

# A Report on the Town of Forest Heights' Existing and Possible Tree Canopy



## Why is Tree Canopy Important?

Tree canopy (TC) is the layer of leaves, branches, and stems of trees that cover the ground when viewed from above. Tree canopy provides many benefits to communities, including improving water quality, saving energy, lowering town temperatures, reducing air pollution, enhancing property values, providing wildlife habitat, facilitating social and educational opportunities, and providing aesthetic benefits. Establishing a TC goal is crucial for those communities seeking to improve their green infrastructure. A TC assessment that estimates the amount of tree canopy currently present (Existing TC), along with the amount of tree canopy that could theoretically be established (Possible TC), is the first step in the TC goal-setting process.

## How Much Tree Canopy Does Forest Heights Have?

An analysis of Forest Heights' tree canopy based on land cover derived from high-resolution aerial imagery (Figure 1) found that more than 99 acres of the town were covered by tree canopy (termed Existing TC) representing 33.9% of all land in the town. An additional 44.4% (130 acres) of the town could theoretically be improved (Possible TC) to support tree canopy (Figure 2). In the Possible TC category, 8.7% (26 acres) of the town were Impervious Possible TC and another 35.7% were Vegetated Possible TC (105 acres). Vegetated Possible TC, or grass and shrubs, is more conducive to establishing new tree canopy, but establishing tree canopy on Impervious Possible TC will have a greater impact on water quality.

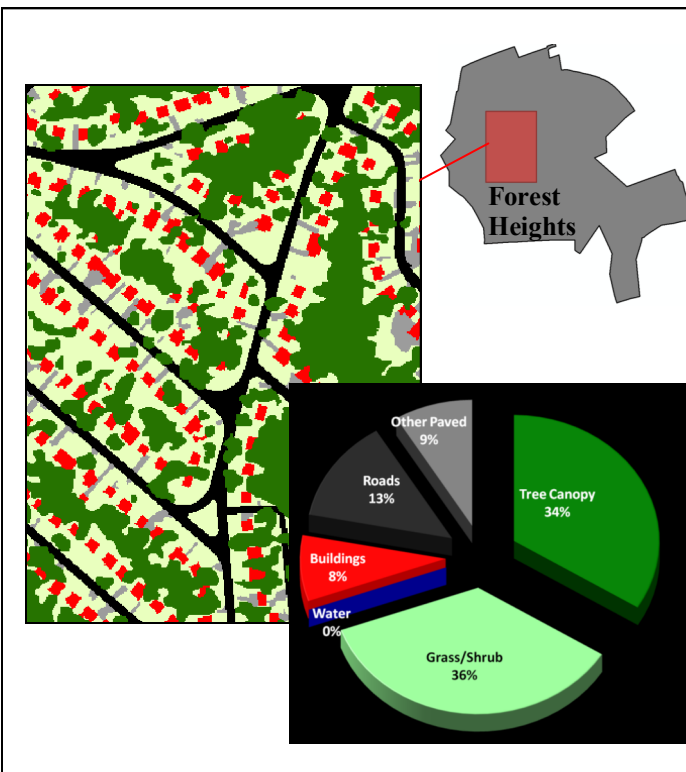


Figure 1: Land cover derived from high-resolution aerial imagery for the Town of Forest Heights.

## Project Background

The analysis of Forest Heights' tree canopy (TC) was carried out in collaboration with the Town of Forest Heights, Prince George's County, and the USDA Forest Service. The analysis was performed by the Spatial Analysis Laboratory (SAL) of the University of Vermont's Rubenstein School of the Environment and Natural Resources, in consultation with the USDA Forest Service's Northern Research Station.

The goal of the project was to apply the USDA Forest Service's TC assessment protocols to the Town of Forest Heights. This analysis was conducted based on year 2009 data.

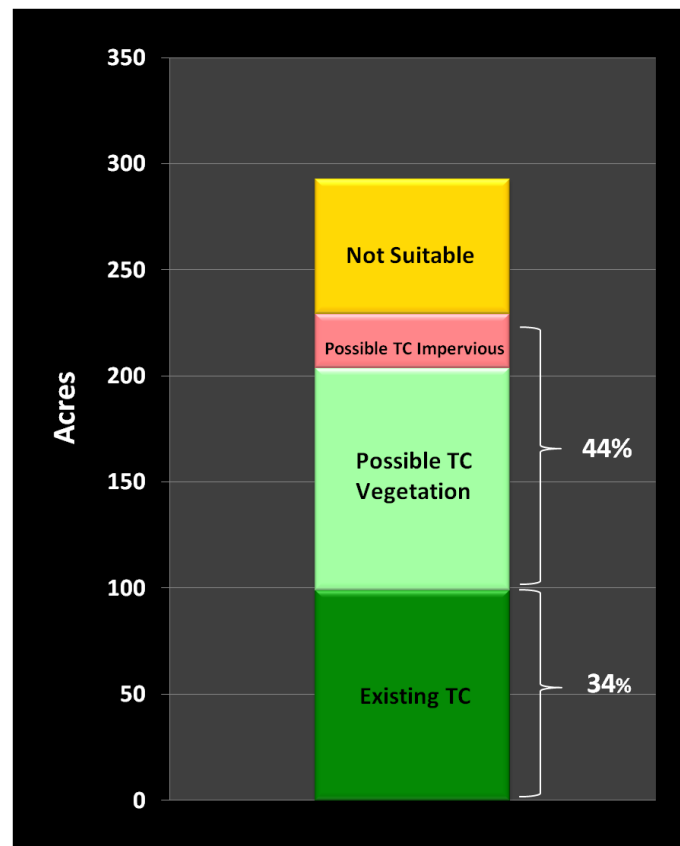


Figure 2: TC metrics for Forest Heights based on % of land area covered by each TC type.

## Key Terms

**TC:** Tree canopy (TC) is the layer of leaves, branches, and stems of trees that cover the ground when viewed from above.

**Land Cover:** Physical features on the earth mapped from aerial or satellite imagery, such as trees, grass, water, and impervious surfaces.

**Existing TC:** The amount of tree canopy present when viewed from above using aerial or satellite imagery.

**Impervious Possible TC:** Asphalt or concrete surfaces, excluding roads and buildings, that are theoretically available for the establishment of tree canopy.

**Vegetated Possible TC:** Grass or shrub area that is theoretically available for the establishment of tree canopy.

## Mapping Forest Heights' Trees

Prior to this study, the only available estimates of tree canopy for Forest Heights were from the 2001 National Land Cover Dataset (NLCD 2001). While NLCD 2001 is valuable for analyzing land cover at the regional level, it is derived from relatively coarse, 30-meter resolution satellite imagery (Figure 3a). Using high-resolution (1 meter) aerial imagery acquired in the summer of 2009 (Figure 3b), in combination with advanced automated processing techniques, land cover for the town was mapped with such detail that single trees were detected (Figure 3c). NLCD 2001 estimated the town to have only 19% tree canopy, compared to the more precise estimate of 34% obtained from this study.

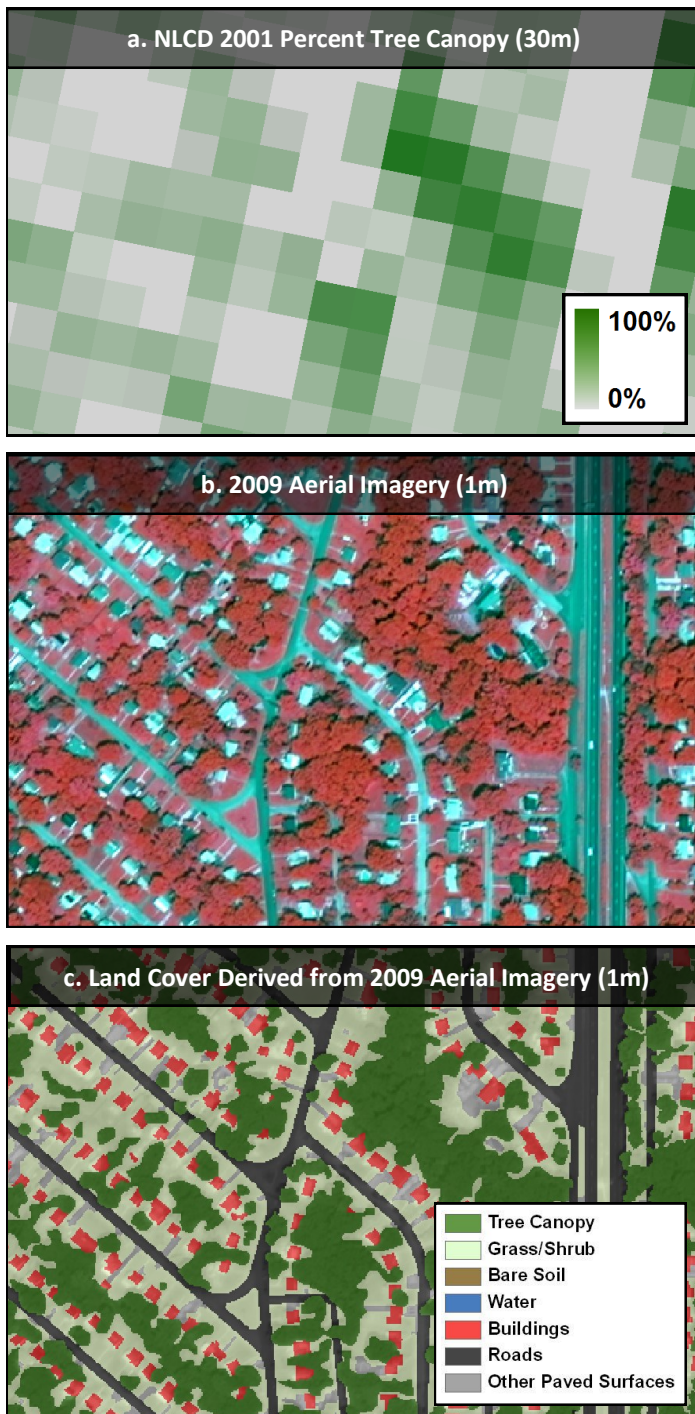


Figure 3a, 3b, 3c: Comparison of NLCD 2001 to high-resolution land cover.

## Parcel Summary

Following computation of Existing and Possible TC, the TC metrics were summarized for each property in the town's parcel database (Figure 4). For each parcel, the absolute area of Existing and Possible TC was computed along with the percent of Existing TC and Possible TC (TC area/area of the parcel).

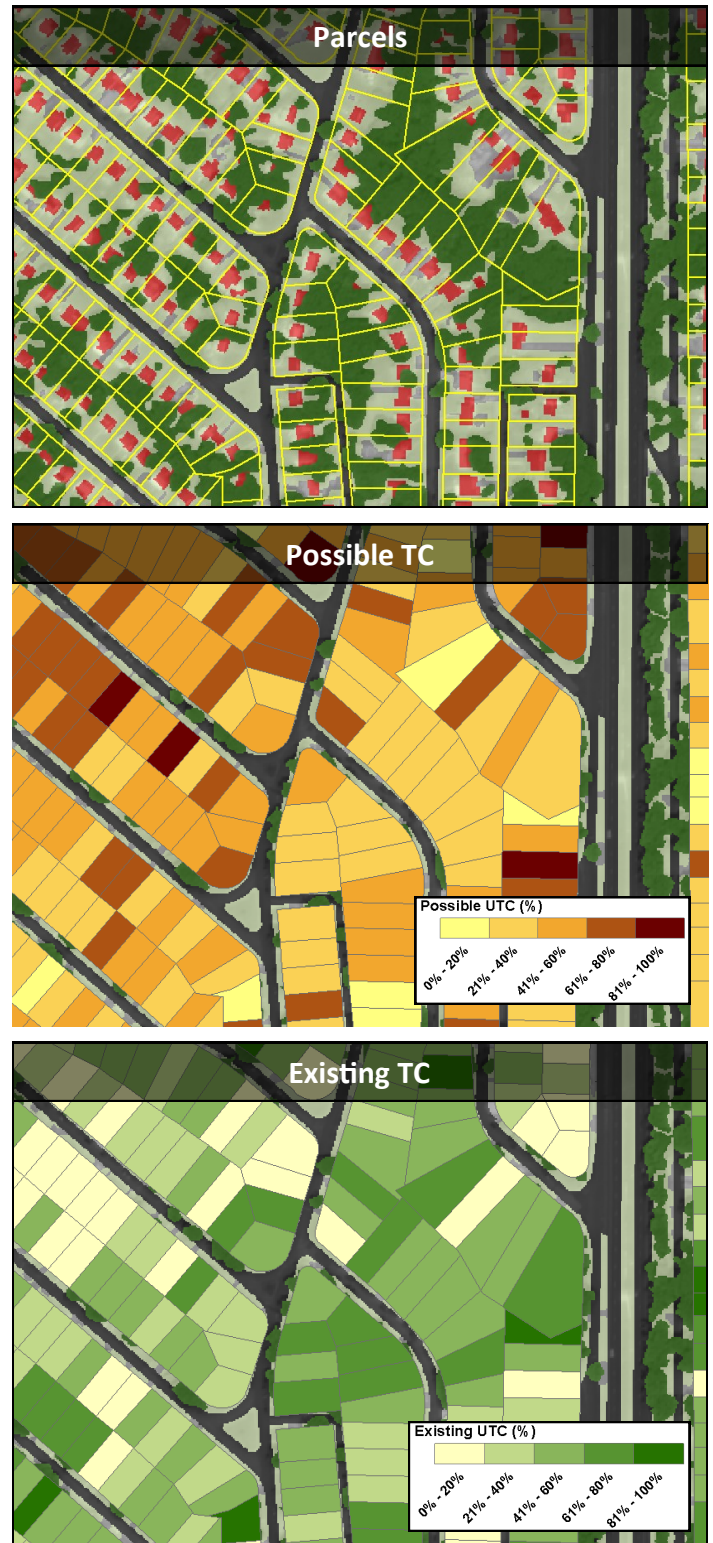


Figure 4: Parcel-based TC metrics. TC metrics are generated at the parcel level, allowing each property to be evaluated according to its Existing TC and Possible TC.

## Land Use

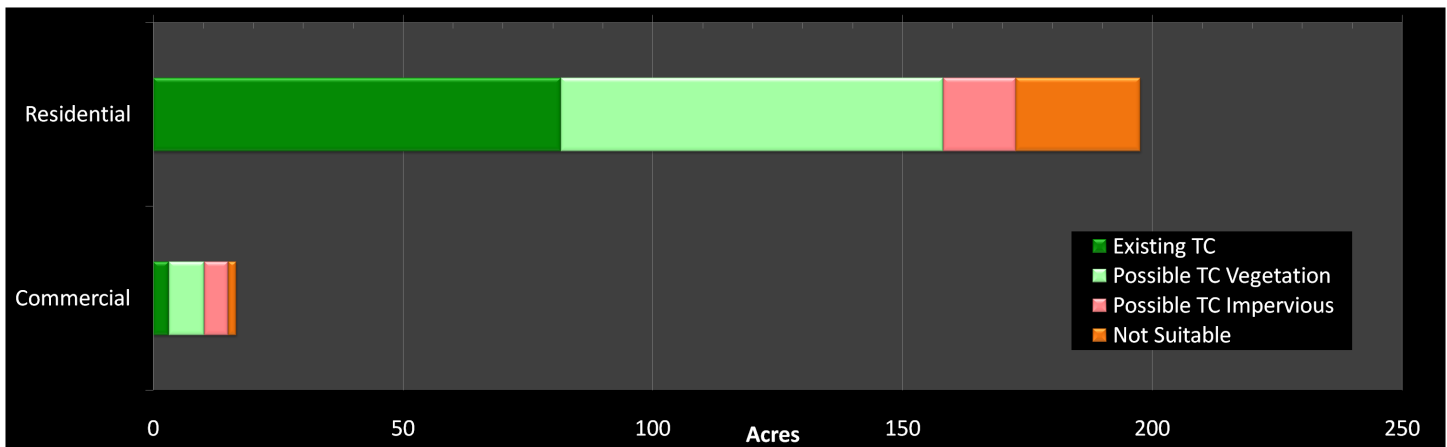


Figure 5: TC metrics summarized by land-use designation.

Land Use	Existing TC			Possible TC Vegetation			Possible TC Impervious		
	% Land	% Category	% TC Type	% Land	% Category	% TC Type	% Land	% Category	% TC Type
Residential	38%	41%	96%	36%	39%	92%	7%	7%	17%
Commercial	1%	19%	4%	3%	43%	8%	2%	28%	6%

$\% \text{ Land} = \frac{\text{Area of TC type for specified land use}}{\text{Area of all land}}$   
 The % Land Area value of 1% indicates that 1% of Forest Heights' land area is tree canopy in areas where the zoning is "Commercial".

$\% \text{ Category} = \frac{\text{Area of TC type for specified land use}}{\text{Area of all land for specified land use}}$   
 The % Land Use value of 19% indicates that 19% of "Commercial" land is covered by tree canopy.

$\% \text{ TC Type} = \frac{\text{Area of TC type for specified land use}}{\text{Area of all TC type}}$   
 The % TC Type value of 4% indicates that 4% of all Existing TC lies in the "Commercial" land use.

Table 1: TC metrics summarized by land-use category. For each category, TC metrics were computed as a percentage of all land in the town (% Land), as a percentage of land area by land-use category (% Category), and as a percentage of the area for the TC type (% TC Type). Note that land-use classes with less than 1% of the county's land area are not shown.

## Decision Support

Parcel-based TC metrics were integrated into the county's existing GIS database for government-owned land. Decision makers can use GIS to identify specific TC metrics for a parcel or set of parcels. This information can be used to estimate the amount of tree loss in a planned development or to set TC improvement goals for an individual property.

Attribute	Value
Land Use	Residential
Existing TC	24%
Possible TC	59%
Possible TC—Vegetation	58%
Possible TC—Impervious	1%

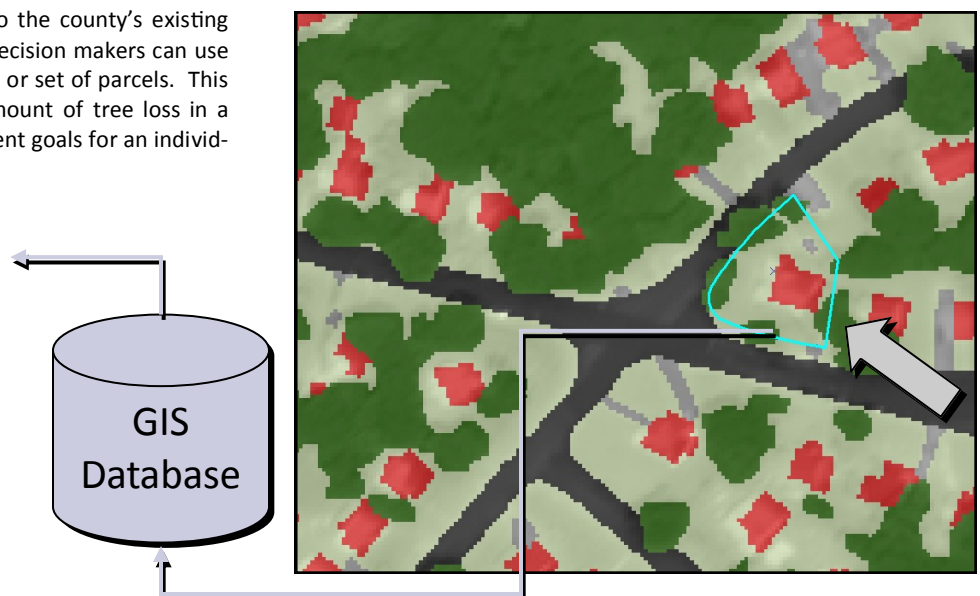


Figure 6: GIS-based analysis of parcel-based TC metrics for decision support. In this example, GIS is used to select an individual government-owned parcel. The attributes for that parcel are displayed in tabular form, providing instant access to relevant tree-canopy information.



## Conclusions

- Forest Heights' tree canopy is a vital town asset that reduces stormwater runoff, improves air quality, reduces the town's carbon footprint, enhances quality of life, contributes to savings on energy bills, and serves as habitat for wildlife.
- Forest Heights should consider establishing a tree canopy goal. Such a goal should not be limited to increasing the town's overall tree canopy; it should also focus on increasing tree canopy in those parcels or blocks that have the least Existing TC and highest Possible TC.
- With Existing TC and Possible TC summarized at the parcel level and integrated with the town's GIS database, individual parcels can be examined and targeted for TC improvement.
- Of particular focus for TC improvement should be parcels within the town that have large contiguous impervious surfaces. These parcels contribute high amounts of runoff, which degrades water quality. The establishment of tree canopy on these parcels will help reduce runoff during periods of peak overland flow.
- Within the town's rights-of-way (ROW) there is 18% Existing TC and 34% Possible TC, indicating that there is room for increasing street trees. As the vast majority Possible TC is vegetated within the ROW, a street tree initiative might not require much in the way of intensive site preparations.
- By ownership type, it is Forest Heights residents that control the largest percentage of the town's tree canopy. Programs that educate residents on tree stewardship and provide incentives for tree planting are crucial if Forest Heights are going to sustain its tree canopy in the long term.
- Forest Heights has a considerable amount of land classified as Vegetated Possible TC, with over 35% of the town's land area falling into this category. In this respect, it is similar to other Maryland communities such as Brunswick, MD. It would be, however, socially undesirable to plant trees on some of these vegetated areas, particularly playing fields. A strategic assessment of plantable areas will help Forest Heights establish a realistic tree canopy goal and implementation plan.

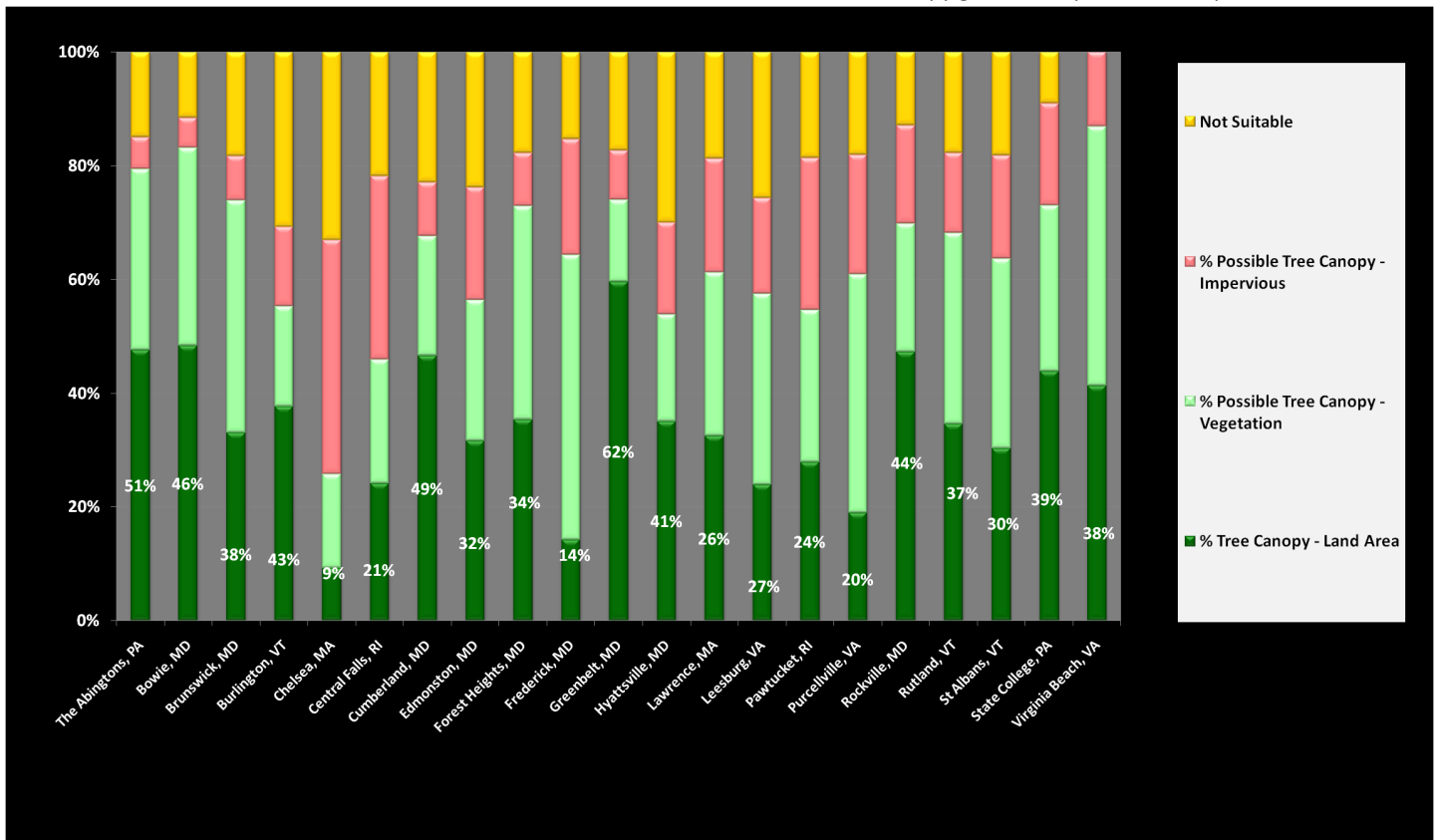


Figure 7: Comparison of Existing TC with other selected cities that have completed TC assessments.

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### Additional Information

Funding for the project was provided by the Chesapeake Bay Trust's Urban Greening Grant. More information can be found on the following web site:  
<http://nrs.fs.fed.us/urban/UTC/>



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