Environmental Protection and Resource Conservation

Background Report

Anne Arundel 2040

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Introduction

The natural environment within Anne Arundel County is rich in diversity and is one of its biggest assets. The County has many large and small rivers, streams and coves that form over 533 miles of tidal shoreline including the Chesapeake Bay, extensive woodlands, farmlands and sensitive areas such as tidal and nontidal wetlands, bogs and steep slopes. It is also home to a variety of animal and plant species.

Conservation of these natural resources is a high priority to the citizens of the County. One of the most commonly voiced concerns throughout the County during the 2009 General Development Plan (GDP) process and the 16 Small Area Plan (SAP) process as well as the recent Plan2040 Listening Sessions was the need for continued protection and conservation of the County's water, forest, and other natural resources. There are multiple programs, plans, and regulatory measures in place at both the State and local level for protection of natural resources, and collectively they have accomplished much in terms of natural resource conservation.

This background report addresses the natural resources of Anne Arundel County, including those designated by the State as sensitive areas. In addition, the report includes discussion of land conservation, agricultural land preservation, mineral resources, air quality and noise pollution. This report also discusses low impact development, green building, coastal flooding, and renewable energy as issues relating to protecting the County's natural resources in the context of the built environment.

Finally, this report will identify future needs with regard to natural resource conservation, and agricultural preservation that can be addressed through new policies and recommendations in Plan2040. It should be noted that the topic of water resource protection will be thoroughly discussed in a separate Background Report on Water Resources that will focus more specifically on pollutant sources to area waterways (e.g. treatment plants, septic systems, and stormwater runoff), their impact on water quality, and their relationship to land use planning.

Planning Framework

The land and water conservation framework within Anne Arundel County consists of programs and regulatory controls. These include, but are not limited to State laws; Critical Area regulations; County subdivision and development regulations; water resource management such as floodplain, stormwater, and watershed management; zoning; grading and sediment control; directing development to designated growth areas as defined by the County's Development Policy Areas in the General Development Plan; designating areas for conservation including greenways from the County's Land Preservation, Parks and Recreation Plan (LPPRP) and the Greenways Master Plan; and the Priority Preservation Area established in the 2009 GDP.

The 1992 Economic Growth, Resource Protection and Planning Act articulated the State's growth policy through seven (7) visions (the General Assembly added an eighth in 2000 and these were updated to 12 in 2009) that centered on concentrating growth in suitable areas; preserving and protecting sensitive areas; and stewardship of the Chesapeake Bay and its watershed. This law requires local jurisdictions to address four environmentally sensitive areas that require protection in their comprehensive plans: (1) streams and their buffers, (2) 100-year floodplains, (3) habitats of threatened and endangered species, and (4) steep slopes. In the 1997 GDP, the County incorporated nontidal and tidal wetlands as a fifth environmentally sensitive area element.

In 2006, the passage of House Bill 1141 / House Bill 2 significantly affected comprehensive plans by requiring that all county and municipal governments include a Water Resources Element (WRE). The WRE addresses the relationship of planned growth to water resources for both waste disposal and safe drinking water. HB 1141 / House Bill 2 also established the Task Force on the Future for Growth and Development in Maryland to study current trends and challenges as they relate to population and growth, to analyze the impact of current local policies on infrastructure and the environment. A separate background report on Water Resources can be found at www.aacounty.org/Plan2040.

The Smart, Green and Growing Act of 2009 modernized the State's eight existing planning visions with 12 visions that reflect the State's aspiration to develop and implement sound growth and development policy. Eight of the twelve visions set forth in the Act speak directly to the preservation of natural resources and the environment:

1. Quality of Life and Sustainability: A high quality of life is achieved through universal stewardship of the land, water, and air resulting in sustainable communities and protection of the environment.
2. Community Design: Compact, mixed-use, walkable design consistent with existing community character and located near available or planned transit options is encouraged to ensure efficient use of land and transportation resources and preservation and enhancement of natural systems, open spaces, recreational areas, and historical, cultural, and archeological resources.
3. Infrastructure: Growth areas have the water resources and infrastructure to accommodate population and business expansion in an orderly, efficient, and environmentally sustainable manner
4. Economic Development: Economic development and natural resource-based businesses that promote employment opportunities for all income levels within the capacity of the State's natural resources, public services, and public facilities are encouraged.
5. Environmental Protection: Land and water resources, including the Chesapeake and coastal bays, are carefully managed to restore and maintain healthy air and water, natural systems, and living resources.
6. Resource Conservation: Waterways, forests, agricultural areas, open space, natural systems, and scenic areas are conversed.
7. Stewardship: Government, business entities, and residents are responsible for the creation of sustainable communities by collaborating to balance efficient growth with resource protection.
8. Implementation: Strategies, policies, programs, and funding for growth and development, resource conservation, infrastructure, and transportation are integrated across the local, regional, state, and interstate levels to achieve these Visions.

The Maryland Department of Planning (MDP) and the Forest Service Division of the Maryland Department of Natural Resources (MDNR) have set goals for protecting and conserving open space, greenways, and woodlands. These goals include:

1. Identifying, protecting and restoring sensitive areas and other lands and waterways that support important natural resources and ecological functions;
2. Focusing conservation and restoration activities within the statewide green infrastructure;
3. Developing a more comprehensive inventory of natural resource lands and environmentally sensitive areas to assist in implementation;

4. Assessing the combined ability of State and County programs to expand the network of contiguous green infrastructure, protect critical terrestrial and aquatic habitats, biological communities and populations, manage watersheds to protect and conserve natural areas and support a productive forestland base and forest resource industry;
5. Establishing measurable objectives for natural resource conservation and combined State and local strategies to achieve them;
6. Preserving the cultural and economic value of natural resource lands;
7. Encouraging private and public economic activities to support long-term conservation objectives;
8. Restoring, managing and protecting Maryland's trees, forests, and forested ecosystems to sustain our natural resources;
9. Connecting people to the land; and
10. Maintaining efficient and effective operations of forestry services to stakeholder groups through innovative technology, proactive policy communication / implementation, efficient use of resources, and professional development of personnel.

Anne Arundel County's 2009 General Development Plan (GDP) established several key goals for natural resource conservation and environmental stewardship. These goals and policies are consistent with the State's goals and include:

1. Achieve or exceed Federal and State mandated water quality standards in all watersheds in the County by maintaining a proactive watershed planning program that integrates land use planning and water resource protection; and maintaining a proactive environmental monitoring program that assesses the effectiveness of stormwater management practices and restoration actions to track progress toward meeting water quality standards.
2. Preserve and protect sensitive areas including streams and their buffers, floodplains, Natural Heritage Areas, steep slopes, tidal and nontidal wetlands, and unique watersheds through protection of stream buffers as a means of reducing stormwater runoff impacts and improving water quality in local tributaries; minimizing disturbance to floodplains, steep slopes, and wetlands; protection of the Jabez Branch and other unique watersheds from adverse impacts; and minimizing the allowance of modifications to the County's subdivision and development regulations where sensitive areas are impacted.
3. Preserve, protect and enhance the County's designated Green Infrastructure Network as well as forest cover by establishing an interconnected network of protected corridors of woodlands and open space in accordance with the goals of the Greenways Master Plan. Ensure maximum protection of the County's green infrastructure, nontidal wetlands, designated wildlife refuges and other natural resource areas, even in areas designated as mixed use, in town centers or in areas designated for growth.
4. Improve air quality by promoting and supporting Transportation Demand Management (TDM) Programs and techniques and transit-oriented development. Discourage incompatible land uses that have localized effects on pollution and promote public education on air pollution.
5. Reduce noise pollution by limiting future residential and other noise-sensitive land uses in areas exposed to high levels of noise. Employ innovative techniques to reduce noise impacts to acceptable standards.

6. Promote prudent use of mineral resources and responsible reclamation of mining sites and conserving mineral resources for future extraction.
7. Promote sustainable site and building design that will result in more environmentally-friendly buildings, conserve energy and water, improve air quality and reduce solid waste.

The 2009 GDP sought to continue the success of previous conservation efforts by seeking a more comprehensive approach to implementing existing preservation recommendations made in past GDPs, Small Area Plans, and various other land preservation plans. In addition to the framework laid out by comprehensive plans, the integration of key programs and tools such as the Forest Conservation program, the Critical Area Program, Subdivision, Zoning, and Floodplain ordinances, are also critical to natural resource conservation efforts. Enhanced coordination between comprehensive plans and existing programs will continue to meet the policy goals of the State Planning Act of 1992 of protecting and managing environmentally sensitive land areas.

In addition, the 16 Small Area Plans (SAPs) supported the 1997 GDP goals and recommendations by addressing sensitive areas and adopting compatible goals of protecting and preserving the environment. Recommendations of the SAPs continue to be implemented and include identifying and inventorying natural resources, creating land trusts to protect and preserve sensitive areas, promoting restoration activities, designating stream and habitat buffers, and developing regulations to protect sensitive species and unique watersheds from development. A status of these recommendations can be found in a separate background report located at www.aacounty.org/Plan2040.

Anne Arundel County has created several community outreach programs to involve citizens in helping preserve their own communities. In 2009, the Anne Arundel County Watershed Stewards Academy was created out of a partnership between Arlington Echo Outdoor Education Center and the Anne Arundel County Department of Public Works to build capacity within communities to reduce pollutants entering our waterways via stormwater runoff. In 2014, the Anne Arundel County Department of Public Works in partnership with the Chesapeake Bay Trust, created the Anne Arundel County Watershed Restoration Grant Program, a community grant program to support watershed restoration activities throughout the County in order to improve water quality in local streams and rivers.

Watersheds, Streams, and Buffers

The Chesapeake Bay is the largest estuary in the United States with a watershed area of over 64,000 square miles encompassing portions of New York, Delaware, Pennsylvania, Maryland, Virginia, West Virginia, and the District of Columbia. It is over 200 miles long and is fed by 48 major rivers and hundreds of smaller rivers and tributaries. The Chesapeake Bay provides an ideal habitat for a broad diversity of animal and plant species, and is an important economic and recreational resource for the more than 17 million people who live in the watershed (U. S. Environmental Protection Agency, 2004).

Anne Arundel County, on the western shore of the Chesapeake Bay, is bordered almost entirely by water. The Patapsco River serves as the County's northern border; to the west is the Patuxent River; and to the east is the Chesapeake Bay. As a result of being almost surrounded by tidal and non-tidal waterways, Anne Arundel County has over 533 miles of shoreline.

Twelve distinct watersheds and a small portion of the Lower Patuxent River Watershed make up the Anne Arundel County landform as shown in Figure 1. For watershed and planning purposes, the Lower Patuxent River Watershed is usually combined with the Middle Patuxent Watershed. Over 1,750 miles of nontidal streams flow from these watersheds into one of the County's rivers and, ultimately into the Chesapeake Bay. The miles of stream, and watershed areas, are depicted in Table 1. With the exception of the Patuxent and Little Patuxent Rivers, all of Anne Arundel County's waterways originate within the County's jurisdictional boundaries.

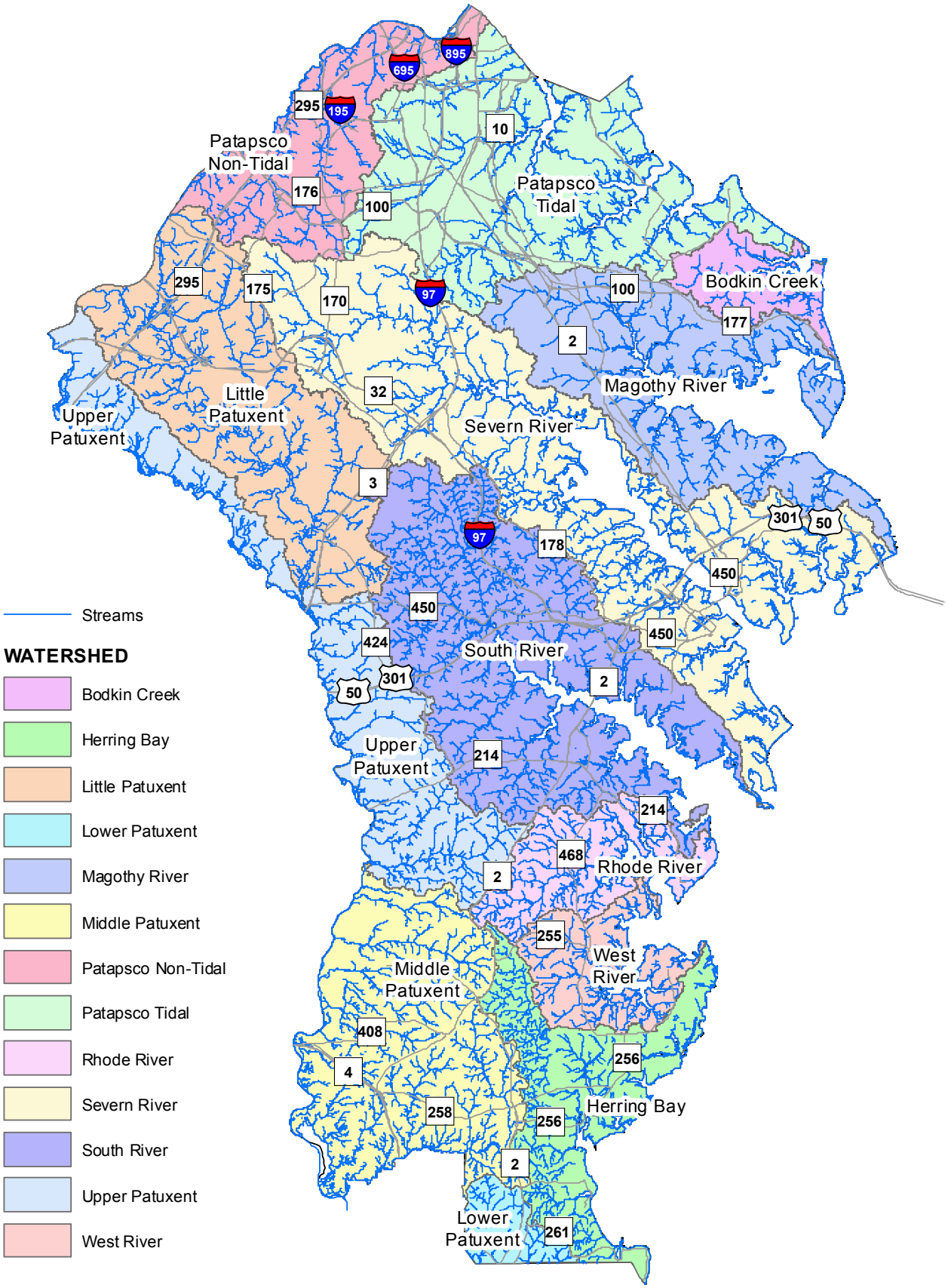
Table 1: Anne Arundel County Watersheds

County Watershed Name	Watershed Area (acres)	Estimated Stream Miles
Bodkin Creek Watershed	5,036	14
Herring Bay Watershed	14,662	108
Little Patuxent River Watershed	27,750	165
Magothy River Watershed	22,845	62
Middle Patuxent River Watershed	29,632	463
Patapsco Nontidal River Watershed	15,275	124
Patapsco Tidal River Watershed	30,841	95
Rhode River Watershed	8,764	65
Severn River Watershed	44,248	152
South River Watershed	36,167	207
Upper Patuxent River Watershed	22,551	304
West River Watershed	7,297	25
Totals:	265,067	1,784

To achieve the goals and polices of the 2009 General Development Plan, action statements were adopted and include completing watershed management plans for each of the County's twelve major watersheds, revising development regulations to require undisturbed buffers along upland streams, improving stormwater management practices to reduce stream erosion and sediment transport to tidal waterways, and enforcing floodplain regulations.

In 2010, the Environmental Protection Agency (EPA) established the Chesapeake Bay Total Maximum Daily Load (TMDL) for Nitrogen, Phosphorus and Sediment. The TMDL established maximum levels of nitrogen, phosphorus and sediment that could be discharged into the Chesapeake Bay and its tributaries. All of the twelve major waterbodies in Anne Arundel County are impaired by two or more substances (e.g., nutrients, sediments, fecal coliform bacteria, toxics, biological, or metals). As a result, all local governments in Maryland were required to develop Watershed Implementation Plans (WIPs) to achieve nitrogen, phosphorus and sediment load reductions by 2025. In response to this requirement, Anne Arundel County developed and submitted to the Maryland Department of the Environment its WIP in 2012. The County's WIP sets three primary strategies for achieving its required pollution reduction targets:

Figure 1: Watersheds and Streams



1. Upgrading, to the current limits of technology, the County's major wastewater treatment plants (WWTPs);
2. Converting roughly half (~20,000) of the County's septic systems to more effective, nutrient reducing wastewater treatment alternatives; and
3. Reducing pollution from urban stormwater. This third strategy dovetails completely with the County's obligations under its National Pollutant Discharge Elimination System (NPDES) MS4 permit, which requires the treatment of currently untreated impervious areas within the County.

In 2013, the Anne Arundel County Council passed legislation creating a Watershed Protection and Restoration Special Revenue Fund and Program. The Watershed Protection and Restoration Program (WPRP) develops and delivers technical environmental assessment, restoration planning and implementation information, and regulatory support to County agencies. This support enables these agencies to carry out their responsibilities for successfully managing delegated programs outlined in the County's NPDES MS4 Permit, the State's Critical Area Program, and the State Forest Conservation Act, as well as their responsibilities for land use decisions set forth in the County Code.

The County reports annually on progress made towards these goals through innovative and collaborative projects. By 2018, all twelve major watersheds will have their watershed analysis complete and ready for implementation. The Watershed Assessment and Planning program is continuously monitoring the state of TMDL development and water quality analyses to justify the delisting of waterbodies from the MDE 303(d) impairment list. For planning purposes at the watershed level, the County is applying the same percent load reduction required for urban stormwater at the County level to each of its watersheds. The County's WIP includes strategies and milestones associated with stream restoration, stormwater best management practice (BMP) retrofits, and other programmatic efforts.

Recognizing the challenge of funding stormwater load reductions, Maryland adopted legislation creating a mandate that the 10 largest NPDES MS4 jurisdictions develop dedicated and protected revenue streams to fund local stormwater remediation. Anne Arundel County convened a Stormwater Fee Implementation Committee comprised of County staff, community stakeholders, and local legislative representatives to address this mandate. The committee recommended a rate and structure that would allow the County to fully achieve both its near-term NPDES MS4 permit requirements as well as it longer range WIP goals.

Streams and stream buffers

Most of the 1,750 miles of non-tidal streams in the County are short, first- or second-order headwater streams that are slow moving with a very low gradient. To better understand the physical characteristics of these sensitive resources, it is helpful to understand the topography as well as the underlying geology of the County. Topographically, the County is characterized by rolling terrain with elevations ranging from 0 feet above sea level along the Chesapeake Bay to 300 feet above sea level in the northwest part of the County. Geologically, the majority of the County is underlain by a wedge of unconsolidated sediments (e.g., gravel, sands, silts, and clays). However, in the very northwestern portion of the County these sediments overlap the eastern Piedmont rock formation along an irregular line of contact known as the Fall Zone. Moving eastward, the rocky outcrops of the Piedmont quickly give way to the more dominant gravel, sands, silts, and clays characteristic of Maryland's Coastal Plain Physiographic Province (Maryland Geological Survey, 2007).

Within the County, stream channels generally have softer and more easily eroded bottoms comprised of the predominant sand, silt, and clays noted above. As the streams flow toward the Chesapeake Bay, they slow down and begin cutting more deeply into the landscape. Reflecting the surrounding topography and underlying geology, these streams are noted to have moderate to low slopes and somewhat steep valley walls (Maryland Department of Natural Resources, 2005).

Stream buffers are important in controlling nutrient and sediment runoff, maintaining stream temperatures, and providing aquatic and wildlife habitat. A stream buffer is an undisturbed strip of natural vegetation contiguous with and parallel to the bank of a stream that functions to provide bank stabilization, to moderate water temperature, provide a degree of sediment and pollutant removal, provide groundwater storage/recharge for a stream and provide wildlife habitat, open space, or both.

Stream buffer evaluation, conducted during the comprehensive watershed assessment and planning process, indicates that the majority of streams within the County's watersheds have vegetated buffers of at least 50 feet in width. In most instances, these buffers are vegetated with multistory canopy (i.e., trees and shrubs) providing wildlife habitat as well as stream bank stabilization and nonpoint source pollutant removal. Information on the width and condition of stream buffers throughout the rest of the County is compiled as part of the on-going watershed assessment and planning process.

Observations of stream buffer width reduction or total absences of stream buffers are most often found in association with developed lands. Additionally, the headwaters of many nontidal streams found in the older and more densely developed areas of the County have been enclosed in pipes or confined to man-made concrete-lined channels. More often than not, these stream systems have no vegetated buffer. Moreover, these headwater systems usually drain land development that occurred prior to stormwater management requirements. Stormwater runoff, and nonpoint source pollution, is rapidly carried away from the paved portions of the land through these man-made conveyances. The runoff is eventually discharged to a downstream waterway via a culvert outfall. The result of the uncontrolled runoff and discharge is manifested as a degraded natural stream channel characterized by steep-sided and slumping banks, scour pools near the outfall, a stream bed characterized by headcuts, trash strewn throughout the reach, and increased sediment deposition. A more detailed discussion on stormwater runoff and nonpoint source pollution and the effects they have on streams is included in the Background Report on Water Resources.

Many cities/jurisdictions across the United States are now looking at "daylighting" previously enclosed streams so they can begin to function as natural waterways. The benefits of daylighting are many and include reducing runoff velocities and preventing stream bank erosion; enhancing floodplain function and; improving water quality by exposing water to air, sunlight, vegetation, and soil, all of which reduce nonpoint source pollution; creating aquatic and riparian habitat for fish and wildlife; providing recreational amenities; and creating or linking urban greenways.

State Antidegradation Policy and Tier II Waters

Maryland's water quality standards consist of three components that, together, set goals to protect the State's water quality. The components are:

1. Designated Uses for each water body (e.g., recreational use, potable water supply);

2. Criteria that set minimum conditions to support the designated use (e.g., dissolved oxygen concentration not less than 5 mg/l at any time); and
3. Antidegradation Policy that recognizes three tiers of water quality and establishes a way to maintain high quality waters such that they are not allowed to degrade to meet only the minimum criteria for their designated use.

Nationally, the Antidegradation Policy was first recognized in the 1987 Clean Water Act Amendments. Subsequent to those amendments, Maryland Department of the Environment (MDE) adopted the Antidegradation Policy as part of the State's Water Quality Standards. Maryland's Antidegradation Policy was promulgated in COMAR 26.08.02.04.

The regulatory intent of Maryland's Antidegradation Policy is to protect the existing designated uses, and the water quality necessary to support those uses, by providing a means for assessing activities that may lower the quality of our State's high quality waters. For purposes of implementing this policy, waters of the State are categorized into one of three tiers based on their assessed water quality and biological conditions. Tier I waters are those that meet the minimum criteria to support their designated uses. Tier I waters are typically referred to as "fishable-swimmable". Tier II "high quality" waters are those water bodies where existing conditions are better than the minimum required for their designated use. Tier III refers to Outstanding National Resource Waters (ONRWs) - water bodies of exceptional quality, where the most stringent protection is both necessary and appropriate to protect and maintain the resource.

Anne Arundel County contains three Tier II stream segments, two located on Lyons Creek in the southern portion of the County and one along the Patuxent River. Maps of the Tier II stream segments can be found in Figure 2. The three stream segments are designated High Quality Tier II waters due to exceptional aquatic biological community conditions (fish and aquatic benthic macroinvertebrates) from within the stream. The first segment of Lyons Creek was listed as a Tier II waters in 2003; the second segment was listed in 2007; the segment of the Patuxent River was listed in 2009 (Table 2).

Table 2: Tier II Waters in Anne Arundel County

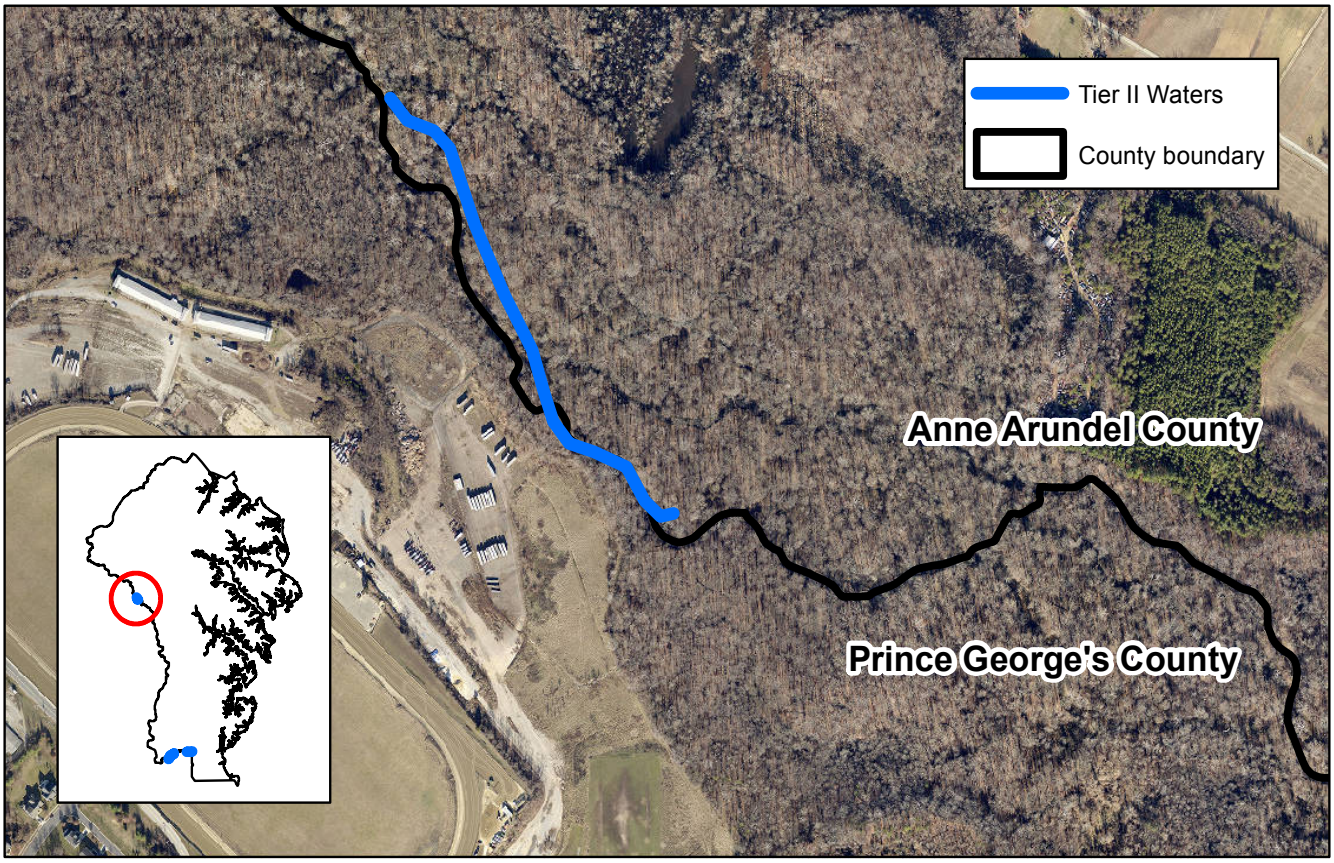
Date Listed	Stream Name	Watershed	Baseline	
			Fish IBI*	Benthic IBI*
2003	Lyons Creek 1	Patuxent	5.00	4.71
2007	Lyons Creek 2	Patuxent	4.67	5.00
2009	Patuxent River 1	Patuxent	4.00	4.71

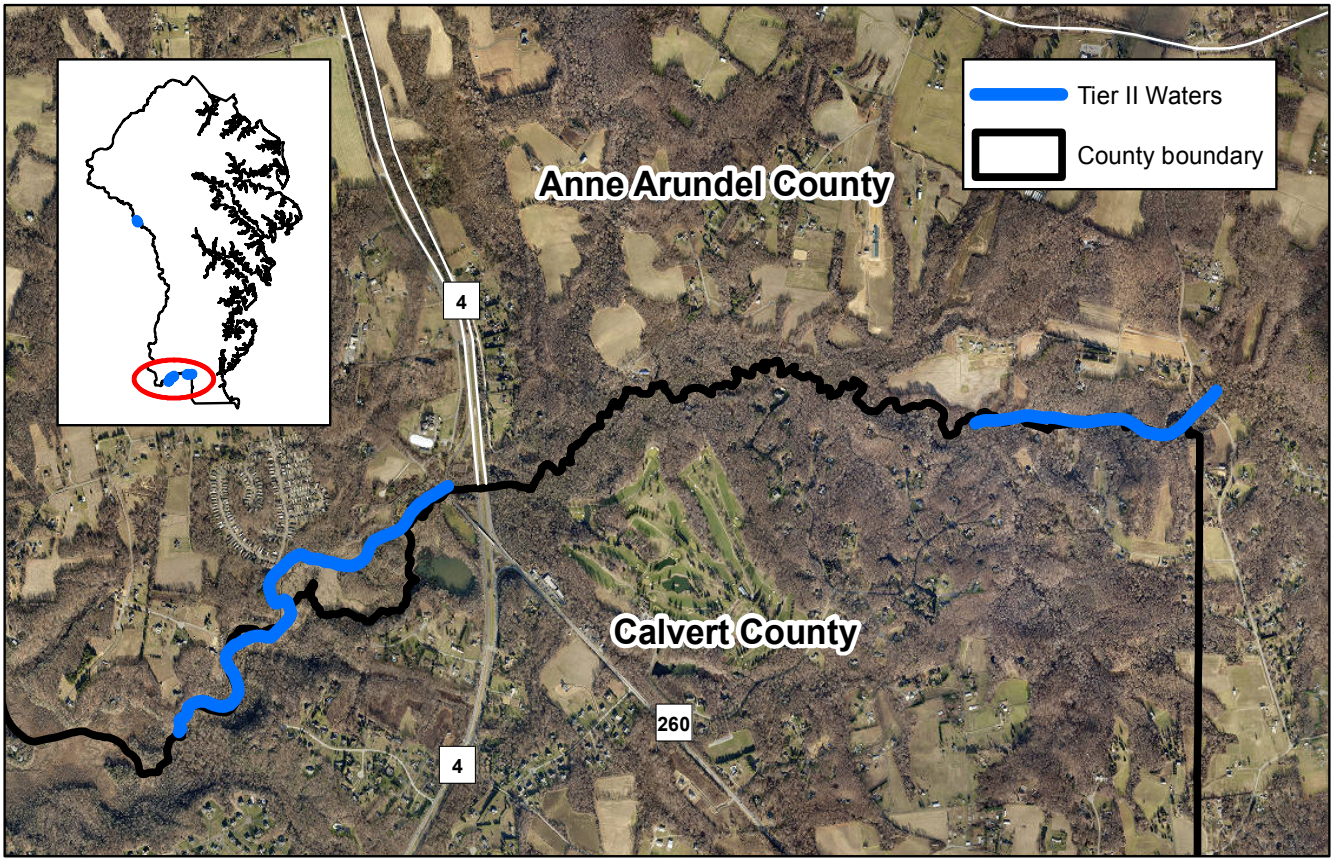
* IBI = Index of Biotic Integrity

A stream segment is eligible for Tier II classification based on water quality and biocriteria. When the water quality of a stream segment is better than that required by the water quality standards to support designated and existing uses, the stream segment is listed as a Tier II water. All readily available water quality and biocriteria information may be considered to determine a Tier II listing.

Tier II listings are made only for those specific characteristics for which monitoring data indicate the stream segment exceeds the numeric water quality criteria (e.g., high dissolved oxygen concentrations) or thresholds established under the narrative standards for biocriteria (e.g., high index of biotic integrity). MDE proposes stream segments to be designated Tier II waters during the triennial review of

Figure 2: Tier II Waters





State water quality standards. This regulatory process occurs every three years, as required by the Federal Clean Water Act, and incorporates active public involvement. At the end of the review period, proposed Tier II waters are adopted via the promulgation of new State water quality standards.

New or proposed amendments to water and sewer plans, new or proposed changes to NPDES Permits, and Nontidal Wetlands and Waterways Permits and Authorizations will trigger an anti-degradation review to assure consistency with antidegradation requirements. Specifically, COMAR 26.08.02.04-1B states that "An applicant for proposed amendments to County plans or discharge permits for discharge to Tier II waters that will result in a new, or an increased, annual discharge of pollutants and a potential impact to water quality, shall evaluate alternatives to eliminate or reduce discharges or impacts. If impacts are unavoidable, an applicant shall prepare and document a social and economic justification. MDE shall determine, through a public process, whether these discharges can be justified." It should be noted that a Tier II Antidegradation Review does not apply to individual discharges of treated sanitary wastewater of less than 5000 gallons per day, if all of the existing and current designated uses continue to be met.

Ultimately, the existing Tier II instream designated water uses, and the level of water quality necessary to protect those uses, must be maintained and protected. MDE may deny any proposed discharge or plan amendment if the existing uses will not be maintained and protected.

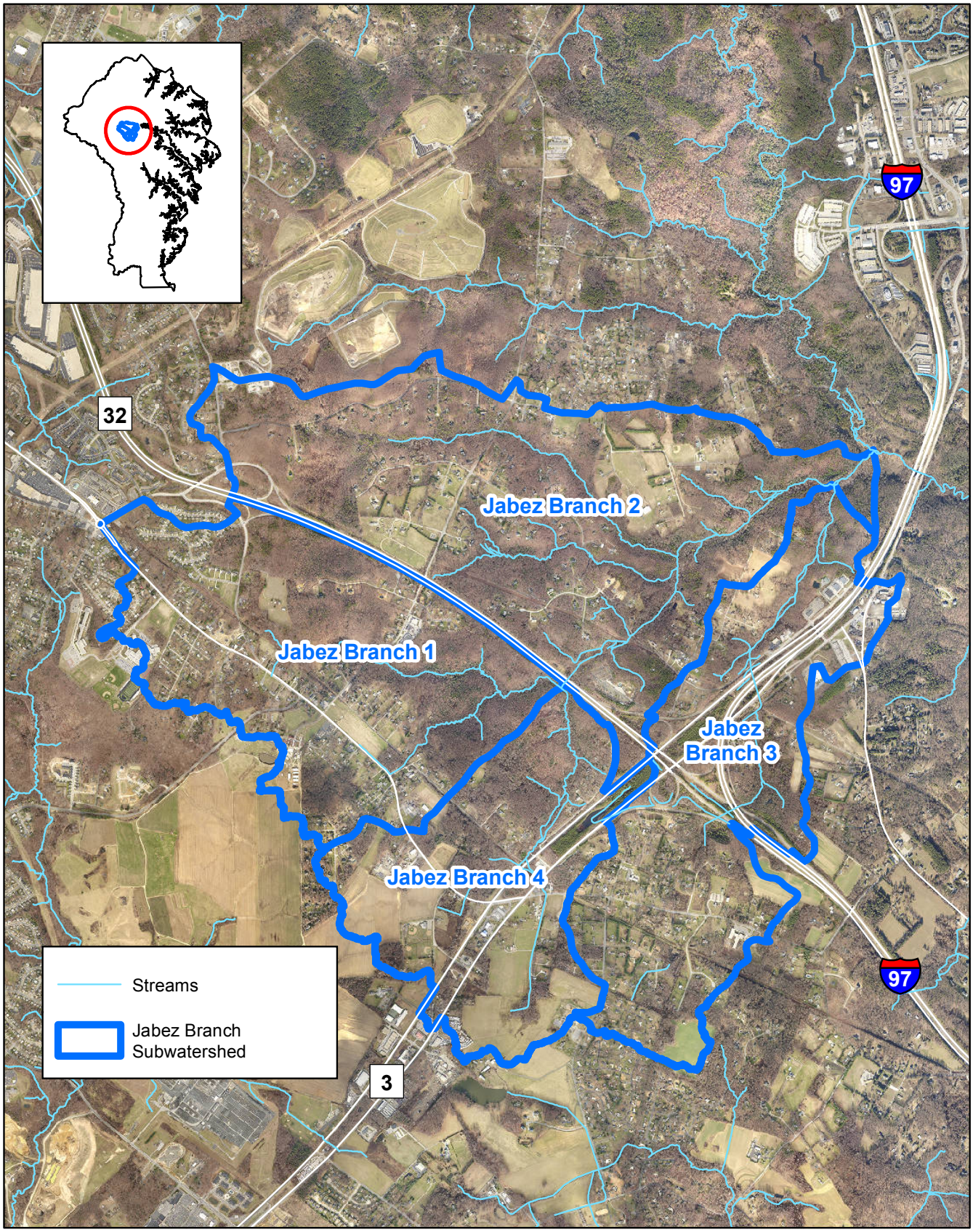
Jabez Branch

Jabez Branch, a tributary to the Severn River (Figure 3), is unique among streams in Anne Arundel County in that it supports a naturally reproducing population of brook trout (Salvelinus fontinalis), the only population known to exist in the Coastal Plain physiographic region of Maryland. Because of the presence of this coldwater fishery, Jabez Branch is a Designated Use III water (a designation specific to use as a naturally reproducing trout stream) by the Maryland Department of the Environment (MDE), the only such designation by MDE in the Coastal Plain region.

First identified in this subwatershed by the Maryland Department of Natural Resources (MDNR) in 1977, it was originally believed that this species was only present in the reaches upstream of MD Route 32, hereafter referred to the Left and Right Forks. However, subsequent surveys in the 1980s show them occurring sporadically throughout the watershed to its confluence with Severn Run.

During 1987, a severe basin-wide decline was observed in the population. Research work done by the MDNR associated this decline with stormwater discharges linked to a retention basin installed as part of stormwater management activities implemented during construction of Interstate 97. The basin was unshaded and was designed to have standing water remain within it for an extended time period to enhance pollution removal functions of the facility. However, by allowing the runoff to remain for an extended period of time as a permanent pool, it was excessively warmed by the sun. When this runoff left the facility, it caused temperatures within Jabez Branch to rise beyond the maximum temperature tolerated by this species (~68 degrees, Fahrenheit). The State Highways Administration corrected the discharge from this facility in the spring of 1988. However, the continued input of heated stormwater from other sources resulted in continued decline and eventual extirpation of the species from Jabez Branch by the end of 1990 (Yetman, 1991).

Figure 3: Jabez Branch Subwatershed



In mid-1991, MDNR biologists began stocking wild brook trout in Jabez Branch in an effort to restore this fish back to the system. These efforts were maintained from 1991 to 1994, when a total of 328 adult fish from watersheds in Frederick and Baltimore Counties were released in the Jabez Branch. This program was discontinued in 1995 when MDNR biologists observed fry, indicative of successful reproduction. MDNR regularly conducts fish monitoring in Jabez Branch. The most recent monitoring effort in Jabez Branch by MDNR was completed in 2016 and confirmed the presence of a reproducing brook trout population.

To protect this critical and rare resource, Victoria (2007) suggests that attention should focus on maintaining or achieving five conditions, including:

1. A stable, coldwater stream flow regime;
2. Minimizing or eliminating all fine sediment inputs;
3. Maintaining a diverse mix of instream habitat conditions like woody debris jams, and undercut banks. An approximate 1:1 ratio in the distribution of riffles and pools provides the best mix of bed features for this species;
4. Keeping watershed wide effective impervious surface levels at current levels or reduce these levels where feasible; and
5. Protecting the large buffer areas, which generally vary from 100 to greater than 300 feet, around all stream channels in this portion of the Jabez Branch.

Protection of the Jabez Branch subwatershed is a priority environmental goal, and to this end the 2003 Odenton Small Area Plan recommended that the County establish an environmental overlay zone for the subwatershed. To realize this goal, and to achieve the above listed conditions and ensure continuation after realization, the County began working with the Severn River Commission to develop requirements for an environmental overlay zone specific to this subwatershed.

In general, an environmental overlay zone applies additional restrictions, beyond those associated with the various zoning categories applicable to lands within the designated zone, to protect rare, unique, or otherwise important natural resources found within the County. The restrictions associated with the overlay zone apply only to those lands within it.

For Jabez Branch, the overlay zone would serve to minimize the impacts from stormwater runoff and sediment loading to the stream, maintain or reduce existing impervious surfaces levels, maintain adequate stream flow and temperature to protect the coldwater temperature and flow regime, and establish and maintain wider forested riparian buffers than currently required under County stormwater management regulations to protect the overall ecosystem quality.

The final language of the overlay zone has not yet been determined. County staff and a subcommittee of the Severn River Commission have worked on finalizing the desired requirements of the overlay zone and will continue to work with the Office of Planning and Zoning to develop appropriate regulatory language. If adopted, regulations would then be incorporated into the County's Zoning Ordinance.

100-year Floodplain

The 100-year floodplain is the land area adjoining a river or stream that has a 1% or greater probability of flooding in any given year. In general, a floodplain is a relatively flat or low land that is subject to partial or complete inundation from floodwater. Historically, 100-year floodplain protection requirements were used to guard against injury to people and to prevent destruction of property. In the context of sensitive areas protection, relatively undisturbed floodplains also serve a variety of environmental functions.

A floodplain is an integral part of the stream system. It provides storage capacity for high flows, helps reduce the erosive power of the stream during a flood, reduces the discharge of sediment during high flow periods and helps floodwaters to move downstream. Floodplains also offer opportunities for wildlife habitat that can increase the biotic diversity of a stream. Floodplains provide water quality benefits as well. It is vital that the 100-year floodplain be kept in its natural state to protect public safety and the quality of streams and their habitats.

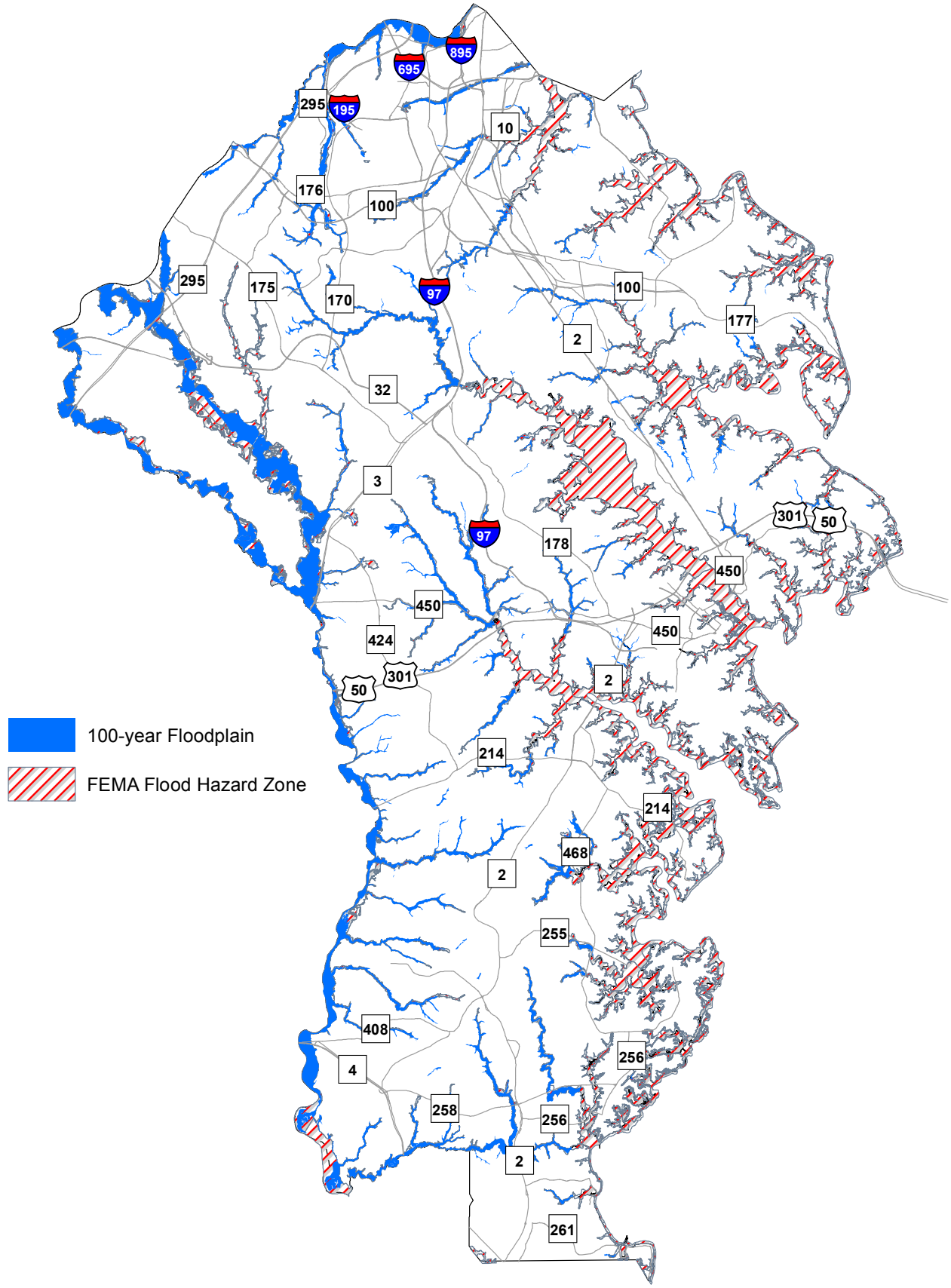
Anne Arundel County is prone to three types of flooding: nontidal flooding from rivers and streams; tidal flooding from storm surges and tides; and coastal flooding caused by intense winds and heavy rains from tropical storms, hurricanes and steady on-shore winds and elevated tide levels.

Floodplains in the County are protected through the Floodplain Ordinance (Article 16), the Subdivision and Development Ordinance (Article 17) and the Zoning Ordinance (Article 18). See Figure 4 for a delineation of floodplains within the County. The Floodplain Ordinance defines the floodplain districts, requires delineation of the floodplain on development plans submitted to the County, requires structures to be elevated above the 100-year flood level and safe vehicle access to and egress from a development is provided. The Subdivision Ordinance requires subdivisions with floodplain areas that are not deeded to the County as open space to provide an easement for access to and maintenance of the floodplain. Most of the floodplain area in the County is zoned Open Space, which allows protection of the floodplain in its natural state. Additionally, the stream buffer requirements associated with stormwater management for new development also serve as a means of floodplain protection.

The Federal Emergency Management Agency (FEMA) is the Federal agency responsible for floodplain management. The floodplains are studied and delineated on official maps. Currently, FEMA is working in partnership with the Maryland Department of the Environment (MDE) to update floodplain studies and associated mapping for 17 Maryland counties. This effort, known as the Map Modernization Program, began in 2004 as a cooperative technical partnership between these State and Federal agencies. The update of the floodplain maps for Anne Arundel County was completed in 2015.

The average age of the Flood Insurance Rate Maps (FIRMs) in Maryland was 18 years, and most of the floodplain studies were conducted in the late 1970s to mid-1980s. Given the changes in land uses since that time, many of the maps no longer depict current conditions from which the flood heights were determined. Additionally, the flood maps were paper maps. The goal of this modernization project is to produce DFIRMs (Digital Flood Insurance Rate Maps), or completely digital products that will allow different geographic information system layers to be overlain.

Figure 4: Floodplains and FEMA Flood Hazard Zones



Through the Map Modernization Program, FEMA will prepare the Flood Insurance Study (FIS) report and map in a Countywide format, which means that flood hazard information for all jurisdictions of Anne Arundel County will be included in one FIS report and one set of DFIRMs. FEMA will include all essential information from FIRMs, Flood Boundary and Floodway Maps, or Flood Hazard Boundary Maps currently in effect. In addition to preparing the FIRM and FIS, a new photographic base map will be provided.

FEMA is preparing the new maps using a process that involves capturing data in a digital format and then plotting map panels using computer technology. Light Detecting and Ranging (LiDAR) technology that supports 2-foot contour mapping is being used for accurate coastal flood zone mapping. LiDAR also allows for more accurate hydrologic modeling and the use of automated hydrology and hydraulic techniques for the riverine floodplain analysis critical to the new floodplain studies. Overall, this technology will generate 100-year flood elevations, and better floodplain lines, to meet FEMAs and the County's needs.

The ultimate objective of the FEMA map modernization project is to more accurately estimate the flooding risk to all County property. For the citizens of the County, this means not only a better estimation of flooding risk for their property, but a more accurate determination of the need for flood insurance from the National Flood Insurance Program (NFIP).

Wetlands

Wetlands, as defined by the Maryland Department of the Environment (MDE), are areas that hold water for significant periods during the year and are characterized by anaerobic (low oxygen) conditions favoring the growth of specific plant species and the formation of specific soil types. The United States Environmental Protection Agency (USEPA) defines wetlands as "...where water covers soil all or part of the time".

For resource management purposes, the U.S. Fish and Wildlife Service developed a scientifically based definition of wetlands that helped ensure accurate and consistent wetland determinations. This definition emphasizes three key attributes of wetlands: 1) hydrology – the degree of flooding or soil saturation, 2) wetland vegetation (hydrophytes), and 3) hydric soils. This further defines wetlands as all areas having enough water at some time during the year to stress plants and animals not adapted for life in water or saturated soils.

Wetlands are important natural resources providing numerous values to society, including fish and wildlife habitat, flood protection, erosion control and water quality protection and improvement. Wetlands comprise a range of environments within interior and coastal regions of Maryland and include both tidal and nontidal wetlands.

Nontidal Wetlands

The State of Maryland defines Nontidal Wetlands as areas meeting the following conditions:

"(a) ...an area that is inundated or saturated by surface water or ground water at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions, commonly known as hydrophytic vegetation; (b)

is determined according to the Federal Manual; (c) does not include tidal wetlands regulated under Natural Resources Article, Title 9, Annotated Code of Maryland.". The Nontidal Wetlands Protection Act provides mitigation requirements "when losses of nontidal wetlands are authorized in a Nontidal Wetlands and Waterways Permit or approved in a Soil Conservation and Water Quality Plan". Nontidal wetlands are further protected though The Federal Clean Water Act, Section 404 which regulates discharge of dredged material or fill material into wetlands.

On the Western Shore of Maryland's Coastal Plain, nontidal wetlands have more varied topography and are generally easier to delineate in comparison to wetlands on the Eastern Shore. These wetlands are often located near streams, although the prevalence of long-term overbank flooding is rare in these areas. Most Western Shore wetlands are supported by a localized, perched water table rather than by shallow groundwater.

Within Anne Arundel County, over half of all wetlands are considered upland or non-tidal wetlands (Figure 5). These are areas where water is the primary factor controlling the hydrology and associated plant life. There are many types of non-tidal wetlands such as forested wetlands, scrub-shrub wetlands, and wet meadows. Non-tidal wetlands provide many of the same environmental functions as tidal wetlands, including providing habitat for fish and wildlife, maintaining water quality and flood control, reducing nutrients from runoff, and recharging groundwater.

The County protects these areas through enforcement of the Chesapeake Bay Critical Area Program, the sensitive areas criteria of the County Grading Ordinance (Article 16 Title 2), and the County Subdivision Ordinance by requiring a 25-foot buffer around nontidal wetlands except in the Parole Growth Management Area, where it is set between 25-75 feet depending on quality and function of the wetland (Article 17 Title 6, Subtitle 4 and Title 7, Subtitle 9). In addition, Article 18, Title 11 of the County Code requires a 50-foot buffer to nontidal wetlands for sand, gravel and clay extraction. All permits that impact wetlands are required to obtain approval from the U.S. Army Corps of Engineers and MDE. See COMAR Title 26, Subtitle 23 Nontidal Wetlands and Subtitle 24 Tidal Wetlands for State regulations pertaining to wetlands.

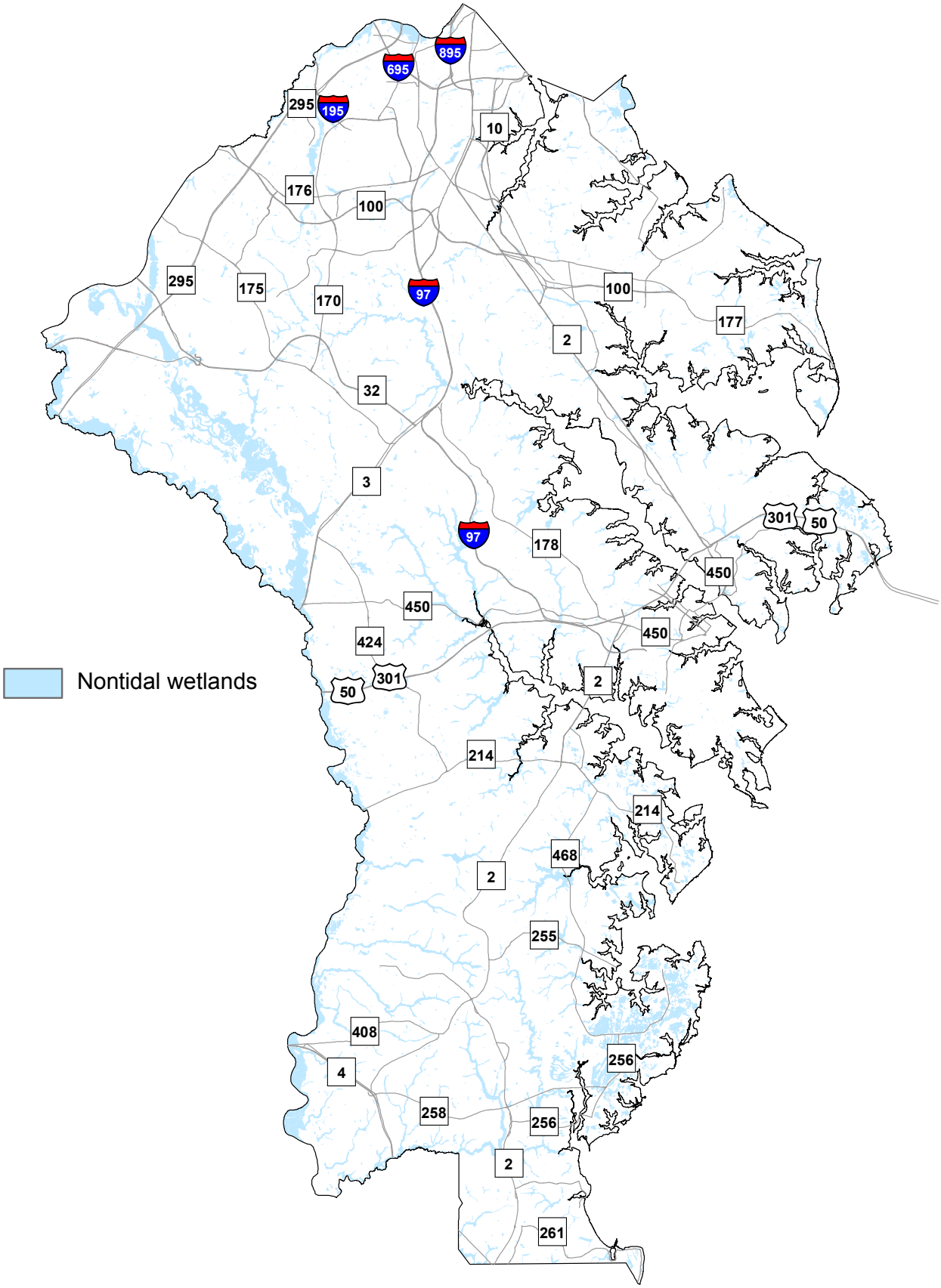
Tidal Wetlands

The State of Maryland defines "Tidal Wetlands" as follows: "all State and private tidal wetlands, marshes, submerged aquatic vegetation, lands, and open water affected by the daily and periodic rise and fall of the tide within the Chesapeake Bay and its tributaries, the coastal bays adjacent to Maryland's coastal barrier islands, and the Atlantic Ocean to a distance of 3 miles offshore of the low water mark."

Anne Arundel County is fortunate to have approximately 533 miles of tidal shoreline and large areas of tidal wetlands. Tidal wetlands have long been recognized as an important component in the health of the Chesapeake Bay. They provide numerous environmental benefits such as filtering sediment and nutrients from upland runoff, controlling flooding and shoreline erosion, providing nurseries for shellfish and finfish, absorbing nutrients from the water column, and providing valuable habitat for many aquatic and terrestrial species of flora and fauna.

Tidal wetlands are critically important to commercial and recreational fisheries. Many of the Chesapeake Bay's commercial fin and shellfish spend a crucial part of their early life cycle in tidal wetlands, and use these areas as refuge from predators.

Figure 5: Nontidal Wetlands



The County protects tidal wetlands through implementation and enforcement of the Critical Area Program, discussed later in this report. Through the permitting process, any proposed impacts to tidal wetlands are assessed to determine compliance with Critical Area requirements, including the requirement for a 100-foot buffer to tidal wetlands. Additionally, the County coordinates with the U.S. Army Corps of Engineers and MDE to prevent adverse impacts to tidal wetlands from development projects and shoreline stabilization projects.

Bogs

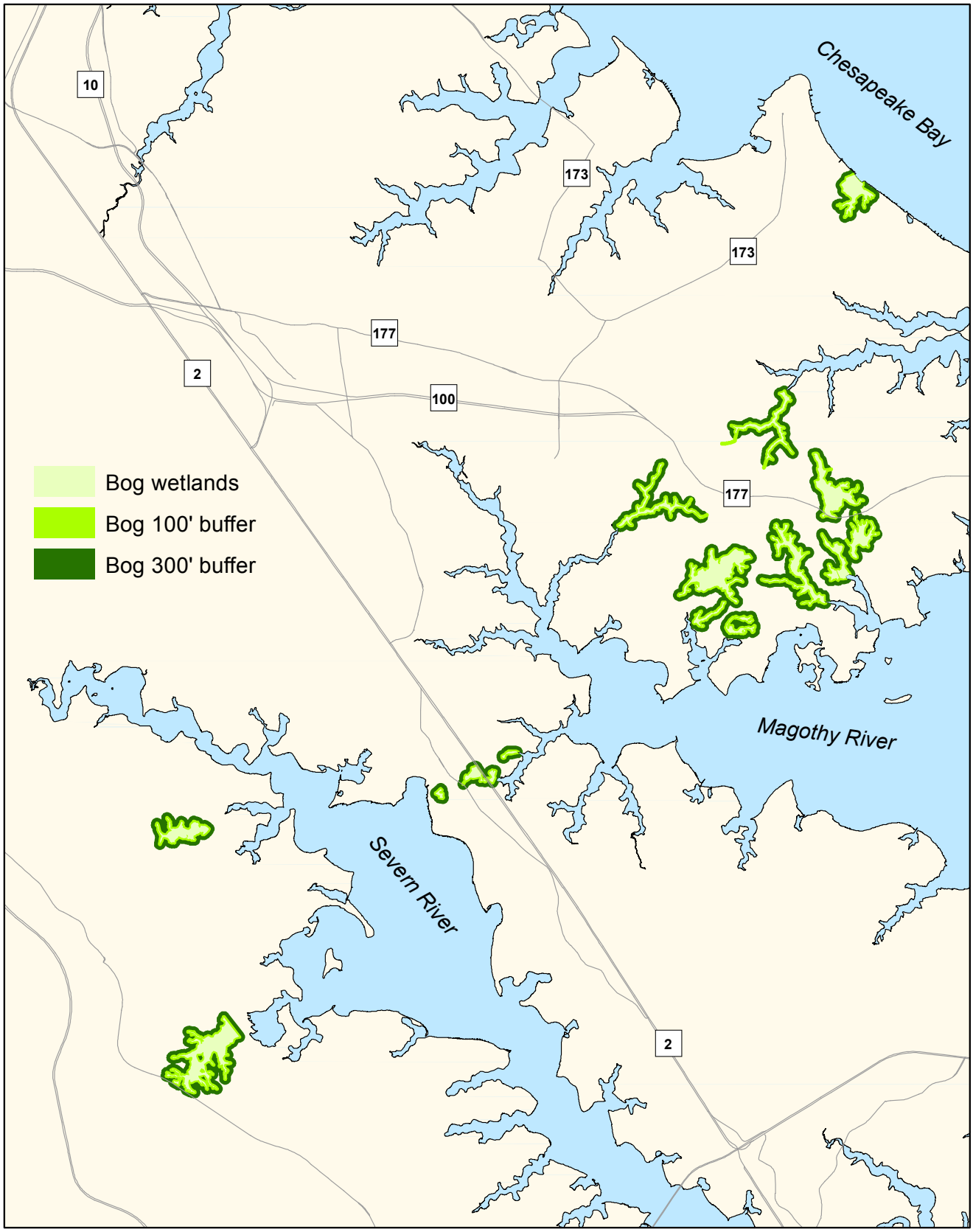
According to MDE, Nontidal Wetlands of Special State Concern are the best example of Maryland's nontidal wetland habitats and are designated for special protection under the State's nontidal wetland regulations. These 889 wetland sites have exceptional ecological and educational value and offer landowners opportunities to observe and safeguard the beauty and natural diversity of Maryland's best remaining wetlands. Many of these special wetlands contain populations of rare and endangered native plants and animals. Other nontidal wetlands of Special State concern represent examples of unique wetland types and collective habitats for species that thrive in specialized environments.

Examples of these special types of wetlands are bogs, Delmarva bays, and coniferous swamp forests. Bogs are highly acidic wetlands that lack the nutrients most common plants require to survive, therefore, they provide habitat for specific communities of plants and animals. COMAR defines a bog as "a nontidal wetland characterized by organic soils, accumulated peat, and soils saturated to the surface through the year with minimal fluctuation in water level". Rare plants such as cranberries, Leatherleaf shrubs, sundew, and carnivorous pitcher plants grow on a mat of sphagnum moss, sedges, and peat. The Delmarva bays are depressions on the Eastern Shore that fill with water in the winter and spring, and dry in the late summer and fall. Because these environments are self-contained, they support many rare and unique species. Coniferous swamp forests are uncommon to Maryland and found in areas such as Garrett County.

Anne Arundel County has several bogs within the Magothy River Watershed, the Severn River Watershed and along the Tidal Patapsco River. Within the Magothy River Watershed, along the north shore of the river, these bogs include: South Gray's Creek Bog, North Gray's Creek Bog Complex, Fresh Pond Bog, Main Creek Bog, Eagle Hill Bog, Shady Pond Bog, Blackhole Creek Bog and Cockey's Creek Bog. Along the south shore of the Magothy River watershed are the Dill Road Bog, Cypress Creek Bog and the Cypress Creek Atlantic White Cedar Forest. Bogs within the Severn River Watershed include the Deep Ditch Bog, Gumbottom Bog and Sullivan's Cove Atlantic White Cedar Forest. Along the Tidal Patapsco River, between Main Creek and Rock Creek is the Hines Pond Bog.

Anne Arundel County recognizes these unique systems as being worthy of preservation and protection. Article 18, Title 14 of the County Code sets forth the protective requirements via a Bog Overlay Zone. The bog protection area is divided into the following classifications: bog, contributing streams, 100-foot upland buffer, limited activity area, and contributing drainage area. Additionally, Article 17 Title 9 of the County Code prohibits disturbance of any kind within a bog and the contributing streams. It further stipulates development requirements within the 100-foot upland buffer and the contributing drainage areas. Bog protection areas are shown in Figure 6.

Figure 6: Bog Wetlands



Steep Slopes

Slopes provide an environment for movement of soil and pollutants during land disturbance. Soils have varying degrees of erodibility and all soils are subject to some degree of movement. Control of this movement, or erosion potential, is often achieved by focusing environmental regulations on those areas where the slope of the land is sufficiently steep to make soil movement a problem. These are considered "steep slopes".

The preservation of steep slopes adjacent to streams, wetlands, and tidal waters is particularly important because of the potential harm to water quality and aquatic habitat that would result from soil erosion. In addition to the loss of water quality and habitat, disturbance of steep slopes can lead to landslides, flooding, and other hazards.

Steep slopes are defined in the County Code (Article 17-1-101(83)) as those that have a 25% or greater slope and that have an onsite and offsite contiguous area that is greater than 5,000 square feet over 10 feet vertical as measured before development. In the Critical Area and designated sensitive areas, steep slopes are defined as those that having a 15% or greater slope that is over six feet vertically as measured before development.

Most of the steep slopes occur along the rivers and streams (See Figure 7). A nearly continuous stretch occurs between the headwaters of the Severn River to the County's southern boundary near Herring Bay. The most severe slopes are along the Severn and South rivers.

Anne Arundel County protects erosion of steep slopes through the Subdivision Ordinance. Development in the County may not occur within steep slopes or within 25 feet of the top of the steep slopes where the onsite and offsite contiguous area of the steep slopes is greater than 20,000 square feet unless development will facilitate stabilization of the slope or the disturbance is necessary to allow connection to a public utility. In the RCA and LDA overlay zones of the Chesapeake Bay Critical Area, development may not occur within slopes of 15% or greater unless development will facilitate stabilization of the slope or the disturbance is necessary to allow connection to a public utility. In addition, steep slopes are considered a primary environmental feature within the Stormwater Practices and Procedures Manual. They must be documented as part of the development process.

Habitats of Rare, Threatened, and Endangered Species

The Endangered Species Act of 1973 was signed into law by Congress to encourage and establish state programs aimed at preserving rare, threatened, and endangered (RTE) plant and animal species throughout the country. This legislation effectively authorized states to protect and enhance sensitive ecosystems, which sensitive species rely upon for survival.

In 1979, the State of Maryland established the Natural Heritage Areas Program (See Figure 8). Per Section 08.03.08.10 of the Code of Maryland Regulations, the listing criteria to qualify as a Natural Heritage Area is: (1) Contain one or more threatened or endangered species or wildlife species in need of conservation; (2) Be a unique blend of geological, hydrological, climatological, or biological features; and (3) Be considered to be among the best Statewide examples of its kind. Administered by the Maryland Department of Natural Resources (MDNR), this program is responsible for identifying, ranking, protecting and managing RTE species throughout the State. In order to accomplish this,

Figure 7: Steep Slopes

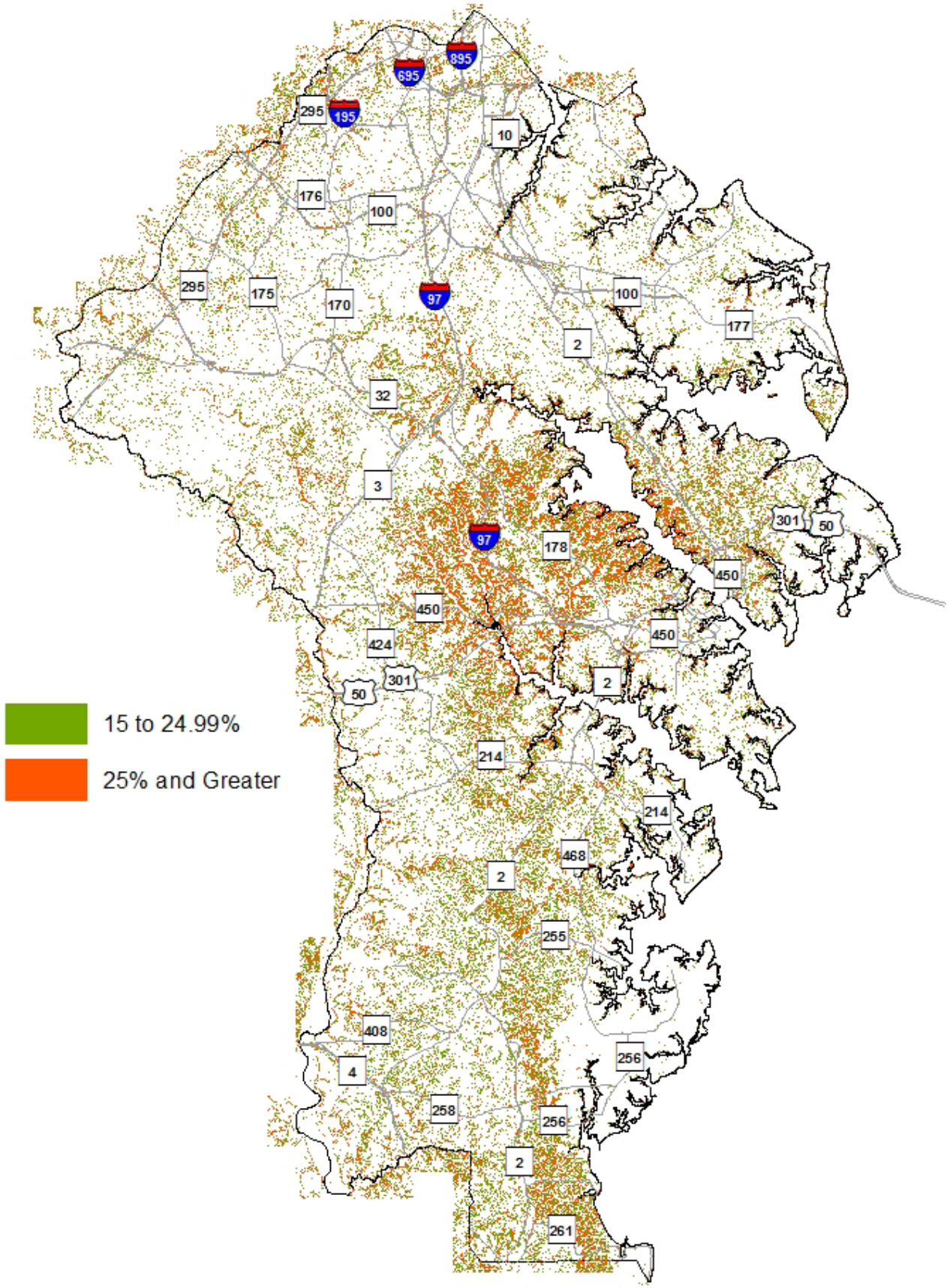
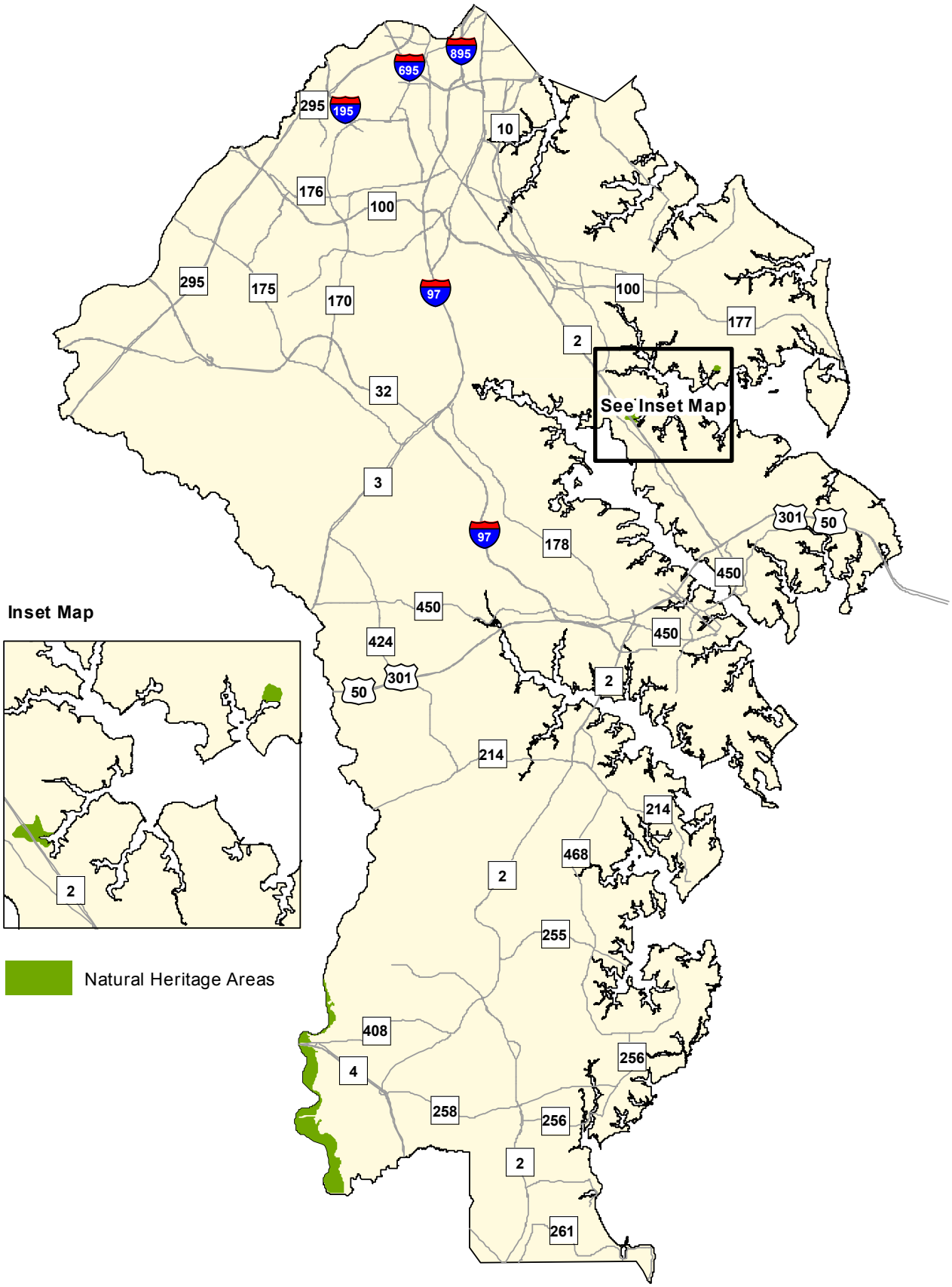


Figure 8: Natural Heritage Areas



MDNR restores degraded habitats, conducts field surveys, performs research, and continues public outreach and education efforts. Currently, there are three distinct areas designated as Natural Heritage Areas within Anne Arundel County. These areas (Cypress Creek Swamp, Eagle Hill Bog, and the Upper Patuxent Marshes) encompass approximately 2,646 square acres of protected lands. Each of these areas contains one or more RTE species classified by MDNR.

The Natural Heritage Areas Program has established review areas through the State. Whenever there are proposed development projects within these review areas, MDNR will review the proposal and work with landowners to ensure that they do not negatively affect sensitive plant and animal species within them. In select circumstances, the Natural Heritage Areas Program will cooperate with local non-profit organizations to acquire land that encompasses RTE species. The Natural Heritage Areas Program will also manage and maintain community projects through restoration and invasive species management. Currently, MDNR has identified 40 animal species and 132 plant species classified as endangered, threatened, or in need of conservation in Anne Arundel County. In 2016, MDNR developed a Pollinator Habitat Plan that sets forth the Maryland Forest Service and Wildlife Management Area System's goals of protecting Maryland's natural resources, including RTE habitats.

The 1992 Maryland Economic Growth, Resource Protection and Planning Act mandates that local jurisdictions address specific sensitive areas when producing and/or updating their General Development Plans. Protecting rare, threatened, and endangered species is one of the topical areas requiring protection under the 1992 Planning Act, and is critical to preserving the diverse ecosystem within Anne Arundel County. MDNR is the primary agency responsible for establishing criteria for the protection and preservation of RTE plant and animal species. The County defers to the recommendation of the state and federal agencies in establishing the appropriate buffers to these habitats. Additional protection of RTE species is provided through the County's Critical Area Program.

Land Conservation

Land conservation is an important component of natural resource protection. Natural areas such as forests, greenways, and open spaces provide many valuable environmental benefits such as flood control, soil erosion control, filtration and absorption of pollutants, and wildlife habitat. They can also help to absorb greenhouse gases, and their cooling effect can reduce energy costs. Currently, County-owned natural resource lands total about 10,410 acres and approximately 14,560 acres of natural resource lands are owned by either the State of Maryland or the Federal government. The largest holding is the 8,850-acre Patuxent National Wildlife Refuge. Thousands of additional acres are protected through land trusts and private, individual ownership.

The following legislation, programs and plans help facilitate the protection of County's natural resources:

Program Open Space – designed to acquire outdoor recreation and open space areas for public use, administers funds made available to local communities for open and recreational space through the State real estate transfer tax and from the Land and Water Conservation Fund of the National Park Service.

Rural Legacy Program – created within MDNR to protect natural, cultural, agricultural, forest and environmental resources from urban sprawl development and promote land conservation statewide by

helping local governments and land trusts conserve land through easement and fee purchases within designated rural legacy areas.

Patuxent River Policy Plan – is a land management strategy to protect the Patuxent River and its watershed. The Plan includes 20 goals that provide a broad vision to restore and maintain water quality, habitat, groundwater and surface water supplies, and a high quality of life along the Patuxent River and its tributaries.

Maryland Environmental Trust – comprised of four main programs that promote conservation of open space: Conservation Easements, Keep Maryland Beautiful, Local Land Trust Assistance, and Rural Historic Village Protection.

Forest Legacy Program –designed to identify and protect environmentally important forestlands through the use of perpetual conservation easements between willing sellers and willing buyers.

Forest Conservation Act of 1991 – mandated that local governments adopt legislation to create a forest conservation program that met specific State requirements. The purpose of the Act is to minimize the loss of Maryland's forest resources during land development by making the identification and protection of forests and other sensitive areas an integral part of the development process. Areas that are a priority for conserving are those adjacent to streams or wetlands, those on steep slopes or erodible soils or those within or adjacent to large contiguous blocks of forest or wildlife corridors. Although MDNR Forest Service administers the FCA, it is implemented on a local level.

Forest Land Incentive Program – encourages long-term sustainability of non-industrial private forestlands by providing financial, technical, and educational assistance via State Forest Service Agencies to assist private landowners in actively managing their land.

Greenprint – a program designed to protect lands critical to long-term ecological health. These lands, referred to as Maryland's green infrastructure, provide the natural foundation needed to support a diverse plant and animal population, and enable valuable natural processes like filtering water and cleaning the air, to take place. The program is expected to boost the State's land conservation capacity by about 10,000 acres per year for the next five years. The funding allocated through this program expands the pool of money available for state land acquisitions. GreenPrint is targeted to protecting the most valuable remaining ecological lands in Maryland.

Sustainable Forestry Act of 2009 - was a landmark legislation that expressed the importance of Maryland's forest to the environmental and economic well-being of the State. One section of the Act replaced the Forest Advisory Commission with the Sustainable Forestry Council. The Sustainable Forestry Council utilized the findings of these previous efforts and new information to advise MDNR on timely forest conservation issues and appropriate actions to help Maryland implement a no net loss of forest policy. The recommended actions build on existing programs and regulations including the recent development of Watershed Implementation Plans to meet the Total Maximum Daily Load requirements for the Chesapeake Bay, the Forest Conservation Act, and local planning and zoning requirements.

The Sustainable Forestry Act of 2009 created a Governor-appointed Sustainable Forestry Council which aimed to advise MDNR on all matters related to:

1. Sustainable forestry management in the state,
2. The expenditure of funds from the Woodland Incentive Fund,
3. Existing regulatory and statutory policies that are perceived as economic barriers to a viable forest products industry,
4. New markets to enhance forest health, including renewable energy development through biomass energy, to offset fossil fuel consumption and reduce greenhouse gas emissions,
5. Creative strategies to help privately owned forest lands better compete with real estate market values that are driving forest conversion and fragmentation,
6. The means to promote forest-based economies and processing capability that contribute to economic and employment growth, and
7. Assigning a nutrient benefit to forest stewardship plans and other forest conservation management plans that can be measurably tracked and reported by the number of forested acres covered by the plans.

Chesapeake Bay Critical Area - As early as the 1960s, there was a growing awareness that the water quality, habitat condition, and overall health of the Chesapeake Bay were declining. A 1983 EPA study, titled Chesapeake Bay: A Framework for Action, concluded that a comprehensive and long-term strategy for addressing the Bay's decline was needed.

In 1984, the Maryland General Assembly passed the Critical Area Act in response to concerns about the decline in quality and productivity of the Chesapeake Bay. Through this action, the General Assembly enacted a comprehensive resource protection program for the Chesapeake Bay and its tributaries. As originally envisioned, the Act would serve to promote more sensitive land development and minimize water quality and habitat degradation. The drafters of the legislation recognized that the land immediately surrounding the tidal waters and wetlands of the Chesapeake Bay had a great potential to affect those resources. Therefore, the Critical Area Act created a special planning area called the Critical Area, and identified this area as all land within 1,000 feet of the mean high water line of tidal waters and/or within 1,000 feet of the landward edge of tidal wetlands, and all waters of and lands under the Chesapeake Bay and its tributaries. The 1,000-foot area was delineated using Maryland's 1972 State Wetland Maps. Local governments then transferred this "Critical Area Boundary" to their own maps.

The law also established a Statewide Critical Area Commission to oversee the development and implementation of local Critical Area programs. The Commission developed specific criteria to guide local jurisdictions in developing these programs. In 1986, the Maryland General Assembly approved the Critical Area Criteria established through the Critical Area Commission work efforts. The result was implementation of local Critical Area Programs directed towards minimizing adverse water quality impacts, conserving plant and animal habitat, and addressing land use policies for development in the Critical Area.

Anne Arundel County is in the process of updating the Critical Area boundaries using updated State mapping criteria as required by legislation enacted in 2008. The State's updated mapping standards are part of an ongoing project called 'iMap'. The iMap project seeks to incorporate updated mapping data to the overall State Base Map. These updated data include higher resolution aerial imagery and base elevation data collected along the Chesapeake Bay and its surrounding tributaries.

Anne Arundel County reviews all subdivision, rezoning, special exception, and variance applications pertaining to property located within the Critical Area for impacts on water quality and habitat. Further, the County adopted its Critical Area Program based on the criteria established by the State's Critical Area Commission in 1986. The three major goals of the program are:

1. Minimize adverse impacts on water quality,
2. Conserve fish, wildlife, and plant habitat, and
3. Establish land use policies for development in the Critical Area.

The State and County program criteria include the requirement to identify and protect wildlife and plant habitats of particular significance due to their uniqueness, rarity, or possible future diminution, and which are not already protected or addressed by other existing programs. These habitats are also known as Habitat Protection Areas and are set forth in Anne Arundel County Code Article 17, Title 8, Subtitle 5, and also defined and discussed in COMAR Title 27, Subtitle 1, Chapter 9.

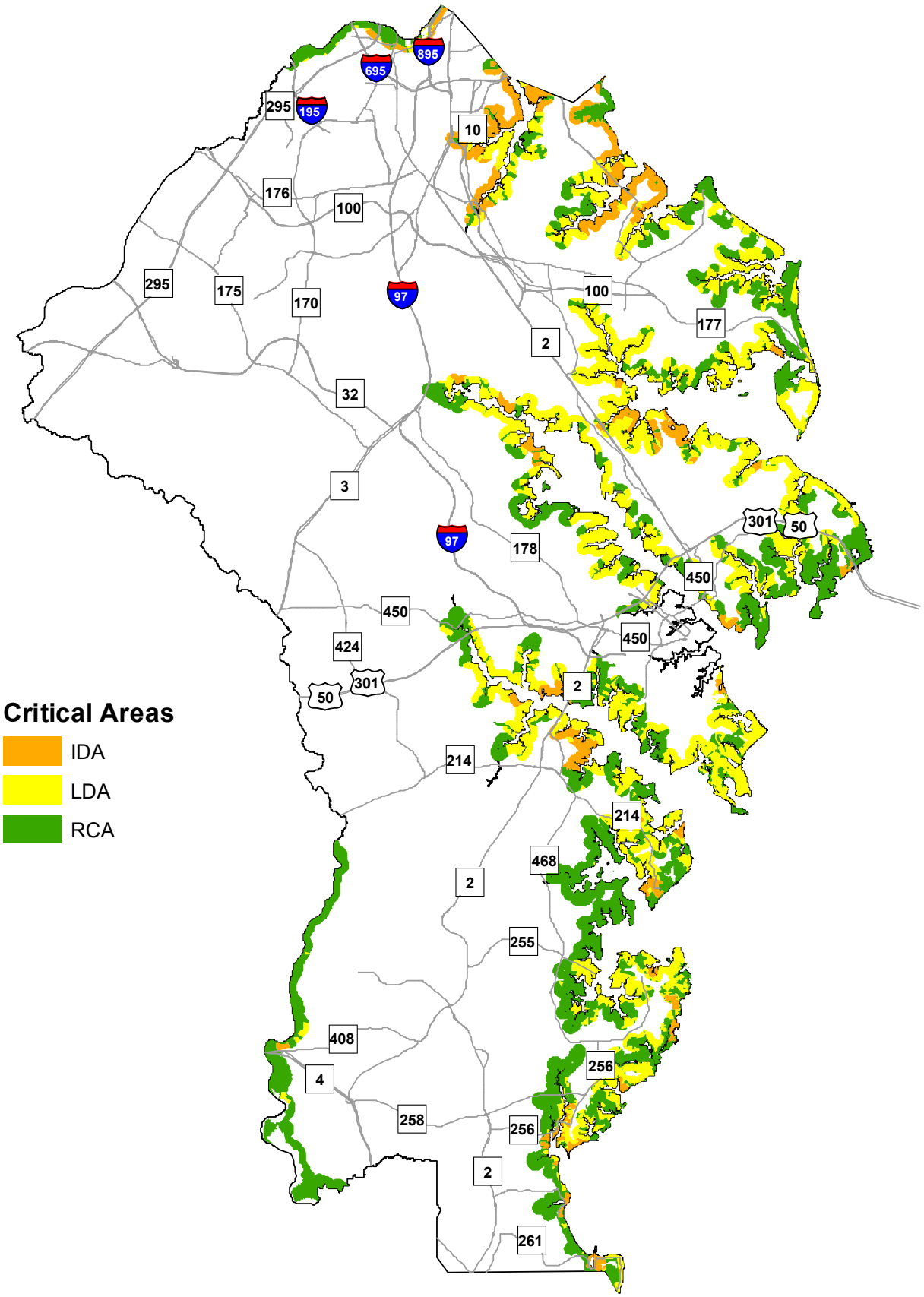
Pursuant to Anne Arundel County Code (Article 17, Title 8, Subtitle 5), Habitat Protection Areas are to be preserved and protected in connection with all development as required by the County and in accordance with the recommendation of the Maryland Department of Natural Resources (MDNR) and other review agencies. Designated Habitat Protection Areas (HPAs) include:

1. Minimum 100 foot buffer from tidal wetlands and waterways,
2. Nontidal wetlands,
3. Threatened and endangered species and species in need of conservation,
4. Colonial water bird nesting sites,
5. Historic waterfowl staging and concentration areas,
6. Existing riparian buffers,
7. Forest areas used by forest interior dwelling birds,
8. Anadromous fish spawning areas, and
9. Natural Heritage Areas and other areas of local significance.

A key provision of the County's Critical Area Program is the establishment, protection, and maintenance of the minimum 100-foot wide vegetated Critical Area buffer. This buffer, a designated HPA, is geographically located within the Critical Area and encompasses lands within 100 feet of mean high tide or the edge of tidal wetlands and tributary streams. The Critical Area buffer is a naturally vegetated and forested area, or an area established in vegetation and managed to protect aquatic, wetlands, shoreline, and terrestrial habitat from man-made disturbances. The areal extent of the buffer is expanded when steep slopes, hydric soils, highly erodible soils exist contiguous to the 100-foot buffer. No development activity is permitted within the buffer without prior approval of the County.

The Critical Area within Anne Arundel County comprises about 49,000 acres (See Figure 9). As directed by the State criteria, the County's Critical Area Program designated three categories of land development within the Critical Area. Designations were based on existing development and public services available as of December 1, 1985. The three designations are:

Figure 9: Critical Areas



1. Intense Development Area (IDA) - those lands where existing or adjoining uses were predominantly higher density residential, commercial or industrial
2. Limited Development Area (LDA) - moderately developed lands
3. Resource Conservation Area (RCA) - primarily undeveloped or low density developed lands; approximately 21,900 acres of County land (8%) is within the RCA area.

Grading, building, and land use must follow the Critical Area criteria specific to the defined designation. These criteria are summarized below and more fully described in the County's Land Use Ordinances.

1. IDAs can be developed with medium to high-density housing, commercial, or industrial uses, according to the underlying zoning designation. Pollutant loadings must be reduced by 10% and Habitat Protection Areas (HPA) must be protected. A minimum 100-foot stream buffer is required.
2. LDAs can be developed with low to medium density housing (a maximum of less than 4 units per acre), commercial and small industrial uses according to the underlying zoning designation.
3. RCAs are limited to one dwelling unit per 20 acres, agricultural and forest uses, and resource utilization according to the permitted use list.

Development within the LDA and RCA must limit impervious surfaces to 31.25% of the site. Additionally, the minimum 100-foot buffer must be maintained, and other HPAs are protected. The County has a buffer modification program for areas where there is no existing functioning minimum 100 foot buffer. Forest clearing is limited, and when allowed, must be replaced. Developments on unforested sites are required to establish 15% of the site in forest. The Critical Area Program also has special regulations for the following specific areas: water dependent facilities, shore erosion protection works; forest and woodlands; agriculture; surface mining; and natural parks.

Within the Critical Area, the County can grant a change in a property's land use classification through the growth allocation process. In accordance with State law, five percent of the County's designated RCA classification may be used for growth allocation. In 2003, the law was changed to limit the use of growth allocation to commercial properties only. In order to receive growth allocation, the applicant must meet the Critical Area Criteria for development in the new designation as well as the criteria for the Growth Allocation process.

The Land Preservation, Parks and Recreation Plan (LPPRP) is required to be submitted by each county to the State of Maryland every five years. See http://www.aacounty.org/departments/recreation-parks/lpprp/index.html for the most recent update. This master plan provides a common benchmark to assist the State's evaluation of County land preservation and recreation programs. It is comprised of policies, recommendations, and strategies related to parks, recreation, and open space; agricultural land and woodland preservation; and natural resource conservation. The LPPRP supports the State's planning visions and qualifies the County for State Program Open Space funds and other programs related to the Plan's objectives. To justify state and federal expenditures for outdoor recreation and land preservation using the following planning criteria:

1. Identify major issues and challenges facing the state's outdoor recreation areas and natural resources;
2. Assess the existing supply of and demand for outdoor recreation opportunities;
3. Conduct an inventory of MDNR land, trails, and water based resources;

4. Quantify the relationship between natural resource protection; land conservation; outdoor recreation; and public health and livability, economic vitality, and environmental sustainability; and
5. Establish priorities for land conservation, outdoor recreation, and natural resource protection for the next five years

The LPPRP recognizes four designated conservation areas within Anne Arundel County and the designated implementation programs that have been set forth to conserve natural areas:

1. The Resource Conservation Area portion of the Chesapeake Bay Critical Area
2. The Priority Preservation Area
3. Greenways from the County's Greenways Master Plan
4. Portions of the County Open Space Zoning District that are not within the Greenways Network that comprise 100-year floodplains, wetlands, parkland and other open space

Anne Arundel County Forest Conservation Program - One of the principal regulatory tools the County has to help implement some of the recommendations in its master plans is the Forest Conservation Program. The program was created in 1991 to meet the requirements of the Maryland Forest Conservation Act of 1991. Anne Arundel County's Forestry Program (housed within the Department of Inspections and Permits) administers the reforestation and afforestation requirements of the Critical Area Program and the Maryland Forest Conservation Act (Article 17, Title 6, Subtitle 3). In general, these requirements apply to new subdivision plans as well as applications for grading and sediment control permits on sites that are greater than 40,000 square feet. The subdivision plan or permit application must include a forest stand delineation and a forest conservation plan that:

1. Identifies, delineates and characterizes forested areas, specimen trees, floodplains, erodible soils, and other sensitive areas on the site;
2. Establishes forest retention areas or reforestation areas that meet a minimum conservation threshold; and
3. Protects these areas through forest conservation easements.

There are alternative approaches allowed for meeting the minimum threshold requirements, but the order of preference is as follows:

1. Retention of existing forest on the site, particularly in priority retention areas such as floodplains, stream or wetland buffers, or steep slopes;
2. Onsite afforestation or reforestation;
3. Offsite afforestation or reforestation;
4. Natural regeneration onsite or offsite; and
5. Payment of a fee-in-lieu to the County's Forest Conservation Fund. Money in this fund can be used for acquisition of forested areas for conservation, reforestation or afforestation costs, or program administration.

Another component of the Forest Conservation Program is the coordination of voluntary reforestation projects with landowners and community associations. Forest Conservation Fund monies can be used to reforest properties with native vegetation, and the landowner is required to place the reforested

areas under a perpetual protective agreement such as a conservation easement. The County has a Forest Conservancy District Board that provides technical assistance to landowners who seek guidance in properly managing their woodland. Table 3 identifies the amount of forest cover in 2011 and 2014. Figure 10 illustrates the Woodlands in the County.

Table 3: Anne Arundel County Forested Land*

	Forested Wetlands (acres)	Woods (acres)	Total Forested areas (acres)	As a percent to Anne Arundel County land cover
2011	286	105,702	105,988	40.6%
2014	8,358	94,256	102,614	39.3%

* Anne Arundel County aerial photography

Note: In 2014, refinements were made in the analysis, primarily the use of overlaying the woods layer with a wetlands layer, to discern between forested wetlands and woods.

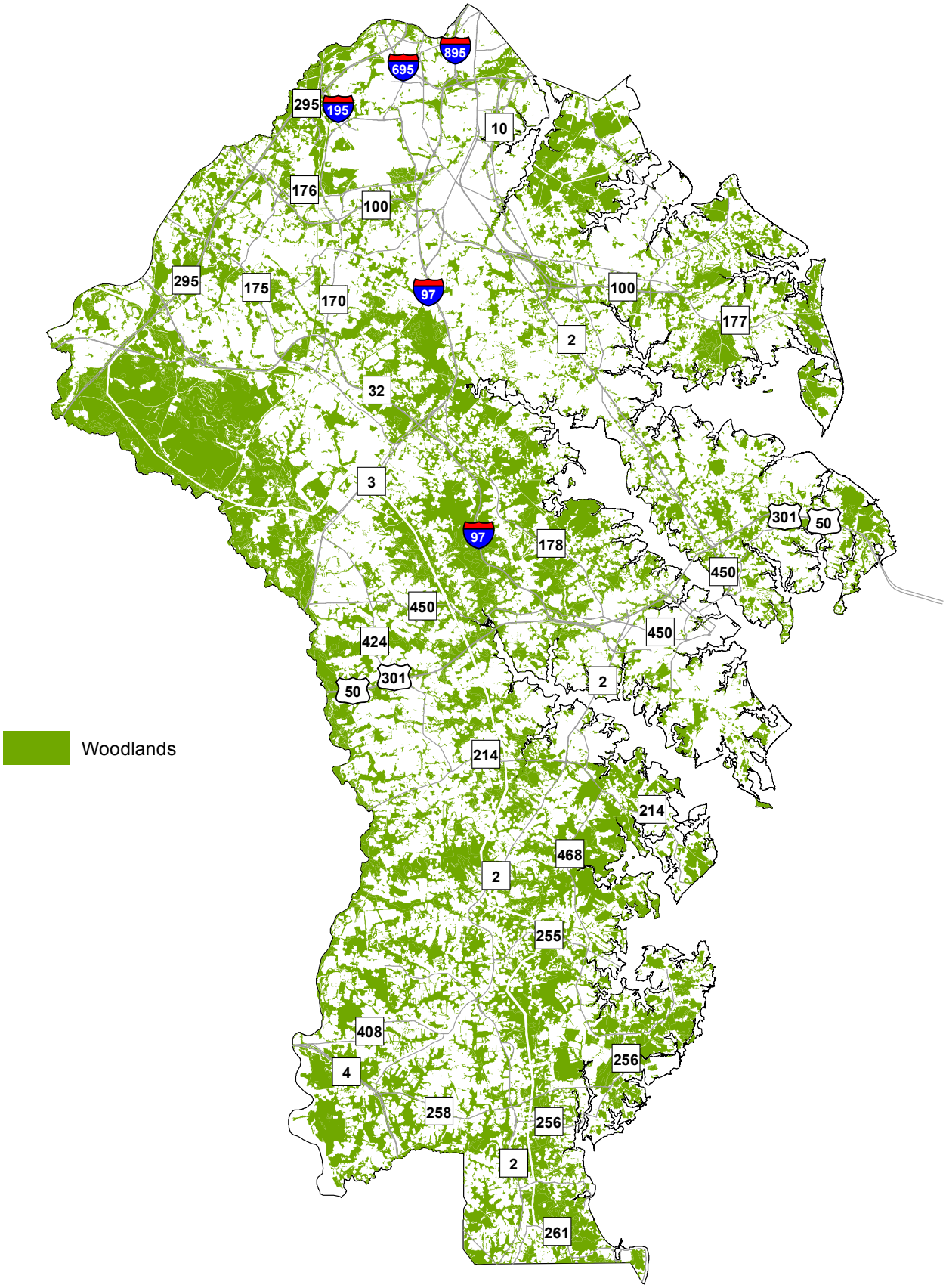
The County also holds many forest conservation easements that were created through forest conservation regulations. Mapping of forest conservation easements required as part of the subdivision process is partially complete. Beginning in 2010, the County began requiring digital submittals of all record plats including forest conservation easements. Surveyed descriptions of forest conservation easements on plats back to 2005 are available, but are not all digitized in GIS.

Most of the larger contiguous areas of woodlands are in the central or southern portions of the County or along the Patuxent River. Although the County retains large amounts of forested areas, these areas have become increasingly fragmented over the past few decades as the County has experienced a moderately high rate of development. More recent efforts at forest conservation are focusing not only on retention of woodlands but also on protection of larger interconnected networks of forest in order to maximize their benefits.

Timber harvesting is allowed within the County. Most timber harvesting occurs in the southern portions of the County. The primary harvest type is a "selective harvest" that generally sets a minimum diameter of trees that may be cut. Yellow poplar (Liriodendron tulipifera) is the dominant species harvested, along with red and white oak families (Quercus sp.). The value of the harvest is not known. A timber harvest permit is required for any disturbance over 1,000 square feet inside the Critical Area or 40,000 square feet outside the Critical Area. Commercial timbering is a small industry in Anne Arundel County, accounting for an average of eight harvest permit applications per year, totaling an average of 20 acres.

Green Infrastructure - The County's Greenways Master Plan was adopted in 2002 with the goal of establishing an interconnected network of protected corridors of woodlands and open space that will protect ecologically valuable lands; provide open space, recreational and off-road transportation benefits for people; provide adequate habitat to support healthy populations of plant and animal species; and improve water and air quality within the County. In 2010, Anne Arundel County issued a Greenways Master Plan Implementation Report that summarized progress on implementation of the Greenways Master Plan since 2002.

Figure 10: Woodlands



The County is in the process of updating the 2002 Greenways Master Plan and renaming it the Green Infrastructure Master Plan. The preliminary draft 2018 Green Infrastructure Master Plan is not a new plan or a departure from the intent of the 2002 Greenways Master Plan, but rather an attempt to enhance the definition of the Greenway, refine the data and analysis, and update the 2002 Greenways Master Plan by using better data and technology to formulate a comprehensive approach to interconnecting environmental ecosystems with active and passive recreational sites and corridors, scenic areas and historic and cultural resources in order to meet challenges related to land use conflicts, and human health and well-being.

The 2002 Greenways Master Plan and the draft preliminary Green Infrastructure Master Plan primarily use an ecological approach of hubs (at least 250 acres) and corridors (at least 200 feet wide) to delineate the network but expands beyond that to include other contiguous areas that are significant for implementing the vision. The Network includes Federal, State and County parks, public and private lands acquired for preservation; agricultural, forest conservation, floodplain, wetland and open space easements; trails; historic and cultural resources; land zoned Open Space; and undeveloped lands that meet the minimum criteria for size, protection status, and land use characteristics. Figure 11 illustrates the proposed Green Infrastructure Network. Approximately 28% of the County's land area has been protected through implementation of the County's Green Infrastructure Master Plan. Table 4 provides a comparison of land in the Greenway/Green Infrastructure Network and its level of protection since 2002.

Table 4: Comparison of 2002, 2010 and 2018 Greenways Network

	2002		2010		2018	
	Acres	% of Greenways Network	Acres	% of Greenways Network	Acres	% of Green Infrastructure Network
Protected	37,245	51%	45,224	62%	72,141	66%
Unprotected	35,222	49%	27,242	38%	37,075	34%
Total	72,467*	100%	72,466*	100%	109,217	100%

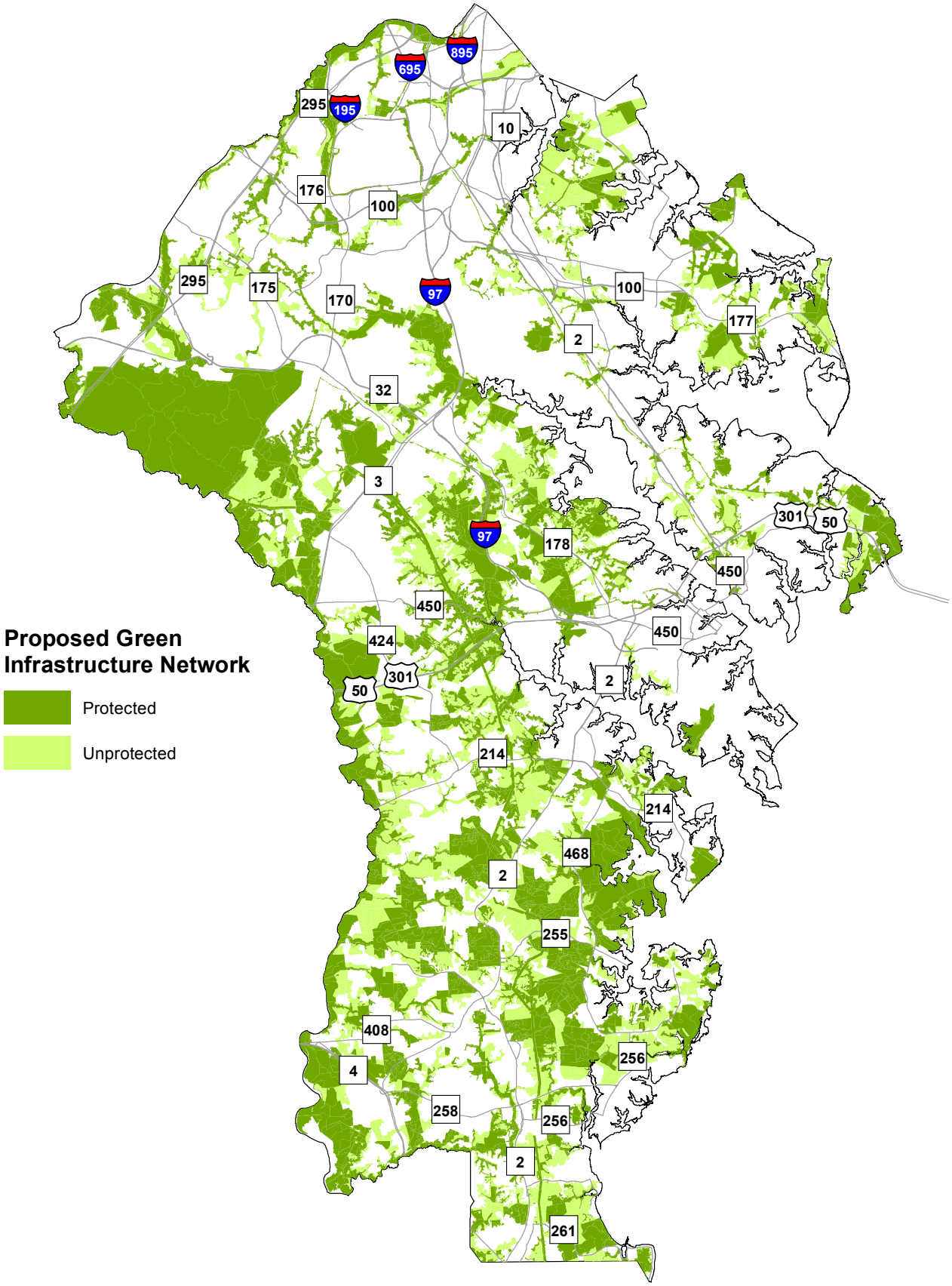
*Difference due to rounding

Sources: 2002 Anne Arundel County Greenways Master Plan, 2010 Greenways Master Plan Implementation Report, and draft preliminary 2018 Green Infrastructure Master Plan

Strategies and actions highlighted by the Green Infrastructure Master Plan serve as the basis for the management approach of the Green Infrastructure Network. Four broad strategies are organization and outreach, planning, land protection and enhancement, and financing. Key actions designed to support the strategies include:

1. Developing more specific implementation and management plans, as needed;
2. Integrating the Green Infrastructure Master Plan into County planning, capital programming, and development review processes;
3. Establishing an interagency Green Infrastructure Network Program;
4. Creating a strong public involvement program; and

Figure 11: Proposed Green Infrastructure Network



5. Creating dedicated green infrastructure funding and incentive mechanisms.

The Green Infrastructure Network is also now organized by the County's watersheds to provide better planning, implementation, and consistency with how other County departments analyze data and environmental resources. For example, the Watershed Protection and Restoration Program Division develops Comprehensive Watershed Management Studies and Plans which provide an assessment of stream and upland conditions within the watershed that identify existing and potential concerns of water quality issues; identify opportunities for improvement; and support and prioritize watershed management and planning activities. This information can then be used for prioritizing the Green Infrastructure Network for protection during the land development process.

Agricultural Land Preservation

Anne Arundel County has been an agricultural community for over 350 years, beginning with its role as a major tobacco-producing region in the 17th and 18th centuries. Today agricultural production is more diversified and remains an important component of the local economy. While the northern part of the county has become much more urbanized over the past century, South County has remained a strong agricultural producing region.

The farms and open spaces of southern Anne Arundel County are important to the County and the region. Agriculture serves a dual role of providing a direct economic benefit as well as preserving the quality of life that is reflected in a rural environment.

Traditionally, Anne Arundel County has had smaller farms than some other Maryland counties, particularly on the Eastern Shore, due to topography and development pressures generated by its central location between Baltimore and Washington. County farms range from crops including nursery and greenhouse, livestock, timber production, equine and the introduction of vineyards and wineries. Many farms remain family operations.

The most recent USDA Census of Agriculture, completed in 2012, indicated over 28,000 acres of land in farm use in the County, representing 13% of the County's total land area. At that time, there were estimated to be 381 farms in the County with an average farm size of 74 acres. Over 50% of the land in farms was used for cropland, 25% was woodland, 12% pasture and the remainder utilized for other uses.

The 2012 USDA Census estimated the total market value of agricultural production in the County to be $19 million, of which crops made up 84% and livestock 16%. In terms of market value of production, the leading product was nursery, greenhouse products, flowers and sod that accounted for $9.3 million of production value, followed by grains, vegetables and livestock. The County's equine industry is also an important part of its agriculture base. A Maryland Equine Census conducted in 2010 reported 4,500 horses and ponies in the County with a value of $39 million. There were over 2,050 County residents directly involved in the equine industry sector, not including hired labor. The horse industry in the County includes the racing breeds of thoroughbreds and standard-breeds, as well as other breeds involved in recreational activities, such as Arabians, quarter horses, sport horses, and smaller pony breeds.

The County currently has three primary planning documents that establish goals and strategies relating to agricultural land preservation. These include the 2009 General Development Plan, the South County Small Area Plan, and the 2017 Draft Land Preservation, Parks and Recreation Plan.

Policies and strategies outlined in the documents relate primarily to promoting agriculture as a viable sector of the local economy; encouraging the use of Best Management Practices; discouraging the loss of prime agricultural land to development; and working cooperatively with State agencies and property owners to increase the amount of land protected through easement acquisitions. Progress is ongoing and is summarized in Table IV-4 in the 2017 Land Preservation, Parks and Recreation Plan.

Priority Preservation Area

The Agricultural Stewardship Act of 2006 authorized counties to include a Priority Preservation Area (PPA) element in their comprehensive plan, and the requirement was mandatory for counties such as Anne Arundel that have State-certified programs. The County's PPA was established following specific State guidelines and adopted in the 2009 General Development Plan. Establishment of the PPA provides an opportunity for the State and County to better target preservation funds to those areas that will provide the most benefit toward meeting a county's preservation goals. The County retains the ability to purchase easements outside of the PPA using the three existing easement acquisition programs, but additional State funding, when available, will be targeted toward preservation within the PPA. The State requires that a PPA meet the following criteria:

1. The area must contain productive agricultural or forest soils or be capable of supporting profitable agricultural and forestry enterprises;
2. The area must be governed by local policies that stabilize the agricultural or forest land base so that development does not convert or compromise agricultural and forestry resources;
3. The area must be large enough to support the kind of agricultural operations that the County seeks to preserve; and
4. The area must include an acreage goal for land to be preserved through easements and zoning in the PPA equal to at least 80% of the remaining undeveloped areas of land in the area.

Based on these criteria, the County defined a PPA boundary by identifying properties that contain productive soils (Class I, II or III soil types), that lie within the Rural Agricultural (RA) zoning district, and that are 50 acres or more in size. The County also took into consideration proximity to land parcels already protected by an agricultural preservation easement as well as the potential to form larger contiguous areas of preserved land.

2017 Land Preservation, Parks and Recreation Plan (Draft to be approved 2018)

As previously stated, one of the three major components of the County's Land Preservation, Parks and Recreation Plan is agricultural land preservation. The plan evaluated the County's current implementation program for agricultural preservation, which is described below, and made recommendations to help further the County's progress in reaching its preservation goals:

1. Update program regulations for the Agricultural and Woodland Preservation Program to correct outdated Code references and to put in place policies that have been discussed over the years;
2. Revise the preservation easement priority rating system to grant extra points to properties located in the Priority Preservation Area;
3. Revise permitted uses on an agricultural easement property to include accessory uses on minimum acreage that will not interfere with farming operations.

Current Implementation Program

Anne Arundel County's commitment toward preserving its agricultural heritage continues. The implementation program for agricultural and woodland preservation consists of three easement acquisition programs, other funding mechanisms, land use controls, public outreach, and an advisory board.

Program policies focus on maintaining agriculture as a viable and sustainable sector of the economy and on preserving agriculture as a key element of the rural character of South County. An overall goal of preserving 20,000 acres of agricultural land and woodlands in South County was established in 1993. Based on these efforts and others, the County has made significant strides toward meeting its preservation goals. Although to date the County has not reached its overall program goal of preserving 20,000 acres of agricultural land through the purchase of easements, 13,659 acres have been preserved since 1992 and an additional 10,000 acres through protective RA zoning at one dwelling unit per twenty acres.

Easement Acquisition Programs

The three easement acquisition programs operating in the County are the Maryland Agricultural Land Preservation Foundation (MALPF) program, the County's Agricultural and Woodland Preservation Program, and the Rural Legacy Program. The amount of agricultural land protected with easements under each of these programs, as of January 2018, is shown in Table 5.

Table 5: Preserved Agricultural Lands

Agricultural Lands	Acres
Easements (permanently protected)	
MALPF	5,483
County Agriculture & Woodland Program	6,370
Rural Legacy	1,606
Community Connections / DNR	200
Total Easements	13,659
Districts (not permanent)	
County Districts	5,447
Total Districts	5,447
Total Easements and Districts	19,106

Maryland Agricultural Land Preservation Foundation (MALPF)

The Maryland Agricultural Land Preservation Foundation program is a purchase of development rights program. After eligibility is established, the MALPF can purchase the development rights from the owner based on the fair market value of the property. The Foundation offers grants for payment in lump sum or in installments. The property is then preserved for agricultural use in perpetuity and placed under an easement. Anne Arundel County has participated in the MALPF Program since 1980. As of January 2018, the County has a total of 5,483 acres that are permanently preserved through MALPF easements.

Anne Arundel County Agricultural and Woodland Preservation Program

The County's Agricultural and Woodland Preservation Program was created in 1990 and has been certified by the Maryland Agricultural Land Preservation Foundation (MALPF) and Maryland Department of Planning since 1992. The County's application for re-certification was recently approved through June 30, 2021. Certification is granted to counties who have established and maintained an effective program based on certain criteria including the county's commitment to spend additional local funds for the purchase of development rights or enhancements in an amount equal to or exceeding the amount of additional funds that will be available as a result of certification. Certified counties are eligible for 75% of the agricultural transfer tax collected in a given fiscal year. Beginning in fiscal year 2009, counties were required to develop a Priority Preservation Area in order to maintain certification.

The program was created to supplement the MALPF program and to offer an alternative for agricultural preservation that recognized the County's small farms, since at that time participation in the MALPF program required a minimum size of 100 acres. Under this program, the County purchases an easements on farms of 50 acres or greater based on 60% of the fair market value and until 2017 paid in installments, plus tax-free interest, over 30 years (Installment Purchase Agreement IPA Program). Starting in the Fall of 2017, the County returned to paying cash at settlement due to lack of interest in the IPA Program. As of January 2018, the County has devoted an estimated $34 million and a total of 6,370 acres have been permanently preserved through this County program.

In consistency with State regulations, the County's Agricultural and Woodland Preservation Program requires that all properties participating in the program have Soil and Water Conservation Plans and/or Forest Management Plans and Nutrient Management Plans when applicable in effect. These plans rely on the use of Best Management Practices (BMPs) to control agricultural runoff and reduce nutrient loads to local waters.

Additional efforts include partnerships with local land trusts and various government agencies including the Department of Natural Resources, public outreach, land use controls and voluntary acquisition of agricultural and woodland easements.

Currently, landowners are offered a percentage of fair market value for a development rights/conservation easement in addition to the District program which allows for a property tax credit on the land and the first $250,000 of assessed value of all structures.

Rural Legacy Program

This program, administered by Maryland Department of Natural Resources (MDNR), requires participating counties to delineate a specific geographic area in need of focused land conservation efforts. Anne Arundel County's designated Rural Legacy Area (RLA) is approximately 37,381 acres in size and is located in South County. Within that area, the County can purchase easements from landowners based on a scoring and ranking system that rates property according to size, development potential, soil productivity and other factors. Grants are awarded for lump sum payments. As shown in Table 6, approximately 16,245 acres (44 percent) of the RLA has been protected as of January 2018. Of these approximately 1,606 acres were preserved through the Rural Legacy program and 200 acres through MDNR's Community Connections Program.

Table 6: Rural Legacy Area Summary

Protected Land	Acres	Percent
Rural Legacy and Community Connections	1,806	
State parks & open space	217	
Federal parks & open space	2,302	
County parks and open space	2,516	
MALPF	4,714	
County Agricultural & Woodland Program	4,654	
Maryland Environmental Trust	21	
Private Land Trust	215	
Total Protected Land	16,445	44%
Developed Land	7,100	19%
Unprotected Land	13,836	37%
Total Rural Legacy Area	37,381	100%

Figure 12 illustrates the location of properties that have been permanently protected with conservation easements through one of the three agricultural preservation programs. As shown, most of the properties are located in rural South County although a few are located on the Broadneck peninsula or elsewhere in the County.

Existing Funding Mechanisms

The primary mechanism for permanently protecting agricultural land in Anne Arundel County is through the purchase of conservation easements on private land. Both local funds and matching State funds are used for easement acquisition. Since 1980, over $70 million has been spent on agricultural land preservation in the County, of which $40 million is from County funding sources (including $6 in matching funds for MALPF and Rural Legacy), over $17 million from MALPF funds, $12 million from Rural Legacy funds and nearly $3 million from Tobacco Buyout funds.

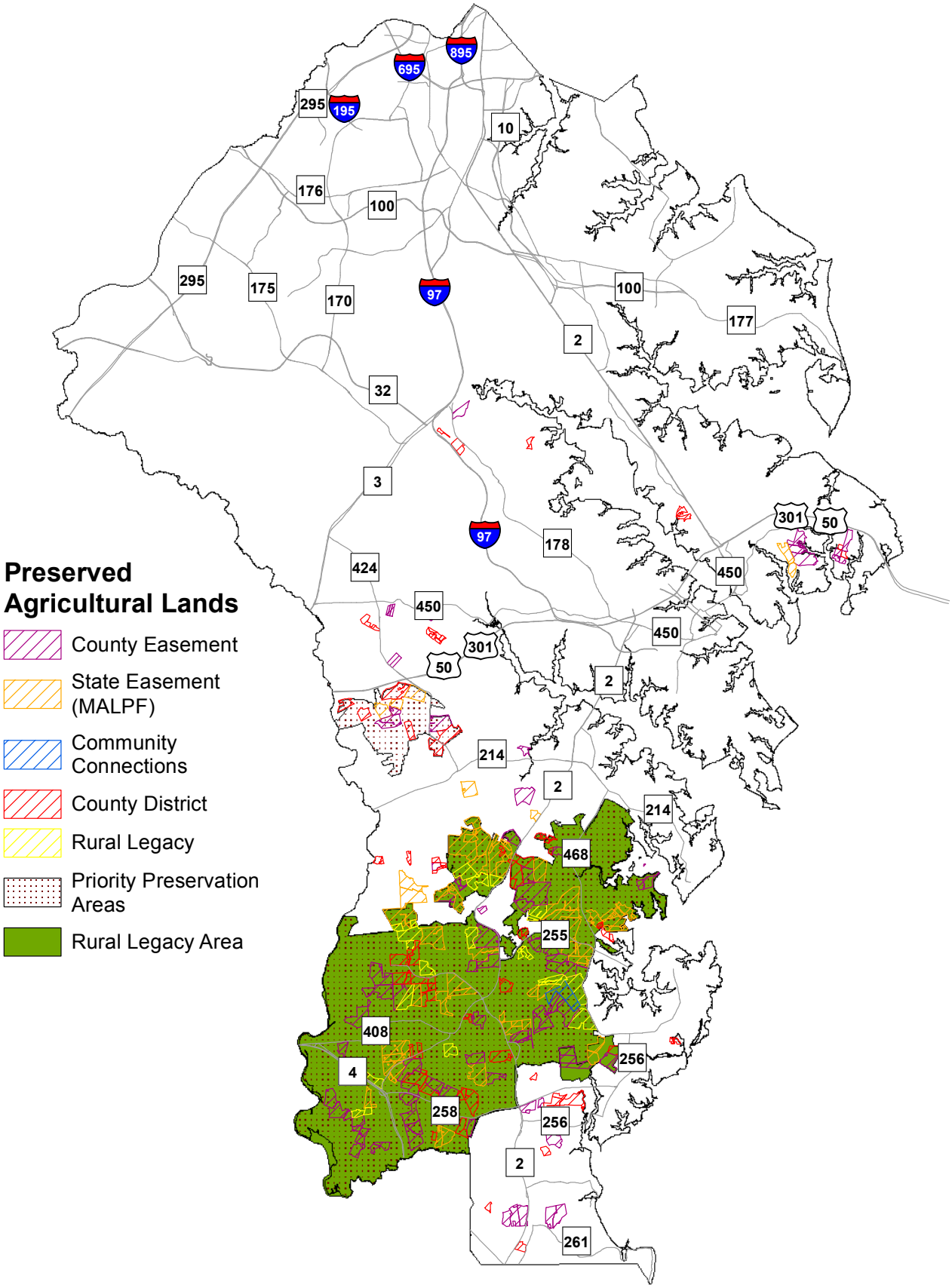
County funding for agricultural preservation comes from a variety of sources, including County General Fund appropriations, and agricultural transfer tax monies which go to both the State and the County. Additional funds come from grants, tobacco buyout funds, and Federal sources. The County has also offered a tax credit program since 1990 as an additional incentive for land preservation.

Land Use Controls and Policies

The County's General Development Plan (GDP), Zoning Ordinance, and Subdivision Regulations are the principal planning and regulatory tools used to establish land use policies and to guide and manage growth, development, and land preservation. The 2009 GDP Land Use Plan designates nearly 89,000 acres of land, including most of South County, for "Rural" land use.

The Priority Preservation Area (PPA) contains 39,430 acres and includes the entire Rural Legacy Area. Approximately 17,700 acres are protected within and contiguous to the PPA by agricultural and woodland easements and districts, and an additional 6,000 acres of local, State and Federal land,

Figure 12: Preserved Agricultural Lands



leaving 15,300 acres with no permanent protection. Less than 50 acres of RA zoned land in the PPA were developed during FY14 through FY17. Approximately 1,300 acres were preserved during the same timeframe through various local, State and Federal programs as easements. Current zoning of one dwelling unit per twenty acres already protects much of the agricultural land and woodland operations in the PPA. New markets such as vineyards, nursery stock, vegetable and flower growers and the equine industry exist on many of the smaller parcels where tobacco was once grown.

Land use tools included in Article 17 Subdivision and Development and Article 18 Zoning of the Anne Arundel County Code such as Growth Tier IV designation, restrictive zoning at one dwelling unit per twenty acres, no planned water and sewer service, and Permitted, Conditional, and Special Exception uses in the RA zoning that have minimal impact on farming, enhance the County's ability to protect the PPA to limit development and stabilize the land base.

In accordance with the Sustainable Growth and Agricultural Preservation Act of 2012, the Office of Planning and Zoning adopted Growth Tiers administratively on June 17, 2013. The County RLA and PPA are included in Growth Tier IV. Major subdivisions are not permitted; minor subdivisions are permitted (maximum 5 lots) and must use on-site septic systems; public sewer systems are not available.

In concert with the Growth Tier IV designation, the majority of land included in the PPA is zoned RA allowing for one dwelling unit per twenty acres. One additional density lot is permitted for residue acreage that exceeds ten acres and, for sites over fifty acres, one additional dwelling unit for every fifty acres and one additional dwelling unit for residue acreage that exceeds twenty-five acres.

The County's Right to Farm bill was adopted with the intention of preventing nuisance lawsuits that can often arise from residential growth in agricultural areas. Laws of this nature help to protect the economic viability of farming in the County.

Public Outreach

Preservation Program information is available on the Anne Arundel County web site at http://www.aacounty.org/departments/recreation-parks/agricultural/. Public meetings are held at different locations to explain the various programs and options available to the landowners. Attendees are provided brochures explaining qualifying criteria, payment options, and deadlines to apply along with application forms. State and local land preservation agencies are in attendance in order to offer information and answer questions. Partnerships have been established with MALPF, Rural Legacy, Maryland Agricultural and Resource-Based Industry Development Corporation, Office of Planning and Zoning Cultural Resources, Scenic Rivers Land Trust and the Anne Arundel Economic Development Corporation, Farm Bureau, and the local Agricultural Advisory Board members. The Agricultural Advisory Board continually markets all preservation programs.

Agricultural Preservation Advisory Board

The Agricultural Preservation Advisory Board is established in accordance with the Agriculture Article § 2-505.1 to promote agriculture within the County. This five-member board is appointed by the County Executive and is comprised of citizens and members of the agricultural community. The Board meets at least four times a year and advises the County Executive and the County Council on the establishment of agricultural districts and the purchase of easements. The Board also makes

recommendations concerning budget and appropriation requests, promotes the preservation of agriculture, and prepares and reviews recommendations related to County policies and programs.

Anne Arundel Economic Development Corporation (AAEDC)

In 2002, the County established an Agricultural Advisory Committee to work with the County, farmers, and the agricultural business community to sustain and promote agriculture. The committee focuses on market development, funding, and public information and outreach and most recently has worked to expand farmers' markets in the County. In addition, AAEDC includes the development of agribusiness in its overall mission of serving business needs and increasing the County's economic base. The Committee is comprised of farmers and representatives of AAEDC, the County's Department of Recreation and Parks, Anne Arundel Public Schools, Maryland Department of Agriculture, the Soil Conservation District and Farm Bureau.

In 2016, the County formed an Agritourism Work Group that was tasked with evaluating the County Code and making recommendations for revisions in order to enhance opportunities for agritourism. The Work Group developed a definition of agritourism, identified specific agritourism activities that could be included as allowable uses in certain zoning districts and defined building code requirements related to agritourism activities.

In October of 2017, Executive Order Number 24 created the Agriculture, Farming and Agritourism Commission. The Commission is comprised of residents of the County who are familiar with agriculture, farming and agritourism and related issues. Duties of the Commission are to advise and report to the County Executive and County Office of Planning and Zoning on the promotion, coordination, development and furtherance and establishment of agriculture, farming and agritourism uses including recommended changes to the provisions of the County Code.

The Anne Arundel Economic Development Corporation (AAEDC) continues to provide outstanding service and support to the agriculture community through a variety of events and functions. Department staff participated in the 2018 Arundel Ag Connect event created as a way to connect farmers with the agricultural service providers.

Mineral Resources

The underlying geology of Anne Arundel County contains large quantities of unconsolidated sedimentary materials that are available for productive extraction and processing via surface mining operations. Surface mining operations within Anne Arundel County concentrate on the extraction of sand and gravel. Sand is used in the construction of roads and highways, while both sand and gravel are key ingredients used to manufacture concrete. Additionally, there are mining operations that extract loose soils from what have come to be known as 'borrow pits'. Loose materials extracted from borrow pits are used in landscape service operations, as supplemental fill for highway projects, as well as for certain building construction projects.

Mineral resources represent a valuable commodity for the local and regional economies. Recent data from the United States Geologic Survey (USGS) shows that sand and gravel production topped $95 million Statewide in 2015, with the total quantity of sand and gravel sold or used reaching 7.5 million metric tons (USGS 2015 Minerals Yearbook).

The first comprehensive mining legislation was passed by Congress in the late 1970's. In 1977, the Surface Mining Control and Reclamation Act of 1977 (SMCRA) was passed to regulate surface and subsurface mining as well as reclamation activities. The intent of SMCRA was to provide a balance for meeting the energy and resource demands of the Country in an environmentally sensitive manner. This law forms the basis from which States and local jurisdictions govern these mining activities. Code of Maryland Regulations (COMAR), Title 26, Subtitle 21 represents the State's legislative authority for regulating surface mining activities. Adopted in 1977, the authority for Title 26 was granted under Maryland Environmental Article 15-803 and 15-813 for non-coal mining permits.

COMAR Title 26 regulates non-coal surface mining activities and operations. The State mandates that surface mining permit applications contain detailed information, including grading and sediment control information. COMAR also requires applicants to submit back filling, grading, and re-vegetation (reforestation), as well as detailed reclamation plans once the productive life of the operation has been reached. Aside from regulating the physical operation and immediate environmental oversight of the mine, Title 26 also governs minimum distances that certain mining activities must maintain from other surrounding properties and non-commercial/industrial uses.

Anne Arundel County has continued to support the State in preserving surface mining operations, while at the same time ensuring that the extraction of mineral resources are done in an environmentally sensitive manner. According to COMAR, the local permitting authority must uphold the intent of Title 26 by way of proper environmental and residential protections while simultaneously allowing the mining operations to be a productive contributor to the local economic base. Anne Arundel County's primary means of regulating and permitting surface mining operations is through zoning (Article 18) of the County Code. These zoning regulations apply the intent of Federal and State law (SMCRA and COMAR respectively).

Under Article 18, activities associated with the surface mining industry are separated into several distinct uses as shown in Table 7.

Table 7: Permitted Surface Mining Activity by Zoning Category

Use / Description	RA	W2	W3
Clay / Borrow, Sand & Gravel Pits	Special Exception	Special Exception	Special Exception
Processing Facility for Clay, Sand & Gravel	N/A	N/A	Conditional

Clay and 'borrow' pits or sand and gravel pits are uses allowed by special exceptions in RA, W2, and W3 zones. Processing facilities for clay, sand and gravel is yet another distinct use within surface mining operations. Clay, sand or gravel processing is allowed as a conditional use in W3 zones only. However, a processing plant can be part of the actual extraction site, which requires special exception approval.

Existing Mining and Reclamation Sites

Surface mines continue to represent a viable component of the County's industrial sector. There are 13 active surface mining operations documented Countywide. The majority of these operations are located along the Patuxent River shoreline in the western and southwestern portions of the County (Figure 13).

The surface mines in Table 8 have active State permits. There are periods of time when the operational status may be in transition because the reclamation process involves the conversion of a once active mining extraction site for productive re-use. According to COMAR (Section 16.21.01.16, Reclamation Schedule), Maryland Department of the Environment (MDE) requires all surface mining applications to include a reclamation plan and expected timeline for terminating mineral extraction activities.

MDE requires that a permitted operator begin reclamation of the site as soon as feasible once mining operations begin, continuing concurrently with mineral extraction and, upon termination of mining, until the entire permit area is reclaimed. In some instances, a mining operator may not be able to begin reclamation until after mineral extraction is completed. MDE tracks the operational status of a mining operation and continues to classify a permitted facility as "active" until all local approvals are met.

The State provides mining operators between three to five years after a mining permit expires to complete reclamation actions and requests and receive the released liability bond. However, a license can remain active while redevelopment plans are submitted through a separate process. This underscores the utility of having access to a current surface mines record, especially the reclamation status for each operation. Access to information such as this is particularly useful for ensuring proper compliance with local land use policies, and allows ready assessment for redevelopment and reuse potential.

To date, out of the 13 active operations Countywide, two operators are exclusively involved in mineral extraction. Three are in the process of reclaiming their site while maintaining mineral extraction activities, and eight are in the reclamation process.

Table 8: Anne Arundel County Active Surface Mining Permits

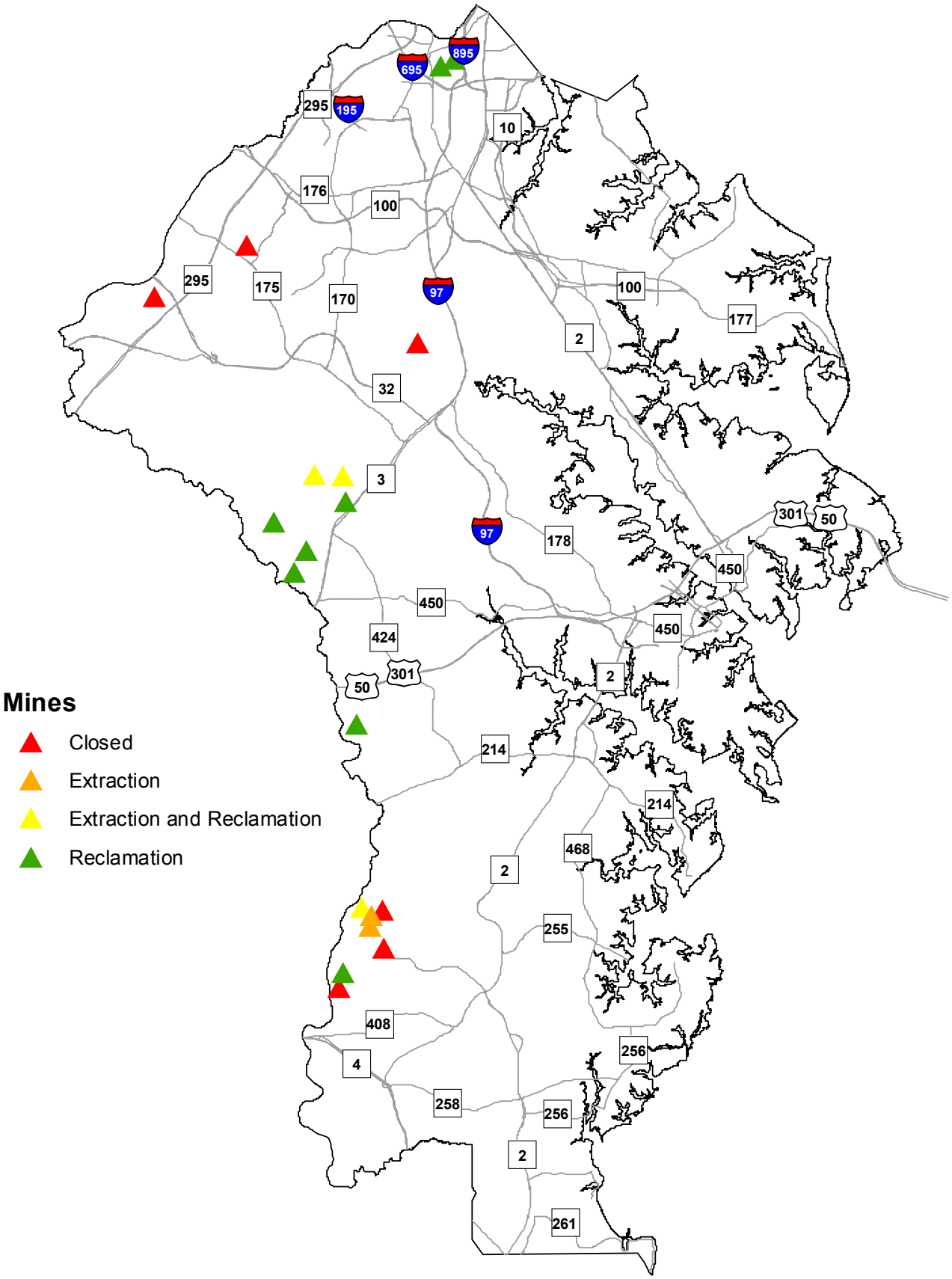
License	Status	Company Name
77-SP-0070	Reclamation	Belle Grove Corporation
77-SP-0074	Reclamation	Belle Grove Corporation
77-SP-0096	Extraction and Reclamation	BBSS, Inc.
77-SP-0141	Extraction and Reclamation	Chaney Enterprises
78-SP-0018	Reclamation	Brandywine Aggregates, LLC
78-SP-0087	Extraction and Reclamation	Tolson and Associates
80-SP-0838	Reclamation	Classic Community Development
82-SP-0130	Reclamation	Belle Grove Corporation
86-SP-0231	Reclamation	Classic Community Development
89-SP-0335	Reclamation	East Patuxent Reclamation
91SP-0394	Extraction	Chaney Enterprises
94-SP-0468	Reclamation	BBSS, Inc.
16-SP-1121	Extraction	Chaney Enterprises

Source: MDE - Mining Program, Land and Materials Administration (4/9/2018)

Land Use Policies and Reclamation of Surface Mining Sites

During the 2009 General Development Plan (GDP) process, Anne Arundel County developed several policies and actions aimed at promoting the overarching mineral resources goal of "prudent use of

Figure 13: Mines



mineral resources for economic use while maintaining the quality of life of surrounding residents." The primary policy statements in the GDP were to conserve mineral resources for future extraction, and to protect natural resources before, during, and after the extraction of minerals. The GDP specifically recommends the implementation of buffers in order to keep nearby residents protected from certain mining activities.

In addition, Small Area Plans specific to those areas bordering the Patuxent River recommended developing a Patuxent River Greenway Overlay District that would include, among other things, guidelines or criteria related to sand and gravel mining sites, and also recommended support of the Patuxent River Policy Plan. Originally adopted by the Maryland Department of Planning in 1984, the Patuxent River Policy Plan is a statewide land management policy document aimed at preserving and enhancing the environmental quality of the Patuxent River and its watershed. It makes reference to protecting and managing lands such agriculture, forests, and aquifer recharge zones, as well as potential sand and gravel extraction sites. The Patuxent River Policy Plan clearly indicates the need to identify where future sand and gravel extraction operations may be located. The 2009 GDP identified mineral resource areas based on geological conditions, but mining in all of these areas would not be consistent with current land use plans and zoning.

There are several examples where active mining sites have been successfully reclaimed through various public and private partnerships. Many of these successes are for sites along the Patuxent River. One of the most recognized examples of successful reclamation in Anne Arundel County is the former "Mardis Pit" operated by Chaney Enterprises. This former mining site was converted to a private golf course known as the Renditions golf course, and was awarded the 2004 Reclamation Award by MDE as well as the 2004 National Reclamation Award by the Interstate Mining Compact Commission (IMCC) for the "non-coal" category. Other examples include a site once operated by the Genstar Stone Products Company, as well as a site formerly operated by Brandywine Enterprises, Inc. The Genstar Stone Products site is now used for multi-purpose athletic and recreation fields, along with some trails/walking paths that surround the fields. Anne Arundel County purchased the site in 2000. The Brandywine site is now under passive recreation / environmental preservation.

While not common, there are also some active mining permits located in areas of the County that are currently planned for residential or industrial use. Examples are the Belle Grove Corporation site in Brooklyn Park that is planned for residential use on the County's Land Use Plan and the Laurel Sand and Gravel site in Annapolis Junction that is planned for Industrial use. Sites such as these serve as important redevelopment opportunities for the County once the reclamation process has been completed.

Low Impact Development

The term low impact development (LID) refers to systems and practices that use or mimic natural processes that result in the infiltration, evapotranspiration or use of stormwater in order to protect water quality and associated aquatic habitat. The term "green infrastructure" is sometimes used to refer to the natural areas ability to manage the quantity and quality of stormwater. Solutions to mitigate and treat stormwater runoff include: bioretention facilities, rain gardens, vegetated rooftops, rain barrels and permeable pavements. (US EPA, 2018)

One example illustrating LID within Anne Arundel County is the Northrup Grumman Baltimore Washington International Airport Parking Lot. The Low Impact Development Center designed and built bioswales, bioretention cells, and permeable pavements as a stormwater management retrofit project at the facility (Low Impact Development Center, 2018).

The County's Stormwater Management Practices and Procedures Manual, most recently updated in October 2017, provides developers, consultants and County staff with guidance regarding the procedures, processes, policies, and regulations that apply to stormwater management for proposed developments. The manual addresses criteria specific to the County that are not addressed within the Maryland Stormwater Design Manual.

Under the guidance provided by the Anne Arundel County annotated code, the Anne Arundel County Stormwater Management Practices and Procedures Manual is required to be updated on a regular basis.

Green Building

Green building, also known as sustainable building, is the practice of creating and using healthier and more resource-efficient models of construction, renovation, operation, maintenance and demolition (US EPA, 2018). There are a variety of organizations that certify the sustainability of construction, but most review projects based on the following subject areas:

- Sustainable sites
- Energy efficiency
- Water efficiency
- Materials and resource use
- Indoor environmental quality
- Emissions
- Operations and maintenance
- Construction and operations plans
- Building owner education

The United States Green Building Council's Leadership in Energy and Environmental Design (LEED) may be the most well-known green building rating system. Projects pursue credits that earn points. The project is then awarded a certification level, ranging from certified to platinum, based on the number of points earned. There are over 150 projects in Anne Arundel County that have earned certification from LEED. The Philip Merrill Environmental Center, located on the Annapolis Neck and home to the Chesapeake Bay Foundation, is the world's first LEED platinum building.

Anne Arundel County does not have any green building requirements, however, the County offers a tax credit (Article 4, Title 2, Subtitle 310) from County real property taxes on high performance dwellings as authorized by § 9-242 of the Tax-Property Article of the State Code for "high performance dwellings". A high performance dwelling means a principal residential structure that meets or exceeds a Silver rating

in the current version of the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) Green Building Rating System for homes or a Silver rating of the International Code Council's 700 National Green Building Standard. Since 2015, there have been 25 successful applicants.

According to the Anne Arundel County Code, a qualified property is eligible for the credit for each year for a period of five taxable years beginning in the year in which the application is approved, provided the credit is not combined with other optional property tax credits as permitted under Title 9 of the Tax-Property Article of the State Code or this title.

The total tax credit allowed is a percentage of the total County property tax assessed based on the LEED rating of the high performance dwelling as follows:

- for dwellings rated LEED Silver or NGBS Silver - 40%, not to exceed $1,000;
- for dwellings rated LEED Gold or NGBS Gold - 60%, not to exceed $2,000; and
- for dwellings rated LEED Platinum or NGBS Emerald - 80%, not to exceed $3,000.

Air Quality

The majority of air pollution in the region comes from three types of sources: (1) mobile sources such as automobiles, trucks, trains, buses and construction equipment; (2) area sources such as drycleaners, automobile body shops, and consumer products such as paints and solvents; and (3) stationary sources such as power plants, manufacturing and chemical industries, and utilities. The Maryland Department of the Environment (MDE) estimates that up to 70 percent of Maryland's smog (ground-level ozone) air pollution originates outside of the State (Maryland Department of the Environment, 2018). It primarily comes from emissions from the numerous power plants in the Ohio River Valley coupled with existing meteorological conditions. Although Maryland air quality has shown a substantial improvement over the last two decades, air pollution continues to be a concern for public health and the environment. Therefore, it is important to include air quality in the planning process to inform land use decisions.

The Clean Air Act and Air Pollutants

The United States Congress passed the Clean Air Act (CAA), as we know it, in 1970 and significant Clean Air Act Amendments in 1990. The Clean Air Act, as amended in 1990, addresses air quality standards, ground-level smog (ozone), motor vehicle emissions, interstate movement of air pollution (transport pollution), international air pollution, air emissions permits, enforcement and deadlines. The CAA established primary and secondary standards for air pollutants to protect public health and the environment. Primary standards set limits to protect public health, including the health of sensitive populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare including reducing harmful effects to wildlife, soil, water, crops, livestock, vegetation, and buildings, and protection against decreased visibility. The CAA, as amended, also established responsibilities for developing air quality regulations (federal government) and enforcing those regulations (delegated to the states).

The Environmental Protection Agency (EPA) sets National Ambient Air Quality Standards (NAAQS) for six principal pollutants, which are called "criteria" pollutants (U. S. Environmental Protection Agency, NAAQS Tables). These pollutants are ground-level ozone (O3), sulfur dioxide (SO2),

particulate matter (PM), lead (Pb), nitrogen dioxide (NO2), and carbon monoxide (CO). They are directly emitted by mobile sources, area sources, and stationary sources or formed as secondary products of the emissions of these sources.

Under the Clean Air Act, the EPA promulgates NAAQS for each of the six criteria pollutants, and within two years of promulgating a new or revised air quality standard, designates areas as "attainment" or "nonattainment," for the standard. An area that meets or exceeds the primary standard is called an "attainment area"; an area that does not meet the primary standard is called a "nonattainment area." For any nonattainment area, the State then has 1.5 – 3 years, depending on the criteria pollutant, to develop a state implementation plan (SIP) addressing how the nonattainment area will come into compliance with the air quality standard (The National Ambient Air Quality Standard, NAAQS Implementation Process). The SIP includes regulations, emissions inventories, documentation on how the State is reducing air pollution and achieving the air quality standard, and a public comment process.

The CAA also regulates what are called "hazardous air pollutants" (HAPs). HAPs are 187 chemicals that EPA considers especially dangerous to human health (U.S. Environmental Protection Agency, 2016). They vary from mercury, which is emitted when a power plant burns coal, to tetrachloroethylene (also known as perchloroethylene, or "perc") used by many dry cleaners, and from roofing and floor tiles containing asbestos, to benzene in gasoline at the pump. Larger sources of HAPs include power plants, cement plants, major airports, and large military bases. Smaller sources include auto body shops, dry cleaners, gasoline stations, and hospitals. EPA strongly regulates sources of HAPs through the National Emission Standards for Hazardous Air Pollutants (NESHAP)/Maximum Achievable Control Technology (MACT) program (U.S. Environmental Protection Agency, NESHAP Table). Most HAPs are regulated first with technology-based emission standards, and then sometimes supplemented with health-based standards. EPA has delegated to MDE the enforcement of these standards.

Maryland facilities that are required to obtain an operating permit, due to the magnitude and/or types of air pollutants that they emit, are required to annually submit to Maryland Department of the Environment (MDE) an emissions certification report including both their HAP and criteria pollutant emissions (Maryland Department of the Environment, Maryland's Air Quality Compliance Program).

Maryland Department of the Environment (MDE) has air monitoring sites (Maryland Department of the Environment, Ambient Air Monitoring Network Map) deployed across the state to measure ambient air concentrations of the criteria pollutants as well as HAPs (air toxics), meteorology, visibility, and other research-oriented measurements (Maryland Department of the Environment, Air Monitoring, Current Air Quality Conditions, and Ambient Air Monitoring Network). The monitoring data for the criteria pollutants are collected and analyzed to help determine the State's attainment of the NAAQS, for the purpose of the area designation process and for determining if a nonattainment area has attained the standard in the required time frame – by its attainment date (The Clean Air Act, 42 United States Code Sec. 7503).

Reducing Exposure to Radiation

The MDE Radiological Health Program is mandated, under the Annotated Code of Maryland, Environment Article, to control the uses of radiation and to protect public health and safety and the environment from inadvertent and unnecessary radiation exposure. A person cannot store or use a radiation (x-ray) machine or radioactive materials without first obtaining a registration, license, or

certification from MDE, and MDE conducts inspections and enforcement actions, where required, to ensure regulatory compliance (Maryland Department of the Environment, Radiological Health Program). In the County and State, radiation machines and radioactive materials are used in medical, dental, and veterinary offices and hospitals as well as in industrial, educational, and academic settings.

MDE has an initiative to raise awareness of the dangers of exposure to radon gas and to reduce exposures. Radon is a naturally occurring radioactive gas that is colorless and odorless. It comes from the decay of trace radioactive materials in the earth and migrates through the soil around building structures through cracks and openings, accumulating primarily in lower levels of structures. Concentrations may be high in one house yet low within an adjacent house, and concentrations can vary over time. Some locations in Maryland, including in Anne Arundel County, have had elevated radon. It is a known carcinogen and the second leading cause of lung cancer after tobacco smoke. See Maryland Department of the Environment, Radiological Health; http://mde.maryland.gov/programs/Air/RadiologicalHealth/Pages/radon; Maryland Department of Health, Environmental Health, Radon https://phpa.health.maryland.gov/OEHFP/EH/Pages/Radon.aspx; and U. S. Environmental Protection Agency, Radon, https://www.epa.gov/radon# f for information on testing and remediation for radon in homes, schools and businesses, and on making new homes radon resistant.

Air Quality Nonattainment Areas

The Baltimore region, which comprises Baltimore City and the surrounding counties of Anne Arundel, Baltimore, Carroll, Harford, and Howard, was designated a moderate nonattainment area for exceeding the 2008, 75 parts per billion (ppb), air quality standards for 8-hour ozone, and in the spring of 2018, designated a marginal nonattainment area for the 2015, 70 ppb, air quality standards for ozone.

Emissions from nitrogen oxides (NOx) and volatile organic compounds (VOC) are what contribute to Maryland's ground-level ozone problem, and reduction of these emissions is key to improving air quality. Studies and modeling data show that weather patterns often transport the pollutants well beyond the locality that produced the emissions. Up to 70% of Maryland's ozone air pollution comes from other states on Maryland's worst ozone pollution days. Emissions from motor vehicles in the Baltimore/Washington area are a significant cause of ground-level ozone pollution of the short-range transport type. Nitrogen oxides are also a significant pollutant to the Chesapeake Bay. Over 25% of the nitrogen pollution entering the Chesapeake Bay is from atmospheric deposition.

An area within a 17-mile radius of a coal-burning power plant in Pasadena has an EPA designation of "nonattainment" for the 1-hour SO2 standard. To fulfill the Clean Air Act requirements for nonattainment areas, the State has been developing a state implementation plan (SIP) to show how the area will come into attainment with the SO2 standard by September 2021, the date required by law. Since the area was designated "nonattainment" based on data generated by a computerized air quality model, air quality modeling data will also be used to determine if the nonattainment area has attained the standard by the 2021 attainment date. Relevant air monitoring data may also be taken into consideration.

Regulations and Programs

To help the State reduce air pollution and bring its nonattainment areas into compliance with the NAAQS, Maryland has implemented programs such as the Maryland Healthy Air Act (HAA), which

went into effect on July 16, 2007, and significantly reduces air pollution emissions from large coal-fired power plants in Maryland. MDE implemented the HAA through regulations that significantly reduced nitrogen oxides (NOx) and sulfur oxides (SOx) emissions (Code of Maryland Regulations , Chapter 26.11.27). Average annual SOx emissions in 2010-2017 dropped 91% from average annual SOx emissions in 2003-2009, prior to the HAA implementation phase for SOx. Average annual NOx emissions in 2009-2017 dropped 76% from average annual NOx emissions in 2003-2008, prior to the HAA implementation for NOx and prior to the first phase of MDE's 2015 NOx regulations for coal-fired electric generating units (Code of Maryland Regulations, 26.11.38). In addition, directly emitted particulate matter emissions were reduced 60%. As far as hazardous air pollutants, mercury emissions reductions exceeded the 90% reduction requirement for 2012 in 2010, and hydrogen chloride (HCl) emissions were reduced 83%. The Healthy Air Act and the subsequent NOx regulations have also significantly reduced atmospheric deposition of nitrogen to the Chesapeake Bay and other waters of the State.

Due in large part to the HAA, Maryland has also been in attainment with the NAAQS for fine particulate matter (PM2.5) across the state since 2010. The HAA has brought Maryland much closer to attainment of the ozone NAAQS, including EPA issuing a clean air quality data determination for the Baltimore area for the 2008 ozone standard. The Baltimore area is now a nonattainment area for the 2015 ozone standard, but the area's classification is "marginal" nonattainment, meaning that the ozone concentrations are just slightly above the standard compared with the area's past classification as a "moderate" or "serious" nonattainment area.

Maryland has an open burning ban that is in effect in Anne Arundel County annually between June 1 and September 1. The ban includes open burning that is primarily used as a form of disposal of certain waste materials by individuals, farmers, and developers. The ban does not affect backyard barbecue grilling or open fires for recreational purposes, such as campfires (Code of Maryland Regulations, 26.11.07). The Anne Arundel County Department of Health issues licenses for open burning at times of the year when the ban is not in effect (Anne Arundel County Department of Health, Requirements for Open Fires, Fire Pits, Bonfires, and Open Burning).

Collaborations for Air Quality and Climate Change

The Baltimore Regional Transportation Board (BRTB), including representatives from Annapolis and Arundel County, develops transportation plans and conducts analyses to ensure that transportation plans and projects are consistent with State Implementation Plans for air quality protection. The State of Maryland is a member of the Ozone Transport Commission (OTC), a multi-state organization created under the Clean Air Act responsible for advising EPA on transport pollution issues and charged with developing and implementing regional solutions to the ground-level ozone problem in the Northeast and Mid-Atlantic regions. The OTC has been working since 1991 to coordinate reductions in air pollution that benefit the region. Both the BRTB and OTC include public and stakeholder processes in which local residents can participate.

The Healthy Air Act also required that Maryland participate in the Regional Greenhouse Gas Initiative (RGGI) which is aimed at reducing greenhouse gas emissions. It is a cooperative effort by Maryland and eight other northeastern and mid-Atlantic states to reduce carbon dioxide emissions from electricity generating plants (see https://www.rggi.org for more information). RGGI has been successful in

developing the first cap and trade program that is designed to reduce carbon dioxide, a greenhouse gas, while maintaining energy affordability and reliability. Also, RGGI invests its revenues into energy and environmental programs such as for renewable energy and energy efficiency. In 2017, Maryland and the other RGGI participating states announced a consensus agreement on a regional emissions cap trajectory that will provide an additional 30% cap reduction by the year 2030.

The Maryland Commission on Climate Change (MCCC) is chaired by MDE's Secretary and consists of 26 members representing a wide variety of interests. In 2016, based on the recommendation of the MCCC, an enhanced Greenhouse Gas Reduction Act was signed into law in Maryland. It includes a requirement for Maryland to reduce greenhouse gases 40 percent from 2006 levels by 2030 (referred to as "40 by 30").

Anne Arundel County supports the Federal, State and regional regulations and programs by adopting a land use pattern that has a positive influence on air quality. The following are types of development that are encouraged within the County through the General Development Plan and implemented through the County's Zoning Ordinance, Subdivision Ordinance and the town center master plans to help curb adverse pollution effects:

1. Mixed-use development: locates complementary land uses such as residential, commercial and employment within walking distance of each other,
2. Transit-oriented development: encourages transit use by developing moderate to high-density residential uses, shopping, and employment centers along the MARC system,
3. Infill development: encourages pedestrian and transit travel by locating new development in existing developed areas where activities are closer together, and
4. Town centers: encourages pedestrian and transit travel within these growth areas.

Other measures undertaken by the County to control air pollution are implementation of the County's Pedestrian and Bicycle Master Plan (2015) that promotes biking and walking; the County's Transit Development Plan (2010), which is a five-phase document identifying local bus transit needs and recommending services to meet those needs; and the Corridor Growth Management Plan (2012) which evaluates the feasibility of increasing use of alternative modes of travel. In addition, Anne Arundel County has two transportation management associations, The Annapolis Regional Transportation Management Association and The BWI Business Partnership. These organizations advocate and promote transportation demand management strategies to reduce traffic congestion and air pollution, reduce commuting cost and provide a central information service for ridesharing and public transportation.

Noise Pollution

Noise at excessive levels affects quality of life and the environment. It impacts the lives of many County residents, particularly noise that is generated from transportation sources such as highway traffic, railroads and aircraft operations as well as construction and industrial activities.

Point source noise pollution (such as stationary construction equipment) and non-point sources (such as vehicular traffic) are transferred through vegetative and non-vegetative features to a receiver. The

method of noise transmittal determines the noise impacts that could vary based on elements such as terrain, highway alignment, and intervening structures within the noise transmission path.

Noise impacts can be severe and have significant effects on humans, including hearing loss. Considerable research has been conducted to determine the effects of various sound pressure levels on human health. In addition to existing noise attenuation measures, appropriate land use planning policies can protect people by minimizing the noise impacts.

Regulations and Programs

Many regulations and programs adopted by the State and Anne Arundel County currently assist in minimizing noise impacts. Maryland's Environmental Noise Act of 1974 sets limitations on noise levels which will protect the general health, welfare and property of the State. It requires that the Maryland Department of the Environment (MDE) assumes responsibility over the level of noise and establishing regulations for the control of noise, including for ambient noise levels and enforcing the standards and regulations. Effective October 1, 2012, MDE is no longer responsible for noise enforcement. Maryland House Bill 190 transferred noise enforcement authority to local governments. MDE continues to be responsible for setting statewide standards and general exemptions.

Environmental Noise Standards

Table 9 shows the maximum sound levels that represent the State standards by general land use category. Noise is measured in decibels and quantified by statistical descriptors, Leq (constant average sound level over a period of time) and Ldn (day-night average sound level for a 24-hour day).

Table 9: Environmental Noise Standards

Land Use Category	Level	Measure
Industrial	70 dBA	Leq (24)
Commercial	64 dBA	Ldn
Residential	55 dBA	Ldn

State noise regulations set maximum day and night sound level limits for receiving land uses. Table 10, below, shows the maximum allowable noise levels for industrial, commercial, and residential land uses.

Table 10: Maximum Allowable Noise Level (dBA) for Receiving Land Use Categories

	Industrial	Commercial	Residential
Day	75	67	65
Night	75	62	55

Highway Noise

The Maryland State Highway Administration (SHA) Noise Policy provides for the evaluation of sound barriers for communities that are adversely impacted by noise from new and existing State maintained highways. SHA also helps reduce noise levels though land use control and highway planning and design,

as well as a Sound Barrier Policy with Type I and Type II Programs that meet federal regulations (MD SHA Sound Barrier Guidelines, 2018).

The Anne Arundel County Code (17-6-110) addresses highway noise by regulating the minimum distance a residential dwelling can be from the edge of the mainline pavement of certain roads in the County. Figure 14 shows the roads in the County that have this buffer. Required setbacks may be reduced if a site plan is designed to place outdoor activity areas in rear yards that are shielded from highway noise by proposed dwelling units that are clustered to minimize front yards or to contain parking areas; or the developer conducts a noise study using Federal Highway Administration prediction methods and the study reflects that the highway traffic sound level in outdoor activity areas is at or below 66dBA or that noise mitigation measures will bring the highway traffic sound level to a level at or below 66dBA in outdoor activity areas and 45dBA in indoor residentially occupied building spaces with highway traffic sound levels at the exterior building facades that exceed 66dBA.

Airport Noise

The Environmental Noise Act of 1974 also required the Maryland Department of Transportation Maryland Aviation Administration (MDOT MAA) to adopt an Airport Noise Zone (ANZ) and Noise Abatement Plan (NAP) at Baltimore-Washington International Thurgood Marshall Airport to minimize the impact of aircraft noise for those living near the airport and prevent incompatible land uses around the airport. See Figure 15 for the current (2014) BWI Marshall Airport Noise Zone contour. MDOT MAA plans to update this contour beginning in 2019. The NAP recommends measures to monitor and reduce or eliminate impacted areas. In developing the NAP, the MDOT MAA works with an advisory committee composed of neighborhood representatives, airport officials, and local, State and Federal officials. The MDOT MAA is required to update the ANZ and the NAP every five years to account for changes in flight paths, total annual aircraft operations, and aircraft types.

In general, residential land uses around the airport are considered incompatible in areas of 65 dBA or greater. There are some residences in these areas that existed prior to the airport, but for the most part, land outside of the airport is zoned for industrial uses. In addition, the MDOT MAA has an FAA-approved voluntary land acquisition program to acquire residential properties severely impacted by aircraft noise and a residential sound insulation program to provide sound insulation treatments to eligible homes to mitigate existing aircraft noise from BWI Marshall operations.

Railroad Noise

The Federal Railroad Administration (FRA) relies upon the Federal Transit Administration noise and vibration impact assessment procedures for assessing improvements to conventional passenger rail lines and stationary rail facilities and horn noise assessment. Train noise can often be controlled through modifications to the trains or tracks or through construction of low noise barriers or berms. FRA's Office of Safety is responsible for enforcing the Railroad Noise Emissions Compliance Regulation that sets maximum sound levels from railroad equipment and for regulating locomotive horns.

Figure 14: Highway Noise Buffers

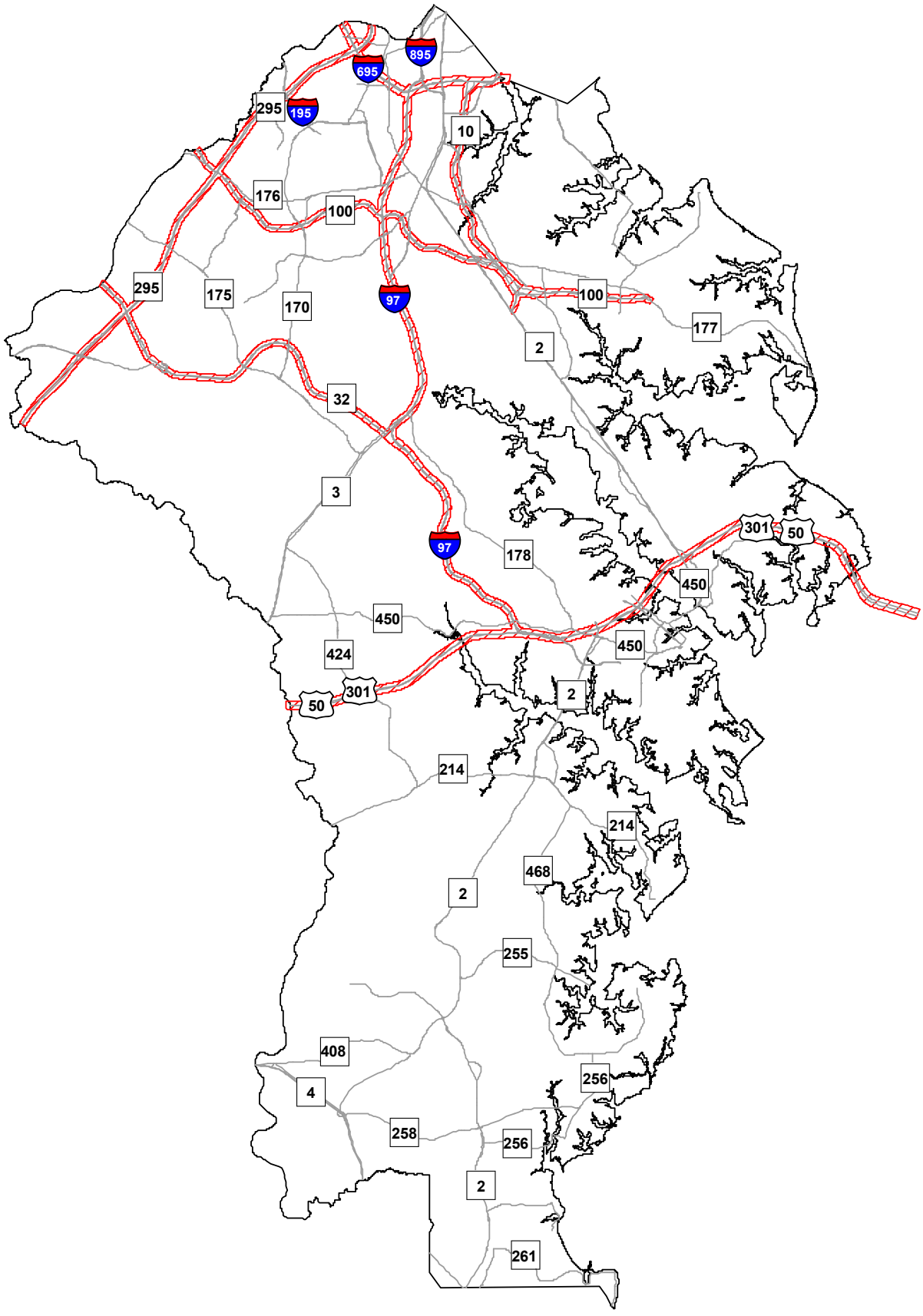
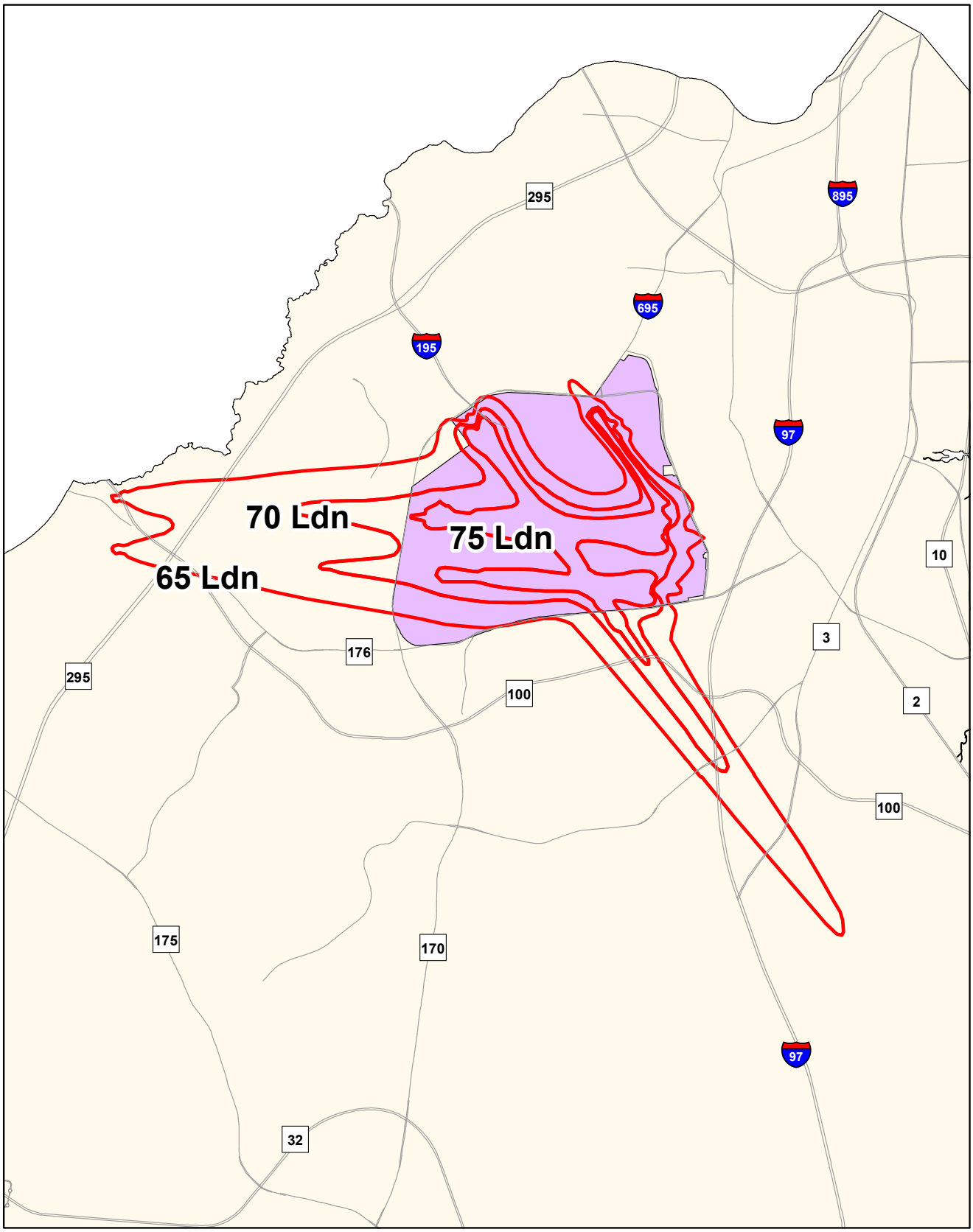


Figure 15: BWI Marshall Airport Noise Zone contour



Most Other Noise

Most other noise sources were previously addressed by MDE. Effective July 1, 2005, MDE's Noise Control Program was de-funded by action of the Maryland Legislature. MDE continues to provide advice to the public concerning noise problems, but as directed by the legislative action, noise issues are now referred to local governments for action.

Current County Goals and Strategies for Reducing Noise Impacts

The 2009 GDP established a goal to reduce noise pollution. To help achieve this goal, the GDP identified the following actions:

1. Amend the County's noise ordinance to incorporate the authority given to the County by the State of enforcing noise standards and regulations.
2. Assess current noise regulations, evaluate existing highway noise buffers and consider buffers or additional roads, airports, and railways.
3. Amend the County Code to include the State's noise standards and regulations.

Coastal Flooding

Anne Arundel County is prone to three types of flooding: nontidal flooding from rivers and streams (riverine); tidal flooding from storm surges and tides; and coastal flooding caused by intense winds and heavy rains from tropical storms, hurricanes and steady on-shore winds and elevated tide levels.

Inland or Non-tidal Flooding

Short periods of intense rainfall or moderate rainfall over an extended period of time, leads to rising levels in area creeks, streams and rivers. As these water bodies overtop their banks and flow into adjacent floodplains, nearby roads or structures in floodplain areas can be impacted.

Coastal Flooding

Coastal and tidal flooding can also impact the community. The most severe coastal flooding is possible during significant storm events such as tropical depressions, tropical storms, or hurricanes. Such storms can generate very significant tidal surges. Occasionally, coastal areas may flood when prevailing winds lead to tidal departures and abnormally high tides. Finally, even during periods of normal high tides storm drain outfalls and open ditches may be inundated and cease to function until the next low tide. This can lead to periods of standing water in ditches or at storm drain inlets along roadways.

Sea Level Rise

Anne Arundel County is almost completely surrounded by tidal and non-tidal waterways and has over 533 miles of shoreline. Historical records suggest the possibility of sea level rise occurring along Maryland's coastal areas. In 2011, the County partnered with the Maryland Department of Natural Resources (MDNR) through the Coastal Communities Initiative Program and published a Sea Level Rise Strategic Plan that studied the potential sea level rise impacts and identified adaptation strategies. The project included four major components: 1) a vulnerability assessment to identify potential areas impacted by sea level rise and develop inventories of resources at risk; 2) development of a framework

for interagency strategic planning; 3) development of a strategic plan; and 4) public outreach and education to promote public awareness.

The Plan summarizes the State's recent research and planning efforts related to potential sea level rise; discusses the key findings from the vulnerability assessment and other planning analysis; identifies the major planning issues for the County as related to potential sea level rise; and recommends future actions to protect resources and minimize impacts.

It is recognized that strategic planning for potential sea level rise will be an ongoing and transitioning process as more research, analysis and guidance becomes available from State and Federal agencies and the scientific and academic communities.

Areas in the County most susceptible to coastal flooding are the Deale/Shadyside and Mayo areas (see Figures 16 and 17). In general, due to the vast coastline, most low lying areas of the County will be impacted by coastal flooding. Coastal flooding has the potential to lead to:

1. Loss of ecologically significant land
2. Impact private residential properties and property values
3. Impair road access
4. Impair public utility infrastructure
5. Disrupt well and septic systems
6. Damage or loss of parkland, archaeological, and cultural resources
7. Adversely impact the maritime industry
8. Shoreline erosion

The County's primary focus for potential sea level rise planning efforts have been more on reducing impacts to existing development and resources, as opposed to determining where and to what extent future development should be limited or restricted. Although the latter may also be necessary in the future as better estimates of development capacity are determined and potential sea level rise projections are refined, it is currently believed that due to the fairly mature state of development in the County, the relatively low- density zoning in place in most vulnerable areas, as well as existing development regulations that limit development in these areas, future development potential is already limited to a significant degree. In addition to the County's subdivision code and zoning ordinance which govern land use and development countywide, the State Critical Area regulations and FEMA floodplain regulations provide additional controls on future development that may occur within vulnerable areas.

Dispersed Energy

Maryland's Renewable Energy Portfolio Standard Program has increased interest in solar efficiencies and government promotional incentives. The Program represents both a potential for great gain and a threat to the fabric of our communities. It has prompted solar energy companies to proactively explore opportunities to locate community solar energy generation facilities around the State. Due to interest from several solar energy companies in locating facilities in Anne Arundel County, the County determined a need to review and assess current regulatory requirements governing solar and other

Figure 16: Potential Sea Level Rise projections - Deale / Shady Side

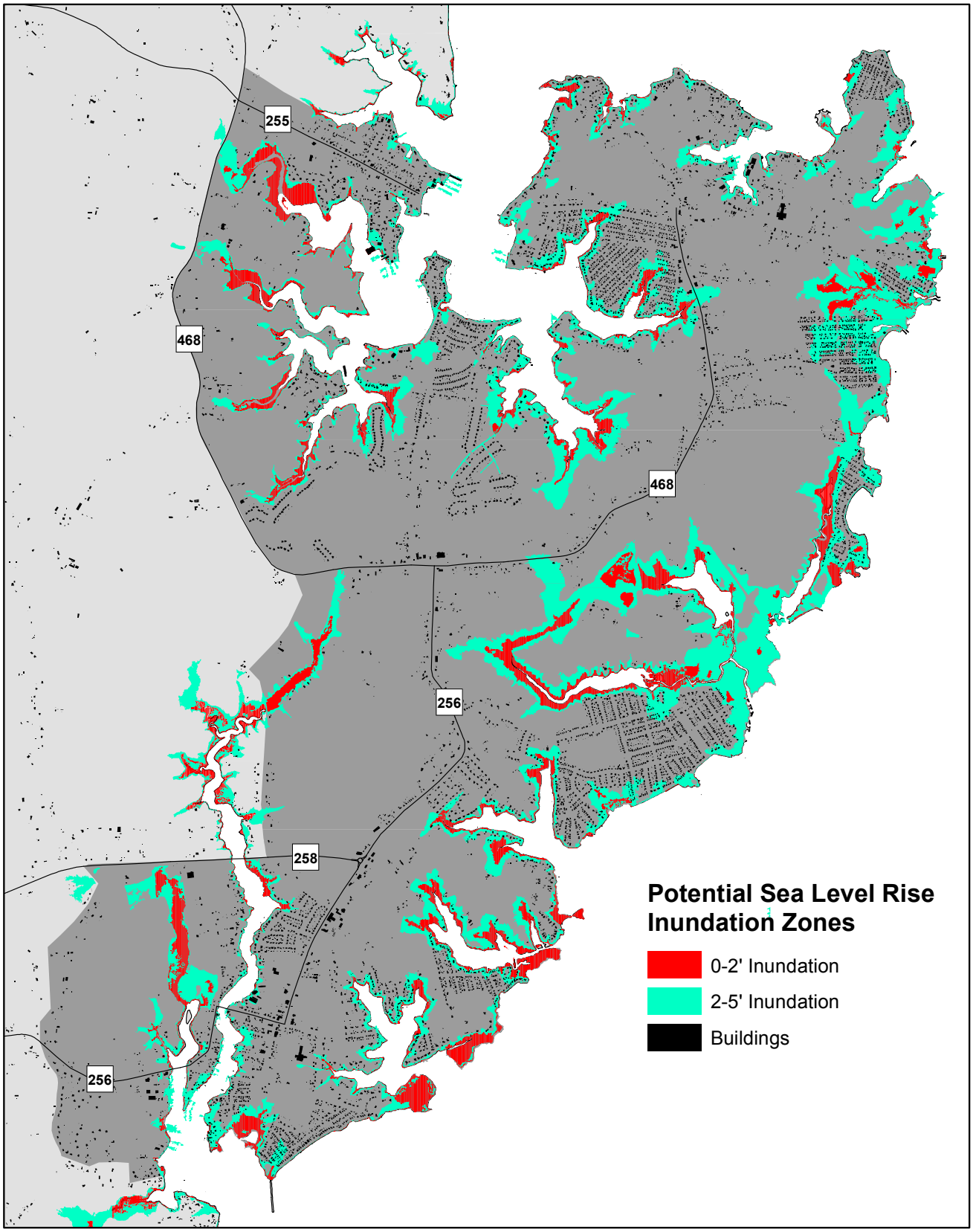
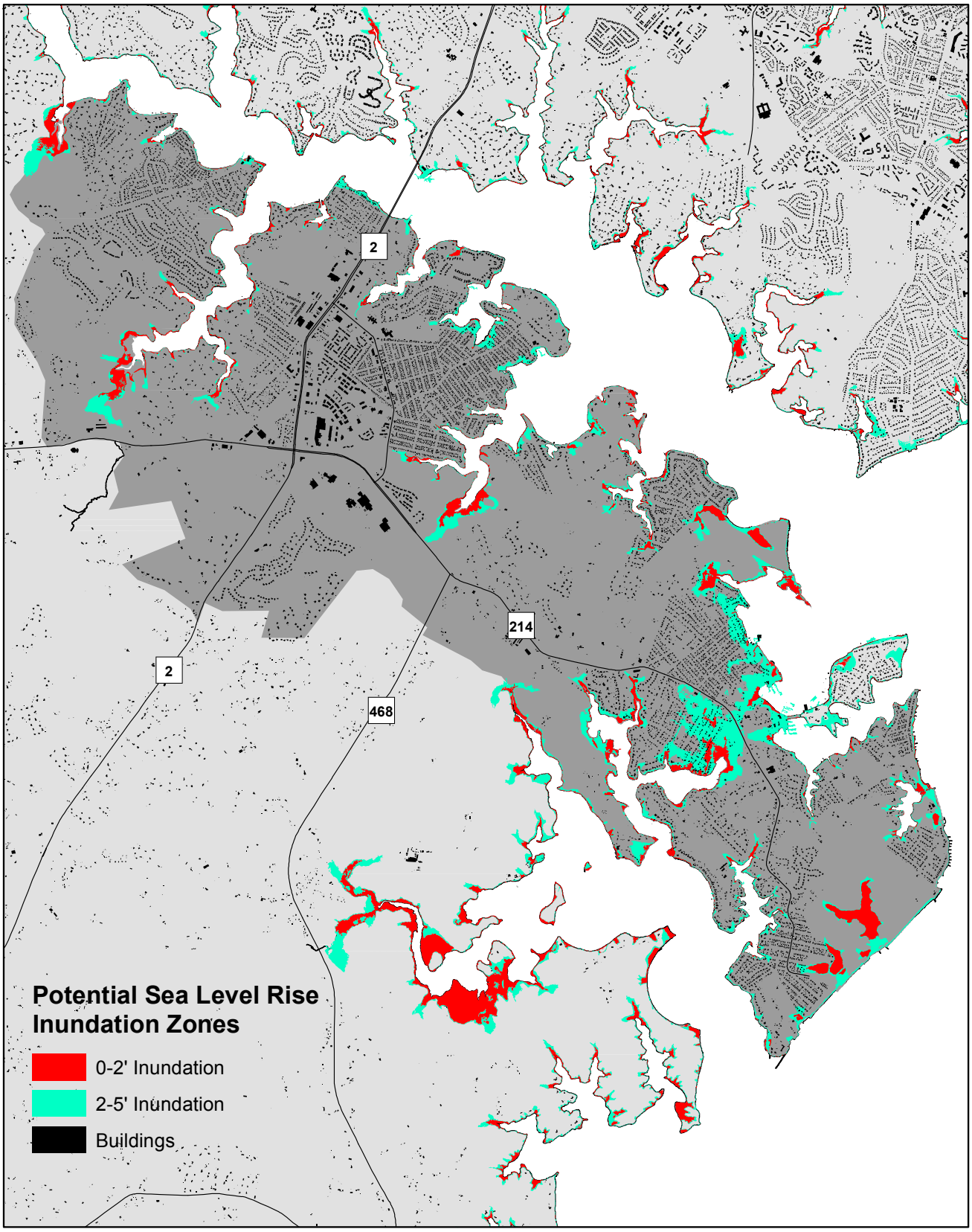


Figure 17: Potential Sea Level Rise Projections - Edgewater / Mayo



dispersed energy facilities and to determine whether revisions to the County Code were needed. A temporary moratorium on the approval of dispersed energy facilities was put in place in 2018.

In coordination with this moratorium and to facilitate this review, the County's Agriculture, Farming and Agri-Tourism Commission established a Dispersed Energy Committee in 2018. The Dispersed Energy Committee was charged with a goal of ensuring that dispersed energy generation projects are appropriately permitted, sited and managed in a way that is consistent with County land use goals and policies and also minimizes any impacts to surrounding land uses, particularly in rural and agricultural areas. The Committee developed and produced a report with recommendations being drafted for County Council consideration.

Challenges, Conclusion, and Future Needs

Comprehensive and functional master plans such as the General Development Plan (GDP), the 16 Small Area Plans, the Greenways Master Plan, Land Preservation, Parks and Recreation Plan, and the Pedestrian and Bicycle Master Plan have provided a good framework for natural resource land conservation in the County. The integration of the plans with implementation tools such as the Forest Conservation Program; the Critical Area Program; the Subdivision, Zoning, and Floodplain Ordinances; the comprehensive Watershed Assessment and Planning documentation; and the Watershed Management Tool has led to significant progress in implementation of the goals.

Watershed Assessment and Protection

Watershed protection is currently accomplished through a number of individual programs including watershed management plans, the erosion and sediment control program, the stormwater management program, stormwater NPDES permit, and the Critical Area program. Future needs include:

1. Continued progress toward completing watershed management plans for the entire County, including a program for plan recommendation implementation,
2. Continued and enhanced coordination between the existing and proposed programs,
3. Development of environmental zoning overlay zones,
4. Continued encouragement of no net loss of wetlands and development of programs for wetland creation and restoration,
5. Development of a method of identifying and tracking protected lands throughout the County, including those protected through private means (e.g., private land trust easements), and
6. Review and update of steep slopes criteria within the County to better protect and preserve this sensitive resource.

Land Conservation

The Greenways Master Plan and the Land Preservation, Parks and Recreation Plan have established strategies and actions for protection of the green infrastructure network. Consolidation of these strategies and actions in Plan2040 as well as better linkage between the programs will help facilitate implementation. Additional recommendations for consideration may include:

1. Developing more specific implementation and management plans as needed;
2. Integrating the Greenways Master Plan into County planning, capital programming, and development review processes;
3. Establishing an interagency Green Infrastructure Network Program;
4. Creating a strong public involvement program;
5. Creating dedicated green infrastructure funding and incentive mechanisms; and
6. Redefine the Open Space zoning district to separate limited active uses from conservation uses.

Agricultural Preservation

Plan2040 will enhance or revise existing policies and strategies or propose new ones in order to increase participation in the voluntary programs. As previously noted, goals and strategies for agricultural and woodland preservation often overlap with related goals and strategies for land preservation, watershed restoration and natural resource conservation. Therefore, Plan2040 will consider all plan elements in laying out its goals, policies and strategies.

Mineral Resources

Surface mining operations within Anne Arundel County continue to support the local and regional economy. For those mining operations near the end of their active mineral extraction, State and County planners should continue to cooperate to ensure that site reclamation complies with long term land use planning. This is critical for reclamation sites within planned growth boundaries as these areas have a greater chance for experiencing long-term land use changes. The County continues to periodically update and evaluate existing mining operations and current reclamation plans status for compliance with locally adopted land use plans. Greater coordination with Maryland Department of the Environment, Bureau of Mines, to identify post mining land uses is necessary.

Challenges and Issues Identified During the Plan2040 Listening Sessions

Listening sessions participants identified challenges and issues such as the the need for additional open space / green space, air pollution, preservation of more trees, preservation of the Chesapeake Bay, the use of renewable energy resources, sea level rise, hazard mitigation planning, lost wildlife habitat, conservation of Critical Areas, agricultural preservation and protection of natural buffers.

The challenges, issues and identified needs identified in this report will be addressed during the development of Plan2040.

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