2021 Tree Canopy Study



Loblolly Pine Historic Brookhaven



Presented to City Council on July 25, 2023



Why 2021 Canopy Study in 2023?

It's all about when the aerial imagery is collected!





2021 Results

48% Canopy Coverage with a Margin of Error of 3.4%

90% confidence that the actual value is between 44.6% and 51.4%

Year Imagery was Collected	2009	2010	2013	2015	2017	2019	2021
Results	47%	51%	49%	53%	50%	44%	48%
Prior Study Results		51.7%	49.0%	53.6%			

Prior Study Results

*2009 – 2019 Results Source: PlanIT Geo 2020 Assessment **2010 – 2015 Prior Study Results: InterDev







What is Tree Canopy?

- The USDA Forest Service definition: tree leaves, branches, and stems covering the ground when viewed from above.
- Canopy studies provide a powerful "bird's eye view" of the urban forest.
- Canopy studies reveal patterns of change.
- Canopy studies measure quantity, not quality.
- When running a tree canopy study, growth and loss is to be expected.



Oak, Murphey Candler Park



Using the Results

- Guide operations management in addition to facilities and tree canopy programming.
- Inform decision-making, policy, and sustainability efforts related to climate, water, air quality, park planning, tree preservation, and watershed protection.
- Refine policies and goals to promote a healthy canopy across all areas of the City.
- Educate the public about the tree canopy in Brookhaven.
- Canopy coverage is a critical indicator when assessing local urban heat island effects.
- Strategically manage and enhance the distribution of the tree canopy mosaic.



Osborne Road and Vicinity



Findings

- 1. Total canopy grew 4% between 2019 and 2021
- 2. Canopy had remained consistent at about 50% between 2009 and 2021
- 3. Per the current ordinance, the City has achieved and maintained its 45% canopy coverage goal
- 4. 2020 was a strong growth year for trees
- 5. Large construction projects tend to cause the fastest decline in the tree canopy (minimal development during the pandemic)
- 6. New construction of single-family homes predominantly exists in the southern region. Conversely, the northern neighborhoods exhibit growth with lesser construction.
- 7. When assessing at the "parcel level," small changes may appear more significant.
- 8. Shadows are good!



Southern Red Oak, LaVista Park Neighborhood



Methodology

- 1. Acquire Imagery
- 2. Classification and Analysis
- 3. Quality Control and Accuracy Assessment
- 4. Change Detection and Visualization







U.S. Department of Agriculture National Agricultural Imagery Program



Imagery Program (USDA NAIP).

•Collected during the "leaf-on" season

•USDA makes imagery available on 2-3 year cycles

•Four-band imagery (infrared)

•Healthy vegetation reflects at near-infrared wavelengths imagery



Classification Methods



vs.

Iso Cluster Unsupervised Classification Grouping similar pixel values





Feature Segmentation - Grouping similar shapes and color





**Object-based classification is the future of imagery classification. The PlanIT Geo study used object-based classification, but the current study employed pixel-based classification due to familiarity. Both methods are industry accepted, however, the next study will return to object-based classification to align with industry advancements.

Quality Control

Errors are identified and corrected in the method outlined below.

In this example, the Cross Keys High School track is identified as having major errors.

- 1. Several thick areas of shadows are incorrectly classified as tree canopy on this track/field.
- 2. A polygon covering the incorrectly classified canopy is created over the area that needs to be corrected
- 3. Pixels are reclassified as Non-Canopy
- 4. All pixels on the fields are classified correctly







Accuracy Assessment

Establishes how well the map performed against the inspected sample points.

The United Nations Food and Agricultural Organization (FAO) established the methodology in 2016.

Advantages allow for statistical sampling and calculating the Margin of Error.







Change Detection

The process of comparing data from different time periods to identify and analyze changes in the environment

- This study uses the 2019 city boundary (for comparing "apples to apples")
- Analysis based on a 1-acre grid to standardize the data
- 1% Net New Change is a HUGE area! (highlighted in blue)





Change Detection

- For this study, **.2 acres of change per 1 acre** is classified as a significant change
- Areas of Largest Canopy Growth
 - Single-family neighborhoods in the northern section of the city
 - Blackburn Park
- Areas of Largest Canopy Decline
 - CHOA Campus
 - Emory Musculoskeletal Institute
 - COB Public Safety Building
 - Lenox Park Townhomes
 - Alta Porter on Peachtree





Per Acre Grid

Greater than 0.2 acres of loss Little or No Change

Greater than 0.2 acres of gain

Tree Canopy by Zoning



Change by Zoning 2009 - 2021



■ 2009 ■ 2010 ■ 2013 ■ 2015 ■ 2017 ■ 2019 ■ 2021





Zoning Area vs. Tree Canopy

Land use drives canopy distribution

Proportional Distribution of Tree Canopy by Zoning Type



- 57% of all single-family residential land is tree covered.
- 38% of all multifamily residential land is tree covered
- 34% of all commercial/industrial land is tree covered
- 25% of all mixed-use land is tree covered.



Percent Tree Coverage by 1 acre grid







Right of Way Canopy

- Red pixels highlight potential high-impact areas for planting right-of-way trees.
- Green pixels represent the canopy over the roads.





Canopy Coverage by City Park

2019 % Coverage Total (All Parks)	2021 % Coverage Total (All Parks)	Total Change
53%	57%	+4%

% Tree Canopy Coverage







Recommendations

- 1. Focus on trends, not precise numbers.
- 2. Remain proactive in enforcing the ordinance.
- 3. Maintain targeted tree planting programs.
- 4. Preserve remaining undisturbed forest and woodland areas, especially on public land and near stream buffers.
- 5. Identify right-of-way (ROW) coverage opportunities and prioritize planting in low-coverage areas.
- 6. Continue the two-year cycle for tree canopy studies, following the USDA's schedule.



Red Oak, Murphey Candler Park, and Jeff Dadisman, Tree Canopy Preservation Manager



Comparison Cities

Atlanta Area Comparison Cities

City	Year	% Canopy	City Size (sq. ml)
Sandy Springs	2019	58%	38.8
Decatur	2019	57%	4.4
Avondale Estates	2015	54%	1.2
Alpharetta	2018	±51%	27.2
Brookhaven	2021	48%	12.2
Atlanta	2018	47%	136.8
Norcross	2015	41%	6.0
Chamblee	2017	36%	7.7

Source: Multiple reports from official city websites

Nationwide

Nation Leafiest Capital Cities May 2023 (Nearmap)	Percent Tree Canopy Coverage
1. Charleston, West Virginia	75%
2. Tallahassee, Florida	56%
3. Little Rock, Arkansas	55%
4. Raleigh, North Carolina	55%
5. Nashville, Tennessee	54%
6. Atlanta, Georgia	53%
7. Annapolis, Maryland	51%
8. Concord, New Hampshire	49%
9. Jackson, Mississippi	48%
10. Augusta, Maine	46%

Source: Nearmap, 2023



Qualitative Aspects of Urban Canopy Management

Measurement no.	: 5	Speed :	5000 r/min	Diameter:
ID number	35-inch Q. alba	Needle state:		Level :
Drilling depth	9.34 in	Tilt	-1°	Direction: SE
Date	25.03.2022	Offset	95/329	Species :
Time	12:54:16	Avg. curve :	off / off	Location : Osborne and Fulle
Feed	: 30 in/min			Name :







Osborne and Fuller ROW trees005.rgp









Test 3	1
I owe	r trunk immediately above buttress roots
Facin	a N/NW/
Conei	stant wood density from 0.19 inches

2484 Appalachee Drive 54 Water Oak028.rgp



Chapter 14 Article III- Tree Preservation, Management, and Maintenance

Developmental and Tree Permit Applications require a Level II Health Assessment by a certified arborist or registered forester for proposed tree plan.

Sufficient tree protection areas are enforced on site plan reviews and in the field; Tree care prescriptions are also commonly required for trees associated with developmental projects.

Sufficient pervious area and soil volume, as well as soil quality, are reviewed and enforced for replacement trees. Species diversity in the urban canopy is also prioritized by way of approved species lists and density credit increases for certain important under-utilized species.

Industry-standard pruning is enforced.

Invasive vines (Kudzu, English Ivy, Chinese Wisteria) are required to be removed from all preserved trees on developmental sites; A stream buffer restoration option also exists in the ordinance for sites with stream buffer constraints.

Tree Canopy Division manages the Invasive Vegetation Management contract work in Brookhaven Park spaces (Park Bond).

Tree Canopy Division began a Piedmont Prairie Restoration/Conversion Program in 2022 to increase biodiversity and reduce Parks Dept maintenance in constrained park areas (severe topography, transmission line clearance area, etc.)

Beautiful Trees of Brookhaven

Dogwood Registered Atlanta Champion Tree Lynwood Park 36" diameter ~75 years old





Red Oak Murphey Candler Park 72" diameter ~120 years old



Post Oak Blackburn Park 54" diameter ~120 years old

Southern Red Oak Drew Valley 56" diameter ~90 years old





Redwood Lynwood Park 36" diameter ~75 years old





Loblolly Pine Historic Brookhaven 54" diameter ~100 years old Southern Red Oak Lavista Park 60" diameter ~120 years old





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