquifer is generally good and suitable for potable water use, although it is incapable of producing a sufficient supply for municipal use. The quality of water obtained from the water table aquifer, or Columbia Aquifer, is generally suited for small-scale irrigation, such as lawn irrigation, but requires treatment for potable use. Associated water quality problems include high acidity, high iron content, and hardness. In addition, the pollution potential for the water table aquifer is high, considering its close proximity to the ground surface and the lack of a low permeable barrier.

Aside from naturally occurring water quality concerns, groundwater quality can be threatened by a variety of sources, including:

- Septic systems;
- Leaking underground storage tanks;
- Spills or improper disposal of hazardous materials;
- Surface waste impoundments;
- Landfills;
- Pesticide and fertilizer applications; and
- Saltwater encroachment.

Most of the existing zoning on the adjacent land to the Northwest River is zoned either A-1, agriculture zoning, and C-1, conservation zoning. The Northwest River also lies within the rural overlay district, which prescribes low density, rural development patterns, primarily devoted to agriculture and related uses. In addition to relying on its existing zoning and overlay district ordinances to protect its primary surface water source of drinking water, the City should enact further measures to protect both its surface and groundwater resources.

The City will assess and protect its groundwater supplies.

Strategies:

- The City Planning Department will coordinate the development of a water supply watershed management program, such as that found in the Hampton Roads Planning District's report titled "Water Supply Watershed Management in Hampton Roads."

- The City Planning Department, in conjunction with the Public Utilities Department, will coordinate a comprehensive assessment of the extent of the City's groundwater resources, the scope of any existing and potential threats, existing local, state and federal protective measures, as well as any opportunities to further these protection efforts.

Issue Five: Wetland Resources

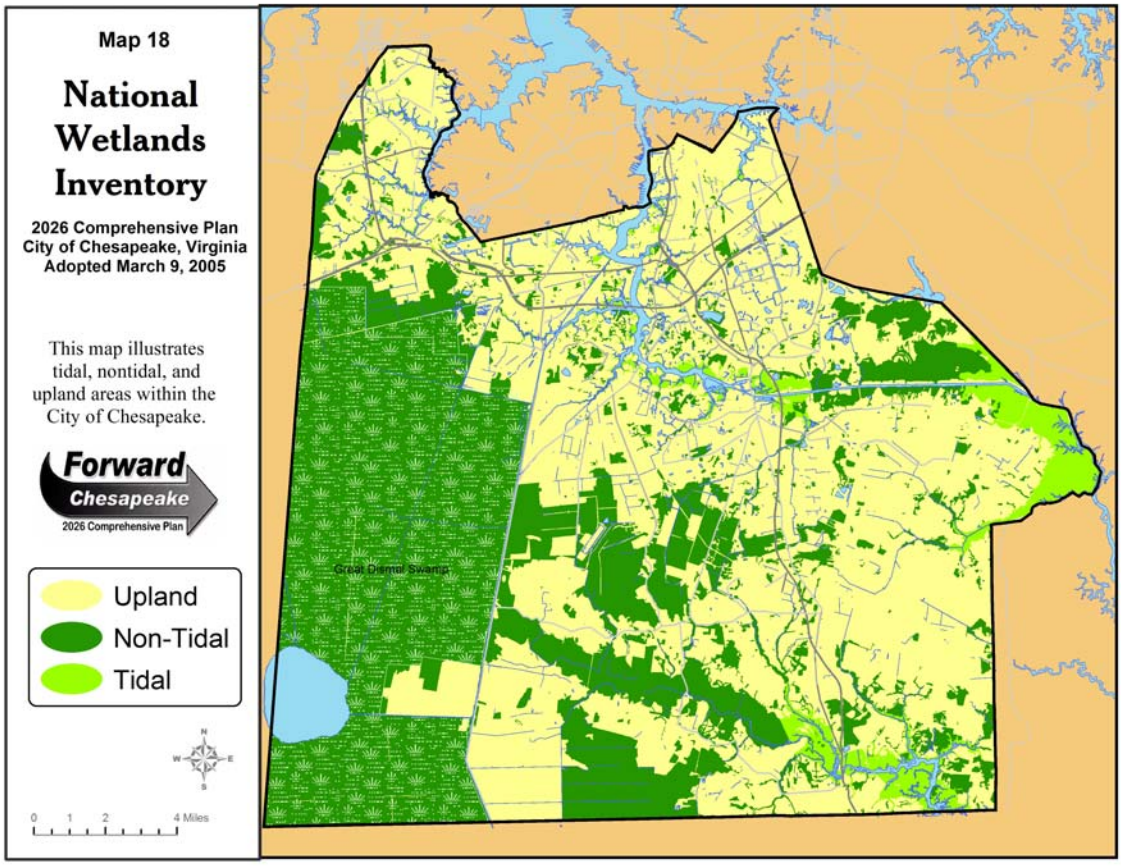
Wetlands in general have intrinsic value in terms of their aesthetic nature or the recreational, habitat and open space preservation opportunities they present. Tidal wetland areas or marshes along the City's shorelines absorb wave energy and buffer erosion of upland areas, thereby protecting real estate values. Wetlands help reduce peak water flows after a storm by slowing the movement of water into tributary streams which allows potential floodwater to reach mainstream rivers over a longer period time, thereby abating potential flood damage. Water quality is also improved by removing

nutrients, pesticides, and bacteria from surface waters as they are absorbed and broken down plants, animals and chemical processes within the wetland. Both coastal and inland wetlands provide breeding, nesting, and feeding habitat for millions of waterfowl, birds, fish and other wildlife. Coastal wetlands provide nursery and spawning grounds for sixty to ninety percent of US commercial fish catches. Often, the City's marsh areas represent unique community character traits and help define the City's sense of place as a Tidewater coastal community. For these reasons and many more, knowing where wetlands areas exist and their relative size, health, and role in water quality protection is important.

The City's 1990 Comprehensive Plan suggests that the locations of all wetlands be mapped and protected from inappropriate destruction or change. Since that time, the City has obtained several sources of wetland location information for its use. The City acquired the National Wetland Inventory from the US Geological Service in a GIS-compatible format which can be used in reviewing development applications. Although this data is comprehensive for nontidal and tidal wetland areas, it is very general in nature and should only be used to identify potential wetland areas for on-site delineation. A table and map summarizing the NWI data is found below. The Virginia Institute of Marine Science (VIMS) also published a tidal marsh inventory for the City in 1999. In December 2001, the City became a signatory to the "Memorandum of Agreement to Improve the Coordination of the Wetlands Compensation Process in the Southern Watershed Area," along with twelve other local, State and federal agencies. The purpose of the agreement is to improve the coordination and sharing of information among the agencies involved in wetland compensation decisions in the Southern Watershed Area as well as to continue to refine a coordinated process for the selection of compensation sites which provide multiple benefits. City staff currently participates on a Technical Advisory Committee to further develop the information sharing process, which includes the sharing of wetland and mitigation site information with other agencies.

Chesapeake's Wetlands

Wetland Type	Acreage	Percentage
Emergent Marsh, Fen or Wet Meadow	1,294	1%
Estuarine Flat, Beach or Sand Bar	107	<1%
Estuarine Forested Marsh	77	<1%
Estuarine Shrub Swamp	122	<1%
Forested Swamp or Bog	87,688	89%
Open Water Estuary	2,613	3%
Pond Shoreline	15	<1%
Salt or Brackish Tidal Marsh	2,031	2%
Shrub Swamp or Bog	5,032	5%
TOTAL	98,979	100%



Source: National Wetlands Inventory,

Historically, it is important to note that wetland loss has been severe in the Elizabeth River watershed. Much of this loss resulted from the siting of numerous heavy industrial uses along the shoreline of the Elizabeth River. According to the The Virginia Wetlands Report (VIMS, 1999), the Southern Branch of the Elizabeth River lost 1,265 acres of wetlands from 1944 to 1977. Many of these losses occurred prior to the City's formation. After the passage of the 1972 Wetlands Act, permitting requirements resulted in a significant decrease in the loss or alteration of tidal wetlands. For example, in the years between 1988 and 1992, approximately 6.3 acres of tidal wetlands in the City were lost or otherwise impacted through permitted activities (VIMS, 1999). In 1999, the latest year for which figures are available, permitted impacts affected less than one-half an acre of tidal wetlands.

VIMS' tidal marsh inventory for the City found that there is approximately 1,746 acres of tidal marsh in the City. The greatest concentration of this tidal marsh is found in the Southern Branch of the Elizabeth River, representing 70% of the total, or 1,230 acres. The findings of the tidal marsh inventory are summarized in the table below. VIMS classified the City's tidal marshes into different types and groups according to their ecological value. Group One wetlands possess the highest ecological value because of their high productivity, wildlife utility, and close association with fish spawning and nursery areas. Group Five wetlands possess the lowest possible ecological value. The great majority, over 80%, of the tidal wetlands in the City are Group One or Group Two, indicating that they possess a very high ecological value.

City of Chesapeake Tidal Wetlands in the Chesapeake Bay Watershed (VIMS, 1991)

System	Marsh Types	Group	Total (Acres)
Western Branch, Elizabeth River	• Saltmarsh Cordgrass • Saltbush • Big Cordgrass • Brackish Water Mixed	I IV V XII	421.3
Southern Branch, Elizabeth River	• Saltmarsh Cordgrass • Saltbush • Big Cordgrass • Reed Grass • Brackish Water Mixed	I IV V VIII XII	1,234
Eastern Branch, Elizabeth River	• Saltmarsh Cordgrass • Brackish Water Mixed	I XII	91
Total			**1,746.3**

Source: HRPDC, City of Chesapeake Public and Private Waterfront Access Study, June 2001.

The soils and hydrology of the Southern Watershed Area (SWA) of the City are uniquely adapted to the development of wetland systems. Located within the broad floodplains of the Northwest River and North Landing River on Pleistocene sands, silts, and clays, the SWA contains several soils series with seasonally shallow (near-surface) water tables (HRPDC, June 2001). These wetland systems range from palustrine forests to herbaceous marshes and shallow-water submerged aquatic vegetation beds. Consequently, significant portions of the SWA in the City satisfy the soils, vegetation and hydrology criteria set forth in the 1987 Corps of Engineers Wetland Delineation Manual for jurisdictional wetlands protected by Section 404 and 401 of the Clean Water Act as well as Virginia State Water Control regulations (HRPDC, June 2001).

Several studies have been conducted in the SWA of the City which identify significant wetland areas. These studies include the Virginia Department of Conservation and Recreation's Natural Heritage Division report titled, Natural Heritage Inventory of the City of Chesapeake, Virginia (June 1998) as well as the Natural Heritage Division's report titled, Comparative Wetlands Ecology Study of the Great Dismal Swamp, Northwest River and North Landing River in Virginia (June 1998). In February 2001, the Natural Heritage Division also published the report called Conservation Plan for the Southern Watershed Area, as part of the Southern Watershed Area Management Program (SWAMP). The SWAMP program produced another report based on this study called the Southern Watershed Area Multiple Benefits Conservation Plan in June 2001, which developed a strategy for increasing the number and types of benefits derived from wetland compensation and other types of conservation measures in the SWA. These studies contain a comprehensive catalogue of the SWA's significant wetland areas and should be consulted prior to any work performed in this area.

Tidal wetland areas in the City of Chesapeake are afforded some existing protections on a City-wide basis. These programs include a Wetlands ordinance, which is included in Article VI, Chapter 26, of the Chesapeake City Code. This ordinance outlines permitted uses in wetland areas as well as establishes the local wetlands board to hear permit applications for proposed activities in wetland areas. Any person who wants to use or develop any tidal wetland area in the City, other than those permitted uses listed in the ordinance, must file an application for a permit with the Wetlands Board. Permitted uses include those permitted by state law under Title 28.2, Chapter 13, such as construction and maintenance of noncommercial piers, boathouses and fences as well certain low-impact recreational uses, conservation activities and shellfish cultivation.

In addition, the Chesapeake Zoning Ordinance contains two conservation districts which vary in the degree of intensity of use. The purpose of the C-1, Conservation District, is to protect and preserve critical and environmentally sensitive areas, including parklands, wilderness areas, open spaces, greenbelts, beach reserves, scenic areas, wetlands, floodplains, floodways, watersheds, water supplies, and fish and wildlife preservation areas. These districts are not intended for development.

In the Chesapeake Bay watershed area, the City has implemented a Chesapeake Bay Preservation Area (CBPA) District. This district is found in Chapter 26 of the City Code and applies only to those lands found within the Chesapeake Bay Watershed. In general, those lands within the Elizabeth River watershed, a major tributary to the Chesapeake Bay, are included in this district.

The performance standards contained in the CBPA ordinance establish the means by which the City protects its Resource Protection Areas (RPAs) and Resource Management Areas (RMAs). Tidal wetlands and nontidal wetlands connected by contiguous surface flow are designated as RPAs and are protected by a 100-foot wide buffer adjacent to any of these features. Development activity is prohibited or curtailed in these areas.

In the SWA, wetlands have been a major focus of biodiversity protection efforts since 1989. As of February 2001, approximately 11,000 acres of wetlands on the North Landing River have been acquired by the Virginia Department of Conservation and Recreation (DCR) as well as the Virginia Chapter of The Nature Conservancy. Additional public lands are owned by the City of Chesapeake and the US Army Corps of Engineers. Approximately 2,250 acres of the middle and lower Northwest River wetlands are owned and managed by DCR as a state natural area preserve. The 763-acre Northwest River Park owned by the City also contains extensive wetlands. Additional natural areas owned by The Nature Conservancy are also situated along the River east of Route 168 (Battlefield Boulevard), and east of Route 17, north of the River.

Although existing federal, State and local laws help to ensure the preservation of valuable wetland areas that have been identified, the City currently has no reliable, site-specific inventory of its wetland areas. The City should strive to fill this information gap in order to better protect and enhance its existing wetland resources. The City could also improve it wetland protection efforts by establishing development criteria to avoid or minimize impacts to its wetland areas outside of the CBPA district.

The City will create site-specific data for its wetland areas and incorporate development design criteria to enhance its wetland protection efforts.

Strategies:

- As recommended in its 1990 Comprehensive Plan, the City Planning Department should map the City's wetland areas as on-site delineations become available, either through the local development review process or through the State or federal permitting process. Information on wetland type, size and location should be tracked and maintained on an annual basis.

- The use of nonstructural shoreline stabilization methods to preserve and facilitate the growth of wetland areas will be encouraged through the City's Wetland Board review process. In areas of low to moderate shoreline recession problems, the Board and City staff should encourage the use of nonstructural shoreline stabilization methods, such as establishing a marsh fringe, to improve water quality and preserve wetland

areas. City Planning and Wetland Board staff will track the use of structural shoreline stabilization methods to gauge the extent of shoreline hardening.

- The City will support the creation of conservation corridors for wetland compensation and restoration as recommended in the Multiple Benefits Conservation Plan Information Sharing Memorandum of Agreement.

Issue Six: Commercial and Recreational Fisheries

Currently, there are no significant commercial seafood operations located along the City of Chesapeake's shoreline. Poor water quality and degraded habitat, such as frequent dredging and the lack of significant submerged aquatic vegetation areas, are several reasons for the absence of a viable commercial fishing industry in Chesapeake. For example, prior to the Kepone contamination of the James River system, the Southern Branch supported a commercial crab pot fishery. Today, the Southern Branch still supports limited commercial crabbing activity. In contrast, the largemouth bass recreational fishery is still particularly viable in the North Landing and Northwest Rivers.

Although Chesapeake is not a location for commercial fisheries, spawning and fish breeding areas are still found within the City's waters. Studies by the Virginia Institute of Marine Science (VIMS) indicate that there is considerable spawning activity, primarily by forage species, in selected areas of the Elizabeth River, namely near its headwaters and in Deep Creek. VIMS also reports that the these areas of the Elizabeth River are used as a nursery ground for a variety of commercially and recreationally important fish, such as Atlantic Croaker, Atlantic Menhaden, Weakfish, Spot, Striped Bass, Black Sea Bass, and Summer Flounder. The shallow margins of the Elizabeth River and its tributaries are important shedding and mating areas for blue crabs.

The Virginia Marine Resources Commission indicate that there are a few privately leased or public Baylor oyster grounds in Chesapeake, and they only exist in the Eastern and Western Branches of the Elizabeth River. As of 1993, the Virginia Department of Health Condemned Shellfish Area #7E covered the entire Elizabeth River System. Therefore, it is unlawful for any person, firm, or corporation to take shellfish, including oysters and clams, from this area for any purpose.

Identification of commercially and recreationally important fisheries, their spawning and nursery areas, shellfish producing and management areas, and waterbodies which are closed to shellfish harvesting, is an important first step in protecting this component of the City's natural resources. Although shellfish information is available from the Virginia Marine Resources Commission, fish habitat is not. In other states, such as North Carolina, fish habitats are delineated on maps and provided to localities for use in their planning efforts. No such maps have been made to Virginia's Tidewater Localities.

The City will develop local fishery protection measures.

Strategies:

- The City Planning Department should create a map which shows condemned shellfish beds and important spawning areas for use in future development review. In addition, information on revenues from recreational and commercial fishing within City limits should be collected by the Planning Department on an annual basis to gauge the true economic impact as well as the health of these industries.

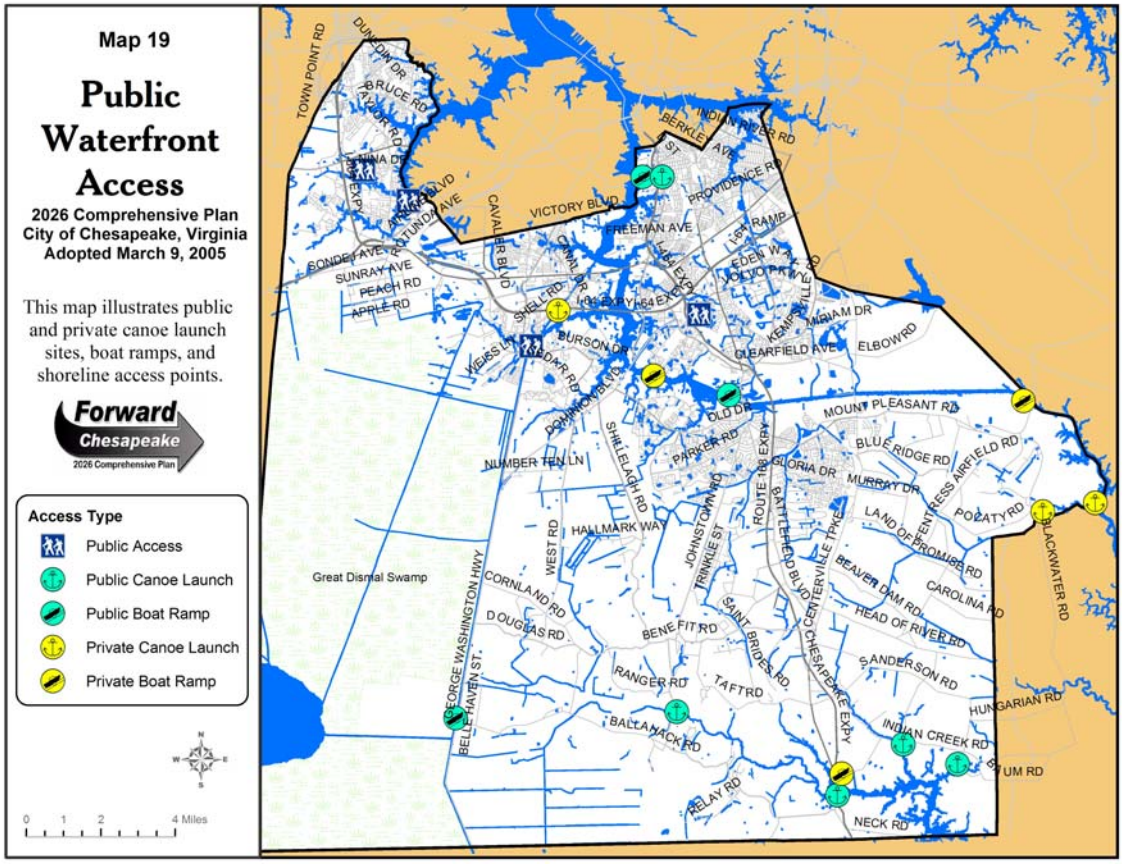
- Criteria should be incorporated in the development review process in order to avoid or minimize impacts to these areas.

Issue Seven: Public and Private Waterfront Access

The ability to access the City's waterways is crucial to its future quality of life for its residents in many ways. Since waterfront property is limited in supply, waterfront property is assessed at a higher level than non-waterfront property. Therefore, waterfront access for both commerce and recreation is a valuable resource that is limited in supply. Not only does waterfront access facilitate shipping and industrial uses, but also boating, fishing, and aesthetic uses as well for its residents. With over 300 miles of shoreline, the City's waterways shape the character of its community and set it apart from anywhere else. This distinctive physical aspect to the City should be conserved as a local showpiece and strategically utilized as an economic growth tool to attract future quality development and redevelopment to the City.

As a result of possessing one of the region's fastest growing populations, Chesapeake also faces an increasing need for water-based recreation opportunities. For example, the City contains one of the fastest growing number of registered boats in Hampton Roads. According to the Public and Private Waterfront Access Study, the number of registered boats grew from 3,700 in 1980 to 5,900 in 1996, an increase of approximately 60%. Data from the Virginia Department of Game and Inland Fisheries indicates new registrations of approximately 250 boats per year.

The public and private waterfront access study performed by the Hampton Roads Planning District Commission found a total of 30 public and private shoreline recreation and water access facilities in the City. Of these, 19 are boating access sites, either in the form of marinas or boat ramps. Of these, 3 are owned by the City and 10 are only available for private use. In addition, 6 canoe access points were identified. A location map of these facilities is shown on Map 20.



According to the 2002 Virginia Outdoors Plan, swimming, fishing, sunbathing and boating are the 3rd, 4th, 7th, and 8th most popular outdoor recreational activities, respectively. The increasingly heavy use of popular water resources is beginning to result in conditions of overcrowding, over-fishing, trespassing, littering and conflicts between user types. In order to meet this ever increasing public need, the City should actively preserve and identify future public water access facilities.

The City will make it a priority to identify and facilitate the provision of future public waterfront access areas.

Strategies:

- The acquisition of new public waterfront access sites, such as those identified in the City's 1990 Comprehensive Plan and the Private and Public Waterfront Access Study, will be pursued including:

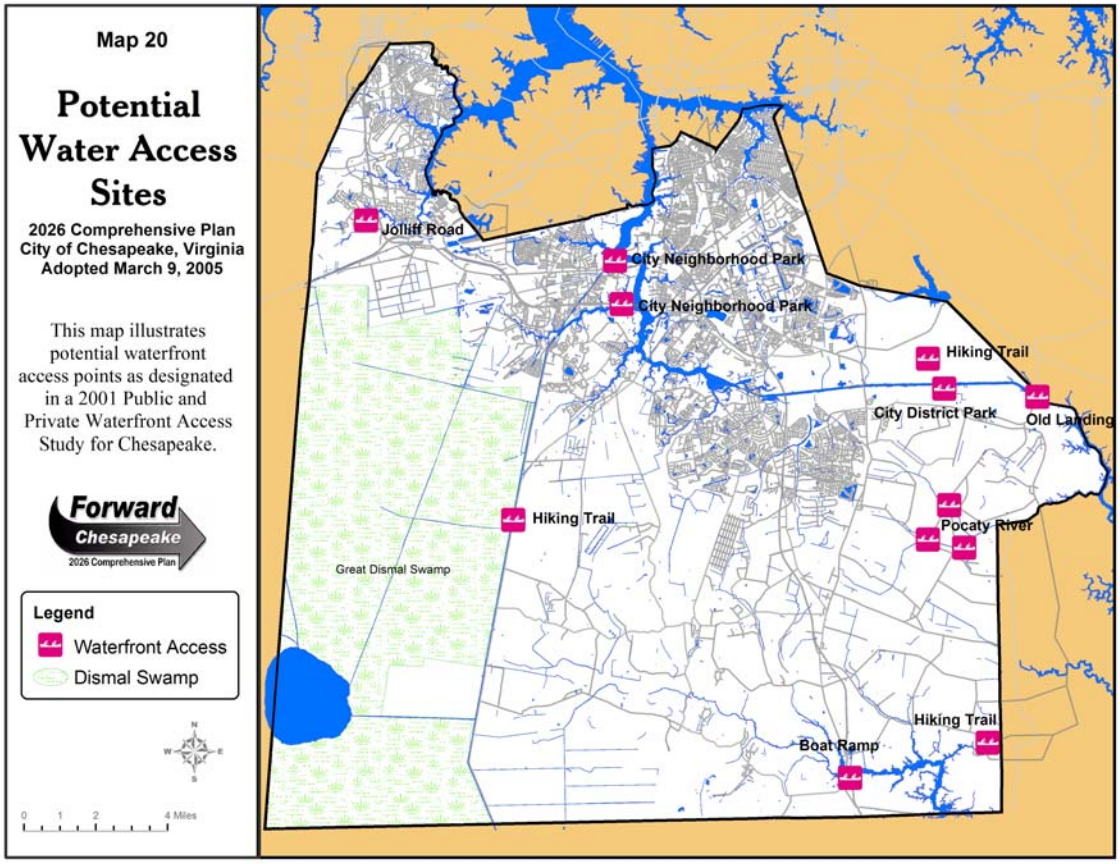
- Waterfront development along the Southern Branch of the Elizabeth River includes the potential for joint ventures with industrial uses, perhaps through the City's Intensely Developed Areas (IDAs) program, for additional water access. Depending on the location and nature of the site, there is the potential for boat ramps, fishing and nature study.
  - Pocaty Creek and St. Julian Creek offer potential access areas.
  - The abandoned Route 168 bridge over the Northwest River could be used to provide an additional boat ramp.

- Increase shoreline pedestrian and boating access to the Albemarle and Chesapeake Canal through a proposed hiking trail on the northeast side of the Canal.
- Institute a hiking trail along the Dismal Swamp Canal.
- The Western Branch area of the City should be further explored for future access points. Possible sites include Western Branch Park and the former Lake Ahoy site.

Although a City such as Chesapeake, which is closely tied to the water, needs community marinas, boat ramps and waterfront pedestrian access to the water, careful consideration should be given to the potential impact of these facilities on its sensitive waterfront areas. In 2001, the Hampton Roads Planning District Commission provided the City with a study on its public and private waterfront access. The study reveals 512 private piers and docks located within the Elizabeth River watershed alone. Although comparative figures for the North Landing and Northwest River were not included, the study does report that the density of piers and docks was highest in Stearns Creek and Drum Point Creek and lowest along the upper reaches of the Southern Branch, the Albemarle and Chesapeake Canal, and the North Landing and Northwest Rivers.

Significant environmental impacts of private piers and docks could include shading and displacement of aquatic life, leaching of wood preservatives that are toxic to aquatic life, increased turbidity and other short-term impacts during construction, and impacts from boating activities. The individual impact of private piers and docks to the surrounding aquatic ecosystem may be significant, particularly where pier and dock densities are high.

The common law riparian right to wharf out has long been recognized in the Virginia Code. Title 28.2-1203(a) of the Code of Virginia allows owners of riparian or waterfront property to construct non-commercial pier to access navigable water without obtaining a permit. While piers and docks are not subject to permit regulations, the Virginia Marine Resources Commission does require an application to determine qualification for an exemption. While riparian property owners have the right to construct a pier or a dock to access navigable water, their impacts can be managed through siting and design requirements.



The City will take into consideration the suitability of different water access types in relation to physical constraints, water quality conditions, fish breeding and spawning areas, and oceanographic characteristics as well as its own plans and policies.

Strategies:

- New development should be required to be clustered away from shorelines and the waterfront area be retained as community open space. Community piers, docks and waterfront access facilities will be encouraged in lieu of private facilities.

- The City Planning Department will track both private and public waterfront access facilities for use in future planning efforts and fulfilling reporting requirements.

- Consideration of adjacent or nearby documented natural areas or environmentally sensitive areas will be incorporated into site plan assessments and impacts to these areas minimized.

- Procedures and guidance will be developed for reviewing marina proposals by City staff and the Wetlands Board that incorporate the marina siting and design criteria developed by the Virginia Marine Resources Commission. Existing and new marinas will be encouraged to adopt pollution prevention practices through participation in the Virginia Clean Marina Program during the development review process.

- Existing City programs, such as its Open Space and Agriculture Preservation Program and the cluster development ordinances, will be used to acquire future water access.

Acquisition and development of such property should be coordinated with the City's Parks and Recreation Department.

Issue Eight: Air Quality and Climate Protection

Local air quality is a serious quality of life issue with the potential to negatively impact individual health, profitability of local businesses, and efficiency of government operations. According to the US Environmental Protection Agency (EPA), the average adult breathes over 3,000 gallons of air every day. Children breathe even more air per pound of body weight and thus, are more susceptible to air pollution. Many air pollutants, such as those that form urban smog and toxic compounds, remain in the environment for long periods of time and are carried by the winds hundreds of miles from their origin. Long-term exposure to air pollution can cause cancer and long-term damage to the immune, neurological, reproductive, and respiratory systems. In extreme cases, it can even cause death.

At the time of the City's adoption of its 1990 Comprehensive Plan, the air quality of the Hampton Roads region, in which the City lies, was found to meet all current air quality standards. In light of this, the Comprehensive Plan recommended that the quality of air in Chesapeake should meet or exceed all air quality standards adopted by the Commonwealth of Virginia and the EPA.

Since that time, the Hampton Roads region has experienced tremendous population growth which has impacted the surrounding air quality. In 2000, the Virginia Department of Environmental Quality recommended a non-attainment designation for the Hampton Roads Region for excessive ozone levels. In addition, new data has emerged during the last decade regarding impacts from rising global temperatures, or "global warming" and the need for climate protection.

Air pollution and global warming share many of the same sources, in that they are both caused by human activities, such as through energy production that burns fossil fuels, deforestation and wood and leaf burning which increases atmospheric carbon dioxide, and landfills which produce methane gas.

The City will identify realistic, cost-effective measures that would provide tangible benefits to local air quality as well as long-term quality of life and economic benefits.

Strategies:

- Increase energy efficiency and use of renewable energy sources, except residential wood burning which can exacerbate air quality problems. Such renewable energy sources could include the wind or solar energy and offer utility customers more options as well as reduce emissions.

- Promote waste reduction activities, such as recycling, in order to reduce reliance on local landfill space to decrease the production of methane gases which add to poor air quality.

- Support alternative modes of transportation, such as mass transit, walking and biking, which help to reduce the combustion of fossil fuels and lower local pollution levels.

- Explore techniques to promote energy efficient housing which improve housing affordability and reduce emissions.

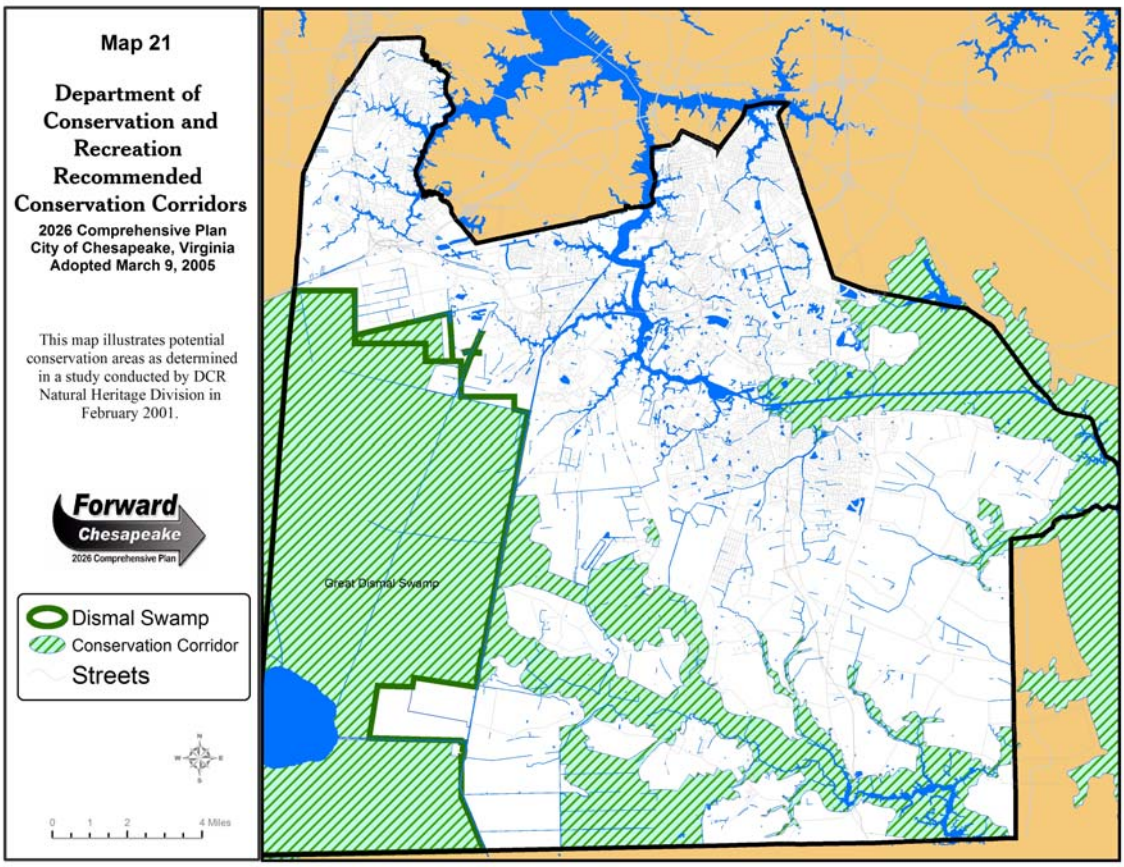
- Promote mixed-use development in order to promote pedestrian activity, which reduces reliance on car travel, thus cutting air emissions.

- Evaluate local air quality issues, such as local ozone levels, and develop a prioritized list of reduction activities. Assess the City's benefits to be gained from its investment in these reduction activities to provide reasonable cost estimates prior to undertaking these activities. Initial measures could include "no and low-cost" initiatives. Develop a reasonable implementation schedule for each reduction activity to provide progress benchmarks and assessing budget needs. Reduction activities should include, but are not limited to the following:
  - Seal air leaks in existing municipal buildings to reduce energy use and provide cost savings;
  - Retrofit existing lights in municipal building to reduce energy use and provide cost savings;
  - Convert traffic signals from incandescent bulbs to energy-efficient light emitting diode technology (LEDs), which last longer and can save the City millions of dollars over time;
  - Continue the City's partnership with the Southeastern Public Service Authority (SPSA) in its "green waste" recycling program which turns yard waste, such as leaves, tree trimmings, weeds, grass, and other organic material, into horticultural compost or mulch. This mulch is then returned to the City for use at City facilities or resold to the community through local retailers;
  - Continue City support for its local recycling program to reduce the need for additional landfill space;
  - Research the implementation of energy-efficient building codes to promote health indoor air, resource efficiency and energy efficiency;
  - Incorporate requirements for pedestrian and biking trail connections between different areas of the City in local ordinances and plans to reduce combustion of fossil fuels; and
  - Explore the feasibility of implementing a "green building" program.

Issue Nine: Habitat

The preservation of habitat is broadly defined as the place where a plant or animal species naturally lives and grows; or consists of the characteristics of the soil, water, and biologic community (other plants and animals) that make this possible. Habitat enhancement and preservation is important, because it is necessary for the survival of native species, maintains natural ecological processes, sustains air and water resources, and contributes to the health and quality of life for Chesapeake residents.

According to the Natural Heritage Division of the Virginia Department of Conservation and Recreation (DCR), Chesapeake is fortunate to have a remarkable assemblage of relatively intact biological and natural resources, particularly in the Southern Chesapeake. Within the last ten years, the City's important habitat areas as well as detailed descriptions of its plant and animal species, have been catalogued in several studies, including the City's "Multiple Benefits Conservation Plan" (Langley and McDonald, July 2001), the "Southern Watershed Area Conservation Plan" (DCR, February 2001), the "Comparative Wetlands Ecology Study of the Great Dismal Swamp, Northwest River, and North Landing River in Virginia," (DCR, June 1998) and the "Natural Heritage Inventory of the City of Chesapeake, Virginia," (DCR, June 1998). A map illustrating DCR's recommended conservation corridors is shown below.



In addition to providing shelter for rare and endangered species, natural habitat areas provide economic value. Intact, undisturbed natural habitat can foster a growing ecotourism industry, components of which include bird watching, hiking, fishing and hunting. The Virginia Department of Game and Inland Fisheries recently designated southern Chesapeake as part of the National Birding Trail. Protected habitat areas help protect private property values. The table below illustrates the amount of existing conservation land in the City of Chesapeake.

Chesapeake Conservation Lands

Land Type	Acreage	Percentage
City Parks	2,085	1%
Virginia Department of Conservation and Recreation	2,282	1%
Conservancy Organizations	7,338	3%
Wetland Mitigation Banks and Sites	4,691	2%
Federal Lands	49,859	22%
Total	**66,255**	**29%**

Proximity to open spaces, such as greenways, wildlife corridors, and natural areas, have been shown to increase the worth of property. Habitat areas also provide valuable public services such as the natural filtration of stormwater runoff, flood storage, and recreational areas.

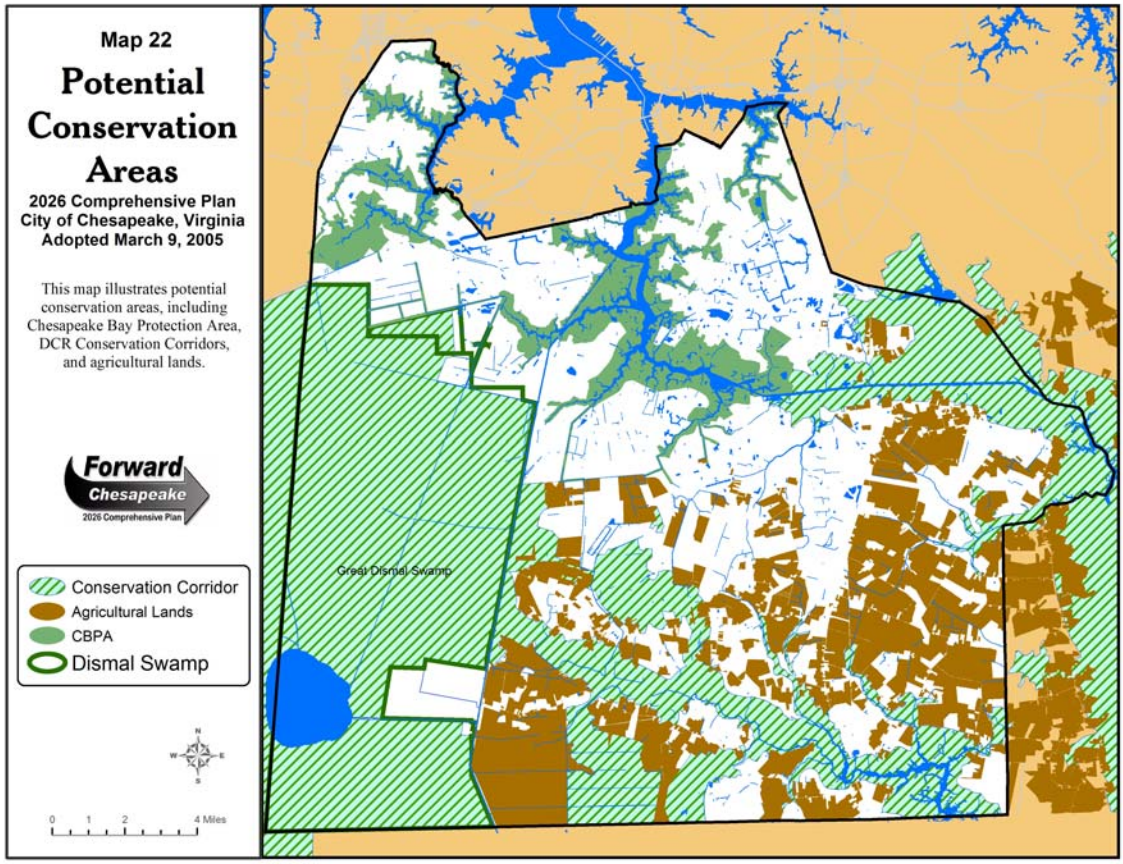
In contrast, habitat loss also has numerous social consequences, including the loss of vital natural processes such as the natural filtration of stormwater runoff, loss of breeding areas for game species, loss of recreational opportunities and degradation of community character. Scattered, unconnected natural areas have only limited ability to provide the important ecological services listed above.

Both members of City Council and members of the City's Comprehensive Plan Advisory Team support the goal of preserving as much of the City's existing natural areas as possible while recognizing the need for areas for future growth. It is important that any habitat enhancement and preservation strategy be based on a scientifically-sound, utilitarian approach to maximize community benefits. In addition, any preservation or enhancement strategy needs to be legally and politically tenable.

The most balanced strategy for habitat enhancement and preservation is to utilize the City's existing programs. Utilizing the City's existing open space and agricultural preservation program can provide permanent protection through an existing City purchase of development rights program. Establishing conservation corridors based on the recommended conservation corridors contained in the City's Southern Watershed Conservation Plan and Chesapeake Bay Preservation Area program would provide a logical, scientifically-based approach to conservation corridor design, because these programs have identified the most environmentally sensitive areas.

This alternative that would allow the City's growing population and natural habitat areas to coexist by providing connections between remnant habitat patches by means of a system of linear open spaces known as conservation corridors. Corridors and greenways restore some of the previous landscape connectivity, providing habitat connections for wide-ranging animals as well as the gene flow necessary to maintain healthy, viable populations of plants and animals. In addition to providing wildlife habitat connections and protecting ecosystems, conservation corridors have been used to promote and enhance local parks, recreational opportunities, and preserve local community character.

Incorporating conservation design techniques in existing ordinances would encourage preservation of conservation corridors through the land development process. Conservation design techniques include clustering development as well as incorporating environmentally sensitive areas into community open space. Wherever possible, due to the high cost of restoration and the difficulty of re-creating functional natural systems, planning preservation areas should come first. A map containing potential conservation areas is included below:



The City's landscaping ordinance also provides a venue to further preserve and enhance the integrity of its natural habitat areas. Although the City landscaping ordinance specifies tree canopy requirements for new development, the City does not have a master forestry plan. Such a forestry plan together with the landscaping ordinance can provide a comprehensive forestry program which can help preserve high priority woodland tracts as well as enhance the functionality of impacted habitat areas.

In developing areas such as Chesapeake, it is important that protective measures stabilize wildlife habitats while allowing public enjoyment of and appropriate use of these resources. Protection measures should be based on local scientific studies, sound planning principles, and public acceptance.

The City will pursue a multi-faceted habitat implementation strategy to provide both sustainable habitat as well as a sustainable development pattern for the City's future growth needs.

Strategies:

- Conservation corridors will be preserved based on the recommended conservation corridors contained in the City's Southern Watershed Conservation Plan and Chesapeake Bay Preservation Area program. This action would provide a logical, scientifically-based approach to conservation corridor design, because these programs have identified the most environmentally sensitive areas.

- City's Open Space and Agriculture Preservation (OSAP) Program should be funded and target potential conservation corridor areas for participation in the OSAP program.

- Conservation design requirements should be incorporated in the City's zoning and subdivision ordinances which require preservation of areas within the potential conservation corridors in the development design process.

- A master forestry plan should be developed and adopted in conjunction with the City Arborist.

Issue Ten: Noise

Ensuring a quality environment also includes the mitigation of noises arising from various land uses. Unusually loud noises can be detrimental to the City's quality of life. The City has several existing noise management programs in place.

The City has an existing noise ordinance as a component of the City Code. The ordinance defines prohibited noises, establishes standards for the determination of unreasonable, excessive or unnecessary noises, maximum sound levels by land use, and penalties for violations.

The City has also adopted the Fentress Airfield Overly District that recognizes the United States Navy's Air Installation Compatible Use Zone (AICUZ) program. The program was instituted by the Department of Defense to address the problem of incompatible land development surrounding military installations. Each AICUZ zone has associated with it categories of compatible or incompatible land uses recommended for that zone based on an average decibel level or accident potential.

The City also incorporated noise attenuation measures in accordance with the Virginia Uniform Building Code. These measures are required for new residential construction within the most intense noise zones in the Fentress Airfield Overlay District. In addition, anyone selling or leasing a residential unit within all noise zones is required to provide written disclosure to all prospective buyers or leases. Additionally, the City requires noise disclosure notes on site plans and subdivision plats.

Land use planning can effectively reduce the effect of noise by isolating noise generators, such as airports and interstate highways, from incompatible uses, such as neighborhoods and hospitals. During development review, minimum distances of separation should be considered between various incompatible land uses, such as between industrial and manufacturing processes and residential uses or even residential areas.

The City will continue to manage detrimental impacts from noise.

Strategies:

- The City will maintain its working relationships with representatives of the US Naval Airfield Fentress Station, Chesapeake Municipal Airport, and the Hampton Roads Airport to mitigate the noise generated by air traffic and to update, if appropriate, and enforce land use controls within the adopted Fentress Airfield Overly District.

- The City will continue to implement the recommendations of the Chesapeake Jet Noise Task Force, as contained in their final report, dated May 2, 2001.

- The City will actively participate in the Joint Land Use Study with the Cities of Virginia Beach and Norfolk, the Commonwealth of Virginia, and the US Department of the Navy, which seeks to address land use issues associated with the operation of Naval Air Station (NAS) Oceana, Naval Auxiliary Landing Field (NALF) Fentress and Chambers Field (formally Naval Air Station Norfolk).

- Off-site impacts of noise associated with certain land uses and transportation facilities will be minimized by combining careful selection of alignment, buffers, landscaping, and sound barriers which provide the most cost-effective noise mitigation benefits.

- Consideration will be given to minimum distances of separation between various incompatible land uses, such as between industrial and manufacturing processes and residential uses, during development review.