

TREE CANOPY COVER ASSESSMENT

EDENTON, NORTH CAROLINA

SEPTEMBER | 2022

Funding for this project was provided in part through an Urban & Community Forestry Grant from the North Carolina Forest Service, Department of Agriculture and Consumer Services, in cooperation with the USDA Forest Service, Southern Region.



EDENTON
North Carolina



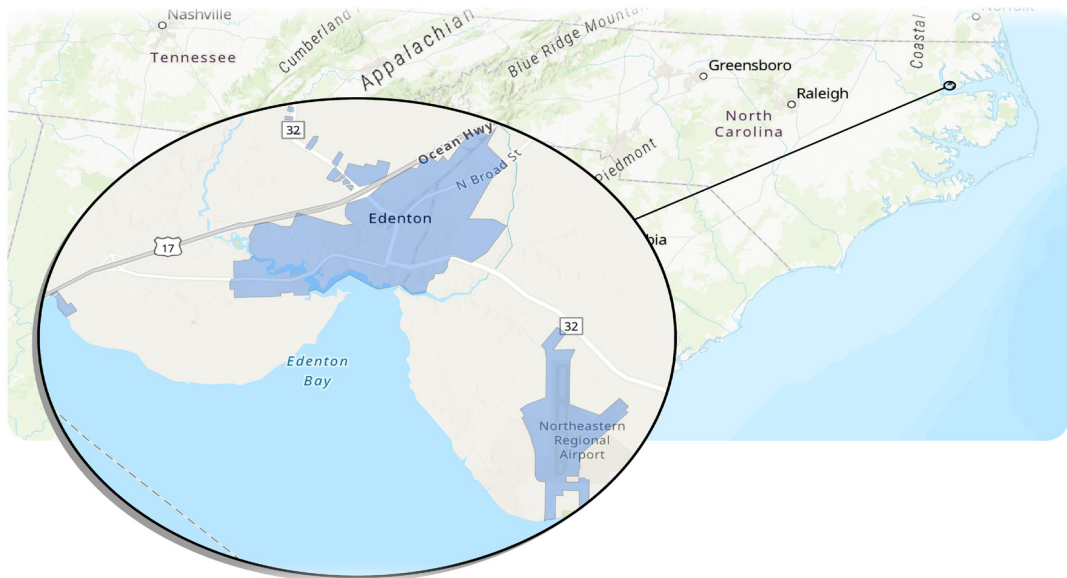


Figure 1. The Town of Edenton occupies approximately 5.5 square miles in coastal North Carolina.

EXECUTIVE SUMMARY

PURPOSE OF THIS ANALYSIS

The Town of Edenton is a coastal gem of North Carolina, known for its beloved trolley tours, rich southern history, and iconic Roanoke River Lighthouse. Located within Chowan County, Edenton is approximately 5.5 square miles, or 3,519 acres, in size. The canopy cover in Edenton is a valuable asset providing residents and visitors with many environmental, social, and economic benefits. This assessment mapped tree canopy cover, possible planting area (PPA), and tree canopy change from 2014 to 2020 and analyzed how they are distributed throughout Edenton’s town boundary, right-of-way (ROW), zoning, and census block groups.

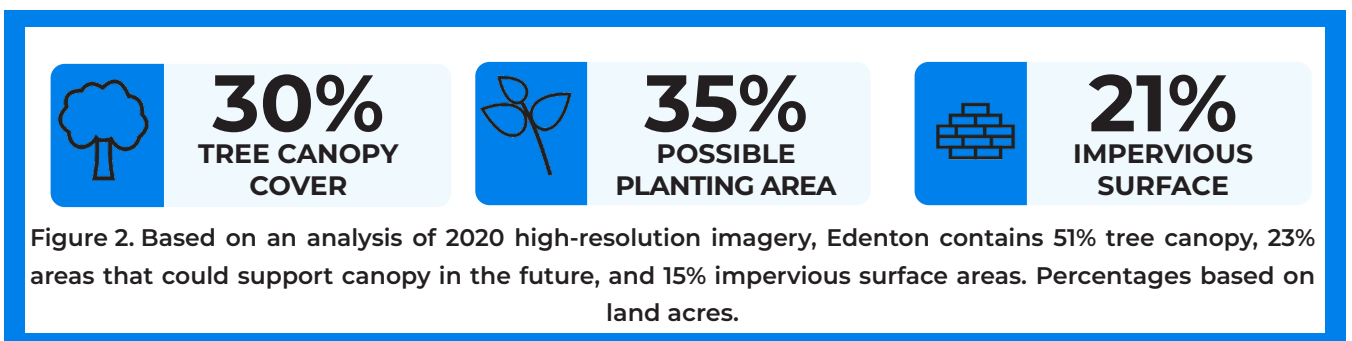
FINDINGS

In 2020, Edenton had 30% tree canopy cover and 35% possible planting area, not including any surface water

bodies within the town. Edenton’s total land cover contained 29% tree canopy, 40% non-canopy vegetation; 5% soil/dry vegetation; 21% impervious surfaces, and 5% water. The 1,020 acres of tree canopy in Edenton provide ecosystem benefits valued at over \$464,000 per year through air quality improvements, stormwater runoff prevention, and carbon sequestration. Results from this assessment found that canopy cover changed from 29% to 30% from 2014 to 2020 (+1% or 46 acres) using the current town boundary. The Industrial-zoned areas contained 30% of Edenton’s total canopy cover and 20% of all PPA in the Town).

RECOMMENDATIONS

This assessment produced a wealth of information that can be used by the Town to set a community-wide tree canopy cover goal. The information were also provided within several subdivisions of the town that will allow for setting goals and targeting priority areas for specific regions of the community based on existing tree canopy cover, available planting space, sociodemographics, and nature accessibility.



PROJECT

METHODOLOGY

DATA SOURCES AND MAPPING LAND COVER

The land cover data set is the foundation of a tree canopy assessment. This assessment utilized high-resolution (60-centimeter) multispectral imagery from the U.S. Department of Agriculture’s National Agriculture Imagery Program (NAIP) collected in 2020 to derive the land cover data set. The EarthDefine US Tree Map (<https://www.earthdefine.com/treemap/>) is produced using a modern machine learning technique to extract tree canopy cover and other land cover types to provide a six-class land cover data set. These classes were then further categorized into tree canopy cover, possible planting area (PPA), and unsuitable for planting. Unsuitable areas, are areas where it was not feasible to plant trees due to biophysical or land use restraints (e.g. golf course playing areas, recreation fields, utility corridors, etc.).

DEFINING ASSESSMENT LEVELS

The tree canopy and other land cover analyses were tabulated within four geographic boundary areas. These bounded areas include the town boundary, zoning districts, the town right-of-way, and census block groups.

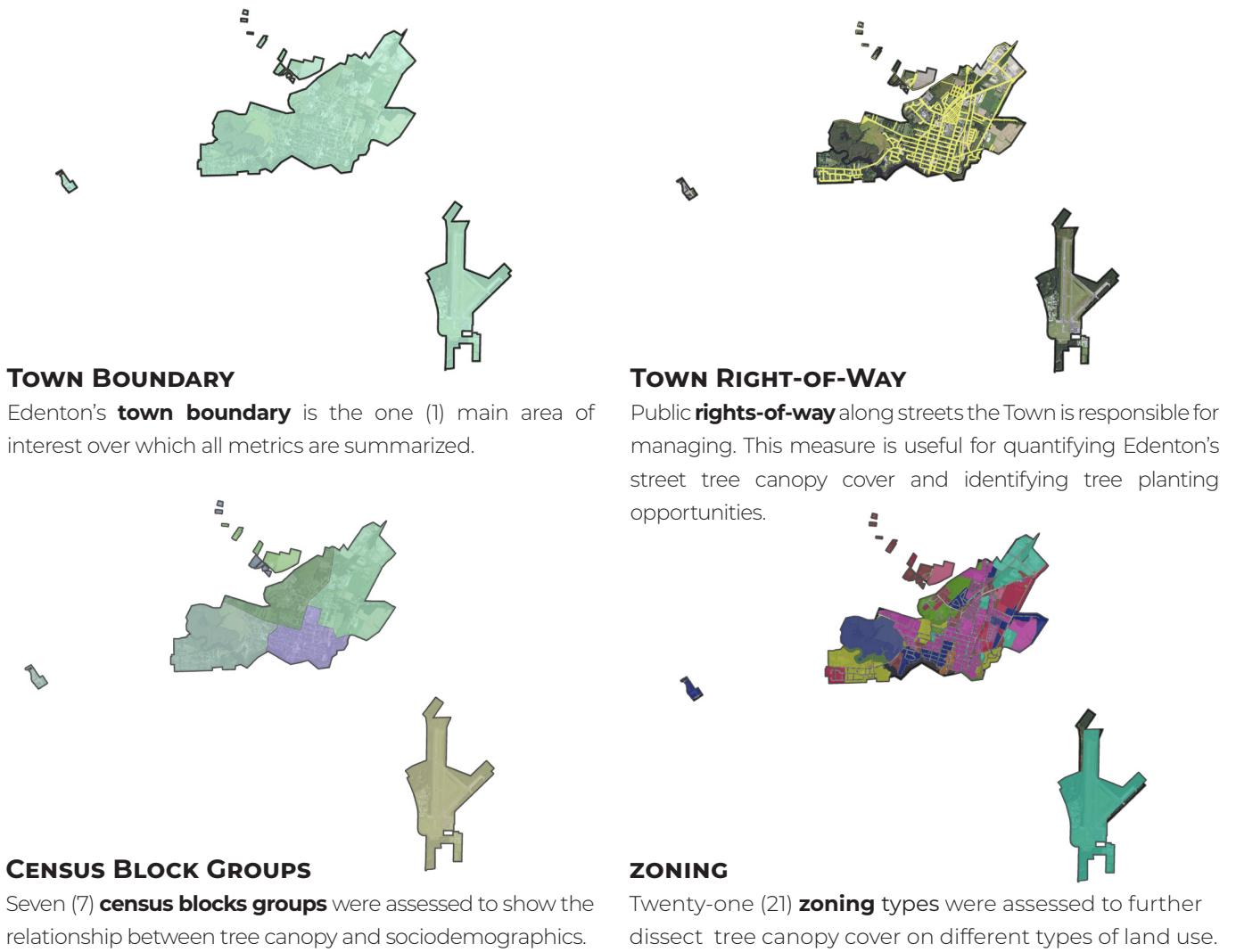
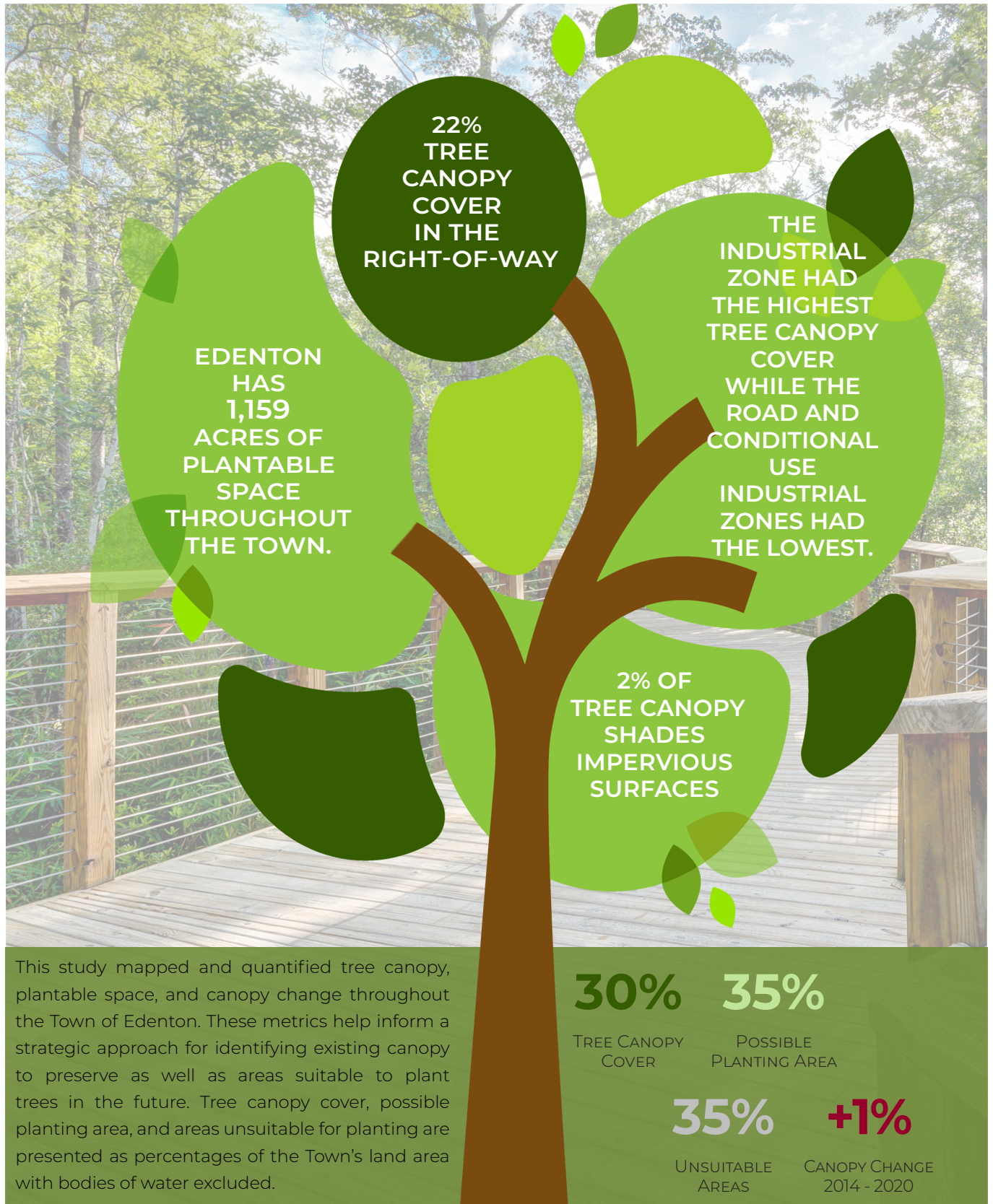


Figure 3. Four (4) distinct geographic boundaries were explored in this analysis: the town boundary, right-of-way, zoning, and census blocks groups.

STATE OF THE CANOPY AND KEY FINDINGS



TOWNWIDE TREE CANOPY COVER

Within the town of Edenton, 1,020 acres were covered with tree canopy, making up 30% of the town's 3,348 land acres; 1,159 acres were covered with other vegetation where it would be possible to plant trees (PPA), making up 35% of the town; and the other 1,169 acres were considered unsuitable for tree planting, making up 35% of the town. Unsuitable areas include impervious surfaces, soil and dry vegetation, scrub/shrub, and any vegetated areas that are not suitable for trees because of their land use.

Over the six-year study period, there was an increase in Edenton's tree canopy cover. Tree canopy increased by approximately 46 acres townwide, yielding a 1% raw increase since 2014. The city's 1,020 acres of tree canopy were further divided into subcategories based on whether the canopy was shading pervious or impervious surfaces. Tree canopy shading an impervious surface can provide many benefits through ecosystem services such as localized cooling provided by shading and increased stormwater absorption. Edenton's canopy was predominantly shading pervious surfaces at 98%, while 2% was shading impervious surfaces.

Tree Canopy Potential in Edenton

- Tree Canopy
- Possible Planting Area
- Unsuitable Area

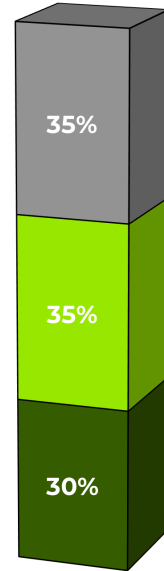


Figure 4. Tree canopy, possible planting area, and area unsuitable for tree canopy in Edenton.



Figure 5. Distribution of land cover throughout the town boundary.

Table 1. Tree canopy cover assessment results by acres and percent. (Percentages based on land acres.)

Town of Edenton	Total Area	Land Area	2014 Tree Canopy		2020 Tree Canopy		Canopy Change	
	Acres	Acres	Acres	%	Acres	%	Acres	%
Tree Canopy	3,519	3,348	974	29%	1,020	30%	46	1%

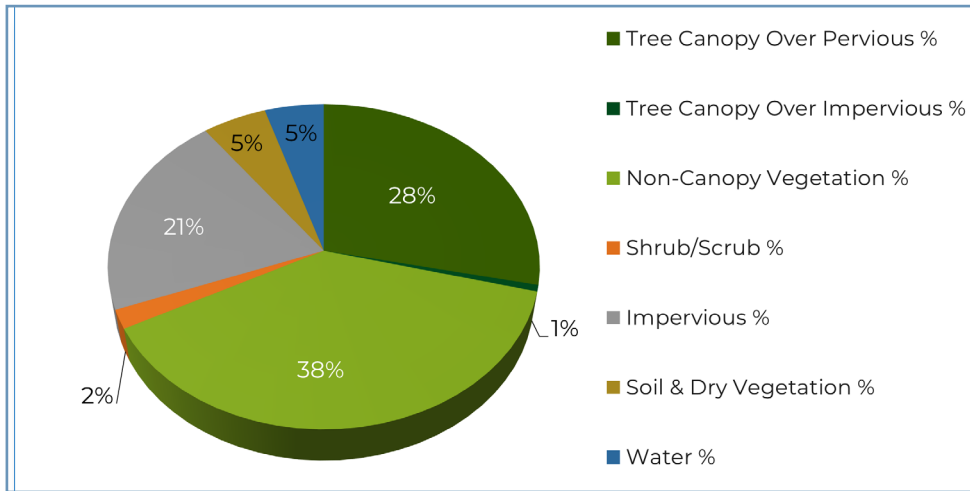


Figure 6. Distribution of land cover throughout Edenton. (Percentages based on total acres.)



Figure 7. Distribution of existing and potential tree canopy cover throughout the Town.

TREE CANOPY COVER BY RIGHT-OF-WAY

The assessment was also conducted within the Town's rights-of-way. The right-of-way (ROW) includes the Town's sidewalks, roadways, and medians that are publicly owned and maintained. This metric helps quantify the Town's street tree resources, as trees in this area provide an especially valuable service in terms of air pollution control, stormwater interception and absorption, and shading. Tree canopy covered 22% of the ROW, slightly less than the town-wide average of 30%. Another 27% of the ROW consists of plantable space where trees could be planted to provide shade to the Town's transportation corridors. 51% of the ROW was unsuitable for planting, primarily consisting of impervious surfaces. Tree canopy cover in the ROW increased by 3% from 2014 to 2020.

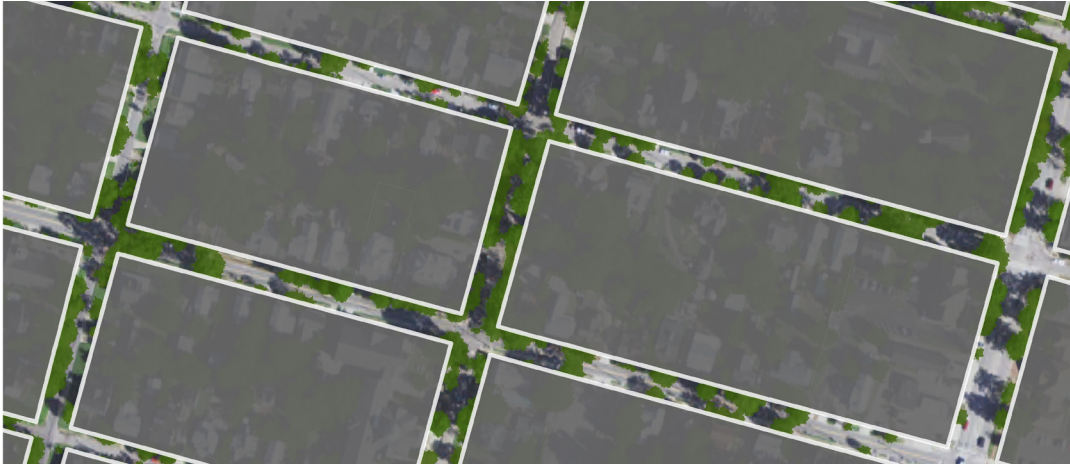


Figure 8. Tree canopy cover in Edenton's right-of-way.

TREE CANOPY COVER BY ZONING

Tree canopy and PPA were assessed for Edenton's 21 zoning types. The largest distribution of the town's area is within the Industrial zone. These areas contained 30% of Edenton's total canopy cover. Within this zone, there was 27% tree canopy and 21% plantable space (20% of all PPA in the Town). This zone experienced an increase in canopy cover, gaining 10 acres (1%) from 2014 to 2020. R-20 Residential zones contained 28% tree canopy (17% of all tree canopy in the town) and 21% of all PPA. Five of the 21 zoning types had greater than 40% tree canopy cover. 14 of the zoning types gained canopy, four lost canopy, and three remained nearly unchanged. The Medical Arts and R-5 Residential zones experienced the greatest increase in tree canopy cover, gaining 17 acres each (11% and 3% respectively). The greatest loss of tree canopy cover occurred in the Conditional Use R-5 Residential zone, losing 13% (40 acres) within the six-year study period.



TREE CANOPY CHANGE BY ZONING (PERCENT)

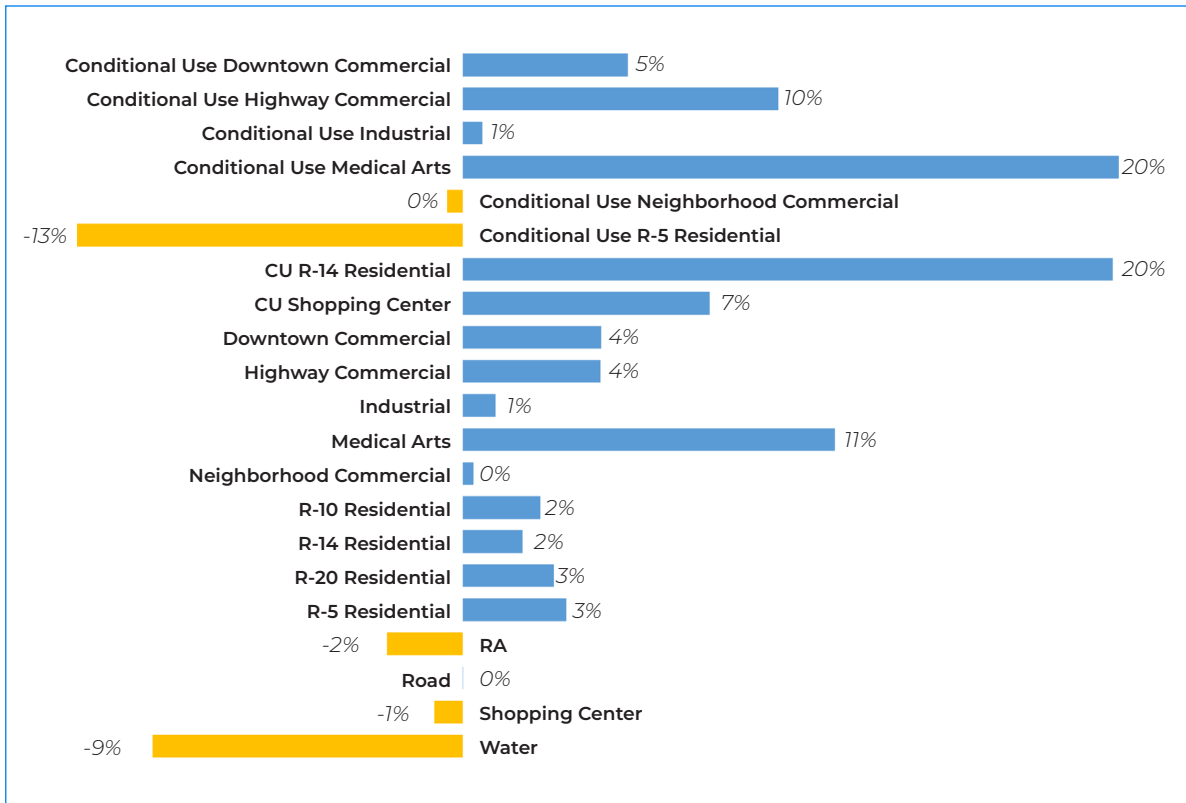


Figure 9. Tree canopy change percent by zoning in Edenton from 2014-2020.

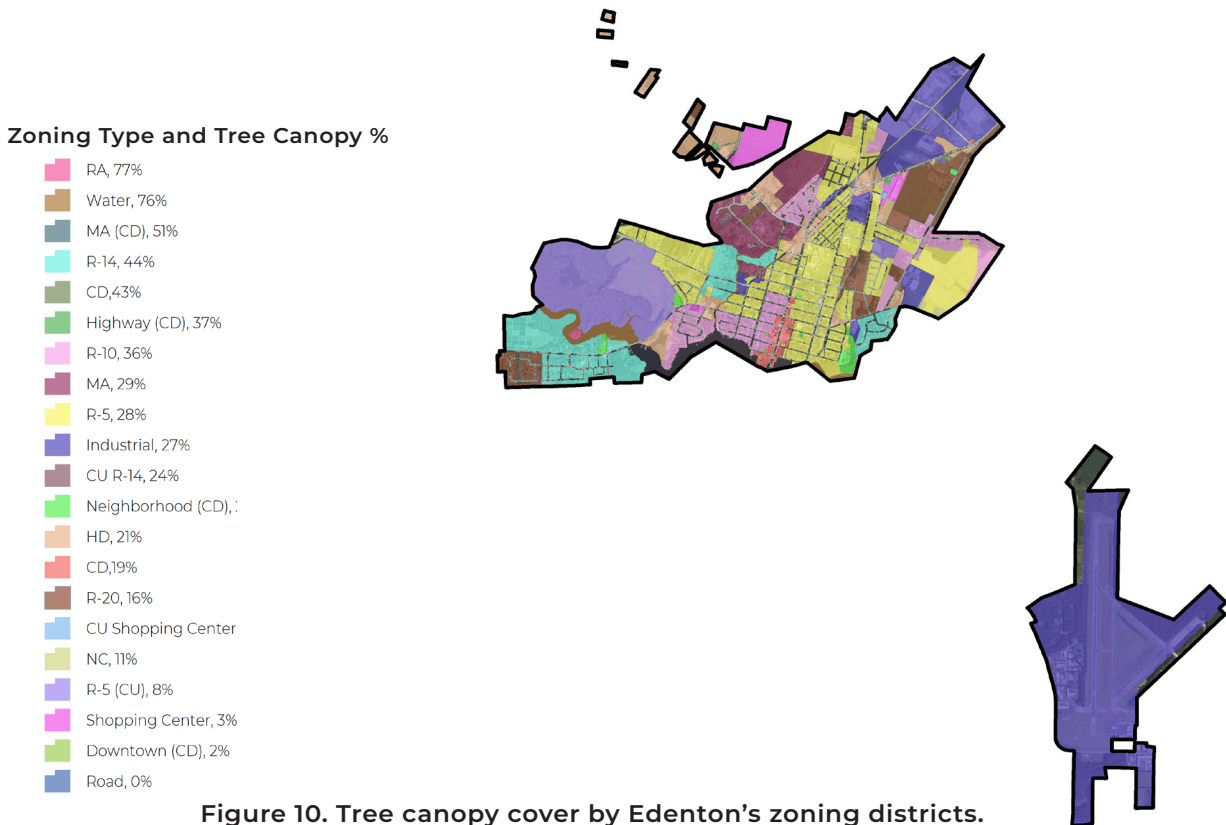


Figure 10. Tree canopy cover by Edenton's zoning districts.

Table 2. Tree canopy coverage, potential planting area, and tree canopy change by zoning districts.

Zoning Districts	Total Area	Land Area	2020 Tree Canopy		2020 PPA		UTC Change	
	Acres	Acres	Acres	%	Acres	%	Acres	%
Conditional Use Downtown Commercial	2	2	0	24%	0	12%	0	5%
Conditional Use Highway Commercial	3	3	0	11%	1	30%	0	10%
Conditional Use Industrial	1	1	0	2%	0	33%	0	1%
Conditional Use Medical Arts	0	0	0	38%	0	41%	0	20%
Conditional Use Neighborhood Commercial	23	23	10	43%	7	30%	0	0%
Conditional Use R-5 Residential	319	305	154	51%	149	49%	-40	-13%
CU R-14 Residential	4	4	1	21%	1	34%	1	20%
CU Shopping Center	1	1	0	7%	0	10%	0	7%
Downtown Commercial	26	25	5	19%	4	18%	1	4%
Highway Commercial	174	168	35	21%	62	37%	7	4%
Industrial	1,015	1,009	273	27%	215	21%	10	1%
Medical Arts	153	150	43	29%	73	48%	17	11%
Neighborhood Commercial	10	10	1	11%	5	44%	0	0%
R-10 Residential	232	225	81	36%	82	36%	5	2%
R-14 Residential	249	228	101	44%	98	43%	4	2%
R-20 Residential	203	202	33	16%	120	59%	6	3%
R-5 Residential	555	553	155	28%	219	40%	17	3%
RA	4	4	3	77%	1	18%	0	-2%
Road	0	0	0	0%	0	0%	0	0%
Shopping Center	68	68	2	3%	24	34%	-1	-1%
Water	51	5	3	76%	1	22%	0	-9%

TREE CANOPY COVER BY CENSUS BLOCK GROUPS

Understanding tree canopy cover and PPA at the census block group scale is valuable for assessing the equitable distribution of tree canopy as these boundaries can be linked to all demographic and socioeconomic U.S. census data. Nearly half of all block groups ranged from 20-30% canopy cover and 71% ranged from 20-40%. One block group (37-041-930101-1) had 42% canopy cover but experienced a 5% decrease from 2014 to 2020. A 71% majority of blocks ranged from 30-50% PPA. The others had between 10-30% PPA. All canopy loss occurred within two census block groups in eastern and western parts of town. The other five census block groups had an increase in canopy ranging from 3-7%.

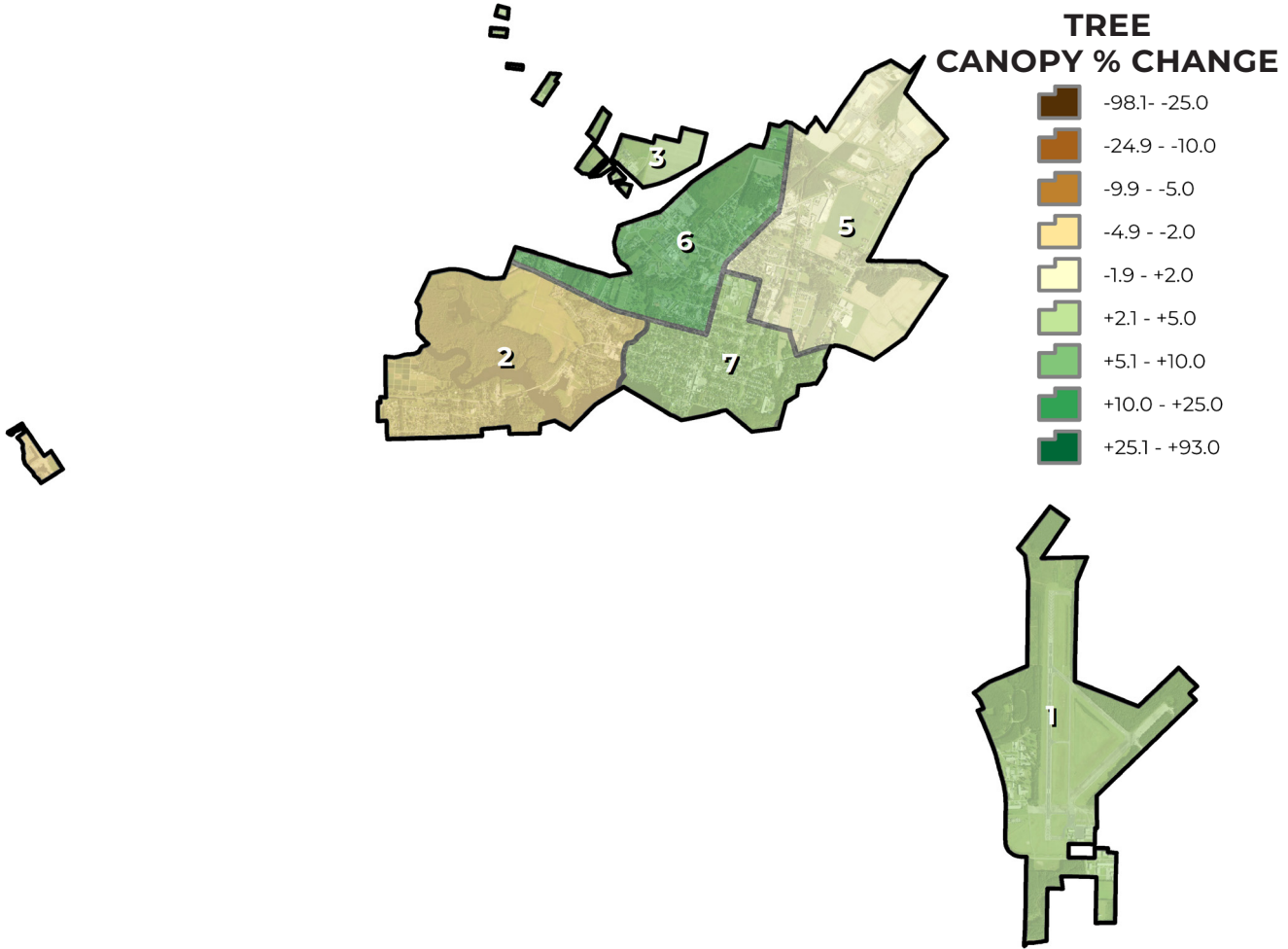


figure 11. Tree canopy change by Edenton’s census block groups. See IDs in Table 3.

Table 3. Tree canopy coverage, potential planting area, and tree canopy change by Edenton’s census block groups.

ID	GEOID	Total Area	Land Area	2014 Tree Canopy		2020 Tree Canopy		Canopy Change	
		Acres	Acres	Acres	%	Acres	%	Acres	%
1	37-041-930102-1	825	821	237	29%	271	33%	34	4%
2	37-041-930101-1	799	680	315	46%	283	42%	-33	-5%
3	37-041-930202-1	100	100	14	14%	17	17%	3	3%
4	37-041-930202-2	26	26	6	22%	6	24%	1	3%
5	37-041-930101-4	857	853	191	22%	182	21%	-9	-1%
6	37-041-930101-3	495	491	101	21%	134	27%	34	7%
7	37-041-930101-2	416	377	110	29%	127	34%	16	4%

ASSESSMENT OF ECOSYSTEM BENEFITS

Using the best available science from i-Tree tools, values were calculated for some of the benefits and functions provided by the tree canopy in Edenton. The canopy cover holds millions of dollars of savings in avoided infrastructure costs, pollution reduction, and stored carbon. The following values were calculated using the USDA Forest Service’s i-Tree Landscape tool with Edenton’s total acres of tree canopy cover as the input data.

AIR QUALITY

Trees produce oxygen, indirectly reduce pollution by lowering air temperature, and improve public health by reducing air pollutants which cause death and illness. The existing tree canopy in Edenton removes approximately 94,000 pounds of air pollution annually, valued at over \$182,000.

STORMWATER AND WATER QUALITY

Trees and forests mitigate stormwater runoff which minimizes flood risk, stabilizes soil, reduces sedimentation in streams and riparian land, and absorbs pollutants, thus improving water quality and habitats. The tree canopy in Edenton absorbs 5.5 million gallons of water per year. Extrapolated townwide, this means that Edenton’s existing canopy provides over \$49,000 annually in stormwater benefits.

CARBON STORAGE AND SEQUESTRATION

Trees accumulate carbon in their biomass; with most species in a forest, the rate and amount increase with age. Edenton’s trees store approximately 35,000 tons of carbon, valued at over \$6 million, and each year the tree canopy absorbs and sequesters approximately 1,300 tons of carbon dioxide, valued at over \$233,000.

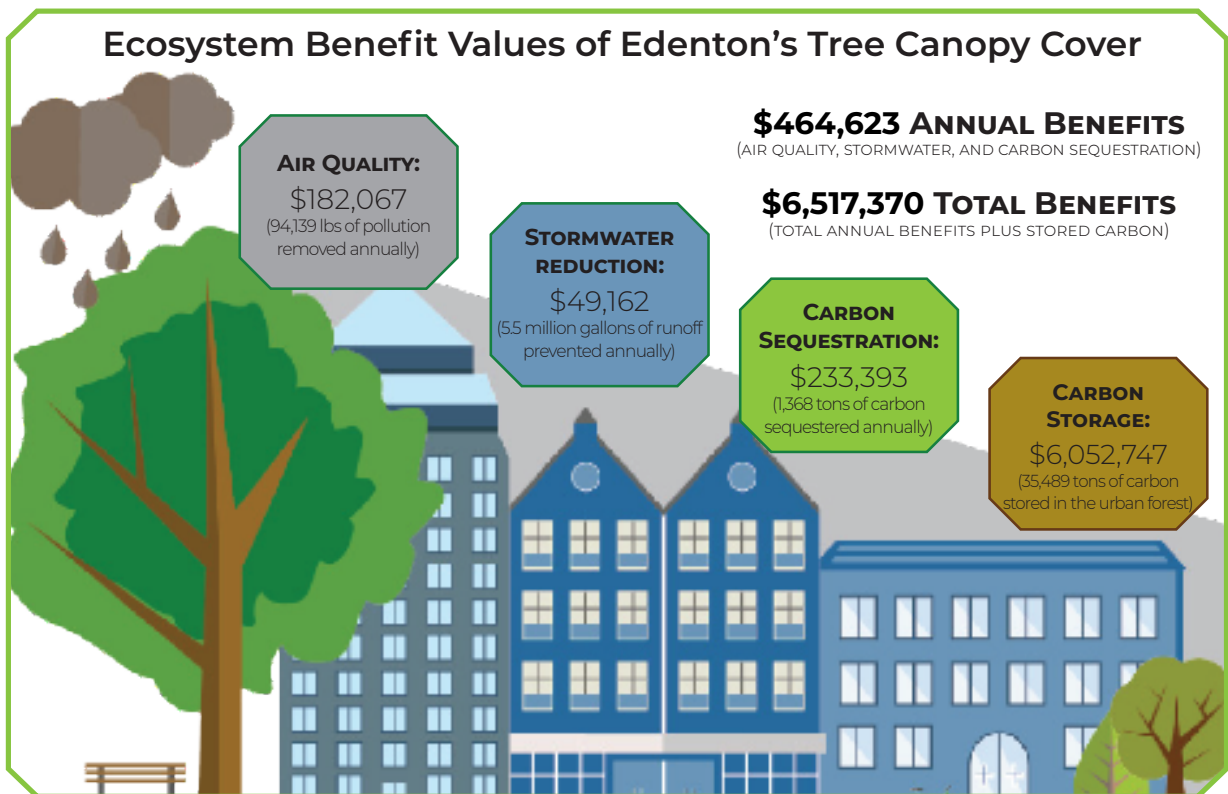


Figure 12. Ecosystem service benefits of Edenton’s canopy cover.

TREE PLANTING PRIORITIZATION

Increased tree canopy cover can provide a wide array of benefits to a local community and its residents and visitors. To locate specific areas in need, several socioeconomic, demographic, and accessibility data sources were analyzed at the census block group scale and each was ranked. Rankings are sorted from high (dark blue) to low (light yellow) and were calculated for each individual criteria as well as overall to show where multiple needs overlap.



People of Color Populations: Tree canopy is often negatively correlated with the percentage of residents of color. Planting trees in communities with higher percentages of people of color can support environmental equity. This criteria highlights areas with greater numbers of residents of color.



Median Household Income: Income inequality often occurs with environmental inequality where lower-income residents live in highly impervious areas with limited numbers of trees, parks, and other greenspaces. This criteria highlights areas with lower median household income.



Median Home Value: Mature trees can increase home and property values. This criteria highlights areas with lower median home value.



Poverty Rate: Trees provide many environmental and health benefits to nearby residents. This criteria shows the percentage of residents with income below 150% of the poverty level.



NatureScore™: NatureScore, created by NatureQuant, is a measure of nature and human health created through the use of machine learning to identify correlations between environmental data sets and health outcomes. Through these correlations, NatureScore determines what beneficial nature is, where it is present, and where it is lacking. This criteria highlights areas with less access to nature.

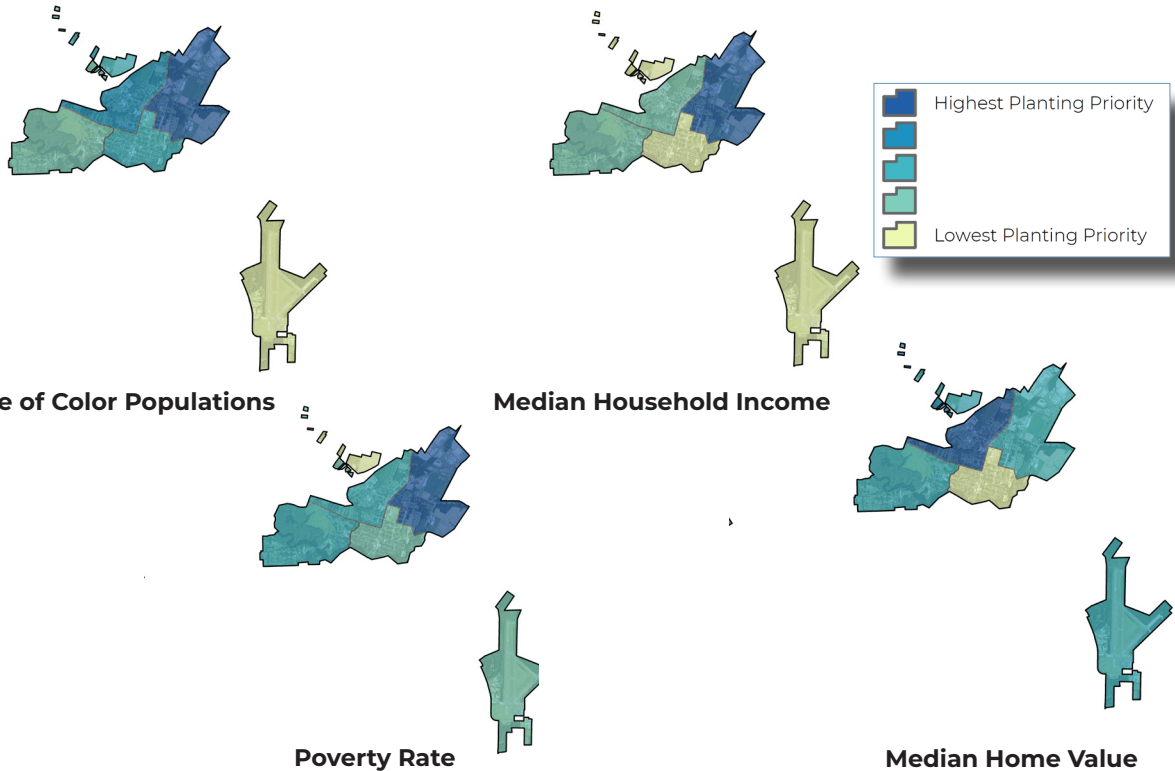
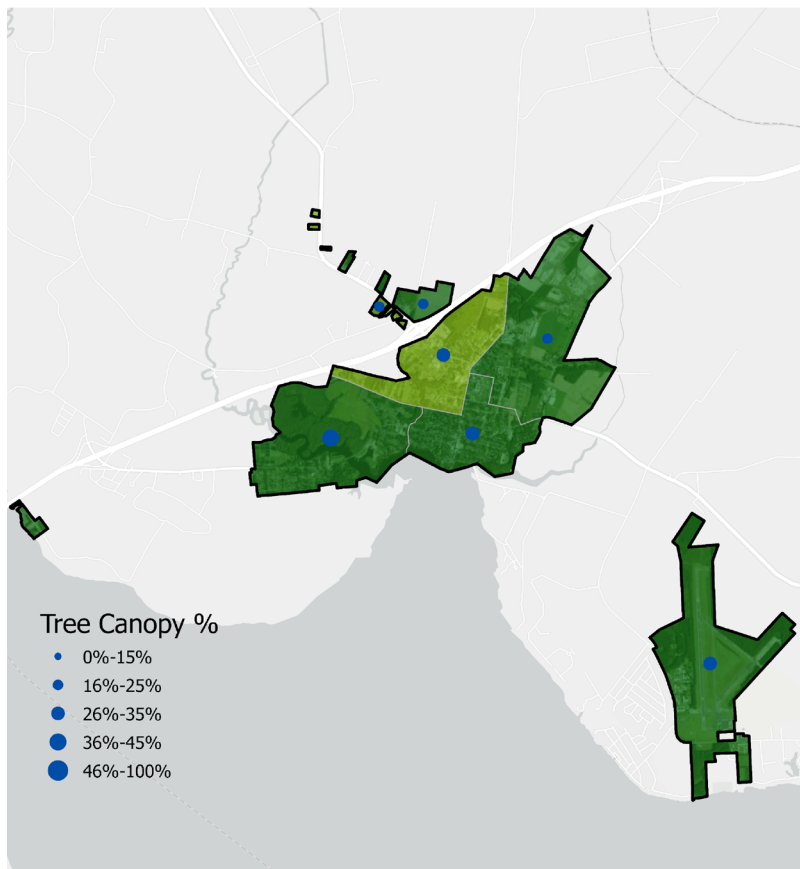


Table 4. Prioritization scores by census block groups.

ID	GEOID	People of Color Populations (%)	Median Household Income (\$)	Median Home Value (\$)	Poverty Rate (%)	NatureScore™
1	37-041-930102-1	9	\$49,091	\$157,100	28	95
2	37-041-930101-1	35	\$34,787	\$165,400	56	88
3	37-041-930202-1	45	\$50,160	\$129,800	25	89
4	37-041-930202-2	23	\$44,066	\$92,500	27	84
5	37-041-930101-4	97	No data	\$173,100	93	94
6	37-041-930101-3	68	\$41,478	No data	42	97
7	37-041-930101-2	46	\$54,471	\$296,100	28	54



NATURE DEFICIENT
 Low Density of natural elements. Effort required for immersive nature exposure opportunities.

NATURE LIGHT
 Moderate to low density of natural elements. Effort may be required for immersive nature exposure opportunities.

NATURE ADEQUATE
 Balanced mix of natural and built environmental elements. Modest effort may be required for immersive nature exposure opportunities.

NATURE RICH
 Significant natural elements. Modest effort may be required for immersive nature exposure opportunities.

NATURE UTOPIA
 Abundant natural elements and nature exposure opportunities.

Figure 13. NatureScore™ by census block groups.

CONCLUSIONS AND RECOMMENDATIONS

Edenton has demonstrated that it values its natural resources and wants to maintain a healthy and sustainable urban environment. Recurring assessments of the Town’s tree canopy represent important steps in ensuring the long-term health of its local canopy. As the Town grows, it will be able to use these data to ensure that its canopy policies and management practices prioritize its maintenance, health, and growth. An even greater percent of canopy cover can be achieved with proper planning, investment, and care of existing trees. The Town should continue to monitor the health of the local forest and implement the following recommendations to ensure the canopy is considered during future town planning and development to sustain and enhance the benefits that trees provide to the community.

LEVERAGE THE RESULTS OF THIS ASSESSMENT TO PROMOTE TREE CANOPY



Encourage investment in urban forest monitoring, maintenance, and management; prepare supportive information for local budget requests/grant applications; help establish new canopy cover goals; engage the community and develop an urban and community forest plan to guide the management, conservation, and renewal of the Town’s trees; repeat assessment at least every five years to track progress towards goals. The Town contained 35% PPA, which could bring its total canopy cover to 65% if all 1,159 acres of plantable space is utilized

IDENTIFY AREAS TO PRIORITIZE CANOPY EXPANSION

Plantable space in the right-of-way is often found close to high concentrations of impervious surfaces. The Town of Edenton can develop a proactive street tree maintenance program to take on the responsibility of planting and managing street trees, ensuring healthy trees are distributed equitably across the town. Edenton’s right-of-way contained only 22% tree canopy cover compared to the town-wide average of 30%. An additional 27% of the ROW was plantable space.



DEVELOP OUTREACH PROGRAMS TOWARDS PRIVATE LANDOWNERS



Community outreach and education programs can better inform citizens and private landholders of the environmental, health, social, and financial benefits that trees provide. Tree canopy in Edenton provides over \$460,000 in annual ecosystem service benefits. 40% of the town is within Residential (R-10, R-14, R-20, R-5) zones. These areas combined contained 41% of Kill Devil Hills’ total canopy cover 49% of all PPA in the Town. Tree giveaways, tree planting programs, and tree maintenance events can help to promote new tree plantings on private property.

FOCUS NEW PLANTINGS IN HIGH PRIORITY

This report and the State’s TreePlotter CANOPY application can be used to locate priority areas based on tree canopy cover, available planting space, socio-demographic factors, and nature accessibility. Efforts should focus on outreach to the residents of these neighborhoods, as well as local business and land owners, in order to promote new tree plantings and continued maintenance of existing trees.



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