



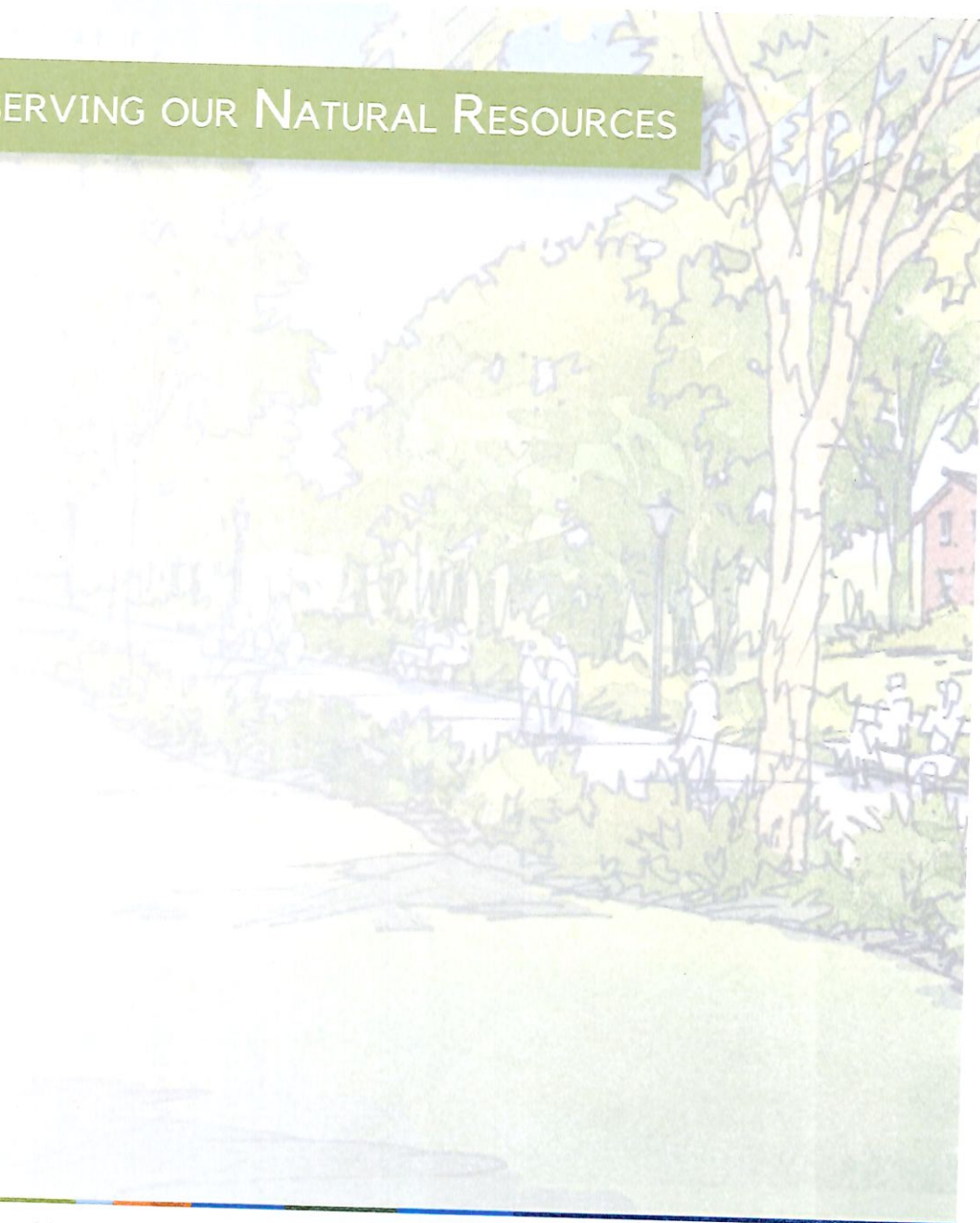
CHAPTER 3  
ECOLOGICAL HEALTH

# ECOLOGICAL HEALTH: PROTECTING AND PRESERVING OUR NATURAL RESOURCES

From its beautiful natural areas to its picturesque working farmlands, Howard County residents have a deep appreciation for protecting and preserving the environment. This chapter discusses the opportunities to deepen Howard County's commitment to environmental stewardship and create better compatibility between the natural and built environments.

Both landscape and environmental factors play a large role in how character is defined within a community. A protected and celebrated natural environment brings significant economic opportunities and enhances quality of life, health, and well-being. Approximately 39% of the County is in parkland, open space, and easement (agricultural, environmental, and historic), and the County continues to invest in the protection and restoration of the natural landscape. Recent actions include adoption of enhanced stormwater management requirements in the Tiber Branch and Plumtree Branch watersheds to address flooding; an overhaul of the Howard County Forest Conservation Act to increase forest retention and mitigation for clearing; early-stage implementation of the Green Infrastructure Network Plan; and acquisition of additional agricultural land preservation easements. Preservation and growth management efforts, including the existing Planned Service Area boundary, have contributed to the current pattern of land uses, where the Rural West is predominantly rural residential, agricultural, and conserved land, and the eastern portion of the County is more traditionally suburban with parks and open space.

Protection and restoration of natural resources will be crucial to the future of Howard County, as climate change alters how we interact with and plan for our developed environments. PlanHoward 2030 included many recommendations that have seen success in the County. HoCo By Design celebrates and builds on this success, recommending further actions to protect and restore natural resources within the County, which will also provide climate change mitigation and adaptation.



## What WE Heard

Throughout the public engagement process, a common thread of discussion was the importance of the natural environment, parkland, and open space in Howard County. Participants expressed strong interest in increasing protections for natural resources and farmland, expanding access to existing parks, exploring opportunities for enhanced, flexible open spaces in site planning requirements, and integrating climate change mitigation and adaptation measures throughout county land use policies.

Many participants advocated for increased implementation of the Green Infrastructure Network Plan and enhanced protection and management of watersheds throughout the County. Participants also emphasized the importance of stormwater management and the need for aggressive development regulations for forest preservation and tree canopy protection to combat heat island effects and climate change. Other participants raised concerns that while environmental regulations may have benefits, they can also complicate redevelopment, infringe on private property rights, and compromise a property's value. Some community members were concerned for those who are already cost-burdened, including low-and moderate-income households, and who may be least able to retrofit their homes to prepare for severe weather impacts, including increased heat and flooding.

Policies and implementation actions within HoCo By Design help support ecosystem health by ensuring natural resources within the County are restored, protected, and managed for long-term health. These measures will, in turn, help the County address climate change mitigation and adaptation. This Plan provides strong natural resource protection recommendations, while also advancing other equity goals, such as affordable housing.

### Diversity, Equity, and Inclusion Focus Groups Findings

- Desire to protect natural resources while advancing other equity goals such as affordable housing.
- Those already cost burdened—low/moderate income households—may be least able to retrofit their homes to prepare for severe weather impacts, including flooding and heat waves
- Suggestion to combat heat island effect and address global warming

### Equity in Action

The following equity best practices inform several of the implementing actions in this chapter. Each implementing action that directly advances equitable outcomes will be noted with a "🔥" symbol.

- Reduce household energy costs with climate mitigation measures
- Protect populations in vulnerable areas from natural hazards **and health hazards caused by airplane noise and particulate**
- Promote environmental justice and increased representation through environmental education
- Build housing in a way that reduces harm to the environment and improves resident health outcomes

## StratEgic Advisory Group InPut

During the HoCo By Design process, three Strategic Advisory Groups were formed to advise the project team on specific opportunities and challenges that were identified.

The Environment Strategic Advisory Group (SAG), comprised of a multi-disciplinary group of experts, was asked to address the following questions: How should the County increase natural resource protection and restoration measures? What additional climate change mitigation and adaptation measures should the County consider? The SAG was additionally asked to focus on natural resource measures to answer the climate change questions, as other actions to address climate change are specified in the County's Climate Action Plan. However, the SAG wanted to ensure that the two plans are complementary.

The SAG's response to these questions began with the overarching concept that a healthy environment is an essential base for a healthy culture and economy. Environmental health in turn is based on healthy ecosystems that support diverse native flora and fauna and are resilient to future changes, including those from climate change. Members agreed that watershed planning and management provides a useful framework for protecting and restoring natural resources. The group also expressed the need to identify communities most vulnerable to climate change and develop solutions related to land use that can help them become more resilient. The SAG also provided recommendations on addressing flood mitigation and stormwater management under a changing climate, increasing regulatory protections and incentives for natural resource protection and restoration and sustainable development, implementing the Green Infrastructure Network Plan, and promoting environmental stewardship. A report of the SAG's findings is available from the Department of Planning & Zoning.

## Ecological Health terms

**Ecosystem:** – An ecosystem is comprised of all living organisms, the physical environment, and the relationships between the living and inanimate elements within an area.

**Watershed:** A watershed is the land area that drains to a body of water, such as a lake or river.

**Climate Change:** Climate change is a significant, long-term shift in weather patterns for a specific geographic region.

**Climate Change Mitigation:** Climate change mitigation seeks to limit climate change by reducing the generation or increasing the removal of greenhouse gases from the air.

**Climate Change Adaptation:** Climate change adaptation seeks to moderate or avoid harm from the current and expected impacts from climate change.

# SuPPorting tHE County's Ecological HEalth

Howard County contains a wealth of natural resources, including forests, meadows, wetlands, streams, and lakes, which are linked together through ecosystems (see Map 3-1). Ecosystems are comprised of all living organisms, the physical environment, and the relationships between the living and inanimate elements within a particular area. Ecosystems provide a wide variety of services that benefit humans and other species, including food production, clean water, flood control, temperature regulation, recreational opportunities, and aesthetic value. However, their monetary values are often overlooked, until human intervention is needed to repair or replace them. It is generally far more cost-effective to protect a healthy ecosystem than to try and restore one that has been degraded.

The health of these ecosystems—ecological health—is the foundation that supports economic and community health and personal well-being. Human activities can negatively affect ecological health by removing or degrading natural resources, but people can also help restore and protect these resources. The challenge is to meet current human needs while ensuring actions protect and restore ecological health so that it may continue to support future life.

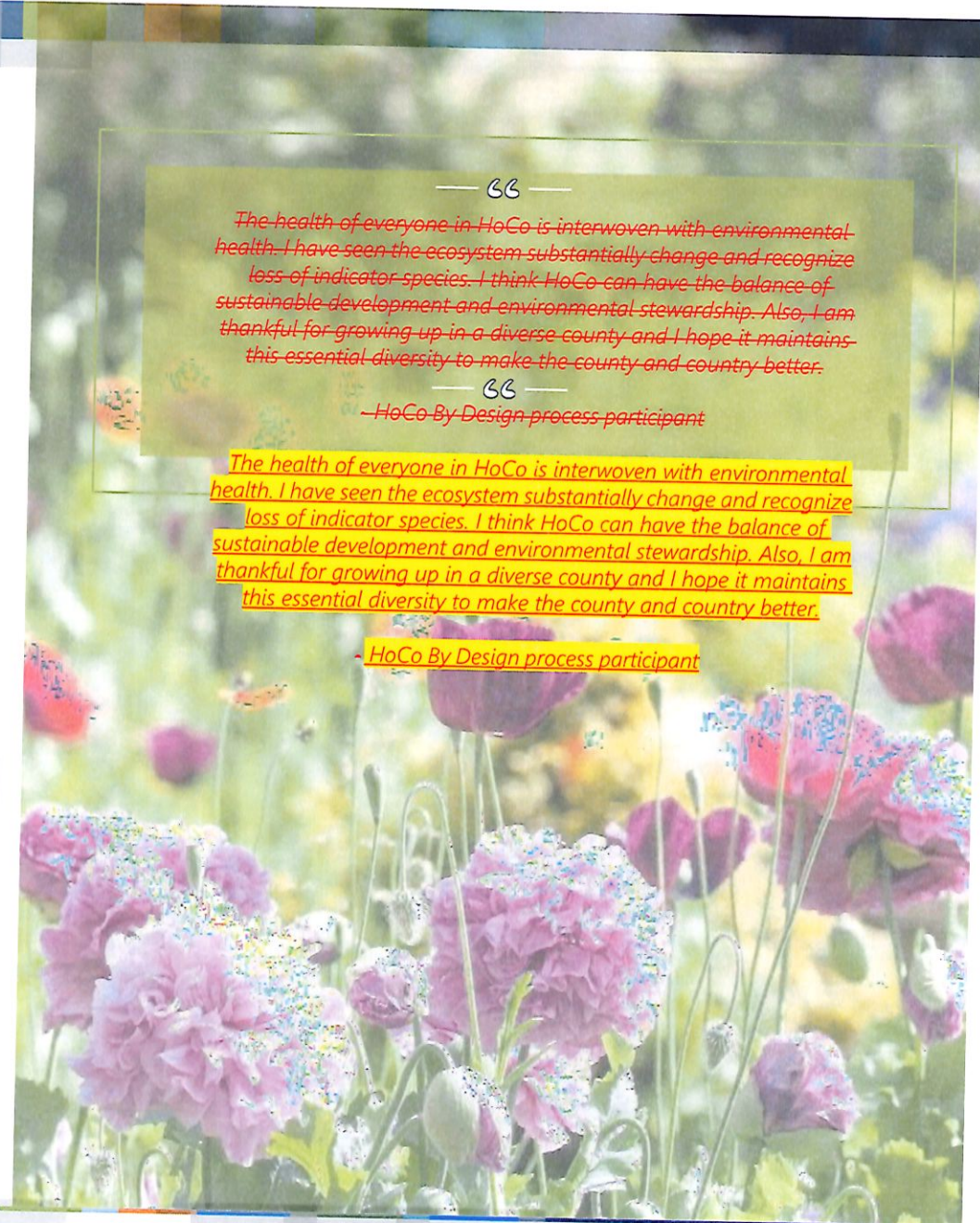
Through the January 27, 2021 Executive Order 14008 on Tackling the Climate Crises at Home and Abroad, the United States joined an international movement by countries to pledge conservation of at least 30% of their land and water by 2030. This pledge is intended to help protect biodiversity and mitigate climate change through locally led conservation efforts. Howard County already has 39% of its land and water conserved in parkland, open space, and easements. The County should continue to support this movement by establishing a goal for natural resource conservation. This goal could be for the County as a whole and each major watershed.

## **EH-1 Policy Statement**

Continue to support the County's ecological health.

## **Implementing Actions**

1. Integrate the goals of protecting and restoring the County's ecological health when updating county programs, regulations and policies.
2. Ensure adequate funding for programs and measures to protect and restore the County's ecological health, track outcomes of these investments, and provide necessary maintenance and enforcement.
3. Create a dedicated funding source, as was done for the Agricultural Land Preservation Program, for environmental programs.
4. Establish a natural resource protection goal for the County and each major watershed to help protect biodiversity and mitigate climate change.
5. Develop open space percentage requirements for activity centers.



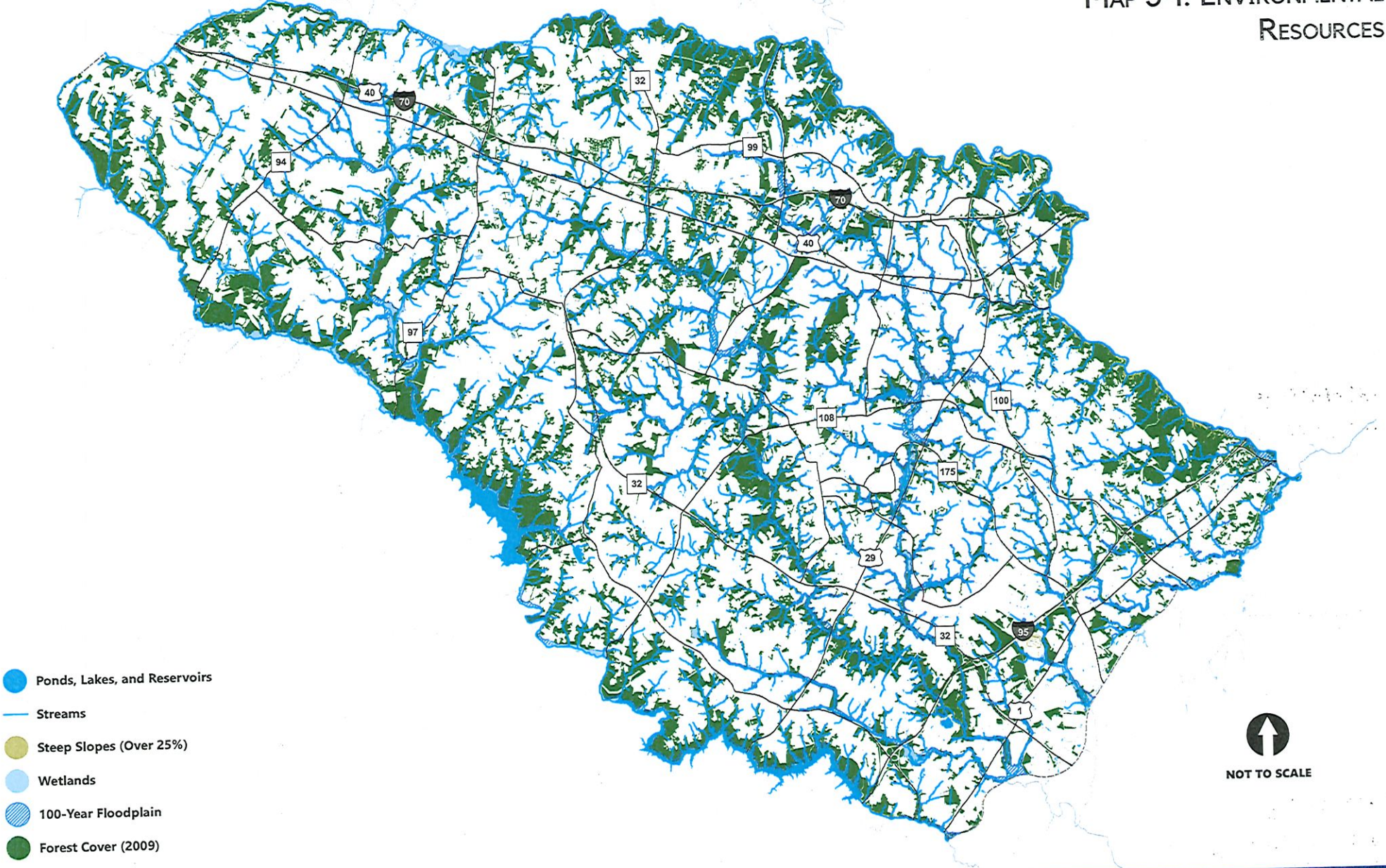
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*The health of everyone in HoCo is interwoven with environmental health. I have seen the ecosystem substantially change and recognize loss of indicator species. I think HoCo can have the balance of sustainable development and environmental stewardship. Also, I am thankful for growing up in a diverse county and I hope it maintains this essential diversity to make the county and country better.*

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*- HoCo By Design process participant*

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- HoCo By Design process participant

# MAP 3-1: ENVIRONMENTAL RESOURCES



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*-HoCo By Design process participant*

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## Mitigating and Adapting to Climate Change

Climate change can be generally defined as a significant, long-term shift in weather patterns for a specific geographic region. The National Oceanic and Atmospheric Administration's (NOAA) Fourth National Climate Assessment notes that emissions of the long-lived greenhouse gases carbon dioxide, methane, nitrous oxide, and fluorinated gases are causing climate change as they build up and trap heat in the atmosphere. The assessment further notes that greenhouse gas (GHG) emissions come from human sources (fossil fuel combustion, industrial processes, deforestation) and natural sources, but emissions from human sources have increased dramatically since the start of the industrial age and the growing use of coal, oil, and natural gas.

NOAA's Maryland State Climate Summary (2017) projects impacts in Maryland from climate change will include increased average annual precipitation, especially during the winter and spring. More frequent and intense rainfall events are also projected, which could lead to more flooding events in urban areas and expanded flood inundation areas. Projected changes also include higher daytime and nighttime temperatures, which could intensify droughts. NOAA further projects that the oceans will continue to warm and sea levels will continue to rise, which may displace people living along the coast. These effects combined could shift available habitat and impact migratory patterns for plant and wildlife species. If these shifts occur at a rapid pace, species that cannot adapt quickly enough may not survive.

Not only could climate change have a devastating impact on the natural environment and plant and wildlife species, it could also economically distress many households, businesses, and families. Families could experience higher energy bills resulting from temperature extremes, unless they are able to upgrade the heating and cooling systems in their homes. They may also need to further weatherproof their homes and retrofit their properties to add stormwater management for more frequent nuisance flooding. While all households may experience impacts from climate change, lower-income and cost-burdened households could have significant challenges affording these extra costs. In Howard County, as of 2018, 5% (5,732) of all households are below the poverty line and 23% (27,310) of households are in the ALICE (Asset Limited, Income Constrained, Employed) income bracket. Financial assistance programs are available to assist income-qualified households, such as weatherization programs funded by federal and state grants.

## Mitigation Measures

Mitigation measures to reduce GHG emissions in our region can include reducing the use of fossil fuels through energy conservation and efficiency in buildings and transportation, switching to renewable energy, and promoting carbon sequestration through natural resources and agriculture. Carbon sequestration is the process by which atmospheric carbon dioxide is taken up by trees, grasses, and other plants through photosynthesis and stored as carbon in biomass (trunks, branches, foliage, and roots) and soils.

Many Smart Growth policies promote development patterns and actions that are in harmony with climate mitigation goals. Policies that promote compact growth, walkable communities, green buildings, complete streets, and increased transit reduce fossil fuel use. Other policies promote protecting environmental resources, such as wetlands and forests, and preserving open space and agricultural land, which can provide carbon sequestration and help mitigate increased temperature extremes. [HoCo By Design's Smart Growth strategy of targeting redevelopment in mixed used activity centers offers opportunities to preserve existing environmental resources by directing growth away from undeveloped lands and creating compact, walkable communities that support transit investment and innovative green building design.](#) Zoning and other policies can promote renewable energy by making it easier to include solar and other on-site or local renewable energy generation, especially on developed parcels. Mitigation measures can help communities improve their quality of life and save money through reduced energy costs, an important outcome for everyone, but especially for low-income or cost-burdened households.



Photo Credit: Sue Muller

## Adaptation Measures

Adaptation will also be needed to address impacts from the climate changes occurring now and in the future due to existing levels of GHG in the atmosphere. Adaptation measures in our region could include the following:

- Revising building and construction standards to increase the resilience of buildings and roads to extreme weather events;
- Planning microgrids with on-site power generation to preserve critical public safety functions during major power outages;
- Revising stormwater management standards to address short-term, intense storms in areas that are or will become prone to flooding;
- Changing agricultural crops, and reforestation and landscaping species to those that are better suited to a warmer climate;
- Changing agricultural and forest pest management to address new pest species or the need for more frequent treatment; and
- Conserving and planting more trees to reduce the urban heat island effect.

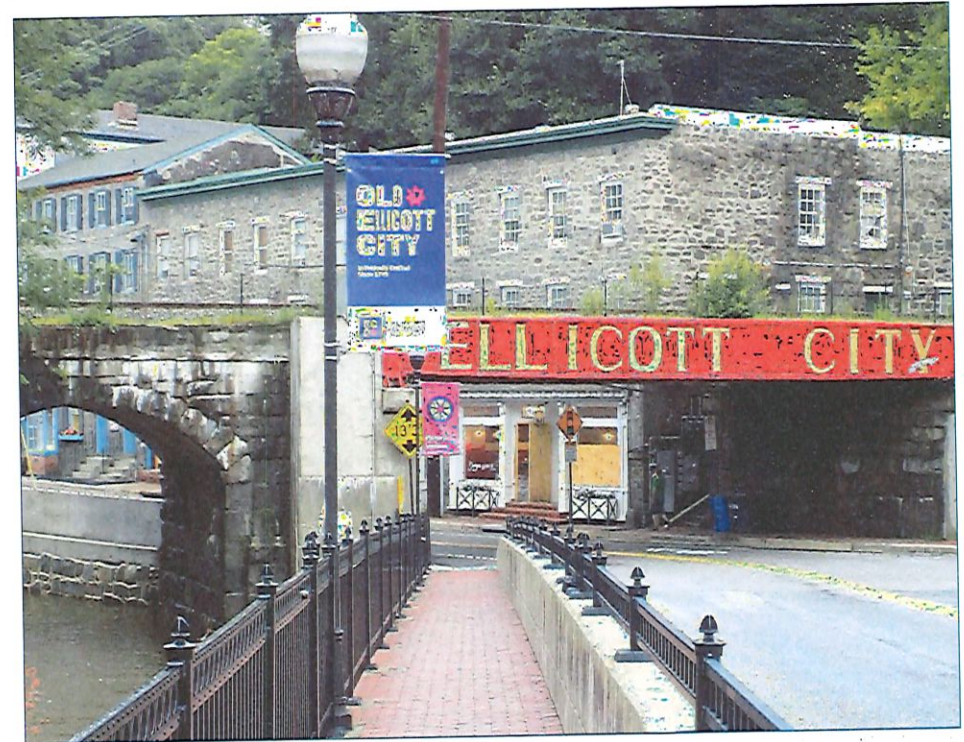
Natural resources will be impacted by climate change, but resource management can help with both mitigation and adaptation.

## Building Resilience

Resilience, and particularly climate change resilience, is becoming an increasingly important topic for land and water resources planning. Resilience can be described as the capacity of a community or an ecosystem to sustain function and well-being under both unexpected shocks and ongoing change. Climate change is often noted as a driver of ongoing change that will also increase unexpected shocks, such as severe weather events (extreme heat, drought, flooding, etc.). In some cases, this planning organizes current best management practices under the theme of promoting resilience. In other cases, such as with flood management and carbon sequestration, planning identifies specific new tools and policies that are needed to adequately address resilience needs. Some communities will be more vulnerable to the impacts from climate change, whether through location or lack of resources. Resilience planning should ensure the special needs of these communities are addressed. The Howard County Hazard Mitigation Plan (HMP), which is intended to reduce the County's human, social, environmental, and economic losses from future natural disasters, contains recommended actions that will help build the County's resilience. For additional information about the HMP, please see the Technical Appendix A: Environment.

## Climate Action Plans

Climate change is a global issue that requires policy changes on a global level to fully resolve. However, local and regional actions, including mitigation and adaptation planning, contribute to broader efforts to combat climate change. Maryland released its first Climate Action Plan in 2008 and has updated the plan several times since. Climate Action Plans contain an inventory of GHG emission sources, set GHG emission reduction targets, and specify actions to achieve those targets by a certain date. Howard County developed a countywide Climate Action Plan in 2010 and updated the plan in 2015 with a focus on emissions from government operations.



An update to the plan began in 2022, and is being developed in concert with HoCo By Design. The updated plan will include countywide strategies and actions for mitigation, adaptation and building resilience to climate change, particularly for the County's most vulnerable communities. For additional information about Maryland and county actions and goals to promote renewable energy and reduce GHG emissions, please see Technical Appendix A: Environment.

## Green Buildings

Green Buildings are designed to be environmentally sustainable and conserve the use of resources in their design, construction, and operation. The United States Green Building Council (USGBC) generates Leadership in Energy and Environmental Design (LEED) standards for green buildings at the Certified, Silver, Gold, and Platinum levels. The County requires that most new public buildings of 10,000 square feet or larger attain a LEED Silver rating and most new private buildings of 50,000 square feet or larger attain a LEED Certified rating. These requirements were established in 2008 and have not been updated since and were revised in 2020 to incorporate bird-friendly design standards to reduce bird collisions. They should be reviewed for opportunities to enhance Green Building requirements.



## Protecting Sensitive Environmental Resources

The County Subdivision and Land Development Regulations and Zoning Regulations contain significant provisions for the protection of sensitive environmental resources when properties are developed. This section discusses regulatory protections for water resources, steep slopes, and rare, threatened and endangered species, as well as three zoning districts specifically designed to protect sensitive resources. Additional protective measures for forests and stormwater management requirements are addressed in later, separate sections.

### Water Resources and Steep Slopes

Water resources include rivers, wetlands, floodplains, ponds, lakes, and groundwater. These are vital natural resources that provide drinking water, stormwater management, pollution abatement, floodwater storage, and recreation, as well as important habitat for a wide variety of plant and animal species.

To protect water quality and habitat within streams, the County Subdivision and Land Development Regulations require the following undisturbed streamside buffer areas:

- 75 to 100 feet along perennial streams in residential zoning districts;
- 50 feet along perennial streams in non-residential zoning districts; and
- 50 feet along intermittent streams in all zoning districts.

The regulations also require a 25-foot undisturbed buffer around nontidal wetlands. Additionally, most wetlands in the County are found within the 100-year floodplain, which is protected from disturbance.

County regulations also protect steep slopes of 25% or greater when there is a contiguous area of 20,000 square feet or larger. Disturbing steep slopes can generate excessive erosion and sedimentation that can be difficult to contain even with enhanced sediment and erosion control practices, and once disturbed steep slopes can be difficult to stabilize. This can be especially problematic when these slopes are adjacent to water bodies. When slopes of 15% or greater occur in conjunction with highly erodible soils, these erosion problems are intensified.

To provide the greatest benefit, stream and wetland buffers should be wide enough to allow adequate filtering of overland stormwater runoff, include adjacent steep slopes and highly erodible soils, and be forested. The use of a floodplain buffer can improve resilience to flooding by accounting for future changes in the floodplain due to changing weather patterns (increased rainfall), increased development, or outdated mapping.

County regulations require sediment and erosion control practices comply with the 2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control when development or forestry activities will result in clearing and grading. These practices prevent sediment and other pollutants from leaving a disturbed site and entering nearby water bodies during storm events. The requirements for sediment and erosion control should be reviewed to ensure they are adequate for changing precipitation patterns, especially short-duration, high-intensity storms.

### EH-2 Policy Statement

Seek to integrate climate change mitigation and adaptation goals as specified in the Howard County Climate Action and Resiliency Plan, or the most recently adopted Plan, into all county programs, projects, and policies, and regulations.

### Implementing Actions

1. Ensure the Howard County Climate Action and Resiliency Plan update continues to maximize opportunities to mitigate and adapt to climate change with clear goals and strategies, and that County Departments' policies are aligned with the plan's goals and strategies.
2. Evaluate and enhance opportunities where needed for climate change mitigation and adaptation measures in the Subdivision and Land Development Regulations and Zoning Regulations, such as redevelopment in mixed use activity centers, natural resource protection, and the provision of renewable energy.
3. Enhance county design requirements for county infrastructure and public and private buildings, to ensure these structures will be resilient under projected future weather patterns and minimize resource consumption.
4. Review and update county Adopt the most current standards of the International Green Construction Code Green Building requirements and review and update county Green Building requirements for opportunities to enhance the sustainability of public and private buildings.
5. Identify and ensure economically-vulnerable communities, businesses, and households have the resources necessary for mitigation and adaptation measures.



## Rare, Threatened, and Endangered Species

The 2019 Maryland Department of Natural Resources (DNR) list of current and historical rare, threatened, and endangered species identifies 98 species within Howard County. Of these 98 species, 15 are animals and 83 are plants. Threats to these species are primarily caused by habitat destruction, particularly of wetlands, riparian areas, steep slopes, and forests. Therefore, protective measures for these important habitats also benefit these species.

The DNR mapped the known habitat areas for rare, threatened, and endangered species throughout Maryland as Sensitive Species Project Review Areas (SSPRA). The SSPRA information is used by the County to initially screen development proposals under the Forest Conservation Act. If this screening indicates that such habitat may be present, the developer is referred to the DNR for guidance on protecting the species and the associated habitat.

## Zoning Regulations

Excluding mixed use zones, there are three residential zoning districts with a stated purpose that includes protecting environmental resources. (Note that there is a fourth district that includes this purpose, but it is applicable only to historic properties.) These zoning districts require or allow the use of cluster development to achieve this purpose. The Residential-Environmental Development (R-ED) zoning district in the East is located primarily along the Patapsco River in areas with steep and narrow stream valleys. The R-ED zoning district has a 50% open space requirement (as specified in the Subdivision and Land Development Regulations) and allows smaller lots, clustered together to keep development impacts away from steep slopes and streams. In the Rural West, the Rural Conservation (RC) zoning district requires low-density, clustered residential development for parcels of 20 acres or greater to protect agricultural lands and natural resources. This type of cluster development is also allowed on smaller lots in the RC zoning district and on any lot in the Rural Residential (RR) zoning district. Cluster development and other alternative development patterns may also be appropriate to enhance environmental protection in other residential zoning districts. For sites where environmentally-sensitive resources are present, alternative or flexible development standards may better realize the intended purpose of the zoning district while providing greater site-specific protection of resources and enhanced site design.

### EH-3 Policy Statement

Ensure the Subdivision and Land Development Regulations and Zoning Regulations provide adequate protection for sensitive environmental resources within new development and redevelopment.

### Implementing Actions

1. Evaluate and enhance protections, including sediment and erosion control, where needed for sensitive environmental resources, such as water resources, steep slopes, and rare, threatened, and endangered species, in the Subdivision and Land Development Regulations.
2. Explore whether cluster development may also be appropriate in other residential zoning districts during the zoning regulation update process.
3. Explore the creation of alternative or flexible development standards that would result in more site-sensitive and enhanced site design outcomes during the zoning regulation update process, including criteria for determining eligibility for utilization of alternative standards.
4. Explore housing development patterns that enhance opportunities for preservation while reducing emissions that contribute to climate change.

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— 66 —  
*- HoCo By-Design process participant*

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# Incentivizing Natural Resource Protection and Restoration

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### Green Neighborhood Program

The Subdivision and Land Development Regulations include the Green Neighborhood Program, which is a voluntary, point-based program that provides housing allocations as an incentive for more environmentally friendly and sustainable development. Under Plan Howard 2030, up to 150 housing unit allocations were set aside annually for projects that meet Green Neighborhood requirements. HoCo By-Design continues this important incentive.

The Green Neighborhood Program is divided into separate Site and Home requirements. Applicants earn Site points for a wide variety of green practices, such as designing a walkable community; exceeding minimum requirements for stormwater management, stream and wetland buffers, or forest conservation; using native plants for landscaping; restoring and creating wetlands; and restoring in-stream habitat. Applicants earn Home points for green practices such as using energy and water-efficient appliances and fixtures, providing on-site renewable energy, and building with wood from sustainably managed forests.

Only two developments with a total of 1,458 dwelling units have qualified as Green Neighborhoods since the program's inception in 2008. Program participation has been limited by a major national recession that slowed development shortly after the program's inception, and the wide availability of housing allocations, which has reduced their value as an incentive. In addition, the development community has reported the need for greater flexibility and options for earning points to qualify for the program. The County has also experienced challenges in enforcing long-term implementation and maintenance for some of the Green Neighborhood features, such as habitat management plans and native landscaping. The program would benefit from an evaluation and update to address these issues and to incorporate new options, such as protecting the Green Infrastructure Network and/or increasing moderate income housing units.



### Zoning Regulations

The Zoning Regulations include a Density Exchange Overlay (DEO) District for the RC and RR Districts, which provides an opportunity and incentive to preserve significant blocks of farmland and rural land in the West. An overlay district is a district established to respond to special features or conditions of an area, such as historic value, physical characteristics, or location. An overlay district may also supplement or provide an alternative to the regulations of the underlying zoning district. The DEO District allows residential density in the RC and RR Districts to be exchanged between parcels. Density exchanges are intended to preserve large parcels in perpetuity, while residential development is directed toward parcels that can more readily accommodate the additional dwellings. Use of this district has been successful in permanently preserving large tracts of open space and environmental and agricultural land, and should be continued under any new zoning regime. Additionally, an overlay district may be an appropriate approach to further protect watersheds with unique conditions or resources, as well as the Green Infrastructure Network.

### Additional Incentives

Additional incentives could be employed to supplement changes to the Subdivision and Land Development Regulations and Zoning Regulations for enhanced resource protection and restoration. These could include density bonuses, tax credits, housing allocations, and private-public partnerships.

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### EH-4 Policy Statement

Incentivize additional resource protection and restoration measures within new development and redevelopment.

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#### Implementing Actions

1. Consider increased use of a density exchange overlay district, in both the West and the East, to protect sensitive resources in areas with unique conditions or resources.
2. Consider incentives to encourage environmental protection and restoration when properties are developed or redeveloped, such as tax credits, density bonuses, housing allocations, and public-private partnerships.
3. Evaluate and strengthen the Green Neighborhood Program to ensure adequate incentives will increase program use and incorporate new options, such as increased moderate income housing units.

#### Implementing Actions

1. Consider increased use of a density exchange overlay district, in both the West and the East, to protect sensitive resources in areas with unique conditions or resources.
2. Consider incentives to encourage environmental protection and restoration when properties are developed or redeveloped, such as tax credits, density bonuses, housing allocations, and public-private partnerships.
3. Evaluate and strengthen the Green Neighborhood Program to ensure adequate incentives will increase program use and incorporate new options, such as increased moderate income housing units.



## Managing Stormwater

Impervious surfaces, such as roads, parking lots, and buildings, interfere with stormwater runoff's ability to soak into the ground. Stormwater runoff travels quickly across impervious surfaces, picking up sediment and pollutants, and during warm weather, becoming warmer, before it enters nearby water bodies. The simultaneous increase in both water quantity, pollutants, and temperature leads to flooding, stream erosion, and degraded water quality and habitat. These impacts will be exacerbated by the more frequent and intense rainfall events and warmer temperatures projected to occur with climate change. Stormwater management can help remove pollutants from runoff, reduce water temperature, moderate the flow of runoff into nearby water bodies, and reduce flooding.

### New Development

Since 2010, Howard County's stormwater management regulations have required that all new development employ environmental site design (ESD) techniques to treat runoff from smaller, more frequent storms (the 1-year, 24-hour storm of 2.6 inches) to the maximum extent practicable. ESD emphasizes reducing the amount of stormwater runoff generated by using site design techniques that limit site disturbance and reduce the creation of impervious surfaces. ESD treats runoff by holding it on-site where it can be filtered and treated by the vegetation and soil in multiple, small treatment facilities. ESD is different from the County's previous approach to stormwater management, which focused on collecting and treating runoff in large treatment facilities, most often stormwater management ponds.

However, the County continues to require stormwater management for the larger 10- and 100-year, 24-hour storm events of 4.9 and 8.5 inches, respectively, in the Tiber Branch, Deep Run, and Cattail Creek watersheds, where older development exists within the 100-year floodplain and are vulnerable to flooding. Stormwater management in these watersheds uses a combination of ESD techniques and large holding facilities, such as ponds or underground storage tanks.

In response to severe flooding events in Ellicott City in 2016 and 2018, the County also adopted stormwater management regulations to address short-duration, high-intensity storms in the Plumtree Branch and Tiber Branch watersheds (requiring quantity management for a 3.55-hour, 6.6-inch storm event). Stormwater management for these types of storms again requires a combination of ESD techniques and large holding facilities. These types of storms are projected to occur more often under the effects of climate change. The County should consider adding quantity management requirements for the 10- and 100-year storms, as well as short-duration, high-intensity storms, to other vulnerable watersheds.

### Flooding Concerns

In 2021 Maryland's stormwater management law was amended to require that the Maryland Department of the Environment (MDE) update the stormwater management regulations to incorporate the most recent precipitation data available and add quantity management standards for flood control in watersheds that have experienced flooding incidents since 2000. The amendments also require that MDE review and update the stormwater management regulations at least once every five years. The County will work with MDE to adopt the new regulations, which are expected to be finalized in 2023.

*Stormwater management will be increasingly important as climate change accelerates.*

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*-HoCo By-Design process participant*

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In 2022 the County initiated a Vulnerable Watershed Restoration and Resiliency Program to evaluate whether other watersheds are or will become susceptible to flooding and develop potential capital projects to address the problem areas. For more information about state and county efforts to address flooding, please see Technical Appendix A: Environment.

## Redevelopment

The County's stormwater management regulations also have requirements for redeveloping sites. Redevelopment sites must reduce impervious cover by 50% or provide an equivalent water quality treatment for the first one inch of rainfall using ESD techniques. However, there are no quantity management requirements. The recent update to stormwater management requirements in the Plumtree Branch and Tiber Branch watersheds also added quantity management requirements for redevelopment in those watersheds.

Requiring stormwater management for redevelopment sites offers a significant opportunity to improve water quality and quantity controls for stormwater runoff in areas that were developed prior to current stormwater management regulations. The County should ensure redevelopment is designed and implemented to reduce stormwater runoff and pollutant loadings to the maximum extent practicable. The County should also consider creating incentives for new development and redevelopment to provide on-site or off-site stormwater management that exceeds minimum regulatory requirements.

## Stormwater Management Facilities

Stormwater management systems must be regularly inspected and maintained and, as they age, deteriorated systems must be upgraded or replaced. The County is required by both state and local legislation to conduct inspections of stormwater management facilities every three years. There are approximately 11,000 stormwater management facilities in the County, and approximately 1,634 of these are public facilities maintained by the County.

In general, the County shares maintenance responsibilities with homeowners associations for residential facilities located on open space lots, while non-residential facilities are privately maintained. With increased use of ESD, small treatment facilities have and will continue to become more prevalent. These types of facilities can include downspout infiltration areas or drywells, and bioretention facilities or rain gardens that can be located on private residential lots. The ability to inspect and maintain these facilities over time is an area of concern. Developments with ESD have multiple facilities, which require increasing county resources for inspections. Routine maintenance of ESD facilities located on individual residential lots becomes the responsibility of the individual homeowner, resulting in property owner education and maintenance enforcement issues. Funding for County inspection and maintenance of stormwater management facilities is through the Watershed Protection and Restoration Fund, which is discussed later in this chapter under Managing Natural Resources by Watershed. The County should evaluate alternatives for improving, enforcing, and funding long-term inspection and maintenance of stormwater management facilities, particularly those facilities located on private residential lots.



## EH-5 Policy Statement

Evaluate and improve stormwater management requirements to enhance climate change resilience.

## Implementing Actions

1. Conduct a flooding vulnerability assessment to determine which watersheds are susceptible to chronic flooding under current and expected future precipitation patterns.
2. Update stormwater management design standards to address current and expected future precipitation patterns. Consider adding quantity management requirements, including management for short-duration, high-intensity storms in vulnerable watersheds. **Incentivize existing commercial centers to provide stormwater management systems consistent with present standards. Ensure that redevelopment, at a minimum, meets current stormwater management requirements for redevelopment projects.**
3. **Evaluate opportunities to further reduce** Reduce stormwater runoff and pollutant loadings when redevelopment occurs **and incorporate water quantity management practices throughout the County. Ensure that redevelopment, at a minimum, meets current stormwater management requirements. Incentivize redevelopment to meet current requirements for new development and address watershed health, flood risks, and other environmental concerns.**
4. **Continue to use** Increase use of a nature-based or green stormwater infrastructure approach (bioretention, swales) in combination with a built or gray infrastructure approach (pipes, ponds) to address flood mitigation and adaptation, to maximize ecological benefits.
5. Evaluate alternatives for improving, enforcing, and funding long-term inspection and maintenance of stormwater management facilities, particularly those facilities located on private residential lots.
6. **Ensure that redevelopment, at a minimum, meets new development stormwater requirements and address watershed health, flood risks, and other environmental concerns. Encourage redevelopment to meet new development stormwater management requirements to the maximum extent possible and address watershed health, flood risks and other environmental concerns.**

## Managing Natural Resources by Watersheds

The health of wetlands, streams, lakes, and reservoirs is directly linked to the use of land within their watersheds. For this reason, the County takes a watershed-based approach to comprehensively address the design, construction, and maintenance of the stormwater management system; water quality and habitat improvements in local streams; and flooding concerns.

The Chesapeake Bay is a valued source of beauty, recreation, and commercial activity in Maryland, and it has played an important role in Maryland's history and development. The multistate effort to restore the Chesapeake Bay continues to be a strong influence in promoting watershed-based planning and management efforts to protect not only the Bay, but also the Bay's numerous tributary rivers and streams. For additional information about restoration efforts for the Chesapeake Bay, please see Technical Appendix A.

Howard County lies within the Patuxent River and Patapsco River watersheds, two major tributaries to the Chesapeake Bay. Approximately 75% of the County is within the Patuxent River watershed and the remaining 25% of the County is within the Patapsco River watershed. The main stems of these rivers have many tributary streams which drain large areas of the County. The Patuxent River and Patapsco River watersheds in Howard County are divided by the State into seven major watersheds, as shown in Map 3-2.

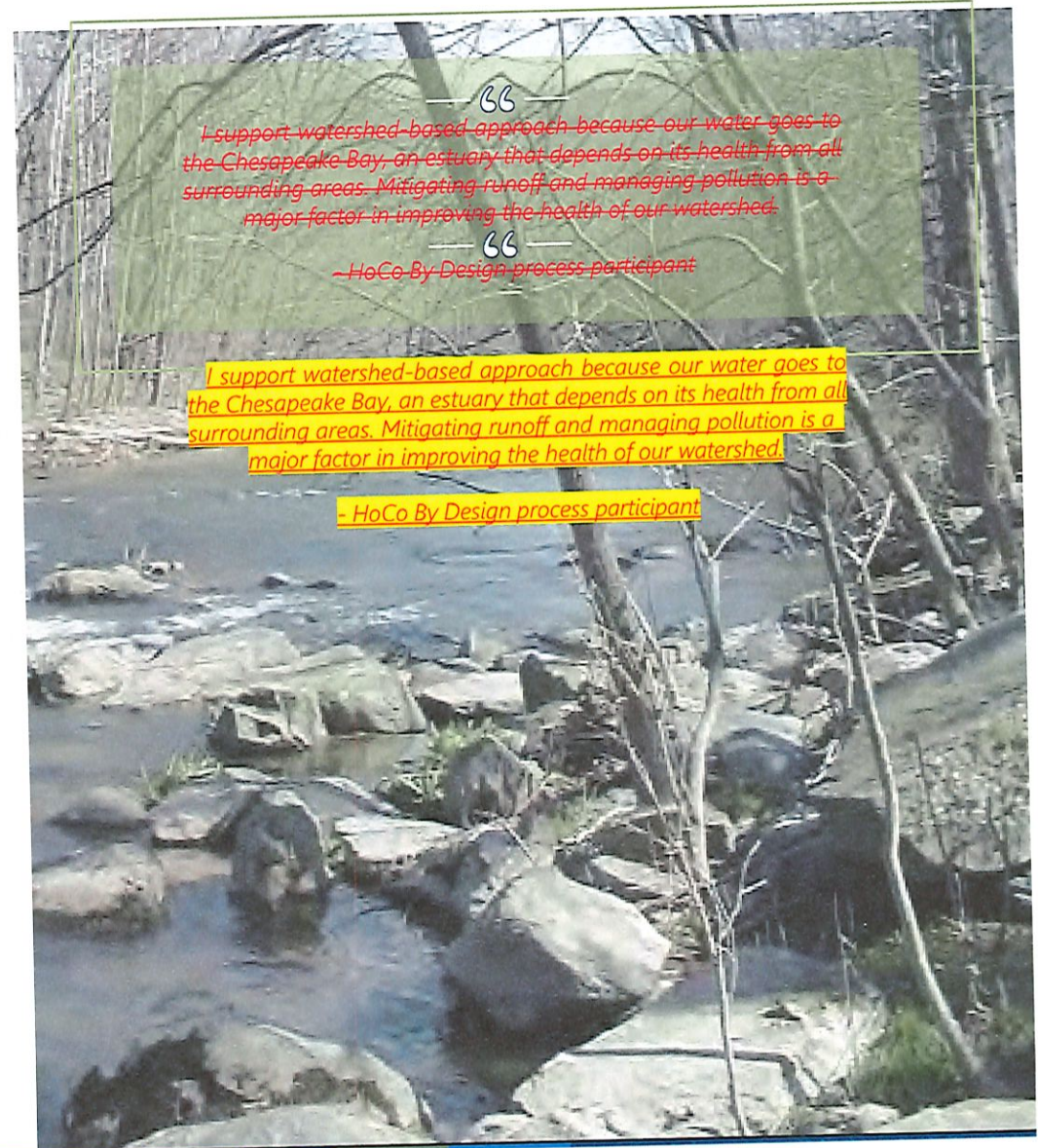
Watershed management plans generally include:

- A description of current land use within the watershed;
- Water quality and habitat conditions in the watershed streams;
- An identification and severity ranking of problem areas;
- An identification and priority ranking of potential restoration projects;
- Preliminary designs and cost estimates for priority restoration projects; and
- An implementation schedule.

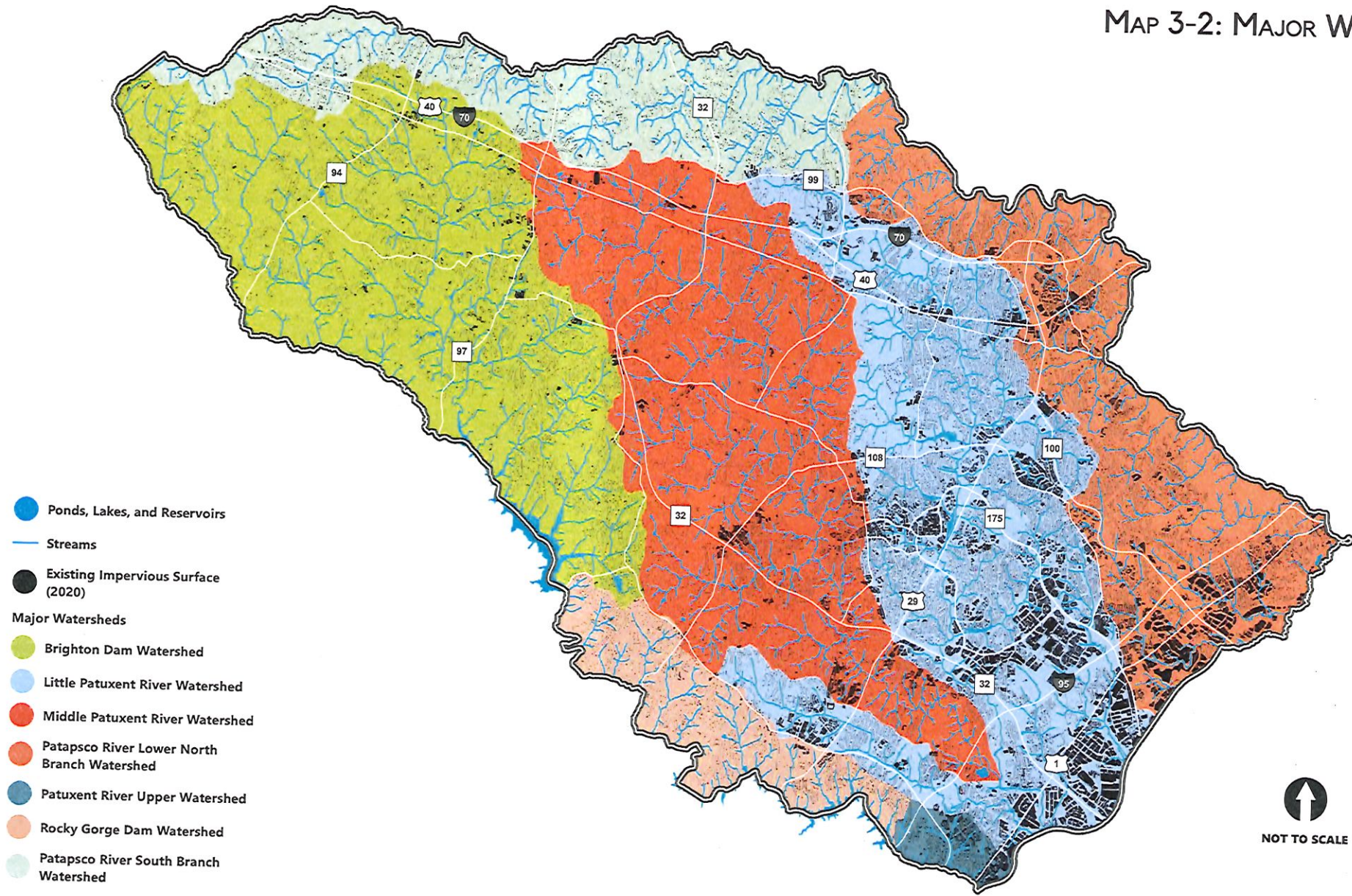
Restoration projects can include:

- Building new stormwater management facilities in areas that lack them and retrofitting existing facilities to add water quality treatment;
- Planting forest, especially to create forested buffers along streams;
- Restoring and creating wetlands; ~~and~~
- Stabilizing stream channels and restoring instream habitats;
- Identifying and eliminating superfluous impervious surfaces, particularly on upstream or county land; and
- Identifying and mitigating most significant point sources of surface runoff.

Many of these restoration projects require cooperation and participation from private landowners, so public outreach and education is a critical component of implementation.



# MAP 3-2: MAJOR WATERSHEDS



Wherever possible, the County uses state of the art, nature-based stream restoration design and construction techniques to promote the long-term health of restored streams and their associated floodplains. Completed stream and wetland restoration projects are monitored to measure changes in water and habitat quality. As more is learned about these projects, state and federal guidance is updated to improve outcomes, and the County works to stay informed and incorporate current best practices for restoration projects.

Protection and restoration goals may vary by watershed. In a healthy watershed, the goal may be to protect and maintain current conditions, whereas in a degraded watershed, the goal may be to actively restore and improve current conditions. It is easier and more cost-effective to protect high-quality resources in a watershed than to restore degraded resources. The more degraded a watershed, the more difficult restoration becomes. In some more highly-developed watersheds, conditions may be so degraded that full restoration is prohibitively expensive.

### Water Quality in Local Streams

Many streams and lakes in Howard County and in Maryland do not meet state water quality standards and exhibit degraded habitat conditions. Eroding stream channels and pipe outfalls from stormwater management facilities and a lack of riparian buffers are common problems in the County's watersheds. However, there are also stream segments in the County with excellent water quality and habitat for aquatic life. The State classifies these types of stream segments as Tier II waters and employs special procedures to regulate discharges to these streams to ensure water quality is not degraded. The State also encourages local governments to further protect these waters.

For additional information about water quality in local streams, and how projected changes to impervious cover and forest cover from expected growth may impact watershed health, please see Technical Appendix A: Environment.

### Total Maximum Daily Loads

The Federal Clean Water Act requires each state identify water bodies that do not meet water quality standards. If necessary, the state must then develop a Total Maximum Daily Load (TMDL) or an allowable pollutant load and an implementation plan to bring the water body into compliance with the water quality standards for that pollutant. Depending on the land uses within the watershed of that water body, the TMDL is divided or allocated between the major pollutant sources in the watershed. In general, the current pollutant loads in a watershed must be substantially reduced to achieve the TMDL, but there is usually no required time frame for achieving the TMDL.



Howard County has the following EPA approved local TMDLs:

**Table 3-1: EPA Approved Local TMDLs**

Water Body	Pollutant
Baltimore Harbor (includes South Branch Patapsco and Lower North Branch Patapsco Rivers)	Nitrogen and Phosphorus
Centennial Lake	Phosphorus and Sediment
Little Patuxent River	Sediment
Lower North Branch Patapsco River	Bacteria and Sediment
Patuxent River	Polychlorinated Biphenyls (PCBs)
Patuxent River Upper	Bacteria and Sediment
Rocky Gorge Reservoir	Phosphorus
Triadelphia Reservoir	Phosphorus and Sediment

### National Pollutant Discharge Elimination System Permit

As a requirement of the Federal Clean Water Act, Howard County has a National Pollutant Discharge Elimination System (NPDES) permit for discharges from the County's stormwater management system. The NPDES permit has a five-year term and each new permit contains significant requirements for improving the quality of water discharged through the County's stormwater management system. The County must document these water quality improvements through chemical, physical and biological monitoring. The County NPDES permit area includes the full County minus lands that have their own NPDES permit, such as federal and state lands, and industrial properties.

The County's fourth NPDES permit was issued in December 2014. To address the Chesapeake Bay cleanup goals, this permit required that the County provide additional or improved stormwater management for 20% of the impervious cover in the County that was not currently managed to the maximum extent practical by the end of the permit term (December 2019). This was approximately 2,204 acres of untreated impervious area. The County met and exceeded this target by 2019, expending about \$56 million in capital and operating funds since 2010.

The permit also required that the County develop watershed restoration plans within the first year of the permit to achieve the stormwater allocations for local TMDLs. In response, the County conducted assessments of the Little and Middle Patuxent River watersheds and developed a Countywide Implementation Strategy (CIS) in 2015. Assessments were done for the Patapsco and Patuxent River main stem watersheds in 2016, and the CIS was updated in 2017.

The CIS includes an assessment of water quality impairments and proposed management measures, including new and retrofit stormwater management facilities, stream restoration, tree planting, and stormwater facility outfall stabilization, with expected pollutant load reductions and impervious area treatment. The CIS also includes a cost estimate of \$168 million, based on an implementation schedule through 2029, when the stormwater allocations are expected to be achieved. The CIS indicates the majority of spending will be in the Patapsco River Lower North Branch watershed, followed by the Little Patuxent River watershed.

The County received a new NPDES permit in December 2022. This permit includes a new requirement to provide water quality treatment for 1,345 acres of the County's untreated impervious area by December 2027. The County must also continue progress toward achieving stormwater pollutant load reductions for each local TMDL. The County plans to update the CIS during this new (5th generation) permit term. The County plans an update to the CIS during the next (5th generation) permit term.

## Regional Water Resources

In addition to watershed planning and management for local water resources, it is also important to remember that the County is part of the larger Patuxent and Patapsco River watersheds. The Patuxent River watershed is located within Howard, Montgomery, Anne Arundel, Prince George's, Calvert, Charles, and St. Mary's Counties. Howard County contains 21% of the watershed, the second highest of the seven counties in the watershed. The Patapsco River watershed is located within Carroll, Baltimore, Howard, and Anne Arundel Counties, as well as Baltimore City. The County is in the headwaters of each watershed, so management practices in the County affect many downstream users. For this reason, the County coordinates and cooperates with other local, regional, and state agencies and organizations on joint watershed planning and management for the rivers.

The Patuxent River Policy Plan, which has been adopted by each of the seven counties in the Patuxent River watershed, contains land management recommendations to control nonpoint or diffuse sources of pollution and also protect and restore habitat in the watershed. The Patuxent River Commission, whose membership includes each of the seven counties and other watershed stakeholders, provides oversight for implementation of the Policy Plan. The County also participates in regional planning for the Patuxent Reservoirs watershed, which is discussed in Technical Appendix A: Environment.

## Funding

The County's NPDES stormwater permit requires the County allocate adequate funding to address permit conditions. In 2013, the County established an annual watershed protection and restoration fee that is based on the size of the property for residential properties or on the area of impervious cover for nonresidential properties.



These fees go to a Watershed Protection and Restoration Fund, which may be used by the County to build new or retrofit existing stormwater management facilities, implement stream and wetland restoration projects, operate and maintain the stormwater management system, conduct public outreach and education, and provide grants to nonprofit organizations to also do this work.

The fund is used to support multiple programs that incentivize environmental stewardship among property owners. Under the CleanScapes Program, residential property owners with homes built before 2003 may add stormwater management to earn a credit against the fee. The fund may also be used to provide financial assistance for stormwater management installations or upgrades. Similar opportunities exist for credit and reimbursement on commercial properties through the Commercial Stormwater Solutions Partnership. The Nonprofit Watershed Protection Partnership Program allows partnering nonprofits to receive a 100% credit on their fee in exchange for working with the County to implement stormwater treatment practices on site. Agriculturally assessed properties can pay a flat rate rather than a fee based on impervious cover if the farm has a Soil Conservation and Water Quality Plan or a Forest Management Plan. The Septic Savers Program is a rebate for residential property owners who have their septic systems pumped out every three to five years to promote proper septic maintenance and reduce pollution in groundwater and streams.

The watershed protection and restoration fee generates approximately \$10 million per year. As each watershed restoration study has identified projects, these projects have been prioritized and added to the overall county watershed restoration project list. This list also includes project sites identified from citizen referrals and complaints. The list is used as the basis for capital budget requests for restoration projects. The fee also helps to fund work on existing stormwater management ponds, including repair of failing infrastructure and implementing water quality enhancements. The watershed restoration project list and the pond repairs/enhancements together total several hundred million dollars' worth of projects. The County spends on average \$10-\$13 million annually, although this amount varies from year to year. The County also uses grants, partnerships, and alternative funding solutions to implement projects, making the best use of limited financial resources. This funds about 8-12 projects each year, depending on the size of the project. Additional funding would be needed to increase the pace of restoration and pond repair/retrofit efforts.

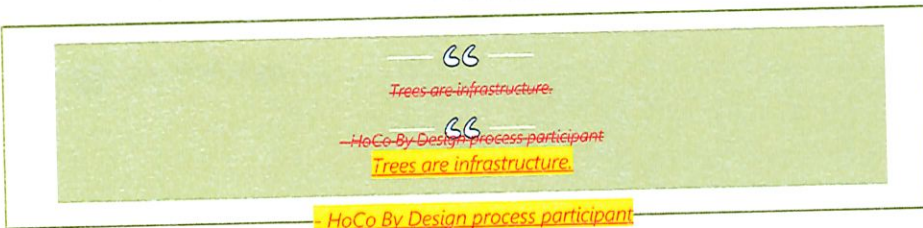
## EH-6 Policy Statement

Expand the use of watershed management plans to provide a comprehensive framework for protecting and restoring natural resources.

## Implementing Actions

1. Expand the scope of watershed management plans to set priorities and guide efforts to protect, restore, and improve the County's environmental resources.
2. Continue to coordinate and cooperate with other local, regional, and state agencies and organizations on joint watershed planning and management for the Patuxent and the Patapsco Rivers.
3. Ensure the Watershed Protection and Restoration Fund has adequate funding to meet National Pollutant Discharge Elimination System stormwater permit requirements and for proactive resource management.
4. Continue to pursue federal and state grant and cost-share opportunities to secure additional resources for restoration efforts. Apply jointly with community and environmental organizations and with neighboring jurisdictions, as appropriate.





## Expanding tree Canopy and Forest Cover

Tree canopy and forest cover help reduce and filter stormwater runoff, minimize erosion and sedimentation of streams, create wildlife habitats, sequester carbon, improve air quality, provide health benefits, and moderate local temperatures. They form visual buffers and are scenic in their own right. Increasing tree and forest cover is also an effective measure for climate change mitigation and adaptation. For these reasons, establishing goals for forest cover and forested stream buffers by watershed helps to achieve multiple objectives. In more developed watersheds, it may be more appropriate to establish a tree canopy goal.

### Existing Tree Canopy and Forest Cover

~~A Report on Howard County, Maryland's Existing and Possible Tree Canopy was published in 2011 by the U.S. Forest Service and the University of Vermont. This report defined tree canopy is defined as the layer of leaves, branches and stems of trees that cover the ground when viewed from above. Tree canopy includes individual trees, such as those found within a parking lot or residential lawn, as well as trees within a forest. Using 2007 Based on Based on 2018 tree canopy data, the report found that the County contained approximately 79,460 -80,000 acres of tree canopy or 50 49% of the County had tree canopy cover. The County tree canopy cover in 2007 2018 is shown in Map 3-3.~~

A forest is a natural ecological community dominated by trees, generally including woody under story plants such as shrubs and young trees, and herbaceous vegetation such as grasses and flowers. To be fully effective as a complex environmental community, forest areas need to be large enough to provide space for a variety of native plant and animal species, to afford protection from outside intrusions, and to be able to mature and regenerate themselves.

Based on a separate analysis by the County of 2009 forest cover data, the County contained approximately 45,460 acres of forest or 28% of the County was in forest cover (distinctive from tree canopy). Forest cover in the eastern portion of the County is prevalent primarily within stream valley areas where sensitive resources have discouraged development or within publicly-owned conservation areas, such as the Patapsco Valley State Park and the Middle Patuxent Environmental Area. In the Rural West, upland and stream valley forests are more extensive. County forest cover in 2009, the most recent data available when the HoCo By Design scenarios were developed, is shown in Map 3-1. Countywide forest cover data should be updated on a regular and consistent basis to help assess changes in forest cover and manage forest resources over time.

Forest loss and fragmentation result in a continuing decline in forest interior habitat, which is generally defined as forest at least 300 feet from the forest edge. Forest interior habitat is generally more isolated from disturbance than forest edge habitat, and has a closed canopy that creates moist, shaded growing conditions, with less predation by forest edge species (raccoons, crows, cats) and fewer invasive species. In 2009, only 17% of the forest cover in the County was forest interior habitat. The loss of forest interior habitat threatens the survival of species that require this type of habitat, such as reptiles, amphibians and migratory songbirds.

### Tree Planting Priorities for Economically-Vulnerable Communities

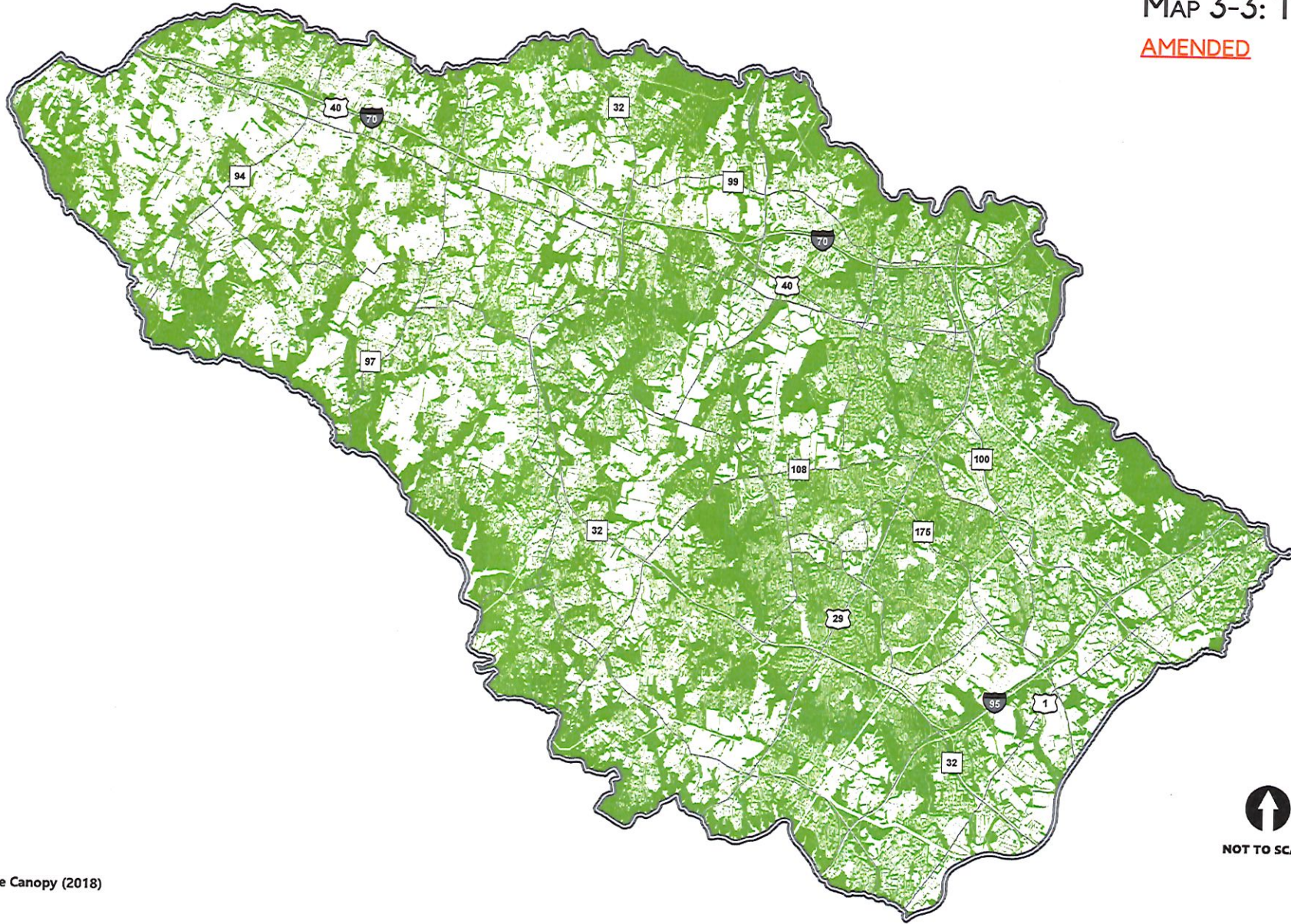
Howard County does not have an overall goal for tree canopy or forest cover, but Maryland has a policy that 40% of all land in the State should be covered by tree canopy. The County has several programs that provide free native trees to help increase tree canopy cover on qualifying residential properties, including the Stream ReLeaf and Turf to Trees Programs, along with an annual tree giveaway.

Map 3-4 shows tree canopy cover by subwatershed and census tracts with average household annual median income under \$50,000. There are four subwatersheds with less than 40% tree canopy coverage that contain one or more of these census tracts. Map 3-5 shows subwatersheds that have less than 40% tree canopy cover and impervious cover over 25%, along with census tracts with average household annual median income under \$50,000. Watersheds with higher levels of impervious cover and lower levels of tree canopy cover will experience greater heat island impacts, and households in these census tracts may have economic difficulty addressing these impacts. There are three subwatersheds that reflect these conditions and contain one or more of these census tracts. These subwatersheds should be prioritized for native tree planting programs, with a focus on residential areas within these census tracts, where there are willing participants.



# MAP 3-3: TREE CANOPY

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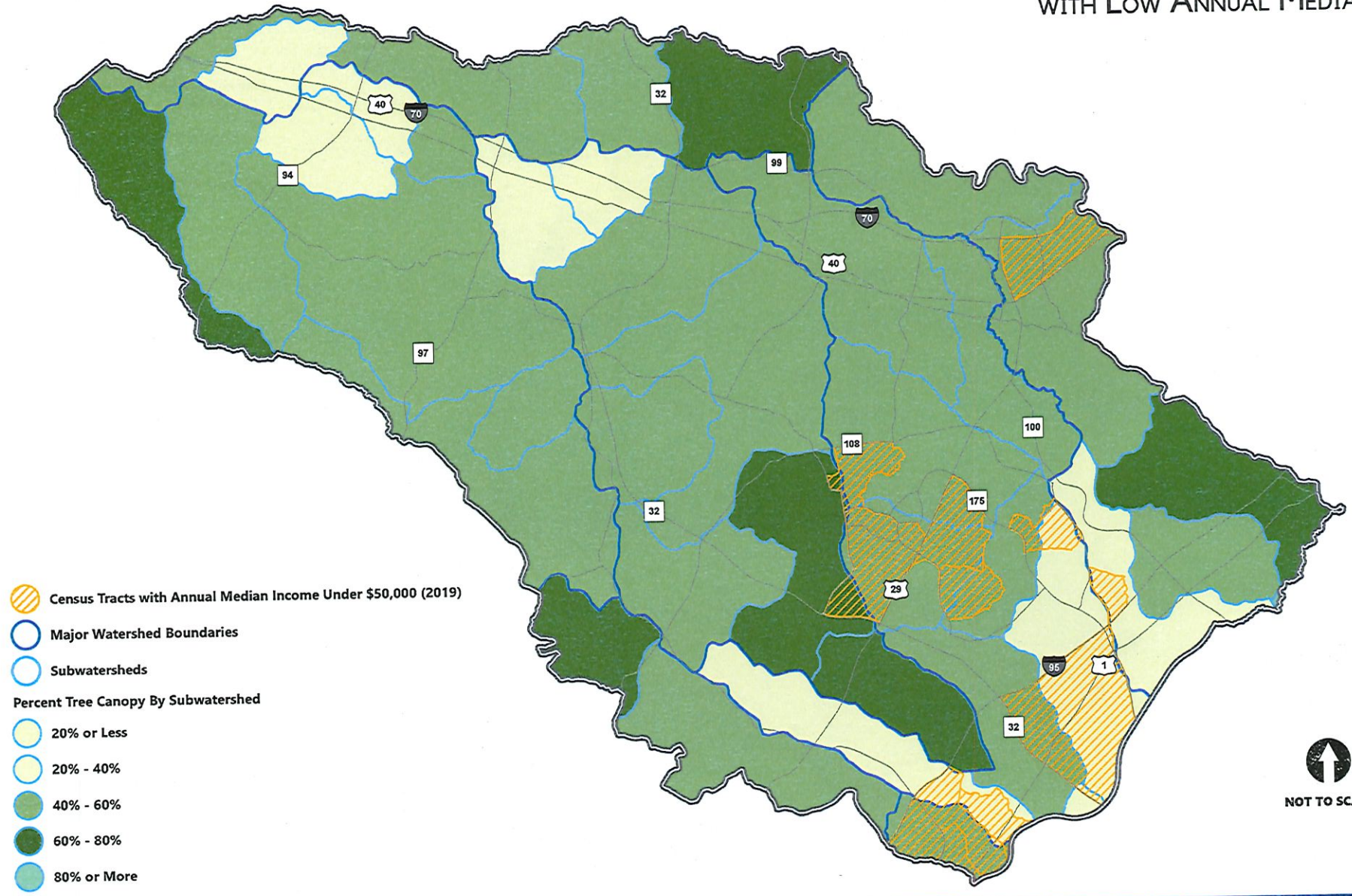


● Tree Canopy (2018)

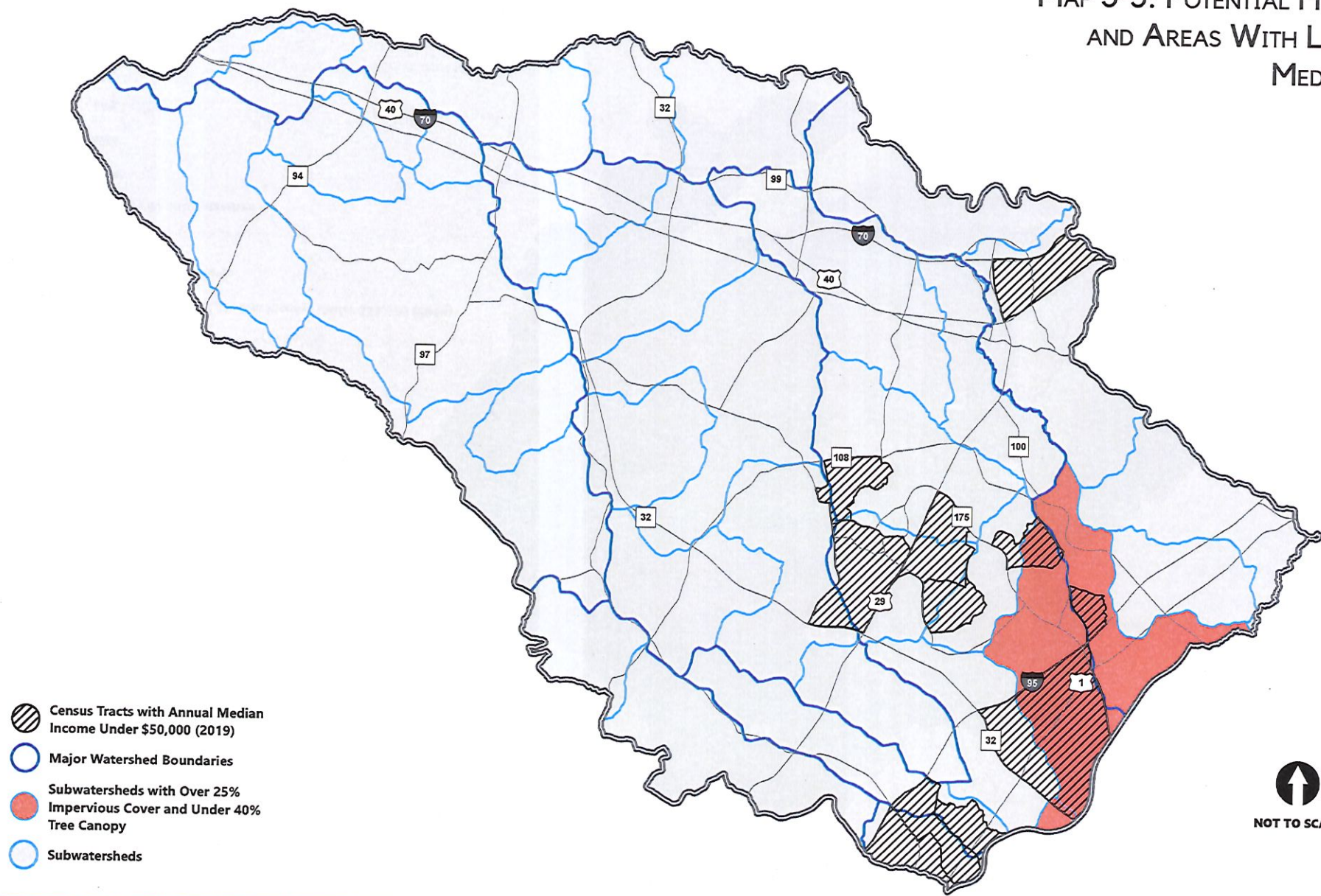
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# MAP 3-4: TREE CANOPY AND AREAS WITH LOW ANNUAL MEDIAN INCOME

AMENDED



# MAP 3-5: POTENTIAL HEAT ISLANDS AND AREAS WITH LOW ANNUAL MEDIAN INCOME **AMENDED**





### Forest Conservation Act

Since 1993, Howard County's Forest Conservation Act (FCA) has mitigated forest loss caused by development. The FCA contains a series of incentives and penalties to encourage forest retention on development sites and includes reforestation requirements for forest that is cleared. Afforestation (planting of areas presently without forest cover) is also required on sites that don't meet minimum forest cover specifications.

The FCA does not require an equal area replacement for forest cleared, and forest cover continues to be lost to development in Howard County and throughout Maryland. The County updated the FCA in 2019 to enhance forest retention, including changes such as adding site design requirements for larger residential developments to meet 75% of their forest conservation obligation on site. The update increased mitigation requirements by increasing replanting ratios, especially if the replanting was done outside the watershed where the clearing occurred, and limiting use of the fee-in-lieu option for residential developments. The update also made changes to ensure more successful forest plantings, such as increasing the maintenance period for new plantings from two to three years. The County will monitor implementation of the updated FCA to measure its effectiveness and modify the regulations as needed to enhance forest retention and ensure forest plantings are successful.

### Threats to Forest Health

The loss of forest species diversity and the degradation of forests by invasive exotic species are concerns for long-term forest health. Invasive exotic species are not native to the area where they live and are a significant problem because they can displace or kill native species. They lack the predators, competitors, diseases, or parasites that help control their populations in their native habitat. Invasive exotic species can include invertebrates such as the emerald ash borer, which kills ash trees, and plants such as Japanese honeysuckle and English ivy, which can smother trees.

Forest health is also damaged by an overpopulation of deer, which tend to prefer native species when browsing. When deer exceed the carrying capacity of a forest, they can eat most of the understory trees, shrubs, and herbaceous vegetation. Overgrazing of understory damages the ability of forests to regenerate, eliminates shrub and herbaceous species, and reduces bird species that nest within understory habitat. This damage can be compounded by impacts from invasive species, which can quickly cover the empty forest floor and inhibit the regrowth of native species. Invasive species often do not provide the same food, cover, and nesting benefits as native species do for native wildlife.

The Howard County Department of Recreation and Parks implements a comprehensive deer management program that is intended to maintain a stable, balanced deer population. Managing deer populations may also help reduce tick populations and tick-borne diseases such as Lyme disease. The program includes managed hunting on public lands to reduce deer numbers where necessary. Deer are quite adaptable and thrive in suburban environments, but hunting is not feasible in these areas, making it difficult to control their population on a countywide basis. Controlling deer-related impacts using a variety of management tools requires a cooperative effort between public agencies and landowners.

Climate change may exacerbate forest health issues caused by invasive exotic species and deer overpopulations. NOAA's Fourth National Climate Assessment notes that warmer winters in the northeast will likely expand the geographic range and population size of existing invasive exotic insect species, such as the emerald ash borer. There may also be a shift in native plant species to those that are better suited to a warmer climate, but if current species die off and new species are unable to become established, the forest may be unsustainable.

Increased forest management on public and private property can help address these threats to forest health and help forests transition to native species that are adaptable to a warmer climate and provide greater resilience to climate change. Federal and State programs are available to assist forest landowners with forest management. For example, the Maryland Department of Natural Resources will work with property owners to develop forest management or stewardship plans for a nominal fee.

### EH-7 Policy Statement

Expand native tree canopy and forest cover in the County and manage forests to ensure long-term health and sustainability, addressing threats from invasive species, overpopulation of deer, and climate change.

### Implementing Actions

1. Monitor implementation of the recently updated Forest Conservation Act and modify the Act as necessary to ensure adequate protection of forest resources.
2. Update countywide forest cover data on a regular basis to help assess changes in forest cover and manage forest resources over time.
3. Establish and achieve measurable goals for tree canopy, forest cover, and riparian forest buffers in all county watersheds.
4. Prioritize economically-vulnerable communities for native tree plantings to mitigate heat island impacts.
5. Continue and expand forest management, including invasive species removal, on county properties to ensure long-term health and sustainability of the forest.
6. Continue and expand outreach and technical assistance to private forest landowners for forest management to ensure the long-term health and sustainability of the forest.
7. Continue and expand implementation of the county Deer Management Program and develop safe strategies for deer management in residential and recreational areas.

# Implementing the Green Infrastructure Network Plan

Howard County's Green Infrastructure Network is comprised of a mapped system of hubs and corridors that includes and links the most ecologically significant natural areas in the County, as shown in Map 3-6. Hubs are large, natural areas that provide valuable habitat for plants and wildlife. Large contiguous blocks of interior forest and sizable wetland complexes are essential components of hubs. Corridors are linear features that tie hubs together and they may include rivers and streams, narrow sections of forest, and other upland areas.

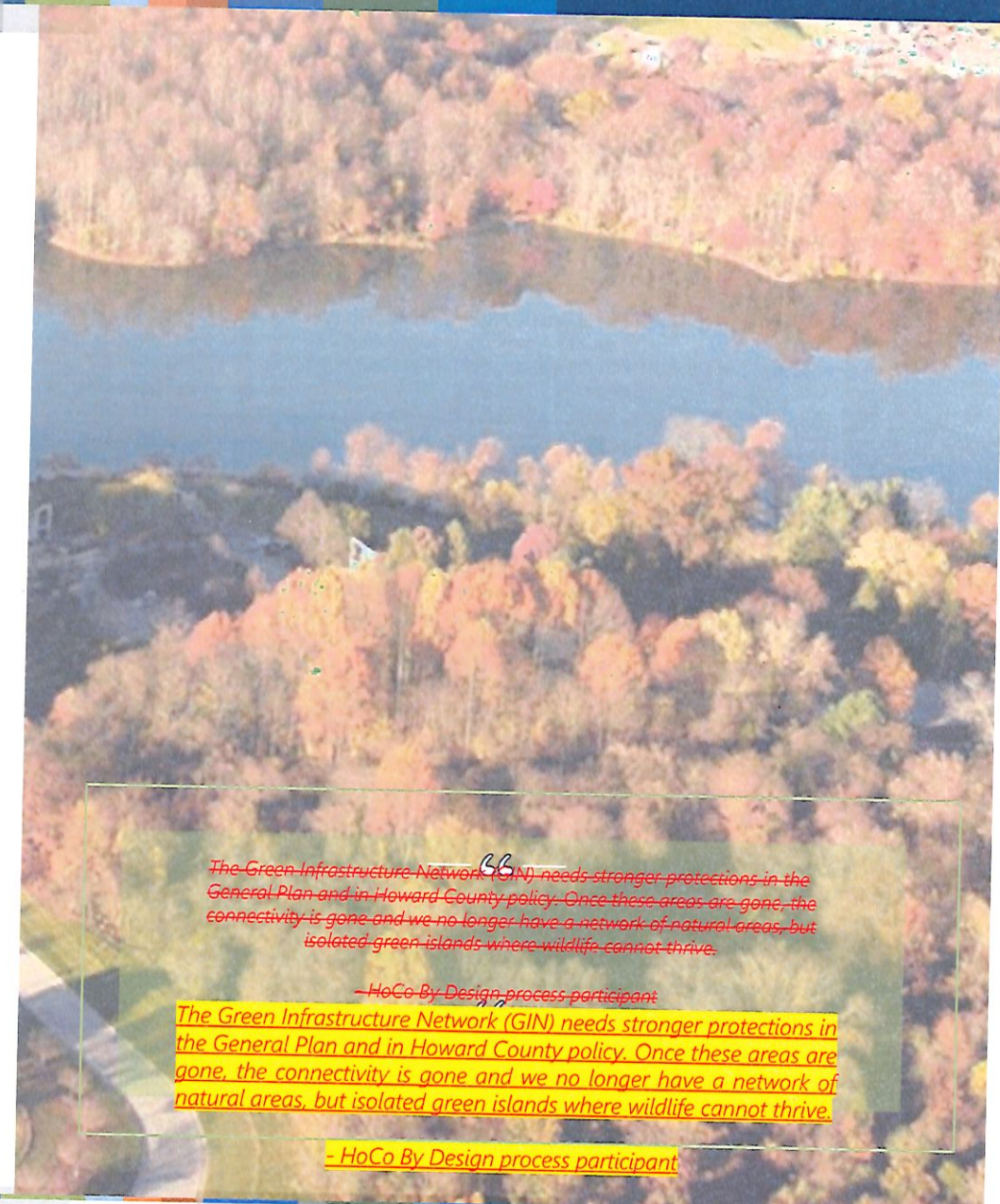
The intent of the Green Infrastructure Network is to provide a protected system of interconnected waterways, wetlands, forests, meadows, and other natural areas. The network helps support native plant and animal species, maintain natural ecological processes, sustain air and water resources, and contribute to the health and quality of life of Howard County's communities. A protected network of continuous habitat is a valuable resource for plant and animal species now and in the future, especially if they need to shift their habitat range due to climate change.

According to the 2012 Green Infrastructure Network (GIN) Plan, there are 51 hubs that contain approximately 22,148 acres or 14% of the County's total land area. Approximately 76% of the land in the hubs is protected in parkland or open space, and 11% is under an agricultural, environmental, or historic easement. The remaining 13% of the land is in a variety of uses and approximately 6% is uncommitted, which is land that still has development potential based on the zoning.

According to the 2012 GIN Plan, there are 48 corridor connections in the network. The corridor system contains approximately 6,173 acres or 4% of the County's total land area. Approximately 26% of this system is protected in parkland or open space, and 26% is under an agricultural or environmental easement. The remaining 48% of the land is in a variety of uses and approximately 11% is uncommitted. Protected land within the GIN is shown in Map 3-7.

Since development of the GIN Plan, the County conducted site visits to confirm the viability of the corridors for safe wildlife passage, with a focus on road crossings and areas close to existing development. Based on this assessment, two corridors (Cattail Creek – Friendship North and South) were removed from the GIN because they were not viable for wildlife passage. A mapping update of the network is needed to reflect these and other changes, such as corridor realignments and new development.

The GIN Plan defines goals and objectives to protect and enhance the network. It also contains a comprehensive toolkit for implementation that includes stewardship, financial incentives, regulatory protection, easements, acquisition, and indicator monitoring. The HoCo By Design public engagement process and the Environment Strategic Advisory Group (SAG) provided extensive comments on the importance of the GIN to identify and protect the County's most sensitive and ecologically beneficial resources. Further, the Environment SAG reported that "the Green Infrastructure Network is a valuable resource for the County, but implementation of the Green Infrastructure Network Plan has been slow." While the County has made some progress with plan implementation,



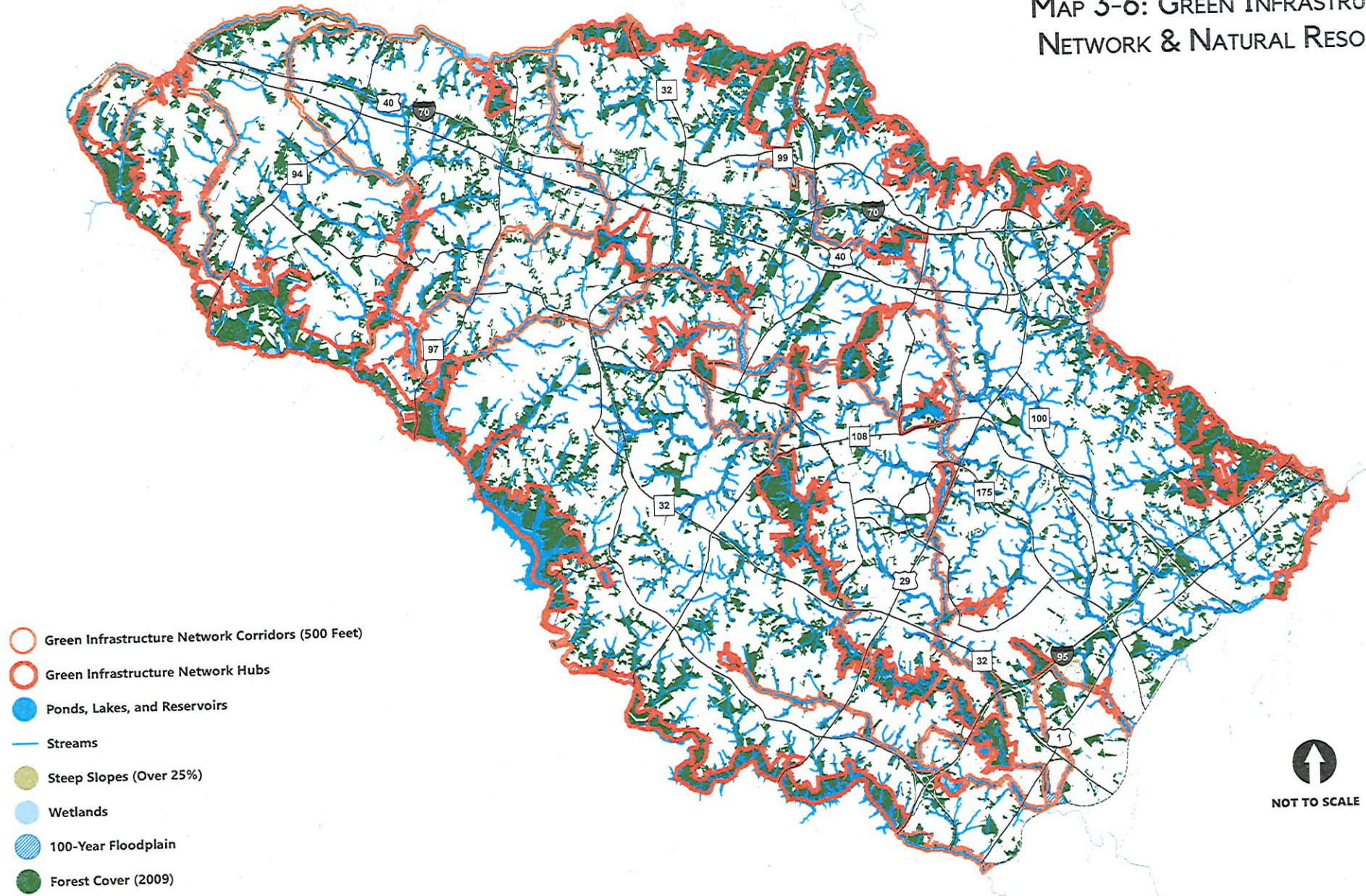
*The Green Infrastructure Network (GIN) needs stronger protections in the General Plan and in Howard County policy. Once these areas are gone, the connectivity is gone and we no longer have a network of natural areas, but isolated green islands where wildlife cannot thrive.*

*-HoCo By Design process participant*










*The Green Infrastructure Network (GIN) needs stronger protections in the General Plan and in Howard County policy. Once these areas are gone, the connectivity is gone and we no longer have a network of natural areas, but isolated green islands where wildlife cannot thrive.*

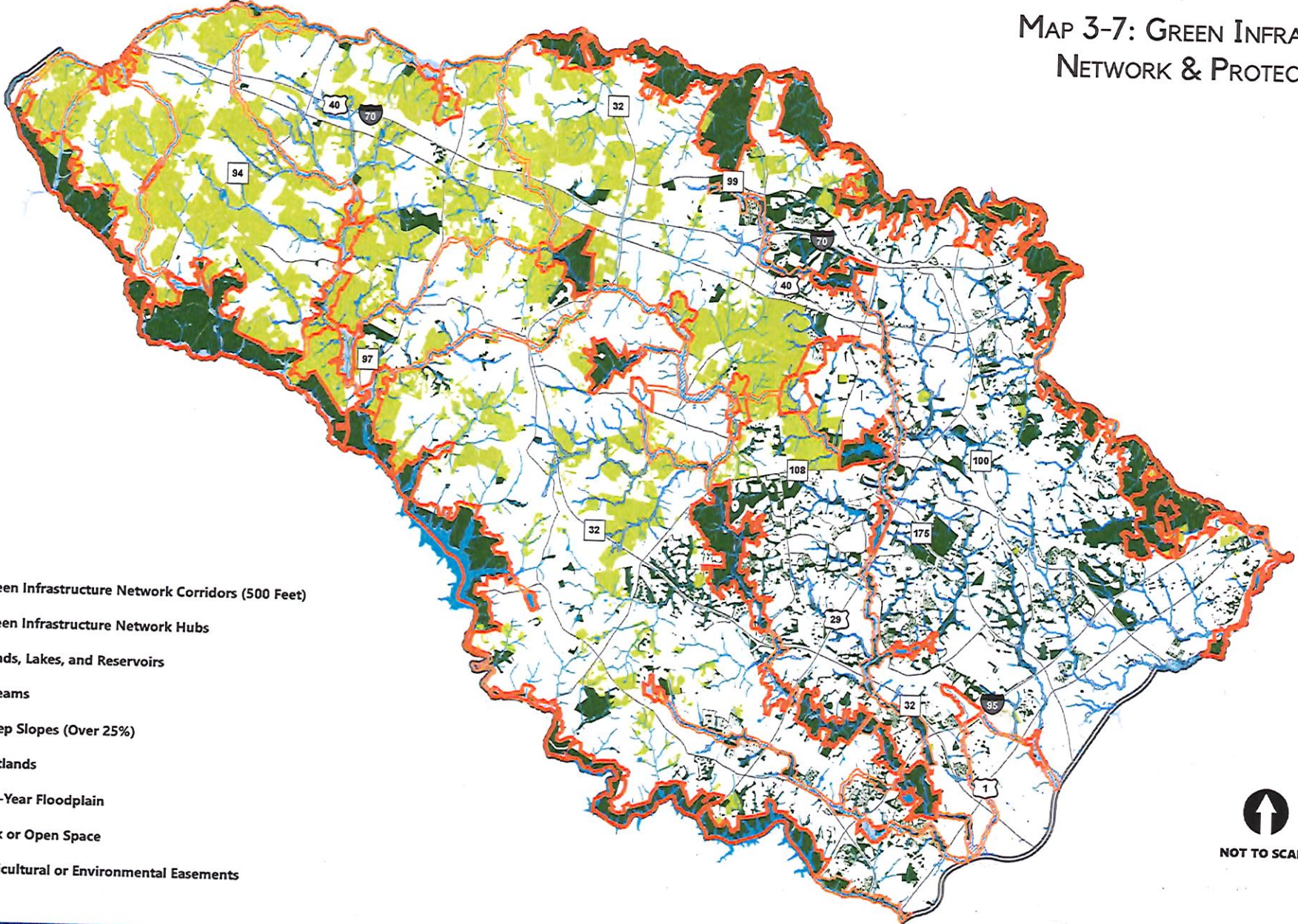
*- HoCo By Design process participant*

# MAP 3-6: GREEN INFRASTRUCTURE NETWORK & NATURAL RESOURCES



# MAP 3-7: GREEN INFRASTRUCTURE NETWORK & PROTECTED LANDS

-  Green Infrastructure Network Corridors (500 Feet)
-  Green Infrastructure Network Hubs
-  Ponds, Lakes, and Reservoirs
-  Streams
-  Steep Slopes (Over 25%)
-  Wetlands
-  100-Year Floodplain
-  Park or Open Space
-  Agricultural or Environmental Easements



  
NOT TO SCALE



additional actions are still needed, such as integrating the GIN Plan into county planning processes, establishing a new easement/land acquisition program, amending development regulations and design standards for increased protection, and instituting financial incentives to support more costly best management practices on private property. Additional studies are also needed on existing resource conditions and on how wildlife use the GIN, so that informed management of the network helps optimize the many benefits provided by the GIN.

While the GIN is intended to provide a connected system of large areas of significant habitat that supports native plants and wildlife, other natural resources and habitats outside the network are also valuable and worthy of protection and restoration. The GIN is part of the larger ecosystems in the County, so the health of these ecosystems supports the health of the network. There may also be value in protecting smaller forest and wetland habitats that could provide 'stepping stones' to the network to strengthen the ecological function of the GIN.

### EH-8 Policy Statement

Expand implementation of the Green Infrastructure Network Plan.

### Implementing Actions

1. Integrate the Green Infrastructure Network Plan implementation actions into the relevant county plans and programs.
2. Consider use of an overlay zoning district or other regulatory measures to target resource protection measures for the Green Infrastructure Network.
3. Establish an easement or land purchase program to protect uncommitted parcels within the Green Infrastructure Network.
4. Amend county design standards for roads, bridges, and culverts to facilitate safe passage for wildlife at county road crossings within the Green Infrastructure Network.
5. Conduct studies of existing resource conditions and wildlife use within the network to enhance management of the Green Infrastructure Network.
6. Consider expansion of the Green Infrastructure Network to include smaller habitat areas that provide 'stepping stones' to the primary network.



## PRESERVING FARMLAND

Howard County preserves farmland in the Rural West primarily through its Agricultural Land Preservation Program (ALPP), in which a property owner, whose land meets certain size and soil criteria, can offer to sell a perpetual easement to the County, while holding fee simple title to the land. The land may be sold, but the easement, which restricts the development of the property, remains with the land and binds future owners. Howard County had one of the first local purchase of development rights programs in the nation and began acquiring agricultural preservation easements in 1984.

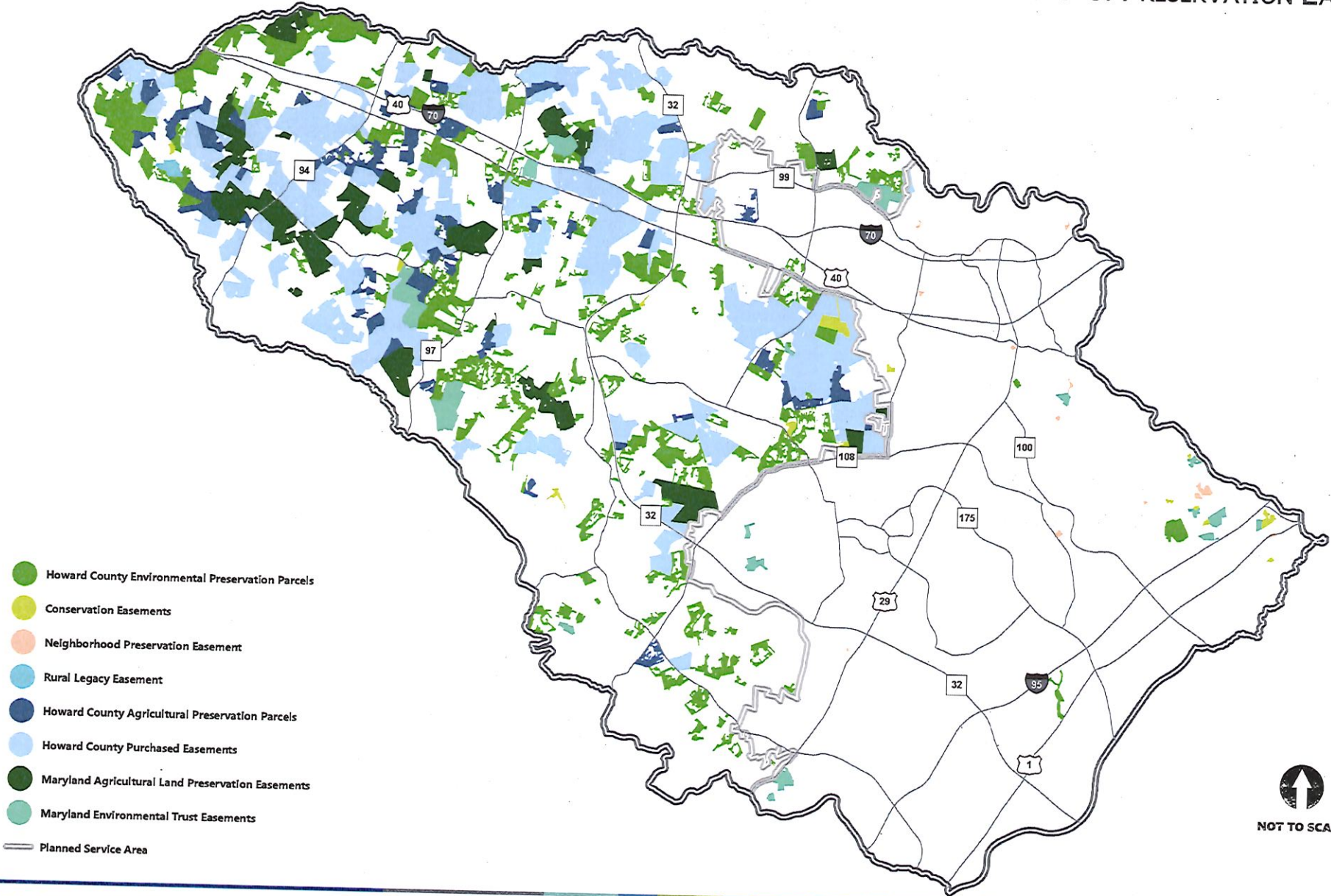
The Maryland Agricultural Land Preservation Foundation (MALPF) program also purchases agricultural easements and was particularly active in Howard County in the early 1980s, prior to the establishment of the ALPP. As of September 2022, there were 4,046 acres under a MALPF easement in the County. MALPF easements established since 2004 are perpetual. MALPF easements established prior to 2004 allow a property owner to petition to terminate their easement and buy back their development rights from MALPF after 25 years. To terminate their easement, the property owner must demonstrate that profitable farming is no longer feasible on the property and both MALPF and the Howard County Council must approve the owner's request. When reviewing the request, MALPF considers the economic feasibility of farming and the County considers local land use priorities, including consistency with comprehensive planning goals and impacts to vicinal properties.

As provided for in the Zoning Regulations, land may be dedicated to the ALPP by way of preservation parcels created through the cluster subdivision or Density Exchange process. No county funds are used to acquire the dedicated easements because they result from private market transactions between the property owner and a developer. Like the ALPP purchased easements, the restrictions on the dedicated parcels against development remain with the land and bind all future owners.

As of September 2022, there were 18,979 acres of preserved farmland through the ALPP Purchased and ALPP Dedicated programs. There is additional farmland that is protected as county-dedicated environmental preservation parcels and some that is held under conservation easements between the landowner and one or more local land trusts, though many of these parcels contain more environmentally sensitive areas than active agricultural land. Local land trusts, such as the Howard County Conservancy and the Rockburn Land Trust, accept donated easements from private property owners and the property owner may receive tax benefits based on the value of the donation. The County recently entered into a partnership with the Howard County Conservancy to create a new purchased easement program for nonprofit landowners with environmentally sensitive areas on their land who cannot derive tax benefits from a donated easement. The Preservation Easements Map (see Map 3-8) shows farmland and other lands preserved in the County through the diverse options available to landowners seeking to preserve their land.

For information about efforts to support the agricultural economy, including agriculture in the East, please see the Economic Prosperity chapter.

# MAP 3-8: PRESERVATION EASEMENTS



## ALPP Funding

Since its inception, the ALPP has been funded by a 25% share of local transfer tax revenues. This dedicated funding source has been critical to the success of the program over the years. The County initially compensated property owners in cash for their development rights, but in 1989 established the installment purchase agreement (IPA) method. The initial IPAs provided the property owner with small, incremental principal payments and twice-yearly tax-free interest throughout the length of the term, with a balloon payment of the remaining principal upon maturity of the IPA bond. After about 20 years, the County stopped using balloon payments and began paying the owner in equal amounts over the length of the term. The twice yearly tax-free interest on the remaining principal arrangement did not change. Howard County was the first jurisdiction in the nation to utilize the innovative IPA approach, the template of which has since been copied elsewhere in Maryland and across the country.

The County monitors the fund balance annually to ensure solvency and to anticipate future spending potential. A number of large final IPA payments will come due between 2019 and 2024, resulting in a significant decrease in the fund balance. However, given the waning number of annual acquisitions, the closure of final payouts, and reduced interest rates over time, the fund balance is projected to rebound quickly and significantly starting in the mid-to-late 2020s.

Given the limited amount of remaining land eligible for preservation, the County should continue to use the fund to improve the ecological health of our agricultural land, consider repurposing a portion of the fund to assist the agricultural community in other ways, and to enhance the County's efforts to improve ecological health, as discussed earlier in this chapter. There is precedent for using the ALPP Fund for other agricultural purposes besides acquisition, including support for the Howard Soil Conservation District and the Agricultural Business Development Program within the Howard County Economic Development Authority. However, any significant transition to non-agricultural uses would require legislation at the state level, since the funding is sourced from the transfer tax.

## The Future of ALPP

There are approximately 86 properties totaling just over 3,300 acres that are potentially eligible for the ALPP. Additional recruitment efforts to preserve remaining uncommitted land may prove successful as properties transfer to new ownership. However, it is unlikely that recruitment will result in a significant amount of additional preserved land, since the ALPP is well known throughout the community, given its 40-year operational history in Howard County.

PlanHoward 2030 recognized that uncommitted land was a diminishing resource and that, in addition to acquisition, the focus of the ALPP should shift to stewarding existing easements, and helping farmers confront challenges and embrace opportunities that they may face in the future. In the intervening years since the adoption of PlanHoward 2030, the ALPP has been active and successful in these endeavors. There have been 26 properties preserved, totaling 1,480 acres. As of this General Plan, two additional properties totaling 55 acres are in the acquisition pipeline. The ALPP established and implemented an easement stewardship program, whereby most properties received their first monitoring inspection in well over a decade. Monitoring helps determine whether the terms and conditions of each easement are being met, such as maintaining the agricultural suitability of the land. Lastly, ALPP staff continues to partner with the County's other agricultural agencies to provide financial incentives, technical assistance, and general support to the farming community as it grows and diversifies.

## EH-9 Policy Statement

Continue to promote agricultural land preservation, recognizing that uncommitted land in the Rural West is a diminishing resource.

### Implementing Actions

1. Build on the successes of the Agricultural Land Preservation Program (ALPP) and continue acquiring land through the ALPP.
2. Continue to promote other land preservation options, such as the dedication of easements to the County through the subdivision process, the purchase of easements by the Maryland Agricultural Land Preservation Foundation program, and the donation of easements to nonprofit land trusts.
3. Continue to implement the Agricultural Land Preservation Program easement stewardship activities to monitor compliance.
4. Evaluate strategies to identify, expand and preserve agricultural land uses within the Public Planned Service Area, to include a review of regulations specific to agricultural use and preservation.

## EH-10 Policy Statement

Expand the scope of potential uses of the Agricultural Land Preservation Program Fund. Expand the scope of potential uses of the Agricultural Land Preservation Program Fund to support traditional agriculture and expand agribusiness opportunities for existing and future farmers.

### Implementing Actions

1. Work with various stakeholders to identify areas for the most appropriate and effective potential uses of the fund, including support for environmental programs in which the fund can be most effective in supporting the overall health of agriculture land along with the overall industry and businesses, while ensuring continued funding of the ALPP.



## Encouraging Environmental Stewardship

The majority of land in the County is privately owned, so environmental stewardship on private property is critical to protecting and restoring natural resources. Healthy natural resources support ecosystems that will be better able to adapt to climate change. Stewardship actions can include reducing the use of pesticides and herbicides, installing rain gardens and rain barrels, planting native tree species (especially along streams and wetlands), and replacing lawn with native plants and pollinator gardens, and removing and refraining from planting non-native invasive plants.

Public outreach and education are essential to raise awareness about the cumulative positive or negative impacts individual actions can have on the environment. Maryland schools are required to provide a comprehensive, multi-disciplinary environmental literacy instructional program for all students and this program must include opportunities for outdoor learning. Through a combination of efforts by government agencies, community and environmental organizations, business associations, and educational institutions, there is a wide variety of outreach and education programs available in the County for residential, commercial, and institutional property owners. Some programs may also include financial incentives or assistance, such as rebates, and planning and installation services. Where needed, these efforts should be expanded and new programs initiated to increase stewardship activities on private property. For example, a rising concern is the detrimental impact to local freshwater streams, lakes, and wetlands from the overuse of winter salt on roads, driveways, and parking lots. Education programs about the proper use of winter salt could help reduce this negative impact.

The County can also continue to exemplify stewardship by incorporating environmentally sensitive site development and property management practices into county activities. County actions could include exceeding minimum Green Building requirements for county buildings; improving energy efficiency and expanding use of renewable energy in county operations; retrofitting stormwater management for county facilities; implementing demonstration projects to encourage their use by others; replacing lawn with native plantings and pollinator gardens; and increasing forested riparian buffers and tree canopy on public property.

SS

*Surveys of biodiversity show the world's overall decline in species. What good is farmland if there are no pollinators for the crops?*

*Contiguous open space and the ecosystem it supports is the only way to protect our food sources in the long run. Sustainability and food security mean preservation of our local farms and pollinators. —HoCo By Design process participant*

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SS

*— HoCo By Design process participant*

## Bee City USA

In 2019, the County Executive signed an Executive Order designating Howard County as a Bee City USA, committing the County to support and encourage healthy pollinator habitat creation and enhancement. This Executive Order notes that bees and other pollinators are responsible for reproduction in almost 90% of the world's flowering plants, including fruits and vegetables, but they have experienced population declines in the United States due to habitat loss, poor nutrition, pesticides, parasites, diseases, and climate change. Under this Executive Order, the County agreed to work with the Howard County Conservancy to enhance understanding among county staff and the public about the vital role that pollinators play and what each person can do to sustain them. Identified techniques include developing and implementing a program to create or enhance pollinator-friendly habitat on public and private land, and adopting an integrated pest management plan designed to prevent pest problems, reduce pesticide use, and expand the use of non-chemical pest management methods.

### EH-11 Policy Statement

Encourage individual environmental stewardship in daily activities on private and public property.

### Implementing Actions

1. The County should continue to provide leadership by incorporating environmentally sensitive site development and property management practices on county properties.
2. Continue existing and expand current outreach programs to promote and assist private property owners with the implementation of stewardship practices.
3. Increase opportunities for student participation in environmental outreach and education and stewardship practices on school properties.

### EH-12 Policy Statement

Commit to and support the County's designation as a Bee City USA.

### Implementing Actions

1. Integrate pollinator-friendly practices into county policies, programs, and capital projects.
2. Incorporate improvements to the County's pest management policies and practices as they relate to pollinator conservation.
3. Develop and implement a program to create and enhance pollinator-friendly habitat on public and private land.

## Managing Mineral Resources

~~A 1981 Maryland Geological Survey study identified Howard County's principal mineral resources as sand and gravel, which are of great importance to the construction industry. These resources are confined mainly to the Coastal Plain portion of the County, specifically from the Howard and Anne Arundel County border westward to approximately midway between Route 29 and Interstate 95. The Maryland Geological Survey also indicates there is potential for crushed stone production west of Interstate 95, based on mineral resources endemic to the Piedmont region of Howard County, but locations were not identified.~~

~~The Maryland Department of the Environment (MDE) issues mining permits per the Surface Mining Act of 1975. MDE identifies three mining operations in Howard County—one in Marriottsville, and two in Jessup. However, one of the Jessup facilities is no longer mining. Both active facilities quarry stone or hard rock. Sand is no longer mined in Howard County.~~

~~Howard County's Zoning Regulations allow quarries as conditional uses in rural and industrial areas, subject to certain approvals and limitations. Pre- and post-extraction planning and ongoing management are required to ensure mining operations do not impact quality of life in adjacent neighborhoods. Existing infrastructure, such as roads, must be sufficient. Final use of a mined site is planned prior to any extraction. While it is not anticipated that quarry activities will cease during the planning horizon for HoCo By-Design, if they do, a planning effort should be undertaken to identify potential reuse of the sites. For any quarry activities that cease during the planning horizon for HoCo By-Design, a planning effort should be undertaken to identify potential reuse of the sites.~~

~~Industrially-zoned areas, where mining is a conditional use, are primarily in the Route 1 Corridor and coincide with the Coastal Plain area of the County. This could afford potential opportunities for additional mining, if feasible, but such activities seem unlikely, given existing and planned development in the Corridor.~~

### EH-13 Policy Statement

~~Continue to balance the potential for mineral resource extraction with other land uses.~~

### Implementing Actions

1. ~~Continue to allow mineral resource extraction as a conditional use in the Zoning Regulations in appropriate locations.~~
2. ~~Explore opportunities for the future reuses of quarry sites.~~