



**LOUDOUN  
COUNTY,  
VIRGINIA**

# AN ASSESSMENT OF EXISTING AND POTENTIAL TREE CANOPY

**45%** TREE CANOPY (2023)  
**39%** PERMEABLE SURFACES  
**11%** IMPERVIOUS SURFACES  
**+3.1%** CHANGE IN TC (2012-2023)

## Overview

Trees are vital components of our ecosystem, providing numerous benefits to both the environment and our communities. In Loudoun County, trees play a crucial role in carbon storage, air purification, and stormwater management. Additionally, trees help reduce energy costs, increase property values, and enhance overall quality of life.

A comprehensive tree canopy assessment was conducted for Loudoun County using 2023 aerial imagery. The assessment revealed that tree canopy covers nearly half of Loudoun County (45%), with the remaining land divided between permeable surfaces such as grass and soil (44%) and impervious surfaces like roads and buildings (11%).

## Change in Tree Canopy

This assessment also analyzed tree canopy changes in Loudoun County from 2012 to 2023. Over the 11-year period, the county's tree canopy expanded by 10,094 acres, a 3% increase within the current county boundaries. Most of this growth occurred in the Rural Policy Area, adding 7,983 acres (2.4% contribution), while other areas saw an increase of 2,098 acres (0.6% contribution). The overall increase in tree canopy was primarily due to maturing trees in older subdivisions and the development of new residential and multi-use areas where non-forested land was replaced with newly planted trees.

## Future Actions

This assessment provides a tool for targeting future planting activities by identifying plantable spaces in key locations, such as census blocks groups with disadvantaged populations, regions that have experienced tree loss, and areas with above-average surface temperatures. One focus will be tree equity, as tree cover is often inequitably distributed in disadvantaged areas. Another focus will be environmental impact. For example, trees overhanging impervious surfaces provide unique ecological benefits, such as localized cooling through shading and improved stormwater management.

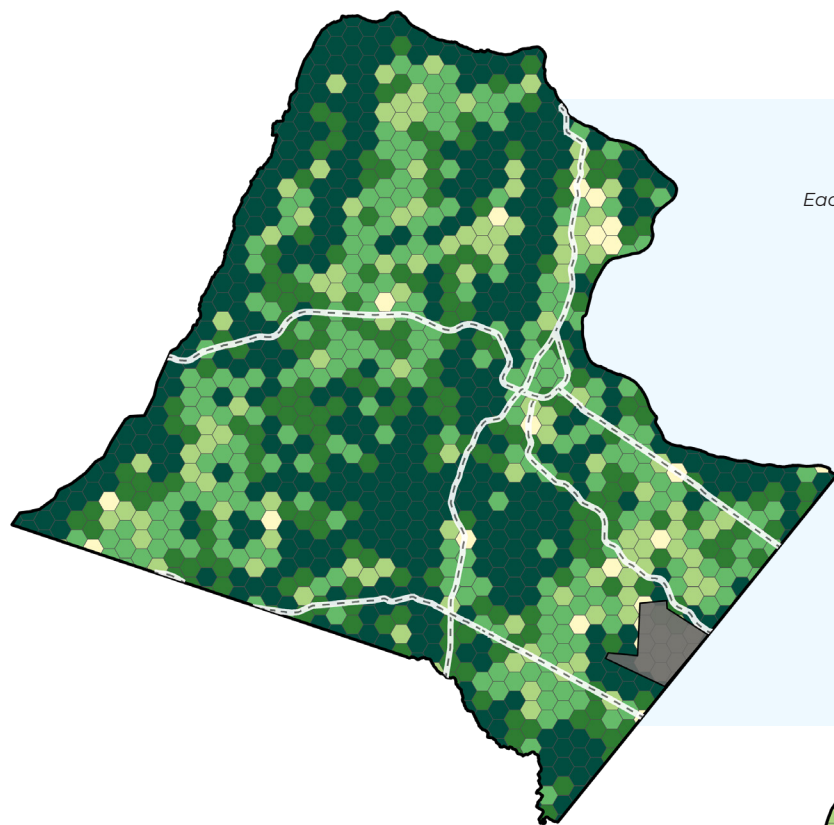
More detailed information about tree distribution, including socioeconomic factors, can be found on the Loudoun County website at [loudoun.gov/TreeCanopy](https://loudoun.gov/TreeCanopy).

This analysis used aerial imagery from the USDA's National Agriculture Imagery Program (NAIP) and advanced machine learning techniques to convert the images to land cover categories. The "tree canopy" category generally encompasses trees taller than 10-15 feet. With a resolution of 60 cm, the classification can capture individual trees and not just contiguous forest (See Figure 1). Additional land cover definitions can be found on the web-page linked above.

**Loudoun County**  
VIRGINIA



Figure 1. Loudoun County's land cover classification map and visual (top) and percent distribution (bottom).



## TREE CANOPY %

Each hexagon cell is equal to approximately 330 acres.

### Tree Canopy %

- Less than 15% (31 Hexagons)
- 16% to 25% (114 Hexagons)
- 26% to 35% (240 Hexagons)
- 36% to 45% (222 Hexagons)
- Greater than 46% (487 Hexagons)
- Major Highways
- Dulles International Airport

Figure 2. Tree canopy percent in Loudoun County.

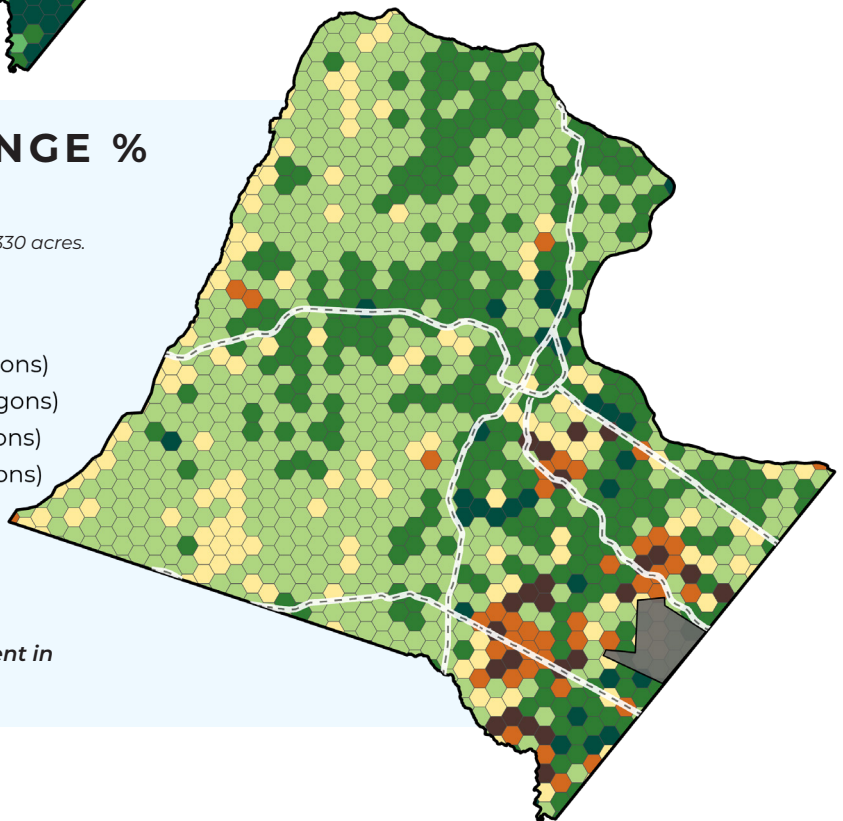
## TREE CANOPY CHANGE % (2012 - 2023)

Each hexagon cell is equal to approximately 330 acres.

### Tree Canopy Change %

- > 15.0% Dec (26 Hexagons)
- 14.9% to 5.0% Dec (41 Hexagons)
- 4.9% to 0.0% Dec (148 Hexagons)
- 0.1% to 5.0% Inc (528 Hexagons)
- 5.1% to 15.0% Inc (319 Hexagons)
- > 15.1% Inc (32 Hexagons)
- Major Highways
- Dulles International Airport

Figure 3. Tree canopy change percent in Loudoun County (2012 - 2023).



### COUNTY-WIDE ECOSYSTEM BENEFITS FROM 2023 CANOPY

- ANNUAL AVOIDED RUNOFF**  
99 MIL GALLONS ≈ 150 OLYMPIC SIZED POOLS
- ANNUAL AIR POLLUTION MITIGATION**  
10.4 MIL POUNDS ≈ 1,025 CARS OFF THE ROAD
- ANNUAL CARBON SEQUESTRATION**  
185 MIL POUNDS ≈ 3,820 HOMES POWERED

Figure 4. Ecosystem benefits provided by Loudoun County's existing tree canopy. Data extrapolated using i-Tree methodology.

### TREE CANOPY CHANGE (% AND ACRES)

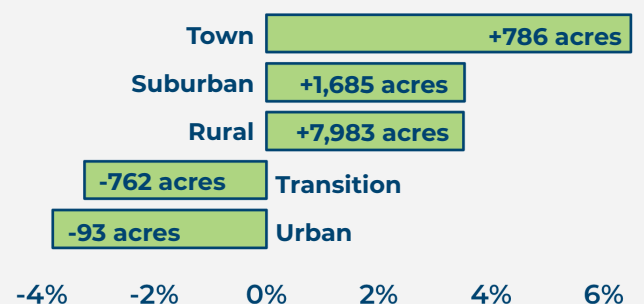


Figure 5. Tree canopy change by policy area (2012 - 2023).