2.2 - ENVIRONMENTAL STEWARDSHIP FRAMEWORK

CITY OF VIRGINIA BEACH ENVIRONMENTAL STEWARDSHIP GUIDING PRINCIPLES

- Preserve, protect and maintain our natural resource areas.
- Improve stewardship of our natural resources.
- Protect our most vulnerable citizens from natural and man-made hazards and assist in their recovery following catastrophic events.
- Restore and protect the Chesapeake Bay and its tributaries, Owls Creek, the North Landing River, and Back Bay.
- Expand public access to our waterways.
- Establish linkages with other environmental plans.
- Ensure that citizens are involved in protecting and maintaining quality environmental resources.
- Promote Virginia Beach as a model of environmental stewardship.
- Be a city that incorporates environmental resources and their enhancement thoroughly into our identity and our quality of everyday life.
- Environmental goals and policies set forth in this Comprehensive Plan should be implementable.

INTRODUCTION

Given its coastal location, our citizens and visitors value Virginia Beach foremost for its vast natural resources and open spaces. Our natural landscape consists of beaches and dunes, inland waterways fringed by tidal marshes and non-tidal wetlands, a vast tree canopy of maritime and inland forests, and farmland. Many of these natural systems are conservation lands, managed by federal, state, and local government as parks, wildlife refuges, natural areas, and wildlife management areas. Miles of shoreline and a multitude of water access points for recreational and commercial boating and fishing, hiking and biking, wildlife observation, and an array of water sports are enjoyed daily.

Along with this rich bounty of natural landscape comes the responsibility for active stewardship for both present and future generations to continue to enjoy, as well as for the many benefits afforded by land and waterway conservation and stewardship. They provide economic value through tourism and environmental value in and of themselves, which in turn creates a quality of life unparalleled in non-coastal communities.

New challenges face our city as evidenced by recent trends and longer-term projections. When asked what are the most important things that should be considered when updating this Comprehensive Plan, our citizens and business owners stated that, aside from transportation, it is environmental stewardship. More specifically, our citizens desire to protect and expand open spaces and recreational opportunities, and for local government to help address flooding, the effects of sea level rise, and stormwater management needs. The General Assembly passed legislation in 2011 requiring that all local comprehensive plans acknowledge the state's preference for "Living Shorelines" when designing erosion control measures. This is to include state guidance for comprehensive coastal resource management plans and best practices in the comprehensive plan. More recently in 2015, a new law was passed requiring local comprehensive plans to include adaptation and mitigation plans and strategies for addressing sea level rise and recurrent flooding.

To do the latter effectively, impacts on both the built and natural environment, including critical public and private, and green infrastructure, must be considered. In addition, it is necessary to understand and plan accordingly for the potential impacts of these hazards on our most vulnerable populations, including the elderly, disabled, low-income persons, and those without an individual means of transportation, in order to put forward the most equitable community resiliency strategies.

A defining character of Virginia Beach can be its environmental stewardship of our ecosystems. We can and should also strive to become a city that incorporates environmental resources and their enhancement thoroughly into our very identity and our quality of everyday life. This chapter presents the City's Environmental Stewardship Framework, which is an implementable way to achieve these desired characteristics for our future. This comprehensive framework and its underlying Guiding Principles were first put forward in the *2009 Comprehensive Plan*. Both the Framework and the Guiding Principles were validated by both our citizens and the Virginia Beach Planning Commission during the Comprehensive Plan review and update process; however, the Planning Commission felt that some enhancements were needed and points needed to be emphasized in the Guiding Principles. Updated policy recommendations and recommendations for future action are presented, reflecting both current and projected needs through the year 2040.

Environmental Stewardship Framework

- Sustainability Plan
- Water Resources Protection and Management
- Parks and Conserved Lands
- Green Infrastructure
- Living Resources and Ecosystems Protection Management
  - Urban Forestry
  - Living Shorelines
  - Unique Plant and Animal Habitats
- Sea Level Rise, Recurrent Flooding, and Hazard Mitigation
- Land Development and Stormwater Management
- Energy Management and Alternative Energy Resources Development
- Solid Waste Management
- Noise, Light, and Air Pollution Management

A COMMUNITY PLAN FOR A SUSTAINABLE FUTURE

In 2008, the eighth Core Strategy-- "Ensure Sustainability"-- was added to the *City's Strategic Plan.* In June 2010, the American Institute of Architects (AIA) assembled the Sustainability Design Assessment Team (SDAT) at the request of the City to identify elements of our physical environment, community statistics, and City services that were supportive of or in conflict with the principles of "livability." Later that year, this initiative was acknowledged and reflected in the City Council's *2010 - 2014 Strategic Plan* (http://www.vbgov.com/government/departments/city-manager/Documents/2015-2017StrategicPlan.pdf) and the Environment and Sustainability Office (ESO) was established within the City's Department of Planning. The new ESO was immediately charged with developing a comprehensive sustainability plan for Virginia Beach that would reflect and blend both the perspectives of the City government and those of the community.

Through a series of community meetings, focus groups, and the input from a stakeholder team, *A Community Plan for a Sustainable Future*, commonly referred to as *the* "*Sustainability Plan,"* was adopted by City Council in March 2013, (http://www.vbgov.com/government/offices/eso/sustainability-plan/Pages/default.aspxadd).

The Sustainability Plan is organized around the three pillars of sustainability-- social, economic, and environmental-- and divided into a series of ten "Elements." Taken together, the Elements describe the totality of the facets that relate to the sustainability of the City of Virginia Beach – both its government and the community at large. Each Element is focused around a "Vision Statement," several "Goals" related to the "Vision Statement," and a series of "Objectives" that outline ways to achieve each "Goal."

In May 2014, a small group of City staff was assembled to continue the community's work on the Sustainability Plan, and to identify and use metrics to provide meaningful measurement of the goals of the Sustainability Plan and progress toward implementing *Envision Virginia Beach 2040.* A series of metrics was developed for each of the ten Elements, and refined by an interdisciplinary team of City staff. In addition to identifying the metrics, the team also developed at least one, but in many cases, a series, of specific objective statements for each metric. These objective statements include specific targets for achievement by the community, which will allow progress to be tracked, reported, and analyzed. It is the ultimate goal that these metrics be adopted by City Council and incorporated into an interactive dashboard, allowing the community to view progress toward each metric, and the overall success of implementation of the City's Sustainability Plan over time.

WATER RESOURCES PROTECTION AND MANAGEMENT

Water is one of the most essential natural resources upon which modern life depends. Conserving and protecting it with the most efficient and sustainable practices is paramount to preventing shortages and ensuring a continuation of a high quality of life. The City seeks to preserve, enhance, and restore water quality in all of its waterways for the protection of the environment and to experience efficient use benefits for the present and future generations.

The City's goal is to bring partners in both city government and the community together to help improve our most valuable natural and man-made resources by protecting public health and safety, minimizing the impacts of stormwater runoff, controlling invasive plant and animal species, and creating and protecting sustainable habitats. The City is slowly but steadily making progress in reaching its goals of cleaner and healthier waterways. There has been ongoing and focused community outreach, new state and federal mandates for onsite stormwater management, shoreline protection and restoration, increased planting buffers, and open space protection and conservation. All of these efforts have contributed to steady water quality improvements within the City's primary and secondary watersheds, and in surface and groundwater resources management.

Water quality monitoring is a critical element of any program designed to manage and protect drinking water supplies. The Commonwealth's ongoing water quality monitoring program evaluates the physical, chemical, and biological character of water in relation to human health, ecological conditions, and designated water uses. These water quality monitoring programs include the sampling of streams, lakes, reservoirs, and groundwater resources that serve as primary sources for drinking water, and are also extended to wetlands and surface runoff. Without accurate and current data on the state of the water resources, effective conservation and

remediation programs cannot be accomplished, nor can the effectiveness of the monitoring programs be evaluated.

Surface Water

One of the City's most valuable natural resources is undoubtedly its surface water resources. The geography of the City comprises three primary watersheds and seven secondary watershed areas (*see Watershed Areas Map in the "Environment" chapter of the Technical Report*). The core components that make up the watersheds that require protection and management consist of wetlands, shorelines, riparian buffers, storm drainage systems, and the land upon which they drain. Collectively, these components determine the overall environmental health, quality, and sustainability of all of the City's natural resources.

Recommended Policies: Surface Water

- Continue to ensure and improve water quality by developing and implementing initiatives to protect our water resources.
- Maintain the Atlantic Ocean and Chesapeake Bay water quality for water contact recreation.
- Demonstrate that provisions of the Clean Water Act are addressed as they apply to achieving total maximum daily load (TMDL) requirements through the City's annual MS4 report.
- Ensure that the goals set forth by the Southern Rivers Area Management Program are met.

Agenda for Future Action Recommendations: Surface Water

- Implement regulatory requirements relating to stormwater management, including but not limited to meeting NPDES MS4 and Chesapeake Bay TMDL mandates.
- Promote partnerships with the non-governmental organizations to achieve the City's water quality improvement goals.
- Implement recommendations of the 2014 Chesapeake Bay Watershed Agreement.
- Develop design criteria that help achieve water quality objectives in conjunction with other SGA objectives, such as preserving open space and planning for sea level rise and recurrent flooding.
- Complete efforts that are currently underway to develop a Stormwater Master Planning Analysis and Inventory.

Groundwater

Groundwater is a vital and finite resource that must not be taken for granted. It is finite because it is dependent on the availability of groundwater recharge zones. The more impervious the ground surface becomes over time, the less the underlying shallow and deep water aquifer systems are able to recharge with groundwater.

The volume of seasonal water used by residents and businesses for lawn watering and other irrigation activities is important for City government to understand, because the primary source of this water is a fragile shallow aquifer that is the only fresh groundwater source available within the City. Residents in the Rural Area rely solely on this aquifer, not only for crop irrigation but also for indoor domestic uses such as drinking, bathing, and cooking. The groundwater close to the surface is mostly fresh, whereas the groundwater found at depths of 200 feet and greater is mostly saline

and generally too salty to drink or use for irrigation.

As of 2008, more than 20,000 private wells operating in the northern portion of the City tap fresh groundwater in the City's shallow aquifer system. Pumping from these many wells often causes groundwater levels to drop below sea level. When groundwater levels fall below sea level, salty sea water intrudes and mixes with fresh groundwater, which increases chloride concentrations in the water, potentially making it unusable. Many other sources found to cause groundwater pollution include drainage from crop lands, urban lawns, golf courses treated with fertilizers and pesticides, livestock, underground failing septic systems, underground storage tanks, unsound land disturbing practices, etc. It is imperative that an action plan be established to monitor all activities that may contribute to the degradation and depletion of the city's aquifers.

Recommended Policies: Groundwater

- All golf courses should maximize the use of recycled water for irrigation.
- Public water and sewer extension plans should be coordinated with groundwater protection goals for all areas north of the Green Line where septic tanks and wells have exceeded their life cycle and are failing.

Agenda for Future Action Recommendations: Groundwater

- Develop a targeted educational program that increases public awareness about the importance of protection and conservation of non-potable groundwater resources and their use.
- Establish protocols to conserve and protect groundwater on city properties:
    - Develop an integrated pest management (IPM) and nutrient management plan.
    - Complete an underground storage tank (UST) remediation on all City sites.

Plans and Programs References:

- EPA Chesapeake Bay TMDL Program (Mid-Atlantic States) http://www2.epa.gov/chesapeake-bay-tmdl
- Virginia Beach Watersheds and Drainage Studies
- Virginia Stormwater Management Program (VSMP) http://www.deq.virginia.gov/Programs/Water/StormwaterManagement.aspx
- Virginia DEQ Municipal Separate Storm Sewer System (MS4) Permits http://www.deq.virginia.gov/Programs/Water/StormwaterManagement/VSMPPermits/MS4Permits.aspx
- Virginia Erosion and Sediment Control Program http://www.deq.virginia.gov/Programs/Water/StormwaterManagement/ErosionandSedimentControl.aspx
- Virginia Wetlands and Stream Protection Program http://www.deq.virginia.gov/Programs/Water/WetlandsStreams.aspx
- Virginia DEQ Coastal Zone Management Program http://www.deq.state.va.us/programs/coastalzonemanagement.aspx

PARKS AND CONSERVED LANDS

Virginia Beach has a large network of parks and conserved lands that contain abundant natural resources. The City's inventory of parkland totals over 7,000 acres, with thousands more acres of parks and conservation lands owned by federal, state, and non-profit groups within the city limits. This network of green and blue spaces is vital to our way of life and our heritage. The importance of the ecosystem benefits provided by these areas is being documented through emerging research in the areas of climate change, sea level rise, recurrent flooding, urban health, air purification, carbon storage, agricultural production, and pollination. It is now widely recognized that ecosystems – including urban ecosystems such as parks, protected areas, and waterways – provide essential services for people.

Open space, park lands, and waterways are integral to the City's character and unique identity within the region. Early development of the region was shaped primarily by waterways used for transportation. Today, these same waterways are important for different reasons. They are the thread that ties neighborhoods together. They provide drinking water, recreation, flood control and wildlife corridors. Virginia Beach's waterways are the backbone of the natural resource system within the City. Conservation of remaining natural resource areas was identified by our citizens during public input sessions as one of the top priorities for updating this Comprehensive Plan.

Local waterways should be protected with natural and/or restored buffer areas, large and small open spaces, park lands and low impact development that work together to form continuous corridors known as greenways. Virginia Beach should acquire, manage, and protect lands for public use in a strategic manner to develop an interconnected system of green spaces that provides public access, conserves natural ecosystem functions, sustains clean air and water and provides places for flood control, recreation and civic engagement.

The "2011 Virginia Outdoors Demand Survey (VODS)," administered by the Virginia Department of Conservation and Recreation, finds high regard for the importance of outdoor recreation opportunities and a strong commitment to the protection of natural areas among the general public. Public support is very strong for public access to open spaces and outdoor recreational opportunities, as well as for public expenditures to make those opportunities available.

Tourism is a major industry in Virginia Beach and the Hampton Roads region. In recent years, Virginia Beach has successfully increased the number of outdoor recreation events to include walks/running races and sports tournaments in collaboration with the private sector. Bikeway and trail connectivity continues to be the top recreational need identified by citizens. Significant progress has been made over the last five years to improve the trail network.

New park spaces will be needed within Strategic Growth Areas to serve increasing population density within a walkable environment. There is also a growing interest in partnerships with conservation agencies and citizen groups to improve public access to conservation lands and parks within the North Landing River watershed.

Recommended Policies: Parks and Conserved Lands

- Continue partnerships with tourism industry and private recreation providers to create additional outdoor recreational activities and amenities that will increase economic activity, especially in the resort shoulder seasons.

Agenda for Future Action Recommendations: Parks and Conserved Lands

- Acquire open space in strategic locations, including in the SGAs, that can provide multiple benefits in terms of flood control, water quality, public access to waterways, preserving or creating tree canopy, and preserving unique ecological and cultural heritage sites.
- Commit resources to maintain the high quality of the existing park system and to expand the trail system.
- Implement the recommendations in the Virginia Beach Bikeways and Trails Plan.
- Implement the recommendations in the Virginia Beach Outdoors Plan.

Plans References:

- *Virginia Beach Outdoors Plan* http://www.vbgov.com/government/departments/parks-recreation/design-development-projects/Pages/outdoors-plan.aspx
- *Virginia Beach Bikeways and Trails Plan Urban Forestry Management Plan* http://www.vbgov.com/government/departments/parks-recreation/landscape-management/Pages/urban-forestry.aspx
- *Green Sea Blueway and Greenway Management Plan* http://www.vbgov.com/government/offices/eso/north-landing-river-study/Pages/default.aspx

GREEN INFRASTRUCTURE

Understanding the benefits that are inherent within our natural ecosystems is the first step to being able to integrate those concepts into more sustainable land use planning. "Green Infrastructure" refers to strategically planned and managed networks of natural lands, working landscapes, and other open spaces that conserve ecosystem values and functions and provide associated benefits to human populations. It can refer to natural ecosystems or man-made stormwater and landscape features that are designed and constructed to mirror natural ecosystem functions. Green Infrastructure can help meet State requirements for the treatment and storage of rain water runoff, which emphasize the use of drainage systems that incorporate natural processes.

Bow Creek and Stumpy Lake are examples of green infrastructure. As part of the Bow Creek Recreation Center and Golf Course renovation project, portions of Bow Creek that had been channelized over time were restored to their natural characteristics. Stumpy Lake serves as a drinking water supply reservoir for the City of Norfolk. As the headwaters of Gum Swamp, located in the South Princess Anne Commons Area, it also provides stormwater management for the watershed. By preserving this natural resource area as part of the City's green infrastructure system, multiple benefits are derived including flood control, wildlife habitat and movement corridors, migratory water fowl nesting, and provision of a continuous greenway from Stumpy Lake to the North Landing River.

Bow Creek Recreation Center and Golf Course – before renovation

Bow Creek Recreation Center and Golf Course – after renovation with green infrastructure design.

Bow Creek Recreation Center and stormwater management pond designed as green infrastructure integrated with the renovated golf course.

The *Virginia Beach Outdoors Plan* (http://www.vbgov.com/government/departments/parks-recreation/design-development-projects/pages/outdoors-plan.aspx) and the *Virginia Beach Bikeways and Trails Plan* (http://www.vbgov.com/government/departments/parks-recreation/design-development-projects/pages/bikeways-trails-plan.aspx) are the primary tools for implementation of our green infrastructure system. These plans identify opportunities for property acquisition and development, conservation easements, as well as specific projects for construction. The Department of Parks and Recreation receives funding in the Capital Improvement Program (CIP) on an annual basis to support open space acquisition, development and management. It is important for this annual funding to continue in order to adequately plan for and secure future green spaces for use as green infrastructure. The three key green infrastructure projects discussed in the *Outdoors Plan* include:

- **Stumpy Lake/North Landing River Greenway**

  This greenway corridor begins at Stumpy Lake and follows Indian River Road to the North Landing River and Back Bay. There are opportunities to connect this greenway with Chesapeake and North Carolina trail systems as well as a larger regional trail system known as the East Coast Greenway. The East Coast Greenway is planned as a long-distance family friendly bike trail from Maine to Florida. Properties in this corridor are being acquired through the Open Space Acquisition program, the AICUZ program for the Interfacility Traffic Area, and the Agricultural Reserve Program. This area is also addressed in the *Green Sea Blueway and Greenway Management Plan*.

- **Thalia Creek Greenway**

  Located just south of Town Center in Pembroke, Thalia Creek Greenway is an example of an urban greenway system that goes beyond the rivers and parklands. Urban greenways provide transportation links, strengthen community identity, and are a way of bringing together unrelated developments. As other areas of the City begin to experience increased density, it is recommended that greenway and open space systems be integrated into all Strategic Growth Area plans. For more information on the *Thalia Creek Greenway Master Plan*, see: http://www.vbgov.com/government/departments/parks-recreation/design-development-projects/Documents/thalia-creek/thalia-creek-greenway-master-plan.pdf

- **West Neck Creek Greenway and West Neck Creek Natural Area Park**

  The West Neck Creek Natural Area is the center for this greenway corridor. To the north, there are opportunities to connect large residential areas along Holland Road to this greenway. To the south, this greenway could merge with the Stumpy Lake/North Landing River greenway.

Designing greenway systems that include recreational opportunities will help local citizens understand the benefits of clean water and the value of healthy waterways. These interconnected greenway systems can be described as green infrastructure. However, merely designating greenway corridors is not enough. Expanding and creating new trail networks that link greenways and allow seamless movement of users through the City's greenways and natural areas will also facilitate sustainable use of these areas. Trail networks provide alternate transportation routes and recreation areas for City residents, and they can help preserve greenways for wildlife. Diligently undertaking the upkeep and maintenance of trail networks within the City's green spaces will

ensure that water resources, sensitive habitats, and wildlife are protected, valued, and minimally impacted by users.

Green Infrastructure that is part of a larger greenway plan can also be used to help preserve land within the floodplain, allowing the City to minimize the impacts of flooding and adapt to sea level rise. The City has acquired numerous properties within the Princess Anne Commons and Interfacility Traffic Area (ITA) that contain floodplains and environmentally sensitive areas. These areas should be examined to identify their potential to be incorporated into a larger greenway network.

Recommended Policies: Green Infrastructure

- Incorporate green infrastructure elements into new commercial and residential developments.

Agenda for Future Action Recommendations: Green Infrastructure

- City properties within the Princess Anne Commons and Interfacility Traffic Area should be studied to identify conservation lands and green infrastructure opportunities that can complement the plans for future economic development projects.

LIVING RESOURCES AND ECOSYSTEMS PROTECTION MANAGEMENT

Urban Forestry

Virginia Beach's urban forest touches the lives of its citizens every day. It consists of all trees in the City on both public and private lands. The City's trees are cherished by residents for promoting strong neighborhoods and a good quality of life. The urban forest provides numerous benefits to the City and its residents, including cleaner air and water, cooler temperatures, and energy savings. With proper management, these benefits increase every year as trees continue to grow and thrive. Virginia Beach's urban forest is a vital component of the City's infrastructure.

Urban forestry consists of practices that the City employs to maximize the social, aesthetic and functional values of its forest resources. Through these practices, the City is able to accomplish a broad array of multiple benefits and functions at lower cost than man-made infrastructure would allow. Urban forestry practices can help offset adverse effects of heat islands and urban runoff, provide shade for people, and provide habitat for wildlife.

The City's *Urban Forest Management Plan* (https://www.vbgov.com/government/departments/parks-recreation/parks-trails/caring-for-our-parks/Documents/2013-ufmp.pdf) provides policy guidance, goals and objectives for urban forest management in Virginia Beach. The plan delivers a vision of a strong urban forest that thrives through mutually beneficial partnerships and effective resource commitment. Its overarching mission is to enhance the Virginia Beach urban forest through education, community involvement, proactive management, and responsible stewardship.

Recommended Policies: Urban Forestry

- Increase tree plantings and preservation of existing trees on all public properties.
- Undisturbed natural areas and important natural features should be identified during the site development design process. Begin by identifying existing natural characteristics of the site that should be preserved. Natural site amenities may consist of a significant stand of trees. Within reason, existing tree and groundcover that are healthy should be preserved and integrated into the overall design of development.

Agenda for Future Action Recommendations: Urban Forestry

- Implement the recommendations in the *Urban Forest Management Plan*.
- Improve the viability and resilience of the City's urban forest by initiating the three-trophic layer (canopy trees, understory trees, shrub and groundcover) approach.
- Improve inspections and enforcement capabilities to better achieve the objectives of local landscaping and tree protection ordinance requirements.
- Enhance policies that guide development requirements for landscape practices on proposed projects.

Living Shorelines

Coastal ecosystems reside at the interface between the land and water, and are naturally very complex. They perform a vast array of functions by way of shoreline stabilization, improved water quality, and habitat for fishes; from which humans derive direct and indirect benefits.

The science behind coastal ecosystem resource management has revealed that traditional resource management practices limit the ability of the coastal ecosystem to perform many of these essential functions. The loss of these services has already been noted throughout coastal communities in Virginia as a result of development in coastal zone areas coupled with common erosion control practices. Beaches and dunes are diminishing due to a reduction in a natural sediment supply. Wetlands are drowning in place as sea level rises and barriers to inland migration have been created by construction of bulkheads and revetments. There is great concern on the part of the Commonwealth that the continued armoring of shorelines and construction within the coastal area will threaten the long-term sustainability of coastal ecosystems under current and projected sea level rise.

In the 1980s, interest arose in the use of planted wetlands to provide natural shoreline erosion control. Today, a full spectrum of living shoreline design options is available to address the various energy settings and erosion problems found. Depending on the site characteristics, they range from marsh plantings to the use of rock sills in combination with beach nourishment.

Research continues to support that these approaches combat shoreline erosion, minimize impacts to the natural coastal ecosystem and reinforce the principle that an integrated approach for managing tidal shorelines enhances the probability that the resources will be sustained. Therefore, adoption of new guidance and shoreline best management practices for coastal communities is now necessary to insure that functions performed by coastal ecosystems will be preserved and the benefits derived by humans from coastal ecosystems will be maintained into the future.

In 2011, the Virginia Assembly passed legislation to amend §28.2-1100 and §28.2-104.1 of the *Code of Virginia* and added section §15.2-2223.2, to codify a new directive for shoreline management in Tidewater Virginia. In accordance with section §15.2-2223.2, all local governments shall include in the next revision of their comprehensive plan beginning in 2013, guidance prepared by the Virginia Institute of Marine Science (VIMS) regarding coastal resource management and, more specifically, guidance for the appropriate selection of living shoreline management practices. The legislation establishes the policy that living shorelines are the preferred alternative for stabilizing eroding shorelines.

This guidance, known as Comprehensive Coastal Resource Management Guidance, has been prepared by VIMS for localities within the Tidewater region of Virginia and shared through their Comprehensive Coastal Resources Management Portal (CCRMP) (http://www.ccrm.vims.edu/ccrmp/). It explicitly outlines where and what new shoreline best management practices should be considered where coastal modifications are necessary to reduce shoreline erosion and protect our fragile coastal ecosystems. This guidance includes a full spectrum of appropriate management options that can be used by local governments for site-specific application and consideration of cumulative shoreline impacts. The guidance applies a decision-tree method using a resource mapping database that will be updated periodically, and a digital geographic information system model created by VIMS.

Recommended Policies: Living Shorelines

- Refer to the guidance presented in the City of Virginia Beach Comprehensive Coastal Resource Management Portal (CCRMP) prepared by VIMS to guide regulation and policy decisions regarding shoreline erosion control: http://ccrm.vims.edu/ccrmp/va_beach/.
- The above-referenced Shoreline Best Management Practices should become the recommended adaptation strategy for erosion control. Departure from these recommendations by an applicant wishing to alter the shoreline should be justified at a hearing of the board(s).
- Use the VIMS Decision Trees for onsite review and subsequent selection of appropriate erosion control/shoreline best management practices: http://ccrm.vims.edu/decisiontree/index.html.
- Use the VIMS CCRMP Shoreline Best Management Practices for management recommendations for all tidal shorelines found at: http://ccrm.vims.edu/ccrmp/va_beach/
- Available open spaces adjacent to marsh lands should be preserved to allow for inland retreat of marshes as a result of rising sea levels.

Agenda for Future Action Recommendations: Living Shorelines

- Train regulatory boards (Wetlands and CBPA) on decision making tools developed by the Center for Coastal Resources Management at VIMS.
- Follow the development of the state-wide General Permits being developed by the Virginia Marine Resources Commission (VMRC). Ensure that local policies are consistent with the provisions of the permits.
- Educate citizens and stakeholders on new shoreline management strategies including Living Shorelines.
- Evaluate and develop a locality-wide regulatory structure that encourages a more integrated approach to shoreline management.
- Evaluate and recommend cost share opportunities for construction of living shorelines.

Unique Plant and Animal Habitats

Virginia Beach is uniquely located geographically such that it affords the most biological diversity found in the state east of the Blue Ridge Mountains. Its position between the mouth of the Chesapeake Bay and the Albemarle-Pamlico Sounds makes the City the northernmost home to many southern plant and animal species, and the southernmost home to many northern plant and animal species.

Abundant waterways and wetlands provide diversity of habitat for many songbirds, shorebirds, wading birds, raptors and waterfowl. A wide variety of freshwater, brackish and salt water fish and shellfish species are also present. Additionally, several endangered and threatened species, including loggerhead sea turtles and bald eagles, call Virginia Beach home.

Virginia Beach is fortunate to possess these plentiful aquatic resources, which hold value for the City in seafood harvests, recreation, and aesthetics. Protecting sensitive spawning and nursery habitats will help ensure that the City's natural resource based industries continue to thrive. Local fisheries and shellfish harvesting should be of special concern. As noted in the Virginia Department of Environmental Quality's *Water Quality Assessment Report*, fishing is impaired in half of the City's secondary watershed areas. Shellfish harvesting is assessed less broadly within Virginia Beach's network of water quality monitoring stations, but it is impaired in at least three of the eight secondary watersheds. Virginia Beach should support a well-coordinated effort between federal and state regulators and private stakeholders to prevent any further harm to its fisheries, and to remedy problems that have led to the decline of its fisheries. The location and health of sensitive spawning and nursery habitats within proposed development areas should be addressed in the development review process.

Recommended Policies: Unique Plant and Animal Habitats

- Protect and restore unique plant and animal habitats to sustain Virginia Beach's high biological diversity in the Southern Rivers area.
- Protect the diversity of habitats through a variety of conservation tools. Use the recommendations cited in the adopted Natural Heritage Report, 1994 when considering developments that may affect designated wildlife protection areas.
- Promote continued coordination between the Hampton Roads Planning District Commission (HRPDC), The Nature Conservancy, and the Virginia Department of Conservation and Recreation/Division of Natural Heritage (VDCR/DNH) of their respective work programs for sharing inventory data bases.
- Use existing maps and other resources that show the important fish spawning and nursery locations to limit impacts of future development. Reference these locations on development plans.
- Reference Natural Heritage Areas on development plan applications and review during the development review process.
- Continue to partner with Wildlife Response, Inc. to treat and care for injured wildlife.

Agenda for Future Action Recommendations: Unique Plant and Animal Habitats

- Develop and implement policies and programs that protect, restore and enhance critical habitats along the City's waterways.
- Restore and attain sustainable inventories of native edible oysters in the Lynnhaven River.

- Restore oyster reefs in the Lynnhaven and Owls Creek estuaries by developing a hatchery plan and constructing sanctuary reefs.
- Work with Virginia Institute of Marine Science (VIMS) and other partners to restore Submerged Aquatic Vegetation (SAV) through planting and habitat enforcement efforts.
- Undertake one wetlands restoration project in the Elizabeth River Watershed the Lynnhaven River Watershed, Back Bay Watershed, North Landing River Watershed, and Rudee Inlet/Owls Creek Watershed.
- Develop a City program to effectively manage invasive plants and animals.

SEA LEVEL RISE, RECURRENT FLOODING, AND HAZARD MITIGATION

Sea Level Rise and Recurrent Flooding

Sea level rise is a major concern for Coastal Virginia and particularly for the Hampton Roads region, which is listed as the largest population center in the country at greatest risk from sea level rise outside of New Orleans. The region has been experiencing increased nuisance flooding, defined by the National Oceanic and Atmospheric Administration (NOAA) as a daily rise in water level above the minor flooding threshold set locally by NOAA's National Weather Service. In 2014, the Sewells Point Tide Station recorded eight days of nuisance flooding. The number of nuisance flooding events is expected to increase as sea levels rise. Since the City's *2009 Comprehensive Plan* was adopted, action has been taken at the national, state, regional, and local levels to plan and prepare for sea level rise and recurrent flooding.

Regional Planning Efforts

Between 2010 and 2012 the Hampton Roads Planning District Commission (HRPDC) released a series of reports focusing on the impacts of climate change on the region. The first report researched potential impacts and engaged local government staff. The second report analyzed the impacts of storm surge flooding on various sectors, such as the built environment and the economy, and public engagement. The third report analyzed the potential impacts of sea level rise on the region's population, built environment, infrastructure, economy, and natural environment. In addition, the HRPDC established a Sea Level Rise Advisory Committee in 2014 comprised of representatives of all HRPDC localities. They also organized a "Dutch Dialogue" in June 2015 to bring together local and Dutch experts to develop strategies for integrated water management and resiliency for two neighborhoods in Hampton Roads, with intended transferability for all Hampton Roads Communities.

In June 2014, the Hampton Roads region was selected to participate in a pilot project with the aim of developing a "whole of government" (federal, state, local) and "whole of community" approach to sea level rise preparedness and resilience planning that can be used as a template for other regions while also furthering a collaborative and efficient approach to resilience planning regionally.

Given its coastal location and being the largest city population-wise in Virginia, Virginia Beach has necessarily been an active participant in the current regional planning efforts. Moving forward, Virginia Beach should remain involved in regional planning efforts and participate in new efforts as opportunities arise.

State Planning Efforts

In 2012, the General Assembly passed Senate Joint Resolution No. 76 directing the Virginia Institute of Marine Science (VIMS) to study adaptation strategies to address recurrent coastal flooding in Tidewater and the Eastern Shore of Virginia. Their report was released in 2013 and presented a series of local potential sea level rise scenarios, in addition to evaluating and recommending adaptation options for local governments (*see http://ccrm.vims.edu/recurrent_flooding/Recurrent_Flooding_Study_web.pdf*).

The Secure Commonwealth Panel established a Recurrent Flooding Sub-Panel in fall 2014 that provided recommendations for how the Commonwealth can respond and adapt to recurrent flooding and sea level rise. Additionally, Governor McAuliffe re-established the Climate Change Commission to review, update, and prioritize the recommendations of the *2008 Climate Change Action Plan*, as well as identify sources of revenue to fund implementation of the plan's recommendations *(see http://www.sealevelrisevirginia.net/docs/homepage/CCC_Final_Report-Final_12152008.pdf*).

The Climate Change Commission has appointed the state's first Chief Resilience officer to lead the effort to prepare Virginia for the current and future effects of climate change.

Local Planning Efforts

As a coastal community, Virginia Beach is proactive in addressing sea level rise. Our oceanfront has been protected from rising sea levels and coastal storms through two major civil works projects: one at the Resort area and the other at Sandbridge. In addition, Chesapeake Bay Beach, Cape Henry Beach, and Ocean Park Beach are replenished approximately every six years as part of the Lynnhaven Inlet maintenance dredging performed by the U.S. Army Corps of Engineers (USACE).

In 2013, Virginia Beach updated its floodplain ordinance and moved it to Appendix K of the City Code as a standalone ordinance. One of the major steps taken during the update was to adopt two feet of freeboard for all new construction and substantial improvements to existing construction. In addition, the City has participated in several rounds of Federal Emergency Management Agency (FEMA) grant funding to elevate homes with multiple flood losses. To date, seven homes have been elevated, and another thirteen have received funding for elevation.

To ensure protection of critical public infrastructure, the Department of Public Utilities has inventoried all sewer pump stations subject to flooding and is evaluating infiltration and inflow from 2, 5 and 10-year storm events. Sea level rise is a contributing factor for some of these stations and collection systems. Aging infrastructure and Virginia Department of Environmental Quality Consent Order mandates have also led to elevating some of our infrastructure or reinforcing it such that it would be resistant to infiltration and inflow from sea level rise and recurrent flooding. As the City replaces sewer pump stations, adds generators, and rebuilds collection systems, groundwater level and flooding are being considered in their design and construction.

With the projection for continuing and possibly accelerating sea level rise, City Council has directed that a *Comprehensive Sea Level Rise and Recurrent Flooding Response Plan* be developed and has allocated significant funding for its development. In 2014, a national consultant firm with expertise in developing comprehensive response plans to sea level rise and recurrent flooding was retained by the City to work with an interdisciplinary team of City staff to study the City's vulnerabilities to

sea level rise and recurrent flooding on a watershed basis and develop the City's response plan. Work began on the plan in fall 2014 is expected to be completed by 2018.

As part of developing this response plan, the City has identified sea level rise planning horizons in order to complete the vulnerability assessment and develop adaptation strategies. Two scenarios were selected for short- and long-term planning purposes, using the NOAA, USACE, and VIMS projection scenarios:

- 1.5-foot of projected rise for the short term planning horizon.

- 3 feet of projected rise for the long-term planning horizon (50+ years) to be used as a basis for making long-term decisions, such as public infrastructure (roadways, bridges, alternative transportation modes, public utilities, and stormwater drainage system) design and replacement.

In addition to planning for sea level rise, several neighborhoods have been impacted by flooding from storm and rainfall events. The City is undertaking a drainage study to develop solutions to address flooding in these neighborhoods and protect them from future events. The City is also exploring the benefits of participating in FEMA's Community Rating System (CRS) Program, which could provide discounts on federal flood insurance premiums paid by property owners.

In Virginia Beach, living near the water remains desirable. Projected patterns for future development should be evaluated and considered to determine the vulnerability to flooding over time. Sea level rise must be particularly considered in areas with relatively flat topography, such as the Southern Rivers Watersheds Area, as small changes in sea level can adversely impact greater land areas. Care should be taken when locating and building homes and other structures, as well as new development and residential subdivisions, to ensure that they are adequately protected from flooding now and into the future.

Hazard Mitigation

Environmental hazards are very real to our coastal area. The City must focus on long-term sustainability by identifying short and long term impacts associated with natural events. The *2011 Southside Regional Hazard Mitigation Plan* (http://www.hrpdcva.gov/uploads/docs/2011%20Southside%20HR%20Hazard%20Mitigation%20Plan.pdf) recommends specific actions designed to protect residents, business owners and the built environment from hazards that pose the greatest risk. A comprehensive mitigation approach addresses hazard vulnerabilities that exist today and in the foreseeable future. Therefore, projected patterns of future development must be evaluated and considered in terms of how that growth will increase or decrease a community's hazard vulnerability over time.

Land use is a particularly important theme in Southside Hampton Roads, where many communities are facing increasing growth rates. Local policies that guide community growth and development, incentives tied to natural resource protection, and public awareness and outreach activities should be considered to reduce participating jurisdiction's future vulnerability to identified hazards.

The *Southside Regional Hazard Mitigation Plan* is currently in the process of being updated and rewritten into a *Regional Hazard Mitigation Plan*, with expected adoption in late 2016. Care should be taken to ensure consistency between the Comprehensive Plan and the *Regional Hazard Mitigation Plan*, especially related to strategies to mitigate recurrent flooding and sea level rise.

Recommended Policies: Sea Level Rise, Recurrent Flooding, and Hazard Mitigation

- Concentrate new development at higher elevations outside special flood hazard areas.
- Use alternative construction techniques to minimize fill in the Floodplain Subject to Special Restrictions.
- Wherever possible in the development approval process, avoid developing inside special flood hazard areas, especially in the Southern Watershed Area, which is characterized by limited relief and a minimal hydraulic gradient.

Agenda for Future Action Recommendations: Sea Level Rise, Recurrent Flooding, and Hazard Mitigation

- Develop a program to educate the public on the beneficial functions and values of floodplains.
- Complete the *City Comprehensive Response Plan to Sea Level Rise and Recurrent Flooding* for all areas of the City and implement the recommendations therein, subject to funding.
- Preserve and enhance beaches and dunes along the City's Atlantic Ocean and Chesapeake Bay shorelines.
- Implement the recommendations of the *Regional Hazard Mitigation Plan*.

LAND DEVELOPMENT AND STORMWATER MANAGEMENT

Land is a precious resource, limited in amount, highly valued and often exploited, a commodity that is constantly being sold, developed, or redeveloped. As the City matures, its land inventory becomes even scarcer. Management of land in its natural state demands that we employ wise management and stewardship practices to safeguard the City's natural heritage. Similarly, developed land should be used in a sustainable manner so that its value to present and future generations is maintained or enhanced. Integrated Site Design and stormwater management are key techniques that can be used to enable responsible and more sustainable land development practices.

"Filterra" stormwater treatment system draining a parking lot at new suburban development site

The City has recently drafted an *Integrated Site Design Guide* as the latest in a series of initiatives intended to help developers accomplish sustainable development in the city. While this effort is designed to update the City's current *Landscaping Guide*, which was published in 2002 and revised in 2009, it is not an attempt to increase current landscape requirements or costs related to landscaping and stormwater management. The Guide seeks to maintain the beneficial landscaping strategies that have been successful in beautifying Virginia Beach over the last 20 years. The Guide will be the tool box from which landscape architects and designers, civil engineers, planners, developers, business owners, and even homeowners will combine landscape techniques with design components to meet the City site plan review requirements. The draft plan can be viewed at: *http://www.vbgov.com/government/offices/eso/Documents/isdg-2014.pdf*.

Stormwater management regulations were passed by the General Assembly after many years of assembling diverse stakeholder input. This landmark decision has more recently devolved from state agency to local government implementation and enforcement without additional resources to local governments. As a result, the City of Virginia Beach adopted new stormwater management regulations and fees, which became effective July 1, 2014. Perhaps more than anything else in recent years, these state-mandated regulations have changed the way development projects are designed and approved in Virginia Beach. In addition, since adoption of the *2009 Comprehensive Plan*, the City of Virginia Beach prepared a *Comprehensive Stormwater Management Plan* that was approved by the Department of Environmental Quality.

Southern Watershed Subject to "Special Drainage Considerations"

In addition, the Southern Watershed (see Southern Watershed map in Chapter 1, Section 1.5 – Rural Area) is subject to "special drainage considerations." Drainage in the Southern Watershed is highly impacted by the presence of high ground water, poorly draining soils, and high water surface elevations in downstream receiving waters. Therefore, it is recommended that the developer of any property in the Southern Watersheds understand and evaluate these factors prior to undertaking the project and properly account for these factors in the project design. Receiving waters in the Southern Watersheds are subject to wind driven tidal influences. High ground water elevations and poorly draining soils can result in increased runoff, can limit the capacity of stormwater conveyance systems, and can counter the use of certain Best Management Practices, such as infiltration.

All of these effects must be fully considered and evaluated in the analysis and design of drainage systems in the Southern Watersheds. Accordingly, it is strongly recommended that the developer has a preliminary drainage study prepared by a qualified professional engineer in advance of any request to approve a discretionary (versus by-right) development application that involves land disturbance in the Southern Watershed. The drainage study should fully and accurately evaluate the effects of the foregoing factors on the planned development and on upstream and downstream areas. The proposed drainage system for the planned development would provide positive drainage that meets City standards and does not result in flooding within the planned development or to upstream or downstream areas.

Recommended Policies: Land Development and Stormwater Management

- "Low Impact Development" design features should be incorporated into the City's major buildings and parking area projects and in all private development plans.
- All waterfront development proposals in the Strategic Growth Areas (SGAs) should be coordinated with the City's Parks and Recreation Department for potential public water access (e.g., canoe/kayak put in, parkland, plaza, etc.,) in accordance with adopted SGA Master Plans.

Agenda for Future Action Recommendations: Land Development and Stormwater Management

- Complete and adopt the Integrated Site Design Guide as a component of Planning's Design Specifications and Standards.

- Enhance stormwater management by exploring alternatives to conventional stormwater management facilities (SWMFs), such as Low Impact Development (LID) approaches that are applicable to the Coastal Plain.
- Work with regional partners to implement the *Green Sea Blueway and Greenway Management Plan.*
- Develop online tools to assist the public with identification of sensitive environmental areas in the development review process.

ENERGY MANAGEMENT AND ALTERNATIVE ENERGY RESOURCES DEVELOPMENT

The City's goal for the year 2040 or earlier for energy resources management is three-fold:

1. All public and private development employs design features that achieve higher levels of energy efficiency;
2. Use energy as efficiently and as effectively as possible, while investing and planning for the continuity of municipal operations during energy disruptions; and,
3. Reduce energy consumption City-wide by 10%, in support of the Commonwealth of Virginia's goal to reduce electric energy consumption by 10% below 2006 levels by 2020, as stated in the in the *2014 Virginia Energy Plan* (https://www.dmme.virginia.gov/DE/2014_VirginiaEnergyPlan2.shtml).

To accomplish this, the City of Virginia Beach became a partner of Virginia Energy Sense. Virginia Energy Sense is the Commonwealth's energy education program under the guidance of the State Corporation Commission. Their mission is to work toward the *2014 Virginia Energy Plan's* electric energy consumption reduction goal by helping Virginias understand their energy use, and what they can do to save energy easily and cost-effectively. Energy efficiency and energy conservation are the most affordable, available tools to achieve this goal. The Virginia Energy Sense program provides the tools to educate and empower all Virginians to get involved and lower the amount of electricity they use.

The City of Virginia Beach can only hold itself and its operations fully accountable for energy consumption and conservation. Making an impact throughout the community will take the entire community—government and its citizens and businesses—working together as partners toward a more sustainable future. This necessary partnership is articulated well in the City's *A Community Plan for a Sustainable Future* (http://www.vbgov.com/government/offices/eso/sustainability-plan/Pages/default.aspxadd).

Our public schools are a major part of the City's inventory of municipal buildings. As such, they are key partners in the pursuit of energy use management. Virginia Beach City Public Schools (VBCPS) has become an internationally-recognized leader for its sustainable design principles and a growing list of innovative LEED-certified buildings. In addition to LEED projects and the constant evaluation of sustainable practices throughout the school division, sustainability has been implemented throughout the curriculum. Sustainability is a vital component of the *Compass to 2020 - Strategic Plan for Student Success* (http://www.vbschools.com/compass/landing.asp), which is implemented by the VBCPS Board. VBCPS was recognized by the USGBC as the "Best Green School Division Nationwide" for 2012.

Virginia Beach has undertaken a variety of initiatives to increase energy efficiency in City buildings:

- The Joint Energy Committee was created in spring 2007 in response to the City's rising energy costs. It reviews current City energy practices, evaluates new technology for potential incorporation into the City's energy strategy, and sets energy consumption goals for municipal operations. The JEC includes representatives from both the City and VBCPS that have been identified to date as the largest energy consumers, as well as representatives from the City's Department of Management Services (Budget Office). The JEC is jointly chaired by City and VBCPS executive managers.

- The City's Energy Office was created in July 2010. Since its creation, the office has led the way on a number of initiatives, helping to monitor and reduce the City's energy consumption.

- In the 2008, the City of Virginia Beach adopted an administrative directive requiring, whenever technically and fiscally possible, all new City building projects that have over 10,000 square feet of conditioned space to be designed and constructed to achieve a LEED-certified rating. To date 8 buildings have achieved LEED certification and another 6 are being designed for certification.

- The City pursues ENERGY STAR benchmarking and certification on existing buildings; to date, 5 have received certification. Currently, VBCPS has 28 facilities (nearly 2.9 million square feet) that have earned ENERGY STAR certification. Twenty facilities were either certified or recertified in 2014.

Mayor's Energy Advisory Committee (MEAC)

The City of Virginia Beach recognizes that local leadership and commitment to energy efficiency are keys to having a large influence over energy use in our community. Nationally, the Virginia Beach Region is 20th overall and is ranked 1st among mid-size cities for number of buildings in the EPA's Energy Star program. Of the 81 Energy Star certified buildings in the region, 35 are buildings located in the City boundaries. With the goal of local leadership and commitment to energy efficiency, the Mayor's Energy Advisory Committee (MEAC) was formed in 2013 to proactively position Virginia Beach to be an active leader in the movement toward a more sustainable and intelligent energy future for our nation, the commonwealth and the community.

MEAC focused on five major areas:

- Updates on the offshore energy efforts and its timeline for decision makers.
- Development of energy conservation programs.
- Tracking energy legislation and policy development.
- Providing energy-related advisory and support activities.
- Advising on new opportunities and actions.

The Committee's recommendations were presented to City Council in 2015.

Alternative Energy Task Force

In 2009 Mayor William D. Sessoms, Jr. created the Mayor's Alternative Energy Task Force to position Virginia Beach as a leader in the movement toward a more sustainable and intelligent

energy future. Members of the task force included representatives from local, state and federal government, universities and research institutions, and industry and citizen groups. The overarching mission of this task force was to develop goals, strategies, and objectives to reduce Virginia Beach's reliance on foreign sources of energy and to ensure adequate future sources of energy to meet domestic needs. The results of this work are captured in the *Alternative Energy Task Force Report* dated September 7, 2010 http://www.hrp.org/Site/docs/ResourceLibrary/VB_AETFFinalReport_07Sep10.pdf.

Recommended Policies: Energy Resources Management

- Build Leadership in Energy and Environmental Design (LEED™) structures or their equivalent for all public buildings.
- Retrofit City buildings to save energy using Energy Star standards.
- Increase our urban forest canopy to absorb more carbon dioxide (CO2).
- Use energy efficient lighting and reduce wasteful electricity use.

Agenda for Future Action Recommendations: Energy Resources Management

- Prepare action and public communications plans to support the Commonwealth's goal to reduce electric energy consumption by 10% below 2006 levels by 2020.
- Implement City's commitment to the US Mayors' "Climate Protection Agreement." http://www.usmayors.org/climateprotection/agreement.htm

Recommended Policies: Alternative Energy Resources Development

- Support research and development of alternative energy sources and encourage their use.
- Link energy resource development and management opportunities to the City's economic development strategy and the region's long-term economic development goals.

Agenda for Future Action Recommendations: Alternative Energy Resources Development

- Encourage research and development of alternative energy sources and promote their use.
- Work with the Virginia Coastal Energy Research Consortium (VCERC) on-offshore wind development.

NOISE, LIGHT, AND AIR POLLUTION MANAGEMENT

Noise Pollution

Noise pollution is unwanted or disruptive sound that interferes with normal activities such as sleeping or conversation, or disrupts or diminishes one's quality of life. Many Virginia Beach citizens are affected by noise created by surface transportation, aircraft and stationary sources. The need to minimize these impacts must be balanced against other required planning objectives as cited in state law. This point is especially true as it applies to the City's Air Installation Compatible Use Zone (AICUZ) program and the recommendations cited in the 2005 Hampton Roads Joint Land Use Study.

Recommended Policies: Noise Pollution

- Adhere to Air Installation Compatibility Use Zones (AICUZ) and other policy and programmatic recommendations cited in the Oceana Land Use Conformity Program (http://www.yesoceana.com/about-oceana-land-use-conformity/) and the 2005 Hampton Roads Joint Land Use Study (http://www.vbgov.com/government/departments/planning/areaplans/Documents/Oceana/JointLandUseStudy.pdf) both adopted by City Council.
- Relocate existing and locate proposed higher noise generating businesses and activities to locations inside the City's higher AICUZ zones and away from residential areas.

Agenda for Future Action Recommendations: Noise Pollution

- Explore alternative means of noise attenuation along roadways and at intersections where noise attenuation is not mandated through the use of wider shoulders and increased vegetation.

Light Pollution

Light pollution is the inappropriate or excessive use of artificial light and can cause sky glow, glare, light trespass, decreased visibility at night, and energy waste. Much of the outdoor lighting used at night is inefficient, overly bright, poorly targeted and improperly shielded. The Dark Skies Initiative seeks to raise awareness of light pollution and encourages shielding outdoor lighting to reduce night-time glare and limit light being emitted into the sky so that the stars and other celestial objects can be visible. The benefits include aid to migrating wildlife, stress reduction and aesthetic value, as well as energy savings. Currently, Virginia Beach is installing LED lights on all new light fixtures and upgrading existing light fixtures to LEDs as they are naturally replaced.

Recommended Policies: Light Pollution

- All outdoor lighting should be of a design that accentuates the site and provides sufficient illumination for the development without projecting light and glare onto adjacent properties or into the sky.
- Lighting poles should be of minimum height, possessing a pedestrian scale, but provide adequate illumination.
- Lighting for pedestrians should be provided from storefronts using either indirect illumination form the building or direct illumination under canopies or awnings.
- Lighting of non-residential buildings should be designed as an integral part of the building's architecture to be as unobtrusive as possible. Lighting especially on the rear of buildings that face residential areas should be designed and placed so that it does not direct or reflect any illumination into residential properties.

Agenda for Future Action Recommendations: Light Pollution

- Develop and adopt a Dark Skies Initiative Administrative Directive.

Air Pollution

Chesapeake Bay Airshed and Watershed

Air pollution is the introduction of particle matter, gasses, odors, or other harmful materials into the Earth's atmosphere. Air pollution is a significant risk factor for a number of health conditions including respiratory infections, heart disease, COPD, stroke and lung cancer and can lead to difficulty breathing, coughing, asthma and worsening of existing respiratory and cardiac conditions. Hampton Roads is located at the eastern edge of the Chesapeake Bay Airshed, an area that is over four times larger than its watershed and covers much of the Ohio valley and the mid-Atlantic region. Distance from remote, industrial pollution sources and Hampton Roads' coastal location have contributed to fewer air quality problems as compared to other metropolitan areas of similar size.

While air pollution is largely a problem that must be addressed at the regional level, there are a number of actions that can be taken at the local level to demonstrate a focused approach at helping to reduce air quality declines, including transit improvements, ride-sharing and better facilities for bikes and pedestrians. Collectively, these actions will help to mitigate against projected pollution increases only slightly; but they can also offer transportation alternatives that can potentially reduce traffic congestion and thereby improve the region's air quality in the future, especially when combined with new technologies being developed in the transportation industry.

Recommended Policies: Air Pollution

- Reduce air pollutant loadings, in part, by working to achieve the 2014 Chesapeake Bay Watershed Agreement goals related to air pollution.
- Increase tree preservation and replacement efforts to help reduce CO2.

SOLID WASTE MANAGEMENT

The City of Virginia Beach is a leader in the field of waste management. Its recycling program is regarded as one of the most successful in the Commonwealth. The City has increased its operational capacity at the City Landfill #2 facility by participating in the Regional Refuse Derived Fuel (RDF) Plant and Power Plant that supplies electrical power to the Norfolk Naval Shipyard in Portsmouth, Virginia. The City must continue this leadership role by being proactive in looking ahead to the next generation's demands for solid waste disposal capacity once the current Landfill #2 facility reaches its operational life capacity.

Recommended Policies: Solid Waste Management

- Manage solid waste generation in such a manner to eliminate, reduce, or recycle waste products to the greatest extent practical.
- Operate the City's waste management facilities to safeguard land, air and water resources for economic and environmental efficiency.
- Ensure all appropriate adaptive reuse "close out" measures for the City's landfill are employed to protect the public health, safety and welfare.

- Recycle and separate waste materials at their source to help extend the life of the City's landfill and the regional landfill.

Agenda for Future Action Recommendations: Solid Waste Management

- Participate with the region's localities to develop a post-2018 SPSA (Southeastern Public Service Authority) Agreement for regional waste management.
- Expand participation and types of materials accepted in the City's recycling program.
- Promote increased recycling in the tourism industry through the development of incentives.