

Review of Forest Protection Measures in Delaware and Surrounding States

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Introduction

The rate of forest loss in Delaware has been a growing concern among state agencies, the public, and environmental groups throughout the state. As of 2020, Delaware forests cover about 29% of the total land use in the state, which is approximately 359,000 acres. Without a state-wide forest preservation bill, these acres are at risk of being lost to development and land use change (University of Delaware Cooperative Extension 2021).

Trees are natural champions, from our state forests to our city parks, they improve air, water, and soil quality. They also play a critical role in helping to fight climate change. Planting and nurturing trees is a nature-based solution to reducing greenhouse gases that drive climate. Trees and forests reduce carbon in the atmosphere by absorbing carbon dioxide from the air and storing it in the tree. Trees provide countless environmental benefits while also benefitting the health and well-being of the community by providing recreation and shade for cooling.

The pressures of forest loss and land use change are indicated through the Preliminary Land Use Service (PLUS). The Delaware Department of Natural Resources and Environmental Control's (DNREC) Division of Climate, Coastal and Energy is responsible for compiling Department-wide comments on development and comprehensive plans submitted through PLUS. DNREC reviewers see multiple projects come through PLUS every month proposing the removal of significant forested land throughout the state, primarily concentrated in Sussex County. Table 1 below shows forest acres proposed to be removed by county in Delaware from May 2021—April 2022. Nearly three-quarters of the total forested acres proposed for removal in Delaware during this 12-month period were in Sussex County. Only 3% and 8% were proposed for removal in Kent County and New Castle County, respectively. While further analysis of forest cover change is currently underway using a combination of GIS and aerial imagery analysis, this observed uptick in forest removal in Sussex County remains difficult to dispute.

Table 1: Forested acres proposed for removal, based on PLUS applications, in each of Delaware's counties from May 2021—April 2022.

<i><u>County</u></i>	<i><u>Forested acres proposed for removal</u></i>	<i><u>Percent of total forested acres proposed for removal¹</u></i>
<i>Sussex</i>	476.18	73%
<i>Kent</i>	22.18	3%
<i>New Castle</i>	49.75	8%

¹ Remaining acreage was proposed for removal in municipalities.

As it currently stands, Delaware does not have legislation for state-wide forest protection. The removal of forest in Delaware results in a loss of carbon sequestering trees, elimination of canopy that provides for shading and cooling, and destruction of essential habitat for Delaware's wildlife and rare and endangered species. There is currently no mechanism in place for the State to limit forest removal happening as a result of new development.

However, some surrounding states have taken steps to protect forests by enacting legislation, and communities within and near Delaware have taken similar steps at the local level. There are several mechanisms that can be used to help to protect forests and trees, as follows:

1. **Preservation**

Under a preservation strategy, a certain percentage of existing forest—usually dependent on zoning classification and other factors—is required to remain intact during development. This is often set aside as common open space. Forest preservation is the highest level of forest protection, as it protects mature forests that provide benefits that younger forests cannot. Because of these benefits, it is virtually always more beneficial to prevent an acre of forest from being cut down than to cut it down and replant a new acre. This concept is exemplified in what's known as the "mitigation hierarchy" of conservation, in which avoiding and minimizing harm is prioritized over offsetting and compensating for it (Forest Trends 2022).

2. **Afforestation**

Afforestation is the establishment of forested land where previously there was none. Afforestation requirements specify that some amount of new forest must be planted on parcels that are not forested or only sparsely forested, such as former agricultural fields where a residential development is proposed.

3. **Reforestation**

Reforestation is the re-planting of a forest that was removed. Reforestation requirements specify the amount of forest that must be replanted after it is removed for development. The amount required to be planted is often dependent on zoning classification and other variables. In cases where the required amount of preservation or afforestation/reforestation cannot be met (and developers must often demonstrate why standards cannot be met) provisions may allow trees to be planted at an off-site location instead of on-site.

4. **Fee-in-Lieu**

In some cases, certain ordinances allow for a fee-in-lieu paid into a conservation fund if forest standards are unable to be met. The conservation fund usually pays for tree plantings in the area where the forest was removed and if plantings cannot happen on-site, then funds will be used for off-site or adjacent plantings.

5. **Incentive Programs**

Reforestation, afforestation, and other conservation efforts could be met with the use of an incentive program. An incentive program is acquiring voluntary participation from a certain group of people to perform an action that benefits their community. Programs use financial or technical leverage to get individuals to enroll and help alleviate some of the costs associated with program participation. Incentive programs are found at the federal, state, and local level.

These strategies are not mutually exclusive and are often used simultaneously in forest protection measures. This paper explores how these mechanisms have been used by state and county governments in legislation to protect forests.

Summary of Findings

Table 2 below outlines the protection threshold, applicability, and general provisions of these forest protection measures.

The information collected for this analysis of forest protection measures in Delaware and its surrounding states was derived from researching state legislation and regulations, town and county ordinances, and incentive programs.

In summary, the State of Maryland has one of the strongest forest protection laws in the United States because it incorporates many mechanisms for forest protection in state and local policies. Delaware and New Jersey have weak legislation that only applies to state agencies. In the case of Delaware, only the Department of Transportation employs reforestation and mitigation measures, requiring that new trees be replanted after forest is removed, but does not have any provisions to prevent forest from being cut down. Virginia falls somewhere in the middle. Virginia's law allows for the establishment of local tree ordinances, but it is more geared towards reforestation rather than preventing forest from being cleared.

As for county legislation, New Castle County has the strongest forest protection legislation in Delaware, followed closely by Kent County. Sussex County has virtually no forest protection legislation at all. Because Maryland legislation requires that most of the counties in the state adopt their own ordinances that meet the standard set by the State, many of the counties in Maryland also have strong legislation. Talbot County, Maryland serves as another example of a strong and comprehensive county ordinance.

Table 2: Summary of forest protection measures in local and state governments in and near Delaware.

<u>Locality</u>	<u>Protection Threshold</u>	<u>Code</u>	<u>Applicable to</u>	<u>Preservation</u>	<u>Afforestation</u>	<u>Reforestation</u>
Delaware	All DeDOT construction activities	Title 17, Chapter 1 §201-§211	DeDOT	✗	For landscaping only	✓
New Castle County, DE	Varies	Code of Ordinances Chapter 40	All activity within county	✓	✓	✓
Kent County, DE	Varies	Code of Ordinances §187-73 - §187-75	All activity within county	✓	✓	✓
Sussex County, DE	None	None	N/A	✗	✗	✗
New Jersey	½ acre or more of deforestation	New Jersey Code Chapter 13 Section 3	State agencies	✗	✗	✓
Maryland	Land-use determines conservation thresholds	Maryland Code of Natural Resources Title 5 Subtitle 10	Entities with zoning or planning authority	Depends on adopted forest conservation plan	✗	✓
Maryland	1 acre or more of deforestation	Maryland code of Natural Resources Title 5 Subtitle 1	State and local governments	✗	✗	✓
Talbot County, MD	Parcels greater than 20,000 square feet	Code of Ordinances §73-2 - §73-16	All activity within county	✓	✓	✓
Virginia	Establishment of local tree ordinances: Minimum tree canopy requirements depend on land-use	Code of Virginia Title 15.2 Chapter 9 Article 5	Locality with 75 people or more, or any locality within the Chesapeake Bay watershed	Not necessarily – ordinances may allow for the preservation of trees to count towards canopy thresholds	✗	✓

The following sections provide overviews of the specific forest preservation, afforestation, and reforestation components of state laws and local ordinances in Delaware, New Jersey, Maryland, and Virginia.

Delaware

State of Delaware

Requirements for state agencies

Chapter 1 §201-§211 within Title 17 of the Delaware Code applies reforestation standards to Delaware Department of Transportation (DelDOT) activities (DelDOT Road Design Manual 2004). The code only applies to construction activities performed by DelDOT on state lands, such as construction of a new road or widening of an existing one.

Preservation standards are not included in Title 17, other than specifying that DelDOT must make “every reasonable effort” to preserve large, mature trees and to remove only the minimum number of trees necessary for the project. Projects that do not propose tree removal still require a landscaping plan that conforms to planting standards. Thus, a small amount of afforestation may be required in the form of landscaping trees.

Reforestation is required when a project necessitates the removal of trees. The reforestation ratio (trees required per tree removed) is 1:1 if 10 or fewer trees are removed and 2:1 if 11-49 trees are removed. For activities proposing removal of 50 or more trees, an acre of land must be replanted for every acre of trees removed. The trees must be planted within the rights-of-way of the roadway.

Mitigation is permitted if the above requirements cannot be met. In that case, DelDOT must plant the trees as close as possible to where they were removed. If there is no suitable location, DelDOT must pay the Delaware Forest Service or DNREC an amount equal to the cost of planting seedlings elsewhere.

Requirements for developers

Delaware does not have any statewide legislation regarding forest preservation, afforestation, or reforestation as it applies to development.

New Castle County, DE

New Castle County has the most robust forest protection ordinances of any local government in Delaware.

Preservation

New Castle County protects forests during development through a variety of mechanisms, one of which is the county’s set of open space standards (New Castle County Code of Ordinances §40.04.231). The standards mandate that areas of open space currently covered in natural

vegetation must be maintained as such. If an area is disturbed due to construction but the developers plan to return it to a natural condition, the area must be planted as forest or with other plants, all of which must be native to Delaware.

New Castle County's site capacity codes (New Castle County Code of Ordinances §40.05.420) require a percentage of each site proposed for development to be protected. In Table 40.05.420 of the New Castle County Code, forests are assigned resource protection ratios between 0.10 to 0.90, depending on the quality of the forest habitat and whether or not they are located within a Critical Natural Area (CNA) as defined in New Castle County Code. For example, a forest with a resource protection ratio of 0.80 means that 80% of that forest must be preserved. Tier 1 forests (see "Forest Habitat Value Assessment") have the highest priority for preservation.

Afforestation

New Castle County also has afforestation standards that vary depending on the zoning district (New Castle County Code of Ordinances §40.04.241). In New Castle County, afforestation is required in parcels that are not currently forested or where existing forest coverage is below the designated threshold for that specific zoning district. The amount of afforestation required is expressed as a ratio of total forest coverage on the site to the area of the entire site, and ranges from 0.10 to 0.35 depending on the zoning district. This is detailed in Table 40.04.241 of the New Castle County Code. Generally, low-density residential districts require the highest afforestation ratio, while high-density commercial and industrial districts require the least.

Forest Assessment

The Forest Habitat Value Assessment (FHVA) is a tool that New Castle County uses in order to protect forests. A FHVA is required when a forest within a project boundary will be disturbed by development. This assessment, required to be conducted by a professional forester, landscape architect, or other certified professional, determines the health and longevity of forests and serves as a basis for enhancement and protection standards. The assessment is point-based and is evaluated on criteria such as the size of trees within the forest, the presence of rare or uncommon species, the amount of forest fragmentation, and the potential for mature forest. Details of the FHVA can be found in Appendix 1.3 of New Castle County Code. Tier 1 forests have the highest point value and are the highest quality habitats in the state, while Tier 3 forests are the lowest quality forests.

Reforestation

Forests may be cleared in a greater area than permitted only if reforestation is provided, and if the following standards are met:

- The Forest Habitat Value Assessment is conducted by qualified professional and the report and plan is submitted to the Department of Land Use.

- The protection level given to forests after reforestation can't be less than the protection level of the original forest, as specified in Table 40.10.135.

An applicant may be able to slightly reduce the resource protection ratio of a forest as long as the forest is not within the Critical Natural Area and if mitigation is provided on the same parcel or an adjoining parcel. The ratio of required trees is specified in Table 40.10.135 of the New Castle County Code. For example, a developer may reduce the resource protection ratio of a Tier 1 forest from 0.80 to 0.70 if twice as many trees are replanted as are removed.

In forests, old fields, and meadows containing a large number of invasive species, a mitigation plan is required to be submitted by the developer. At a minimum, the plan must include the elimination of invasive species and a long-term maintenance plan focusing on the eradication of these plants.

Kent County, DE

Like New Castle County, Kent County's tree protection legislation addresses forest preservation, afforestation, and reforestation, making for a strong set of codes to protect forest in the county.

Preservation

Kent County has regulations to preserve "woodlands", which are defined as "an area of contiguous wooded vegetation of at least 10,000 square feet in area where trees exist at a density of at least one tree with a diameter at breast height of six inches or greater per 400 square feet of land and where the tree branches form a contiguous canopy," except for active tree nurseries and orchards. These laws apply to any activity on a property that requires conditional use, site plan, or subdivision approval by the County. Different levels of protection apply depending on a site's location within or outside of the growth zone. Kent County defines a "growth zone" in their 2018 Comprehensive Plan, which consists of a corridor from Smyrna, through Dover, into Milford, as well as Harrington, where growth is expected and encouraged. Outside of the growth zone, development standards are more stringent, and this applies to forest preservation as well.

Preservation standards are detailed in §187-73 of the Kent County Code. Within the growth zone, between 20-60% of the existing woodland (depending on the density and zoning district) must be preserved. "Selective clearing" is permitted on half of the preserved woodlands, allowing for trees to be removed in order to place individual lots. Outside of the growth zone, no more than 30% of a woodland area may be cleared for any reason. Tree removal cannot occur in wetlands unless permission is granted under state and/or federal permits.

Afforestation

According to §187-74 of the Kent County Code, for development in areas that do not meet the criteria for "woodlands", afforestation is required. For example, developers proposing projects in agriculture fields are required to plant trees. In the growth zone, new trees must be planted

at a rate of one tree per 10,000 square feet of residential or 5,000 feet of nonresidential development. Outside of the growth zone, the rate is increased to one tree per 5,000 square feet of residential or 3,000 square feet of nonresidential development. The applicant must provide a one-year full-price guarantee for all new plantings.

Reforestation

According to §187-75 of the Kent County Code, mitigation is permitted in the form of reforestation if physical limitations or issues of public health, safety, welfare, or public convenience preclude the applicant from meeting the tree preservation and afforestation requirements. The following criteria must be met:

- If a waiver is sought from the minimum tree planting requirements in nonwoodland areas, new tree plantings must occur at a rate of 1:1 in the growth zone and 2:1 outside the growth zone.
- If a waiver is sought from the minimum woodland preservation area requirements, mitigation must be in the form of newly created woodlands. They must be created at a rate of 1.25 times the amount to be removed within the growth zone and 1.5 times outside the growth zone. A woodland mitigation plan must be prepared by a professional.
- Mitigation must occur onsite unless an offsite location is approved by the Commission.

Mitigation areas may be required by the Commission to be placed in permanent conservation through deed restrictions, conservation easements, or donations to land trusts.

If trees are cleared for development illegally in non-woodland areas, the applicant must plant between two to five trees per removed tree, depending on the size of trees that were removed. For woodland areas that are illegally cleared, mitigation must be provided in the form of a newly-created woodland 1.75 times the size of the area removed. The removed woodland must be replanted to satisfy part of this requirement. A mitigation plan must also be provided.

Sussex County, DE

Except for requiring forested landscape buffers around residential subdivisions, Sussex County does not have any legislation regarding forest preservation, afforestation, or reforestation.

Maryland

State of Maryland

Maryland has one of the strongest forest conservation bills in the nation under the Maryland Forest Conservation Act. Because the Maryland Forest Service falls directly under the Maryland Department of Natural Resources (MDNR), it was easier to incorporate forest protection measures into erosion and sediment control requirements, when they were first put into place in the early 1990s. Maryland's Natural Resources Code §5-1602 through §5-1605 includes provisions for forest protection alongside requirements for erosion and sediment controls.

The Primary Components of this bill are:

Local Forest Conservation Program

Local governments with planning and zoning authority must submit a Local Forest Conservation Program to MDNR for review and approval; the local authority may delegate authority to the county.

The Local Forest Conservation Program submitted to the Department must include a policy document of all applicable new and amended ordinances relating to the implementation of the of regulated activities, incentives, and enforcement of the program. It must also include a technical manual which outlines the requirements for submitting forest stand delineations, approval of forest conservation plans and specific protection techniques.

Section 5-1604 details the requirements for forest stand delineations. Forest stand delineations are required for the entire development site when “a person making application for subdivision or grading of sediment control and permits on areas greater than 40,000 square feet.” A forest delineation is required to be conducted by a licensed forester and shall be used during the preliminary review process to determine areas of greatest forest conservation.

Once a forest stand delineation is approved, the applicant submits a forest conservation plan for the entire site.

Code §5-1605 details the requirements for the proposed forest conservation plan. Forest conservation plans must include an afforestation or reforestation timetable, afforestation or reforestation plan with description of species and site conditions, and the total area of forest conservation required for the site. Commercial logging, timber harvesting operations, any routine maintenance of public utility rights-of-way are exempt. The forest conservation plan must also be developed by a licensed forester or other qualified professional.

Preservation

Preservation requirements are not directly addressed or outlined in this code; however, it does give authority to the local entity to include more stringent requirements in their local conservation program, which could include preservation thresholds. The code recognizes that forest conservation plans shall provide for reforestation when reasonable efforts to minimize the cutting or clearing of trees have been exhausted, implying that preservation should be a priority during development.

Reforestation - private

Forest planting thresholds are established for different land use categories according to §5-1606. Depending on the land use, the threshold ranges from a ratio of ¼ acre planted for every 1 acre removed to 2 acres planted for every 1 acre removed. Local governments are permitted to adopt stricter standards.

Reforestation – Government Owned Lands

Title 5, Subtitle 1 requires that lands owned by state or local government must complete a reforestation project if they are proposing to clear cut one or more acres of forested land. Governments subject to this subtitle must reforest an equivalent area of publicly owned land at a rate of \$0.10 per square foot of the total area.

If a sufficient location for reforestation is not found in the county or watershed with which the construction is taking place, reforestation may occur with the use of credits in a forest mitigation bank.

Fee-In Lieu

If either a sufficient reforestation site cannot be located or reforestation cannot be accomplished through credits, then the constructing agency must contribute money to the Reforestation Fund. The Reforestation Fund is administered by MDNR. The fund is used only to plant trees on land located in the county and watershed in which the construction activity is located, purchase credits, or to finance the prevention of and response to forest health emergencies.

Maintenance

Code §5-1605c.9. requires submitted forest conservation plans to include a 2-year binding management agreement for the designated areas of reforestation or afforestation. The management agreement should include methods of watering and replanting if survival falls below standards.

Talbot County, MD

Maryland's Forest Conservation Act requires that local governments adopt their own forest conservation laws that meet the standards set forth in the Act, as described above. Talbot County closely follows the State of Maryland Act and is included as a representative of many Maryland counties' ordinances. Most Maryland county ordinances differ only slightly from Talbot County.

Forest Assessment

In §73-2 of Talbot County Code, "forest" is defined as "a biological community dominated by trees and other woody plants, covering a land area of 10,000 square feet or greater", excluding orchards and tree nurseries. These laws do not apply to activity on parcels less than 20,000 square feet in size, properties within the Chesapeake Bay Critical Area (an area defined by the Chesapeake Bay Critical Area Act of 1984 which has its own set of forest protection regulations), and other exceptions like certain agricultural activity, highway construction, etc.

§73-4-§73-6 of Talbot County Code outlines forest stand delineations. There are three types of forest stand delineations that may be required. Simple delineations are required when there is no forest on the site, or when none of the forest will be cut. These delineations require the creation of a forest stand or environmental features map and information about the past and present management of forested and unforested areas. Intermediate delineations are required

when the amount of forest retention is greater than or equal to the levels specified in the code (between 15-50% depending on the zoning classification). These are more robust than simple delineations, and additionally require a summary of the forest composition, a soil map, topographic map, priority retention areas map, and a narrative summary of a walk-through forest survey. A full delineation is required when the conditions for either a simple or intermediate delineation have not been met. In addition to the previous information, they must also include a more detailed forest stand map with information on the forest types, a topographic map that includes streams, wetlands, floodplains, steep slopes, and buffers, the limit of disturbance, habitat used by species of conservation concern, trees meeting size requirements as defined in the code, and more.

Preservation

Forest conservation plans are required by development applicants, as outlined in §73-7 of Talbot County Code. They must be prepared by a qualified professional and are submitted with any final site plans, building permits, or sediment and erosion control permits. They must include the forest stand delineation. The forest conservation plan must prioritize the retention of the existing forest. If this is not possible, the applicant must qualify for a variance by demonstrating 1) how techniques for forest retention have been exhausted, 2) why priority areas (defined below) cannot remain undisturbed, 3) how required reforestation will comply with requirements, 4) or that the requirements for reforestation or afforestation cannot reasonably be accomplished and a fee in lieu is required. Some of the information required includes:

- Total project area
- Area of forest conservation required under §73-11 of Talbot County Code
- Area of forest conservation proposed
- Planting plan in the case of afforestation or reforestation
- Two-year maintenance agreement as required in §73-16A of Talbot County Code
- A long-term binding protective agreement as specified in §73-16B of Talbot County Code

Trees meeting the following criteria are considered priority for retention:

- Located in sensitive areas, such as 100-year floodplains, stream buffers, steep slopes, wetlands and their buffers, etc.
- Are considered rare, threatened, or endangered by the state or federally
- Are part of a historic site
- Are particularly large—either 30 inches diameter at breast height (DBH) or are 75% the DBH of the largest tree of that species in the state

Hydrological areas like floodplains and wetlands are prioritized because forest cover in these areas helps to absorb excess nutrients from runoff before entering the water system. Trees in

these priority areas must be left undisturbed unless the applicant can demonstrate that reasonable efforts have been made to protect them and the plan cannot reasonably be altered.

Afforestation

Project areas with less than 15% forest cover must be forested up to 15% cover, as outlined in §73-10 of Talbot County Code. In certain zoning districts, such as agriculture conservation and countryside preservation, the threshold is 20% cover. Afforestation must be conducted within one year or two growing seasons. Native plants must be used when appropriate.

Reforestation

A forest conservation threshold, between 15-50%, is defined for each zoning classification in §73-11 of Talbot County Code. The percentage refers to the ratio of forested land on the parcel to the total land area of the parcel. If after forest clearing, the remaining forest is above this threshold, a ratio of ¼ acre planted for each acre removed is required to be planted. If forest clearing results in the remaining forest falling below this threshold, two acres of forest are required to be planted per forested acre removed.

Priority areas for afforestation and reforestation include (§73-12 of Talbot County Code):

- Stream buffers
- 100-year floodplains
- Establishing forest corridors
- Buffers for critical habitat
- Areas adjacent to existing forest
- Buffers to nontidal wetlands

Fee-In-Lieu

As outlined in §73-14 of Talbot County Code, if reforestation or afforestation, on- or off-site, cannot reasonably be accomplished, the applicant must contribute money to the Forest Conservation Fund, at a rate established by the County Council. Within a priority funding area, where development is encouraged, the rate is 20% lower. Money in this fund is spent on the costs directly related to reforestation and afforestation. It must be spent within the watershed of the project it originated from, or elsewhere at the discretion of the Department of Land Use.

Maintenance

Two types of maintenance and management agreements are required under Talbot County code (§73-16) when developing on a forested parcel. Short-term protective agreements cover a two-year timeframe. These agreements detail how the reforested and afforested areas will be maintained to ensure the protection and satisfactory establishment of the forest. This agreement also requires financial security in the form of a bond to the City Council or a letter of credit equal to the estimated amount of the cost of the afforestation and reforestation. Long-

term protective agreements conserve and protect the forest beyond the two-year mark. They can include an approved forest management plan or a forest conservation and management agreement.

New Jersey

State of New Jersey

New Jersey is another state working toward mitigating forest loss through legislation. New Jersey adopted its No Net Loss Reforestation Act in 1993, administered under the New Jersey Department of Environmental Protection's (NJDEP) Division of Parks and Forestry.

Reforestation

All state entities are required to develop and submit a plan for compensatory reforestation for state owned lands. Compensatory reforestation must occur for all areas removing a half-acre or more of forest. The NJDEP must approval a reforestation plan prior to site development (§13:1L-14.1). The Community Forestry Council is a part of this review process and is established in New Jersey Statute §13:1L-17.5. b.

A reforestation plan is not required for activities occurring on state land that has been deemed by NJDEP's Division of Parks and Forestry as necessary for standard forestry practices and wildlife management.

Reforestation plans can also prioritize reforestation in an adjacent area to proposed forest removal, within the municipality in which forest removal is proposed, within 5 miles of the site, or off-site (in that order).

Reforestation plans include appropriate methods for planting, maintenance, and care, the use of natives when practical, and the use of the Tree Replacement Factor, which details the number of trees that must be planted based on their size. Prior to deforestation, NJDEP must hold a public forum within the municipality if the deforestation is 1 acre or greater (§13:1L-§14.1).

Virginia

State of Virginia

Virginia state legislation allows certain localities to adopt ordinances on the planting and replacement of trees during development. In §15.2-961 of Virginia Code, "Any locality with a population of at least 75 persons per square mile or any locality within the Chesapeake Bay Watershed", may adopt an ordinance for tree replacement for any new subdivision or development with minimum tree cover dependent on zoning. There are no statewide standards for forest preservation during the development process, however, this section of the Virginia code allows for the adoption of ordinances that implement forest protection measures.

Preservation

Existing trees on the project site can be preserved to meet minimum canopy requirements outlined in the adopted ordinance.

Reforestation

If preservation is not feasible, then the reforestation measures may be employed to meet minimum canopy requirements set forth by the ordinance. Ordinances are to be reasonable and provide for exceptions specifically on developed farmland or when the ordinance would result in unnecessary hardship.

Fee-In-Lieu

On sites where the canopy requirement cannot be met, the permittee can contribute money to a canopy bank or fund (fee-in-lieu) to plant trees off site. The fund may be used directly to plant trees on public property or disburse to community-based organizations with a tree planting mission (§15.2-961).

Other Provisions

Ordinances may prohibit the planting of certain tree species for reasons such as negative impact on native plants, tendencies to cause damage to nearby structures, or characteristics that cause the tree to structurally fail. Violating an ordinance set forth in a locality will bear the same penalty as violating a zoning ordinance (§15.2-961).

Local Tree and Street Tree Ordinances

Municipal and county tree ordinances protect trees and encourage, or require, their replacement at the individual level if they are removed. Unlike forest preservation ordinances, which protect swaths of forested land, tree ordinances are concerned with preserving and planting individual trees, often those that are located along the street and provide benefits for an entire neighborhood. Street trees improve air quality, sequester greenhouse gases, reduce urban heat, buffer noise, reduce stormwater runoff, and beautify the surroundings (Dorwart 2018). As such, many counties and municipalities enact legislation protecting them, even those located on private property.

Street trees face unique threats, from poor air quality, compaction of the root system, heat stress, and water stress in areas of high impervious cover. Climate change is exacerbating these stressors, changing weather conditions and flooding dynamics that impact trees, which is particularly a threat in coastal areas. Redevelopment often requires the removal of mature canopy trees which, if they are replaced at all, are often replaced with small ornamental trees that do not provide the same benefits as the original trees. Utility companies are more aggressive than they have been in the past about pruning trees to clear power or communication lines (City of Rehoboth Beach Planning Commission 2014). Similarly, insurance

companies are more insistent about removing or significantly trimming trees, regardless of the health of the tree, in order to reduce liability (City of Rehoboth Beach Planning Commission 2014).

Rehoboth Beach Street Trees

With their robust network of mature canopy trees facing these threats, Rehoboth Beach adopted a strong tree preservation ordinance that is a model for Delaware municipalities (City of Rehoboth Beach Chapter 253). The law requires a minimum density of trees within residential lots: one tree per 1,666 square feet of land in residential districts. For multi-family lots, two trees are required per dwelling unit. A permit is needed to remove trees and to prune or plant trees located within city rights-of-way.

Philadelphia Street Trees

A newly proposed bill for the City of Philadelphia (City of Philadelphia, Bill No. 220414, 2022) would expand existing tree preservation and planting requirements and introduce new fees for developers if they do not replace removed trees. These new ordinances will work in conjunction with the Philly Tree Plan, which is currently in draft. The plan addresses the significant discrepancies in urban heat resulting in temperature gaps of up to 22 degrees Fahrenheit in Philadelphia neighborhoods. The city's current street tree program has failed to resolve this disparity. The existing program is request-based, meaning that property owners must request street trees themselves. The property owners are also financially responsible for the maintenance of the trees and the costs of repairs to sidewalks. Wealthier property owners, who tend to be more engaged, are more likely to request street trees and can afford their financial burden, unlike lower-income residents. The draft tree plan recommends a cost-share program between the city and property owners to help pay for maintenance and repairs. In the long term, the city would take full responsibility for sidewalks, removing the burden from residents who want street trees (Schmidt 2021).

Local Ordinances Protecting Specimen Trees in Delaware

Specimen tree provisions are a common component of forest preservation ordinances. Specimen trees are individual trees of particular value, often for their size or species. They may include trees that are native but uncommon for the region or those that are particularly large. The latter criteria may be defined by a particular DBH or as 75% the circumference at breast height (CBH) as the state's "champion tree", the largest tree of that species known to exist in a state, which in Delaware is maintained by the Delaware Forest Service and published regularly in their "Big Trees of Delaware" publication. These provisions protect individual trees of significance from removal due to development.

Forest Preservation and Conservation Incentive Programs in Delaware

Although there is no state legislation to protect forestland in Delaware, there are federal and state incentive programs available for tree preservation, conservation, and enhancement.

Federal Incentive Programs

Conservation Reserve Enhancement Program

The Conservation Reserve Enhancement Program (CREP), administered by the United States Department of Agriculture's Farm Service Agency, works with Delaware partners to enroll up to 10,000 acres of agricultural land to conserve and improve for environmental benefits. With CREP, high priority conservation areas recognized by the State can receive federal funds to supplement non-federal funds to achieve conservation goals. Program participants voluntarily enroll and remove agricultural lands from production to practice a conservation method, such as riparian buffers, to improve water quality, soil quality, wildlife habitat, and more. Payments are made to participants, which vary depending on the implemented conservation practice and number of acres enrolled (United States Department of Agriculture, *Conservation Fact Sheet*).

Federal Forest Legacy Program

The Federal Forest Legacy Program, administered by the Delaware Forest Service, is intended to protect forestlands threatened by land conversion. Using funds available from the U.S. Forest Service's State and Private Forestry budget, lands are protected through conservation easements. Eligible lands under this program, are lands identified in a Forest Legacy Area, which are lands within the state with high concentrations of forested lands. Delaware has four areas that are identified as a Forest Legacy Area, which include White Clay Creek, Blackbird, Redden/Ellendale, and the Cypress Swamp. In Delaware, the program has protected more than 3,000 acres of forested land. The acreage has been added to existing state forests or remained privately owned through easements (University of Delaware Cooperative Extension 2021).

Section 319 Grants

The Clean Water Act Section 319 Grant addresses nonpoint source pollution. Funding for these grants is appropriated by the Environmental Protection Agency (EPA) but administered by the Nonpoint Source program housed in DNREC's Division of Watershed Stewardship. Grants are competitive, run on a federal fiscal year, available annually, and contracts are five years in length. The grant provides funds for implementing projects with Best Management Practices, which could include the planting of trees (Delaware Department of Natural Resources and Environmental Control, *Section 319 Grants*).

Chesapeake Bay Implementation Grants

Chesapeake Bay Implementation Grant (CBIG) addresses nonpoint source pollution within the Chesapeake Bay Watershed. Funding for these grants is appropriated by the Environmental Protection Agency (EPA), but administered by the Nonpoint Source Program housed in DNREC's Division of Watershed Stewardship. Grants are competitive, run on a federal fiscal year, available annually, and contracts are six years in length. The grant provides funds for implementing projects with BMPs in the Chesapeake Bay, which could include the planting of trees. (Delaware

Department of Natural Resources and Environmental Control, *Chesapeake Bay Implementation Grant Program*).

Non-Federal Incentive Programs

Forestland Preservation Program

The Forestland Preservation Program is a state-level counterpart to the Forest Legacy Program. The program allows landowners with at least 10 acres of land to enroll forested parcels into a preservation area for a period of 10 years. Lands may be placed into a permanent easement, which would pass to the new landowner at the time of the sale. This program has protected over 36,000 acres through easements and permanently protected 8,000 acres (University of Delaware Cooperative Extension 2021).

Tree for Every Delawarean Initiative

The Tree for Every Delawarean Initiative (TEDI), administered by the DNREC in partnership with the Delaware Forest Service, started in 2021 and aims to enhance tree planting projects throughout the state. Funds are allocated by the General Assembly with each fiscal year. TEDI focuses on supporting and financially supplementing reforestation and afforestation projects, usually occurring on multiple acres. (Delaware Department of Natural Resources and Environmental Control, *A Tree for Every Delawarean*). Currently this program addresses enhancing forest lands while also contributing to the Urban & Community Forestry grant program.

Urban & Community Forestry Grant Program

The Urban & Community Forestry Grant Program, administered by the Department of Agriculture's Delaware Forest Service, is a federally funded program to enhance street trees, trees in parks, and urban/suburban communities to increase urban canopy cover. Selected communities could receive up to \$5,000 to implement a planting project. Program coordinators also provide technical assistance to communities who are interested in getting involved in tree planting projects (Delaware Department of Agriculture, *Urban and Community Forestry*).

Community Water Quality Improvement Grants

The Community Water Quality Improvement (CWQI) Grant is administered by DNREC's Non-point source program. The Delaware Clean Water Revolving Fund Non-Federal Administrative Account provides the funding for this grant. The grant is intended for projects to improve water quality as part of specific watershed improvement plans. Projects should demonstrate innovative and sustainable methods, techniques, and/or practices for water quality improvements with cost effective and measurable results (Delaware Department of Natural Resources and Environmental Control, *Community Water Quality Improvement Grants*).

Delaware Natural Areas Preservation System

The State of Delaware recognizes Natural Areas, which are areas of land or water that have biotic, geological, scenic, or archaeological features of value (Delaware Department of Natural Resources and Environmental Control, *Natural Areas and Nature Preserves*). This is a formal recognition of the exceptional habitat quality in these areas, although it does not provide any protection to prevent development within them. However, once an area is designated as a Natural Area, the landowner can choose to permanently protect it as a State Nature Preserve. A conservation easement or articles of dedication identify restrictions on the land to prevent future development and conserve the natural, geological, or archaeological features on the site. Dedication as a Nature Preserve permanently protects these features and guarantees their existence for future generations. Many forested areas in the State are within Natural Areas and are potentially eligible to be protected as Nature Preserves.

Private Incentive Programs

Arbor Day Foundation's Tree City USA

Led by the Arbor Day Foundation, Tree City USA recognizes and celebrates municipalities all over the country who are committed to growing their urban canopy. Cities who wish to become a Tree City must maintain a tree board or department, establish, and enforce a community tree ordinance, spend at least \$2 per capita on urban forestry, and celebrate arbor day. Cities must reapply annually maintain Tree City USA status. Delaware is home to 13 municipalities with Tree City recognition. Some of those include New Castle, Rehoboth Beach, Milford, Newark, and the Dover Air Force Base. Tree City USA members receive national recognition (Arbor Day Foundation).

1T.org

1T.org aims to mobilize and connect the global community to conserve and protect 1 trillion trees by 2030. This organization offers companies the opportunity to be transparent and make a global pledge to protect trees. Corporations who make pledges stay actively engaged and report annually on their pledge progress (1T.org).

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