Strategic Tree Canopy Plan

Darlington South Carolina

MARCH 2026

City of Darlington
South Carolina

cityofdarlington.gov

Green Infrastructure Center

Plan by the Green Infrastructure Center Inc. for the City of Darlington

gicinc.org

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Prepared by the Green Infrastructure Center Inc.
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CITY OF DARLINGTON

Strategic Tree Canopy Plan

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Executive Summary

The urban forest is a critical asset for healthy, resilient, and sustainable cities. Trees provide benefits that directly support public health by cleaning the air and filtering and reducing stormwater runoff, reducing urban temperatures, and fostering greater economic development. However, these benefits are at risk because tree canopy cover is declining across many U.S. localities. This Strategic Tree Canopy Plan provides data and strategies for maintaining and restoring tree canopy in Darlington.

This plan is the culmination of a nine-month planning process that included workshops and strategic planning sessions led by the Green Infrastructure Center Inc. (GIC) with city staff and community partners. The public was engaged in this process through outreach events, a community open house and community interviews. The extent of urban forest cover was determined by analyzing aerial imagery to map the City's land cover. Open space was evaluated to determine the Potential Planting Area where future trees might be planted, along with assessments of the environmental and social benefits that the City's trees provide. Strategies for retaining, protecting, and restoring tree canopy coverage were created.

City Goal

The City of Darlington currently has 43% tree canopy coverage city-wide. The City will maintain Darlington's tree canopy at 43% with a focus on growing the canopy in the southwestern region of the city. Tree planting will be needed to maintain the 43% canopy because trees will die from pests, storms, landowner removals, additional development, or old age. The City will manage losses to maintain 43% tree canopy coverage by using these strategies:

Top 5 strategies to achieve the goal:

1. Outreach to residents on low canopied parcels for free trees or tree giveaways.
2. Partner with the school district to plant trees on school properties.
3. Recognize property owners that have heritage trees.
4. Hold an Earth Day event with local public schools.
5. Recruit new members to the Darlington Tree Board.

How Trees Benefit the City

Tree canopy provides benefits such as cleaner air, urban cooling, stormwater capture, wildlife habitat, and natural beauty. This plan quantifies and identifies strategies to increase these benefits.

Air Quality

Trees sequester carbon and clean the air of particulate matter and ground-level ozone.

Each year, Darlington's trees remove:

- 9,548 metric tons of carbon
- 34,106 lbs. of ground-level ozone (O_3)
- 8,967 lbs. of airborne particulate matter

Urban Cooling

Excessive pavement and lack of shade create urban heat islands. Darlington's trees counter urban heating by shading hot areas. Tree canopy cover lowers surface temperatures and cools the city.

Stormwater Uptake

Trees capture rainfall and filter pollutants. During a ten-year/24-hour rainfall event (5.39 inches) the City's trees:

- soak up 12.8 million gallons of water
- reduce runoff pollution loads for nitrogen by 21%, phosphorus by 26%, and sediment by 9%

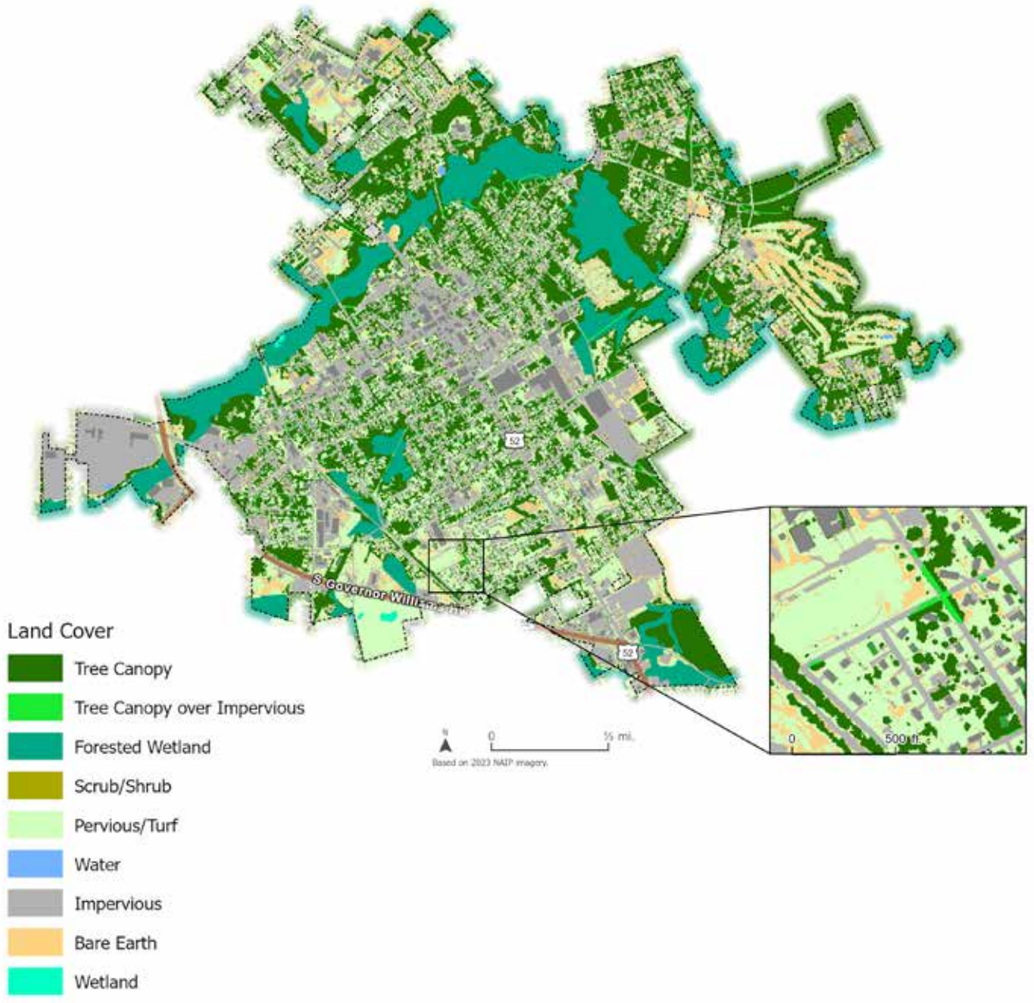
Canopy Goals

Darlington's goal is to maintain tree canopy at 43% by planting approx. 500 trees annually on public and private land:

- 11% (55 trees) on city-owned land per year.
- 89% (445 trees) on private property through education, tree giveaways, voluntary planting and new development.

Tree Canopy and Potential Planting Area

The City of Darlington now has baseline data to identify opportunities to plant new trees for shade, energy savings, increased stormwater uptake, and improved air and water quality.



Introduction

The City of Darlington was founded and chartered by the South Carolina General Assembly in 1835 and was built around the courthouse. Although the origin of the name is unknown, it is thought to have been designated to honor Colonel Darlington, a revolutionary war hero, or to have been named for a town in England. The Courthouse and surrounding public square sit in the location where Colonel Lamuel Benton and Captain Elias Dubose met after their heated argument over the location of the courthouse in the late 1700s. Before the Civil War, Darlington had a population of about 500.

Agriculture has had great significance in Darlington. First settlers brought in cotton farming, and over the years with an increasing acreage devoted to the planting of cotton, a Planters Club and the Darlington District Agricultural Society were formed to promote planting interests in the area. Cotton warehouses and gins were established throughout the area and wealth grew considerably until the late 1800's. Bright Leaf Tobacco became the new cash crop in 1899. As a result of the success in the market, Darlington became the largest tobacco market in South Carolina. This was a time of progressive city government and economic prosperity, with banks and businesses opening regularly in the town. Operations such as carriage makers, blacksmiths, watchmakers, saw and grist mills, and turpentine distillers began industrialization in the mid-1800s. Even with the Great Depression, Darlington continued to have one of the largest tobacco markets in the country. The cotton market along with other enterprises, survived the Depression.

Today, the City of Darlington is a member of the South Carolina Cotton and Tobacco Trails and is home to many cultural and historic events. The Darlington Raceway, built in 1950 by Harold Brasington brings in thousands of race fans every year. Historic landmarks such as the Darlington Memorial Center, Dargan House, Wilds-Edwards House, Carnegie Library and Grove Hill Cemetery reflect the city's rich history. The architecture in the historic district of the city displays the designs and features in vogue during the late 1800s.

The city boasts many green assets. The Darlington oak, depicted in the City's logo, is a local native evergreen oak species that derives its name from Darlington. These majestic trees provide ecosystem benefits to the city. The city has several parks and forested areas. The largest park in the city is a forested natural area called Williamson Park that has a network of popular recreational trails. The park is part of a greater forested corridor that threads through the city and protects Swift Creek, a local waterway. These green assets add character and quality of life to the residents of Darlington.

FAST FACTS

City of Darlington

Population: 6,128 people*

Total City Area: 5 square miles
Land Area: 5 square miles
Lakes/Ponds: 3 acres
Wetlands & Marshes: 373 acres
Tree Canopy: 1,378 acres
Potential Planting Area: 445 acres
Impervious Surfaces: 878 acres

**(U.S. Census 2023 estimate)*

The Historic Darlington County Courthouse sits at the center of the downtown Darlington public square.

Tree Benefits

Trees benefit communities ecologically, economically, and socially. Some of the many benefits include:

- Cleaner air and water
- Enhanced natural beauty
- Bird and wildlife habitat
- Reduced city heat
- Reduced levels of crime
- Reduced traffic accidents
- Increased revenues from sales and property taxes
- Lower vacancy rates
- Improved mental health and focus
- Improved metabolic function
- Increased access to outdoor fitness opportunities.

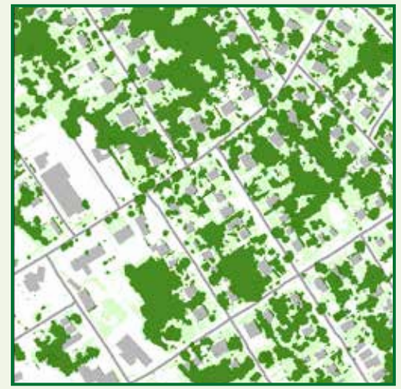
Trees Are Green Infrastructure

Trees and other vegetation serve as the City's "green infrastructure." Just as localities manage grey infrastructure (roads, sidewalks, bridges, and pipes), they should also manage vegetation as infrastructure. Trees support a vibrant, safe, and healthy community while adding to its historic character. They enhance sustainability by filtering stormwater and reducing runoff, cooling streets, cleaning the air, capturing carbon emissions, and increasing property values.

Large canopy trees provide greater benefits than smaller trees. The USDA Forest Service found that in 2025 dollars, a large tree is worth $7,411 in annual benefits while a small tree is worth just $450 (Center for Urban Forest Research and Southern Center for Urban Forestry Research & Information 2006).

Gray vs. Green

The image on the left shows the City of Darlington's gray infrastructure, including buildings and roads. Classified high-resolution satellite imagery (on the right) adds the City's green infrastructure (trees and other vegetation). This *green infrastructure* provides cleaner air and water, energy savings, and natural beauty.



Reducing Stormwater Runoff and Filtering Pollutants

Trees protect communities from problems associated with stormwater runoff. As forested land is converted to impervious surfaces, such as roads, buildings and parking lots, urban stormwater runoff increases. Excess stormwater runoff can cause temperature spikes in receiving waters, increased pollution of surface and ground waters, and greater potential for flooding.

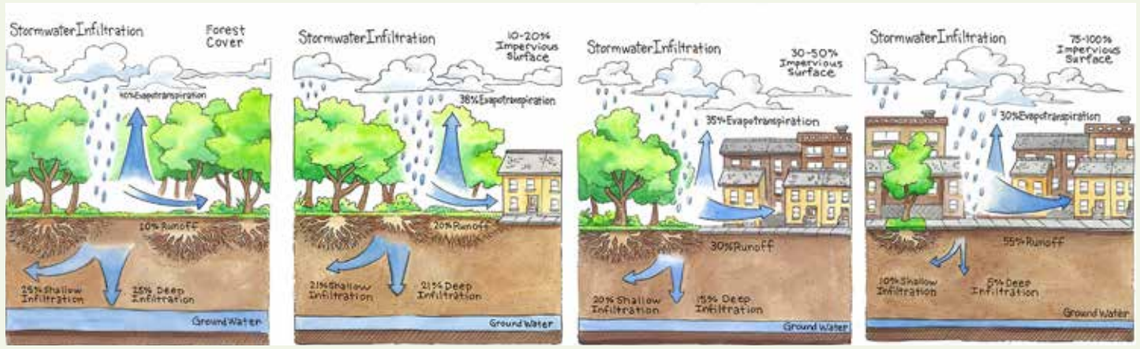
Trees reduce nitrogen, phosphorus, and sediment in stormwater by filtering runoff of these pollutants. Increased loads of nutrients in stormwater runoff reduce oxygen in surface water, causing harm to fish and other aquatic life. Nitrogen and phosphorus can cause harmful algal blooms, while sediment can clog fish gills, smother aquatic life, and necessitate additional dredging of canals and waterways. As tree cover is lost and impervious areas expand, excessive urban runoff of these harmful pollutants greatly increases. The presence of trees means fewer pollutants enter the City's many watersheds, including the Bellyache Creek, High Hill Creek/Black Creek, Lucas Creek/Black Creek and Swift Creek/Black Creek.

The average annual precipitation in Darlington is 47.76 inches (National Weather Service 2025). Much of this runoff flows into the municipal stormwater drainage system transporting surface pollutants from the land to local waterways. Large, paved areas contribute significant volumes to this runoff. While stormwater ponds and other best management practices (BMPs) are designed to mimic natural land cover by detaining and filtering runoff, they do not fully replicate pre-development hydrology. In addition, older parts of the city

Trees filter and clean stormwater runoff before it enters surface waters, ensuring healthy rivers and creeks for recreation and habitat. This sign posted in Williamson Park informs the public about how they can help prevent pollution caused by stormwater runoff.

Excess impervious areas cause hotter temperatures and increased runoff. This parking lot could be retrofitted to add more trees, bioswales, and pervious surfaces that allow water to seep into the ground.

Infiltration Rates with Development



Runoff increases as land is developed. *Graphic adapted by GIC. Data Source: U.S. EPA Watershed Academy 2025.*

Trees planted in medians help capture rain and reduce stormwater runoff in highly impervious areas of town such as downtown.

may lack updated stormwater management practices required for new developments, so not all runoff is captured or treated before it flows into open waterways.

Since trees filter stormwater and reduce overall flows, planting or conserving trees is a natural, cost-effective way to mitigate stormwater. Each tree plays an important role in stormwater management. Based on the GIC's review of canopy rainfall interception studies, a typical street tree's crown can intercept between 760 and 4,000 gallons of water per year, depending on the tree's species and age.

These street trees along Cashua Street provide stormwater management benefits for the surrounding neighborhood and prevent pollution from entering the nearby Swift Creek.

Buffering Storm Damage with Green Infrastructure – Trees!

Another benefit of conserving trees and forests is buffering against storms and reducing losses from flooding. According to the U.S. Environmental Protection Agency (EPA), excessive stormwater causes increased flooding, property damage, and public safety hazards. The EPA recommends ways to use trees to manage stormwater in its book *Stormwater to Street Trees*. https://www.epa.gov/sites/default/files/2015-11/documents/stormwater2streettrees.pdf

Retaining trees and forests along streams prevents erosion and provides key habitat for fish, birds, animals, and people too. A community can categorize their trees as "green infrastructure" to help justify spending money on city trees because they function as natural infrastructure by reducing standing water, preventing erosion, serving as windbreaks, and shading areas to reduce excessive temperatures.

In some cases, FEMA has reimbursed communities for lost tree cover when those trees were part of identified infrastructure, such as when a stream restoration project was damaged by a hurricane and the community had already identified the planted trees as infrastructure. To qualify, trees must be inventoried, have records of maintenance, and be specifically utilized for stormwater management, buffers, or other "green infrastructure" functions. Trees should also be recognized as infrastructure in policy documents such as the Comprehensive Plan, the Capital Improvement Plan (CIP), and even the City's tree ordinances.

Riparian buffers prevent stream erosion and reduce the risk of flooding.

Improving Air Quality, Public Health, and Economic Values

Trees Clean the Air

Higher tree canopy cover is correlated with better air quality. Trees reduce ground-level ozone (O_3) while filtering out fine particulate matter, which can damage lungs and lead to respiratory distress and conditions such as asthma. In fact, well-treed neighborhoods have lower rates of respiratory illness (Rao et al. 2014). Trees capture such greenhouse gases as sulfur dioxide and carbon dioxide. These gases contribute to a warming planet and are associated with health problems from excessive heat. Trees also sequester carbon by storing it as wood, preventing its release into the atmosphere and mitigating the impact of climate change.

Trees Cool the City

Tree shade provides important refuge for children and the elderly during hot summers. Excessive heat can lead to heat stress, especially affecting infants and children up to four years of age, and people 65 years of age and older, or people with obesity or other health issues. (Centers for Disease Control and Prevention 2024).

Trees placed in high traffic areas, like this one on the corner of public square, will help filter pollution emitted by cars from the air in downtown Darlington.

People shop longer and spend more in treed commercial shopping districts.

Tree canopy shades streets, sidewalks, parking lots, and homes, making urban locations cooler and more pleasant for outdoor activities, such as hiking, gardening and playing in city parks. Multiple studies have found significant cooling (2-7°F) and energy savings from shade trees in cities (McPherson et al. 1997, Akbari et al. 2001). Individual trees can transpire hundreds of liters of water per day, which represents a cooling effect equivalent to the energy needed to power two average household central air-conditioning units (Ellison et al. 2017). Proper tree placement can reduce summer air conditioning costs by up to 35% (Arbor Day Foundation 2025). Pavement shaded by trees has a longer lifespan than pavement in full sun, reducing maintenance costs of roadways and sidewalks (McPherson and Muchnick 2005).

Trees Improve Cognitive Function

Exposure to green spaces such as parks or treed landscapes for just 20 minutes a day can significantly improve cognitive function, emphasizing the need for green spaces around schools to allow children to learn to their best ability. Children with Attention Deficit Hyperactivity Disorder (ADHD) benefit from exposure to greenspace. Children who regularly play in green spaces have milder symptoms of ADHD (Faber Taylor and Kuo 2011).

The City's trees reduce temperatures during hot summers through evapotranspiration and by casting shade.

Darlington's downtown streetscape could be re-envisioned to provide more space for trees.

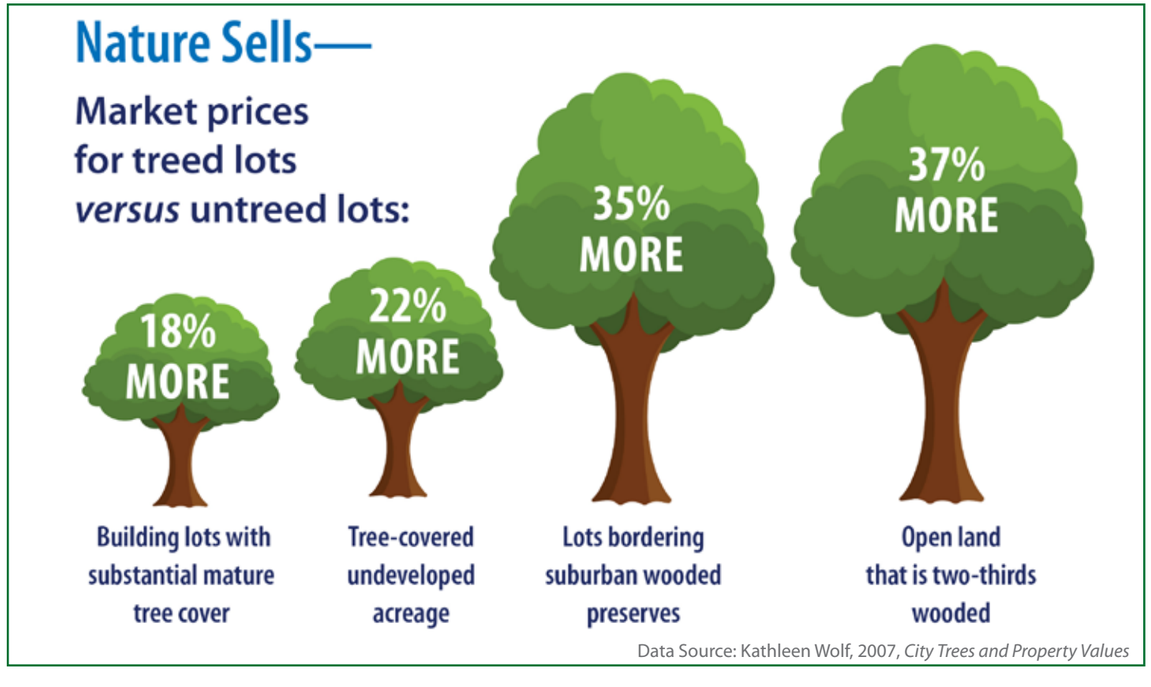
Home buyers will pay more for homes with mature trees.

Trees Improve Walkability

Trees result in people walking more and walking farther. The cooler temperatures, aesthetics, and traffic calming effect increase a community's walkability. When trees are not present on a street, people perceive distances to be longer, hotter, and less pleasant, making pedestrians less inclined to walk than if streets are well-treed (Tilt, Unfried, and Roca 2007).

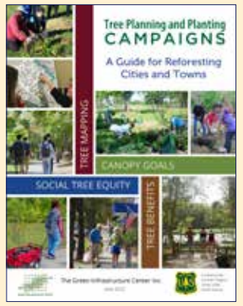
Trees Increase Property Values

Developments that include green space or natural areas in their plans sell homes faster and for higher profits than those that take the more traditional approach of building over an entire area without conserving natural space (Benedict and McMahon 2006). Individual trees and forested open spaces make lots more valuable. Trees on developed lots add about 18% to property assessments and real estate value. (Wolf 2007). [*See the Nature Sells graphic, below.*]



Preventing "Green Gentrification"

Gentrification is a reasonable concern when it comes to community planting projects in lower-income neighborhoods. The concern is that beautifying a neighborhood with numerous shade trees, adding street medians with more trees, planting trees in front yards, and having more parks and other open spaces nearby will raise property values and make houses unaffordable, spur landlords to raise rents and result in property tax increases. This is a legitimate concern and warrants a comprehensive approach that minimizes the negative consequences of green gentrification through policies that encourage residents to stay in their homes while enjoying the many benefits of trees and green space, such as cleaner air, cooler summers, less flooding, lower energy costs and general social well-being. To learn more about how to prevent "green gentrification", see the GIC's *Tree Campaign Guide* https://gicinc.org/books/tree-planning-and-planting-campaigns/



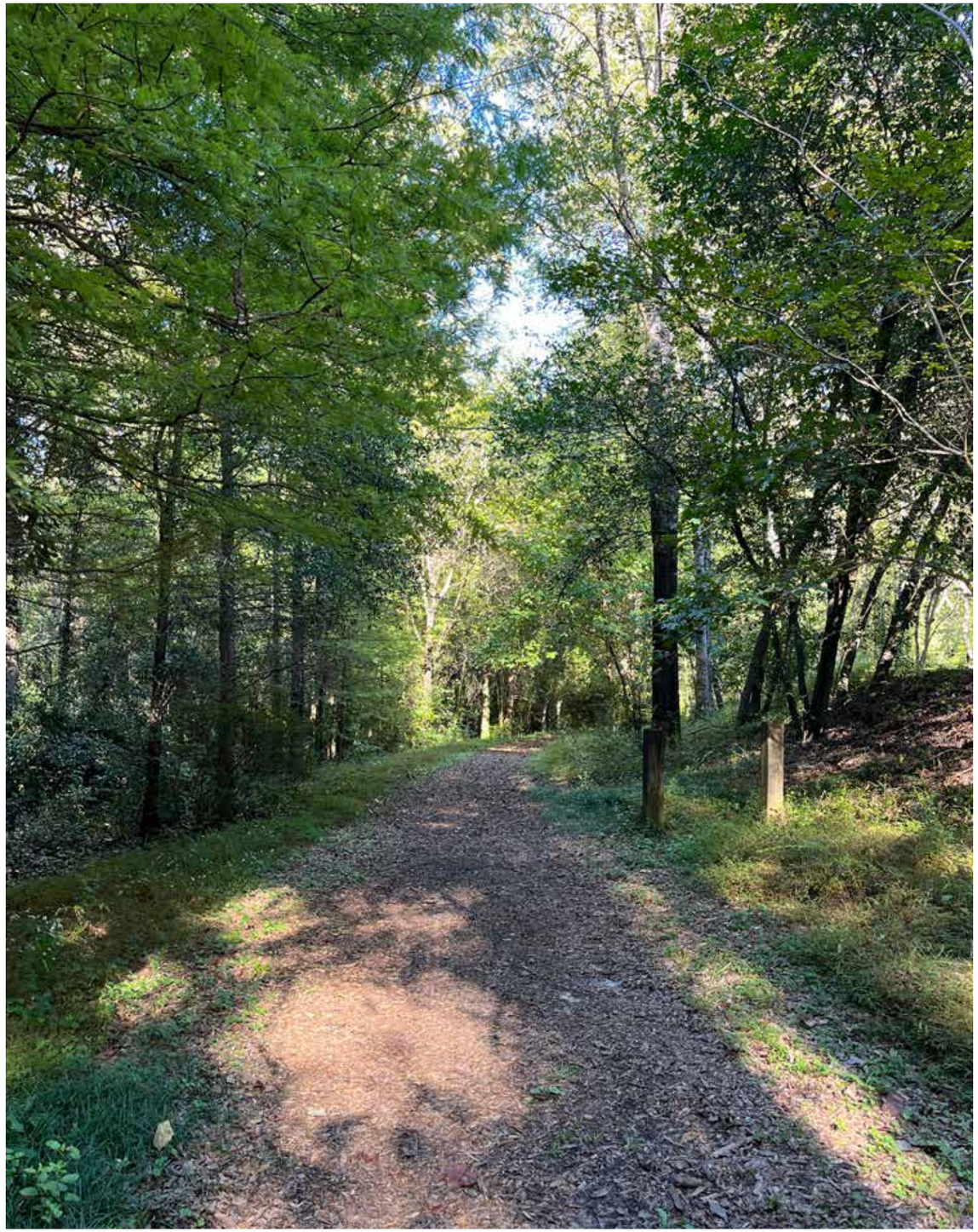
Instead of holding back on greening projects, cities should address the sources of affordability problems. One example would be an agreement with landlords not to raise rents within five years of a planting project; another would be to engage the community housing and development staff in providing more affordable housing. The City of Greenville, South Carolina for example, spent a decade and millions of dollars purchasing land around a future park development, Unity Park, that was to be built on city-owned land in historically black neighborhoods that experienced discrimination and disinvestment. The City created a housing fund to build a thousand affordable housing units around the new park, allowing low-income residents to remain in the adjacent neighborhoods and reduce the risk of gentrification. The desire for more affordable housing in the area surrounding the park was an idea driven by local residents and community activists during the planning of the park.

Trees provide shade and make the city more walkable.

Trees Pay Us Back

As the City considers the cost of planting and caring for more trees, it's important to note that "every dollar invested in planting a tree results in an average return on investment of $2.25" (Endreny 2018). In fact, even a newly planted tree will immediately begin to provide benefits. So, while the City will need to expend more funds to increase and maintain its canopy coverage, those trees will more than pay their way. This includes increases in property values, and thus property tax revenue, the rejuvenation of business districts, tourism revenue, and makes the city more attractive to new businesses. For example, people were seen to shop longer and spend more in treed commercial shopping districts, which benefits the city through increased sales revenues (Wolf 2007).

Planting trees should not be seen in isolation, but as part of a wider cycle of urban renewal and growth, in which trees spur development and raise incomes, business sales and that 'feel-good factor', which can, in turn, lead to a desire for more trees, parks and outdoor leisure facilities. Trees help turn a downward spiral into an upward spiral, as part of a city's renewed sense of pride and prosperity.



Tree Canopy Analysis Methods

The tree canopy analysis was performed to map current tree canopy, quantify the ecosystem services these trees provide, map potential planting areas, and estimate potential future canopy based on plantable areas. This new tree canopy data can be used to analyze urban cooling, walkability, and street tree plantings; or to inform area plans, urban forestry planning, and the City's planning efforts.

Satellite imagery from the National Agricultural Imagery Program (NAIP) distributed by the USDA Farm Service Agency was classified to determine the types and extent of different land covers in Darlington. The land cover map was created at 1-meter resolution using NAIP imagery from April 3, 2023. LiDAR (light detection and ranging) data were used to determine height, in order to distinguish between large shrubs and trees.[1] This allows the GIS analyst to separate bushes from trees and other vegetation. This distinction of tree/non-tree vegetation is very important when modeling tree benefits, since the modeled pollution-removal benefits are based on trees, and do not necessarily translate to smaller, non-woody vegetation. In addition, various vector data were used where possible (e.g. sidewalks, driveways, and other impervious surfaces). The tree canopy was mapped at 99% accuracy, with an overall land cover accuracy of 92%.

Determining Plantable Acreage

Potential Planting Areas

In urban areas, a realistic goal for expanding urban canopy depends on an accurate assessment of the total plantable open area. A *Potential Planting Area* (PPA) map estimates areas where it may be feasible to plant trees. The PPA is estimated by selecting land cover types that have space available for planting trees and accounts for the overlap of canopy (canopy that is intermingled or a large canopy tree that partially covers an understory tree).

Of the nine land cover types mapped, only pervious and bare earth were considered for the PPA. However, some paved areas could be removed or reduced, soil conditioned and then used to plant new trees. For example, a parking lot could be redesigned in order to accommodate more tree canopy to absorb and clean stormwater runoff and provide shade for cars.

[1] LiDAR is a remote sensing method that uses light in the formof a pulsed laser to measure ranges (variable distances) to the top of the vegetation, compared to the underlying surface of the Earth. The farther the laser beam travels, the shorter the vegetation.

NAIP Aerial Image

Potential Planting Area (PPA)

There are many places where new trees can be planted in the City, such as at the new townhomes off E Broad Street or at the Darlington County Intervention School.

Eligible planting areas are also limited by their proximity to features that interfere with a tree's natural growth (such as buildings) or where a tree might affect the feature, such as power lines, street signs, or road junctions. The GIC buffers potential planting areas to exclude trees from these features. City staff and the GIC reviewed the draft PPA map and removed playing fields, cemeteries, and other land uses where trees would not be appropriate. The resulting PPA represents the maximum potential places trees can be planted and grow to full size.

Based on an analysis of existing pervious surfaces, 13.8% of the City's land area, or 445.3 acres, could be planted with additional trees. The GIC recommends that no more than half the available PPA, 7% or 223 acres, is realistic to plant, since many other uses, such as vegetable gardens or swimming pools, require full sun.

Potential Planting Spots

Potential Planting Spots (PPS) are created from the PPA. A GIS modeling process is applied to select spots where a tree can be planted, depending on the desired mature size. For this analysis, expected canopy spreads of 20ft. and 40ft. diameter for individual mature trees were used, with priority given to 40 ft. diameter trees, since larger trees provide more benefits.

Potential Canopy Area

The *Potential Canopy Area* (PCA) is created from the PPS. Once the PPS are selected, a buffer around each point is created to represent the mature canopy spread. For this analysis, that buffer radius is either 10ft. or 20ft., which represents a 20ft. or 40ft. diameter canopy. These individual tree canopies are then merged to form a *Potential Canopy Area*.

Potential Planting Spots (PPS)

Potential Canopy Area (PCA)

Canopy Analysis Maps and Findings

The *Tree Canopy Analysis* has been used to plan the City's target tree canopy goal and will act as a benchmark to gauge the future status of the City's tree canopy. An ArcGIS geodatabase with digital shape files produced during the study has been provided to the City.

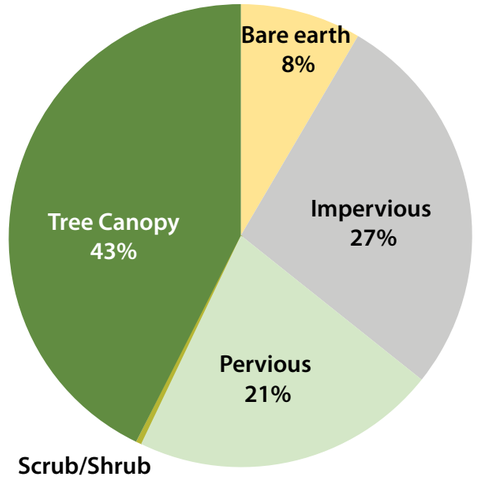
In addition, the City received tree canopy statistics for the following areas:

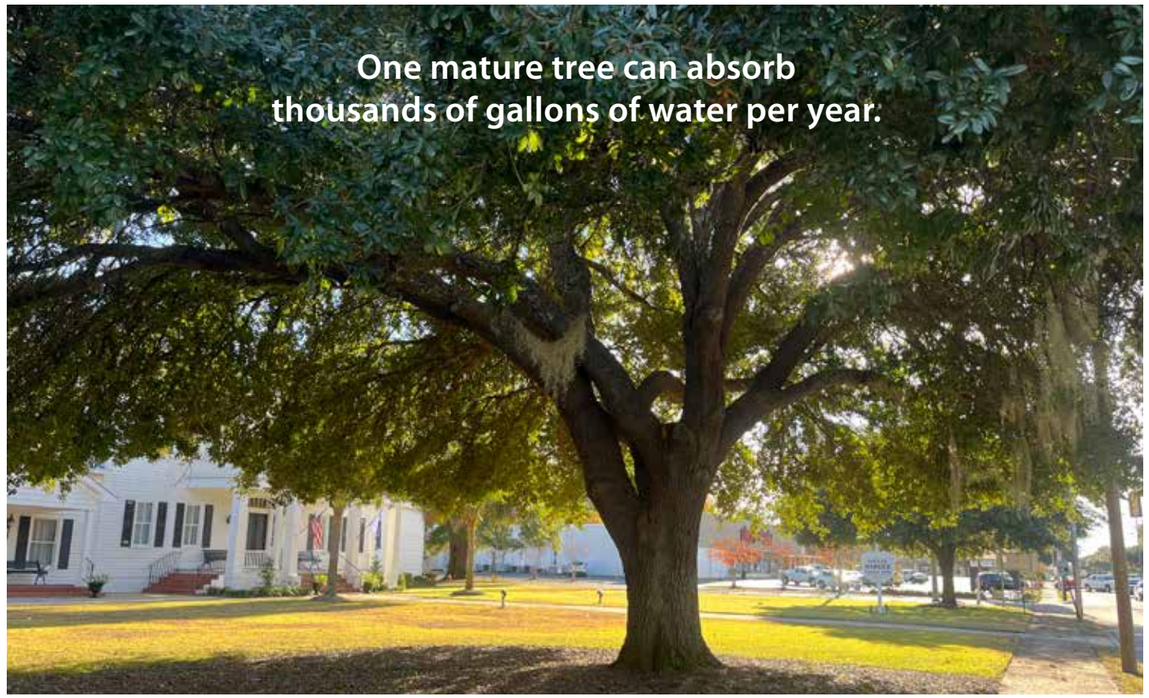
- Parcels
- Parks
- Schools
- Streets
- Census Block Groups
- Watersheds

The Tree Canopy Analysis can inform tree planting decisions to meet many goals, such as walkability, greenhouse gas emission reduction, energy savings, urban heat reduction, and economic revitalization.

The following five pages contain Darlington's *Tree Canopy Analysis* Maps.

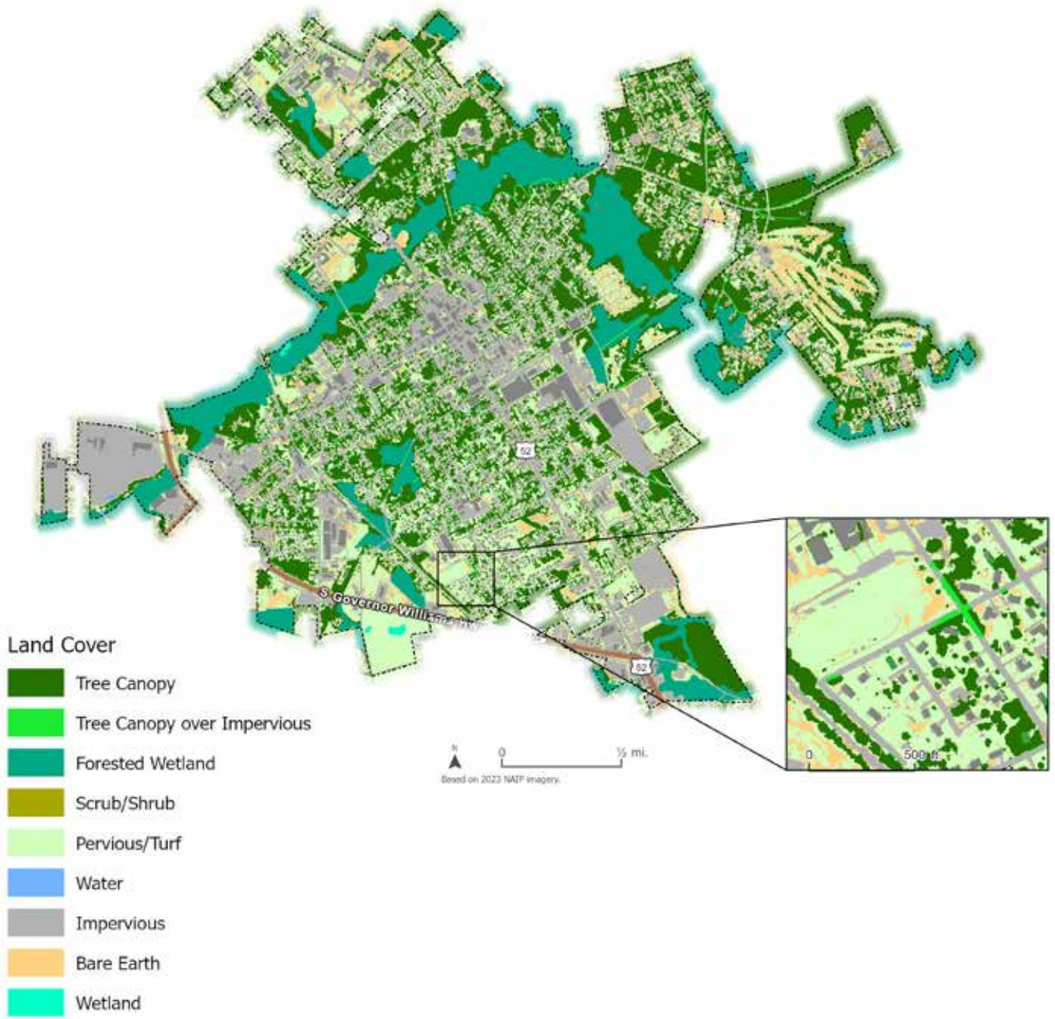
Darlington Percent Land Cover





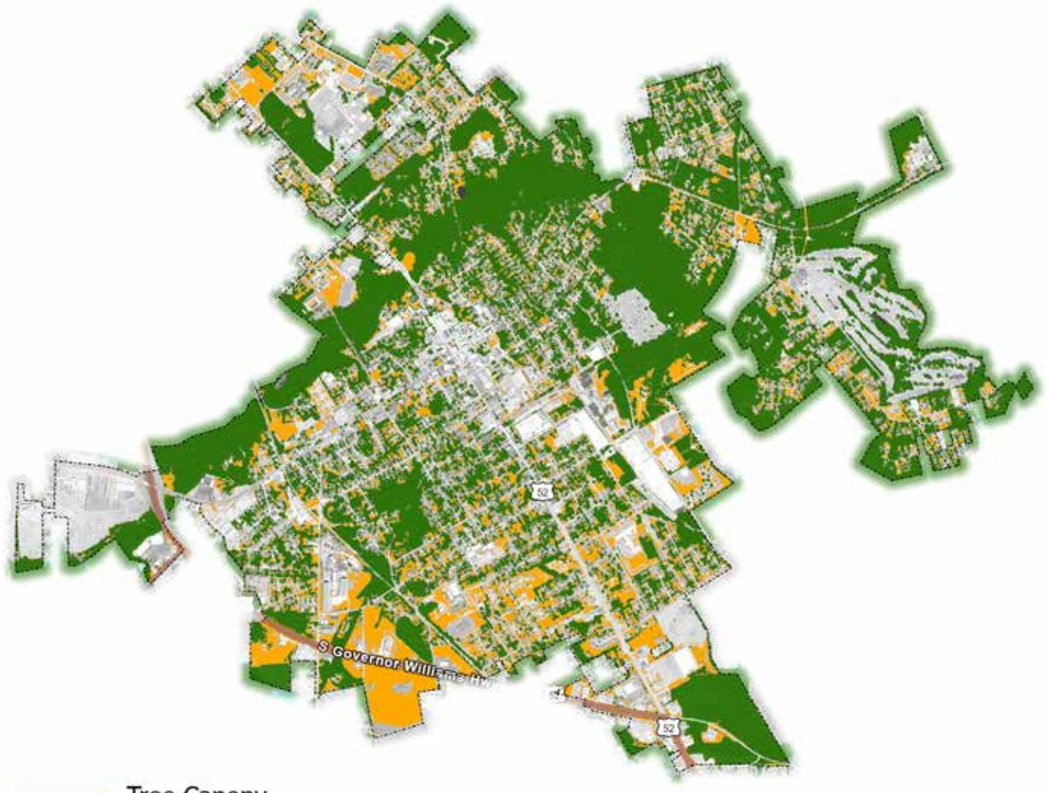
City Land Cover

GIC classified 9 land cover types for the City of Darlington from 2023 NAIP aerial imagery.



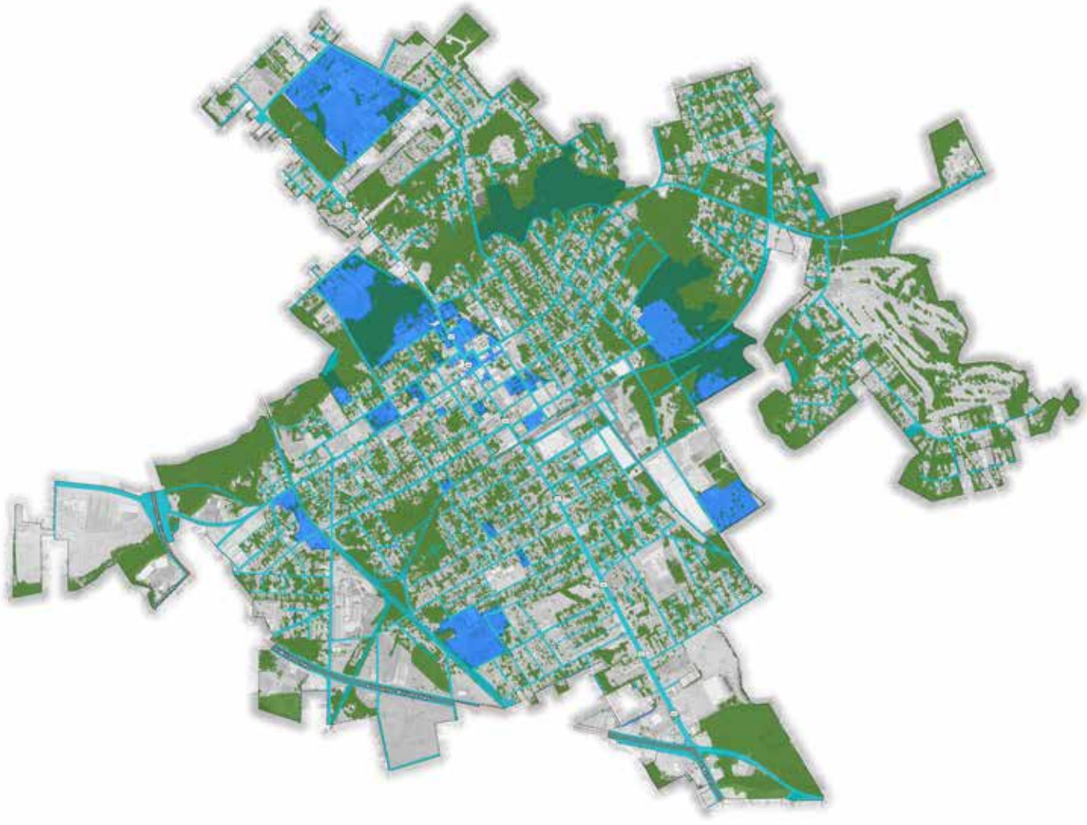
Tree Canopy and Potential Planting Areas

Existing tree canopy (green) and potential planting area (orange) were determined based on land cover data and input from the City. Potential planting areas (PPA) depict areas where it may be possible to plant trees. All sites would need to be confirmed in the field prior to planting. The map shows PPA on both private and public lands.



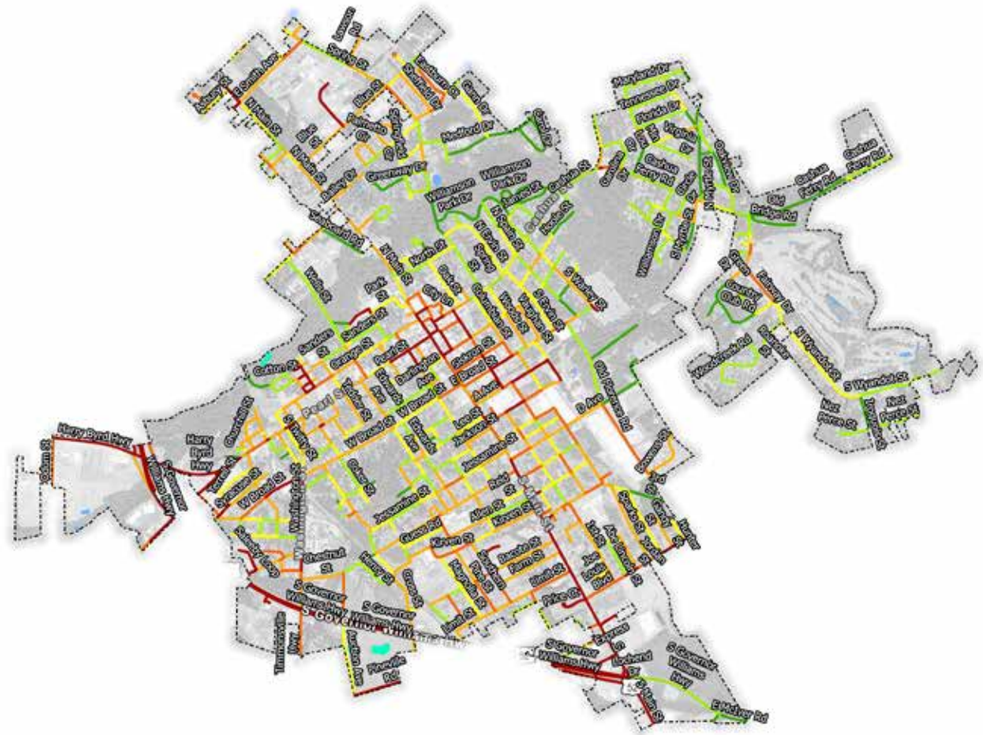
Public and Private Land

On average, publicly owned land makes up 20%, while privately owned land makes up 80% of the total land in a city. This map shows a breakout of public and private land in Darlington. To successfully meet Darlington's tree canopy goal of maintaining a 43% tree canopy, saving existing trees and planting trees must occur on both public and private land.



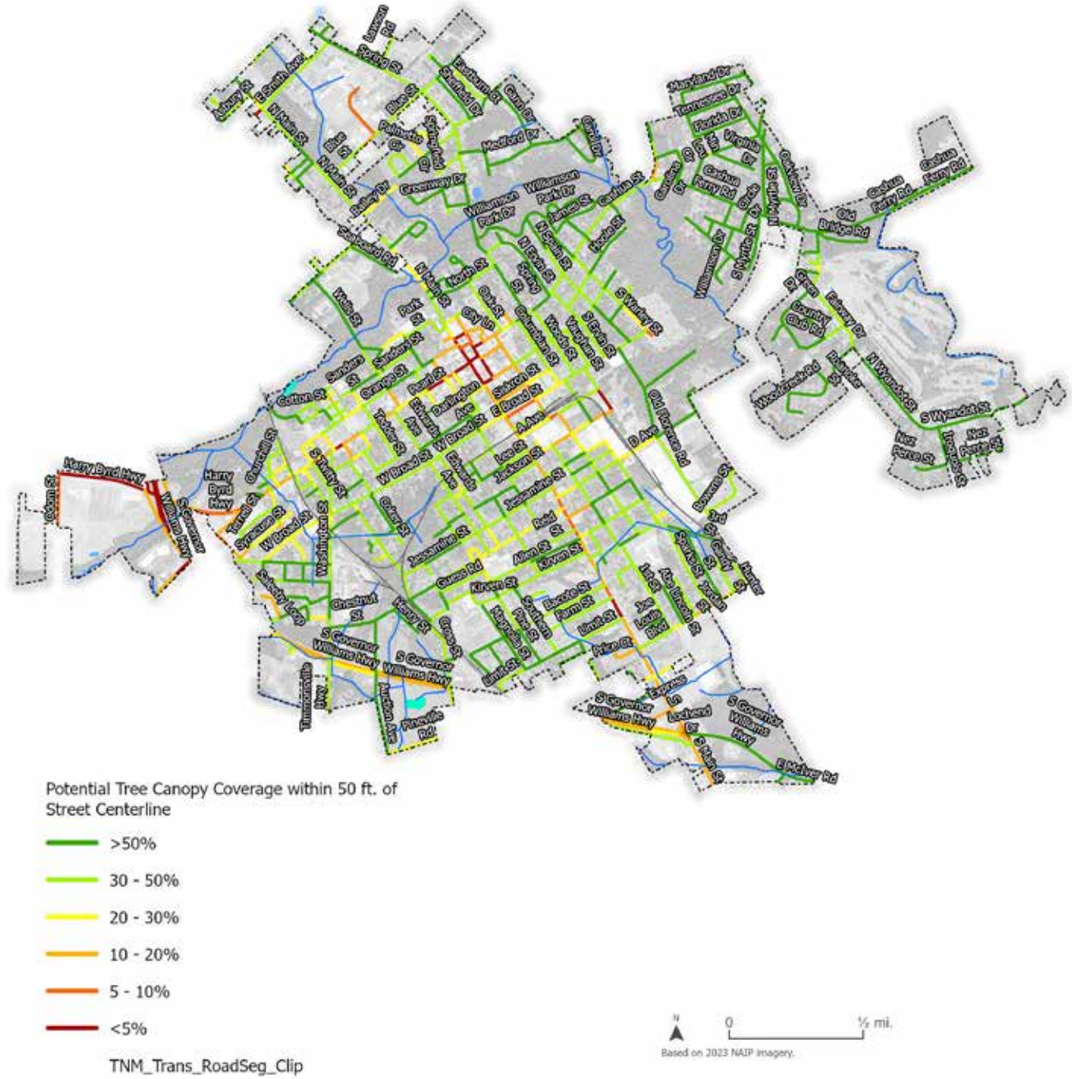
Existing Tree Canopy Coverage Along Streets

Streets that have the most canopy (dark green) and those that have the least canopy (red). Streets that lack good tree coverage can be targeted as appropriate for planting to facilitate specific City goals, such as safe routes to school or beautifying a shopping district.



Potential Tree Canopy Coverage Along Streets

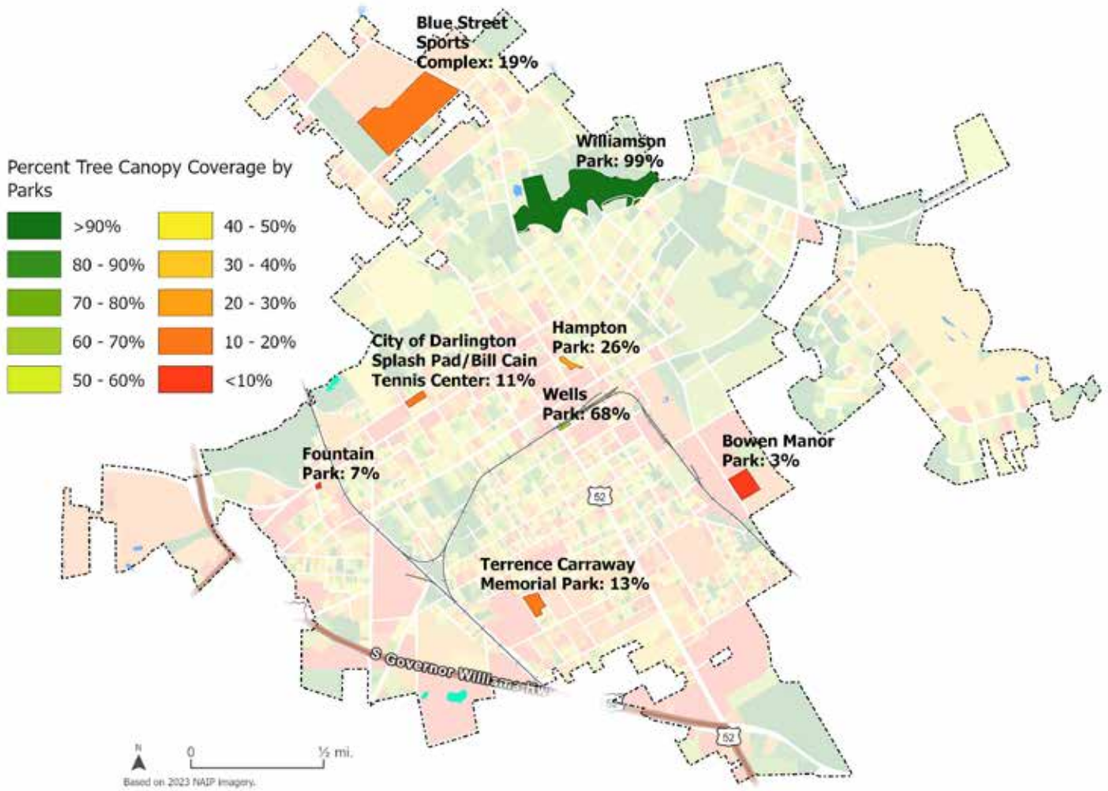
If all potential planting areas within 50ft. of every road's center line were planted, this is what the canopy coverage along streets would look like.



Disclaimer: This map is based on Potential Planting Areas (PPA) within 50ft. of the Right-of-Way.
As such, it identifies unconstrained planting sites based on the best available GIS data, meaning that existing underground tree wells or narrow landscape strips (under 6ft.) are not included in this analysis.
As with the overall PPA map, it does not account for utilities, and all locations must be field verified.

Tree Canopy Coverage by Park

Tree canopy for each City park. Parks with trees promote physical and mental health and provide shaded areas for children to play.

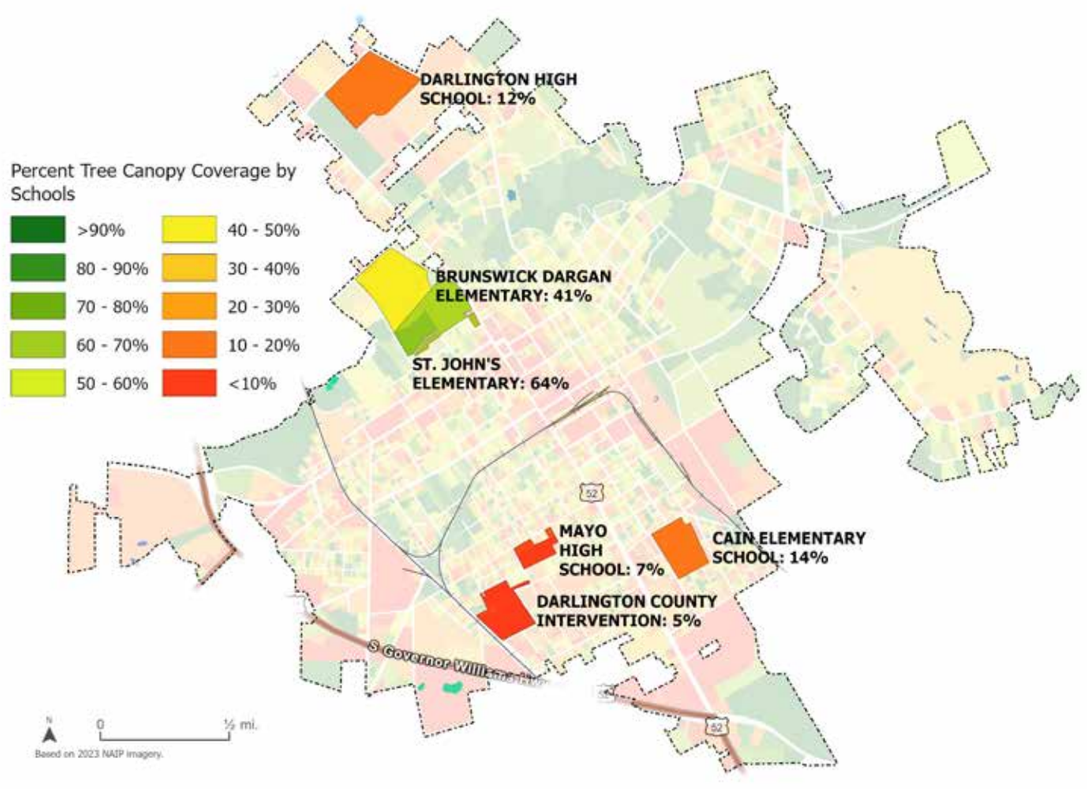


Darlington Parks

Park	Current Tree Canopy	Potential Tree Canopy	Potential Tree Plantings	Small Trees That Could Be Planted	Large Trees That Could Be Plante
Blue Street Sports Complex	19%	27%	199	113	86
Terrence Carraway Memorial Park	13%	76%	138	64	74
Bowen Manor Park	3%	42%	126	93	33
Hampton Park	26%	60%	34	22	12
Splash Pad/Bill Cain Tennis Center	11%	34%	29	18	11
Williamson Park	99%	100%	21	16	5
Fountain Park	7%	37%	7	4	3
Wells Park	68%	76%	4	3	1

Tree Canopy Coverage by School

Planting at school sites can save energy costs for cooling and boost student concentration and learning.



Darlington Schools

School	Current Tree Canopy	Potential Tree Canopy	Potential Tree Plantings	Small Trees That Could Be Planted	Large Trees That Could Be Plante
Darlington High School	12%	36%	707	359	348
Brunswick Dargan Elementary	41%	67%	658	285	373
Cain Elementary	14%	59%	641	296	345
Darlington County Intervention School	5%	50%	614	218	396
St. John's Elementary	64%	76%	329	196	133
Mayo High School	7%	34%	192	100	92

Calculating Environmental Benefits

Stormwater Uptake

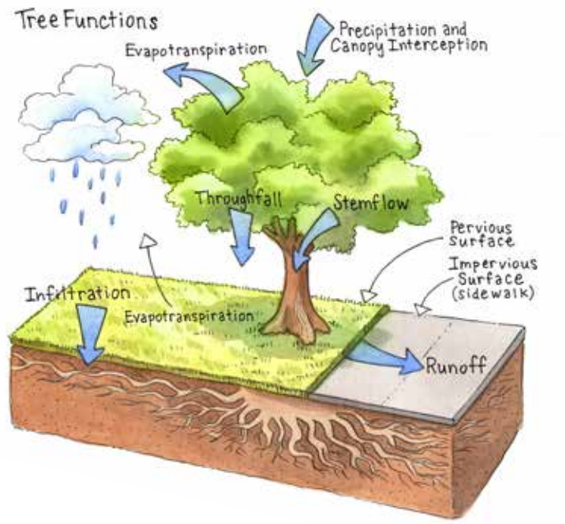
Trees and forests are the best land cover for taking up urban stormwater and are recognized as such by forestry scientists and civil engineers (Kuehler 2017, 2016). Tree canopy stormwater interception varies from 100% at the beginning of a rainfall event to about 3% at maximum rain intensity (Xiao *et al.* 2000).

Trees help capture and filter stormwater runoff. The Trees and Stormwater (TSW) Tool developed by the GIC estimates the stormwater interception, infiltration, and runoff of different land cover types. This methodology uses a modified version of the "curve number" approach, originally developed by the Natural Resources Conservation Service (NRCS) which factors in impacts of hydrologic soil groups, land cover types, hydrologic condition, and design/management practices that impact runoff. The modified TR55 curve numbers (CN) provided by GIC include a factor for canopy interception. This approach allows for more detailed assessments of stormwater uptake based on the landscape conditions of the City's forests. It distinguishes whether the trees are within a forest, a lawn setting, a forested wetland, or over pavement, such as streets or sidewalks. This is because the conditions and the soils in which the tree is living affect the amount of water the tree can intercept. For more about this methodology, please visit: https://gicinc.org/projects/resiliency/trees-and-stormwater/

The GIC used its TSW Tool to model stormwater and pollution reductions by City tree canopy. The model shows that, during a 10-year/24-hour rainfall event (5.39 inches), trees take up 12.8 million gallons of runoff, or about 19 Olympic swimming pools of water. Darlington's trees capture:

- **10,655 nitrogen lbs. annually**
- **869 phosphorus lbs. annually**
- **568 sediment tons annually**

The TSW Tool takes into account the interaction of land cover and hydrologic soil conditions within each watershed. The TSW Tool can also be used to run 'what-if' scenarios, specifically losses of tree canopy from development or storm damage or increases in tree canopy from additional tree planting.



Trees in a lawn or grass area soak up more stormwater than trees over pavement.

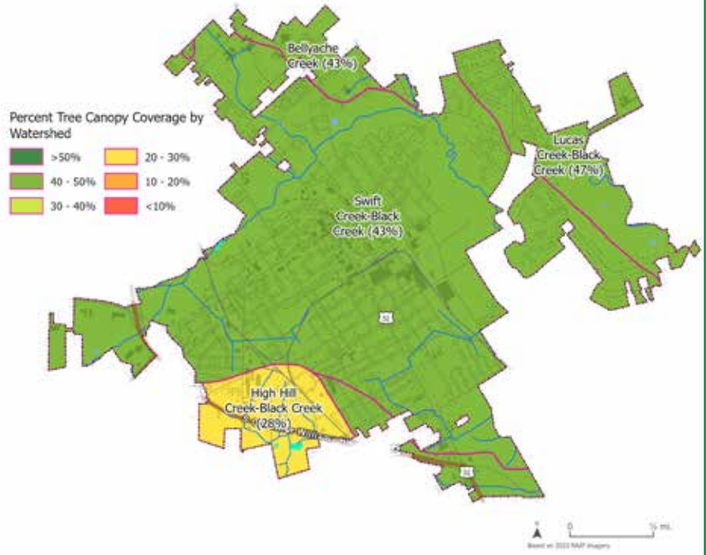
Tree Canopy Coverage by Watershed

The conditions under and around a tree, such as the size of its planting box, the amount and type of open space, surface soils, drainage, and root spread affect the infiltration of water. The TSW Tool uses plantable open spaces to determine how many more trees could be planted and how much additional nitrogen, phosphorus, and sediment pollutants new trees and their surrounding soils could absorb.

Removal of mature trees and existing forest results in the greatest increase in stormwater runoff. As more land is developed, the City should maximize tree conservation and encourage new tree plantings to maintain surface water quality and groundwater recharge. The following maps use soil types and tree cover to show the areas where it is most important to retain trees for stormwater uptake and areas where tree planting will have the most benefits for stormwater uptake.

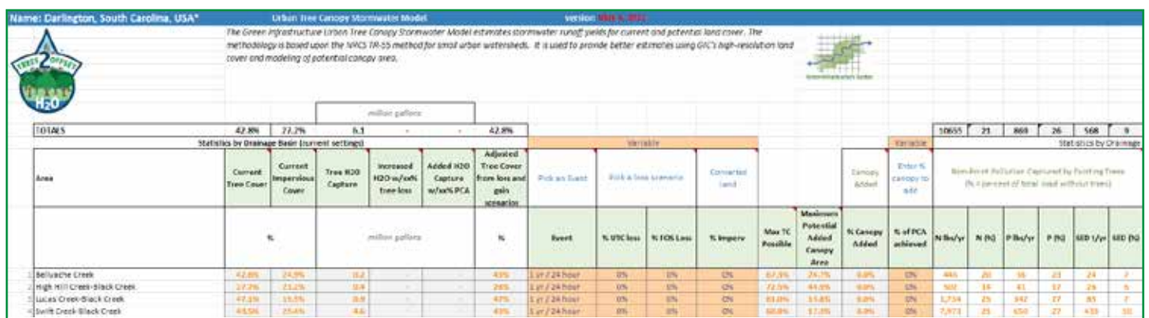
Tree Canopy Coverage by Watershed

The City can use the TSW Tool for running scenarios and setting goals at the watershed scale, for planting trees, and for evaluating consequences of tree loss, as it pertains to stormwater runoff.



The TSW model is a tool for seeing the stormwater impacts of adding or losing tree canopy and the resulting pollution increases or decreases.

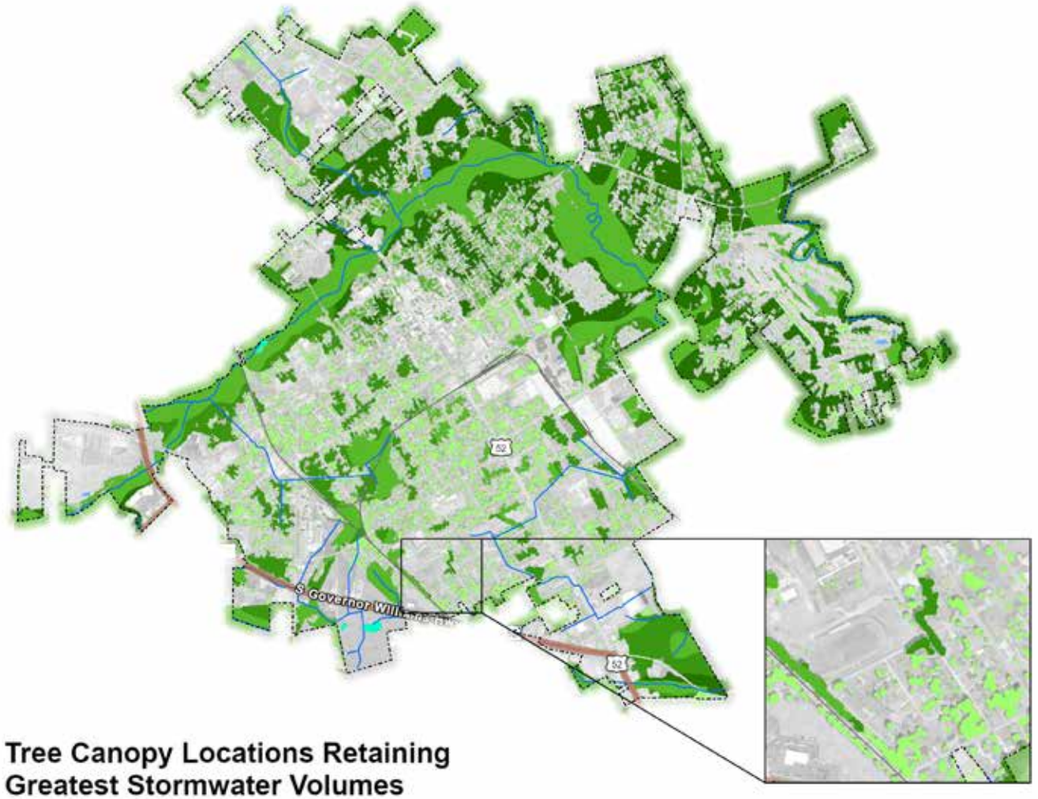
Williamson Park is a 70-acre cypress forest treated as a woodland preserve. This forested acreage is the best land cover type for stormwater uptake.



The TSW Tool allows the City to model water uptake by the existing canopy and impacts from changes, whether positive (adding trees) or negative (removing trees).

Best Tree Canopy to Save for Stormwater Infiltration

The TSW Tool was applied to map the locations where tree conservation will result in the greatest amount of stormwater capture and infiltration (dark green).



Tree Canopy Locations Retaining Greatest Stormwater Volumes

Based on a 2 inch storm event

Inches per acre

Better Draining Soils

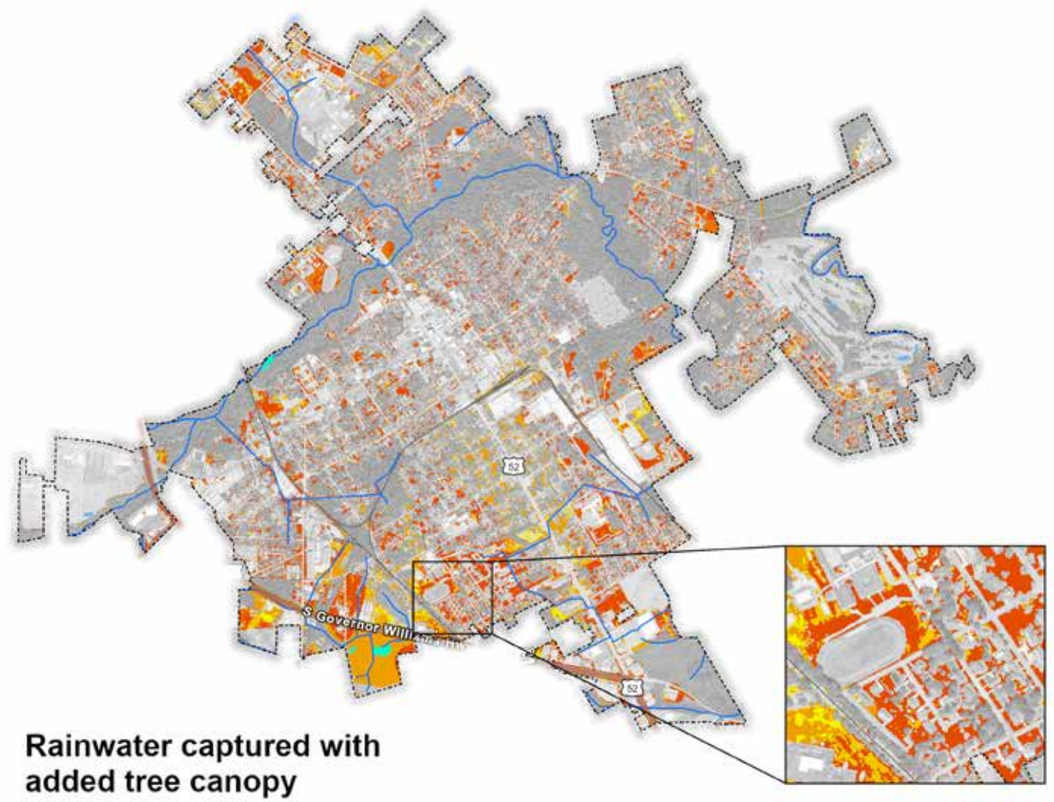
- 0.356 - 1
- 0.265 - 0.355
- 0.197 - 0.264
- 0.153 - 0.196
- 0.136 - 0.152
- Water
- Wetland

N 0 ½ mi.

Based on 2023 NAIP imagery.

Best Tree Planting Locations for Stormwater Infiltration

The TSW Tool was applied to map locations where planting trees will result in the greatest amount of stormwater capture and infiltration (red).



Rainwater captured with added tree canopy

Based on a 2 inch storm event

Inches per acre

Better Draining Soils

- 0.563 - 1
- 0.552 - 0.562
- 0.53 - 0.551
- 0.524 - 0.529
- 0.522 - 0.523
- Water
- Wetland

N 0 ½ mi.

Based on 2023 NAIP imagery.

Air Quality

Air pollution removal values were calculated by applying the pollution removal values for each acre of tree cover from the *i-Tree* model. *i-Tree* is a peer-reviewed software suite from the USDA Forest Service that provides urban and rural forestry assessment tools.

Trees mitigate climate change by storing carbon in their tissue and sequestering atmospheric carbon from carbon dioxide (CO_2) in new tree growth. Current trees in the City are storing 42,821 metric tons of carbon that will be released back into the atmosphere when these trees die. Trees also capture particulate matter, ground-level ozone (O_3), nitrogen dioxide (NO_2), and sulfur dioxide (SO_2) from the air, resulting in better air quality and healthier neighborhoods.

Air pollution and greenhouse gases removed annually by trees in Darlington						
CO (carbon monoxide)	**NO_2** (nitrogen dioxide)	**O_3** (ozone)	**PM_{10}** (particulate matter 10 microns)	**$PM_{2.5}$** (particulate matter 2.5 microns)	**SO_2** (sulphur dioxide)	**C seq** (carbon sequestered)
904 lbs	**2,586 lbs**	**34,106 lbs**	**6,960 lbs**	**2,007 lbs**	**958 lbs**	**9,548 metric tons**

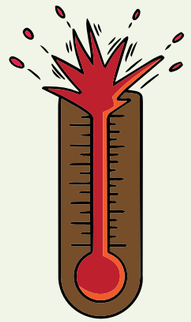
Investments in canopy at the neighborhood level can improve the respiratory health of residents.

Well-treed neighborhoods have cleaner air and lower rates of asthma.

Urban Heat and Equity

Urban heat is a growing concern as extreme heat continues to increase in South Carolina with the changing climate. In Darlington, the number of days above 100˚F is projected to rise from the historic average of 16 days per year to 97 days per year by the year 2070. To reduce temperatures, the City can plant trees to cool the landscape. Inequities in the distribution of tree canopy and opportunities to correct them can be identified through tree canopy data, surface temperature data, and U.S. Census data that provides race and income statistics.

How much hotter is your homecity now than when you were born?



This interactive online tool allows a user to put in their homecity and birthdate to see how their homecity has changed since then and how much hotter it may get. The tool provides the average number of days over 90°F.

https://www.nytimes.com/interactive/2018/08/30/climate/how-much-hotter-is-your-homecity.html

Extreme Heat

Average days per year with temperatures over 100˚F

In this table "bold action" refers to reductions in greenhouse gases through energy conservation. It does not consider the effects of planting more trees.

Where we are now	Where we are currently headed		If bold action is taken
Historically 1971-2000	Midcentury 2036-2065	Late Century 2070-2099	Extreme heat limited to
16 days	**65** days	**97** days	**50** days

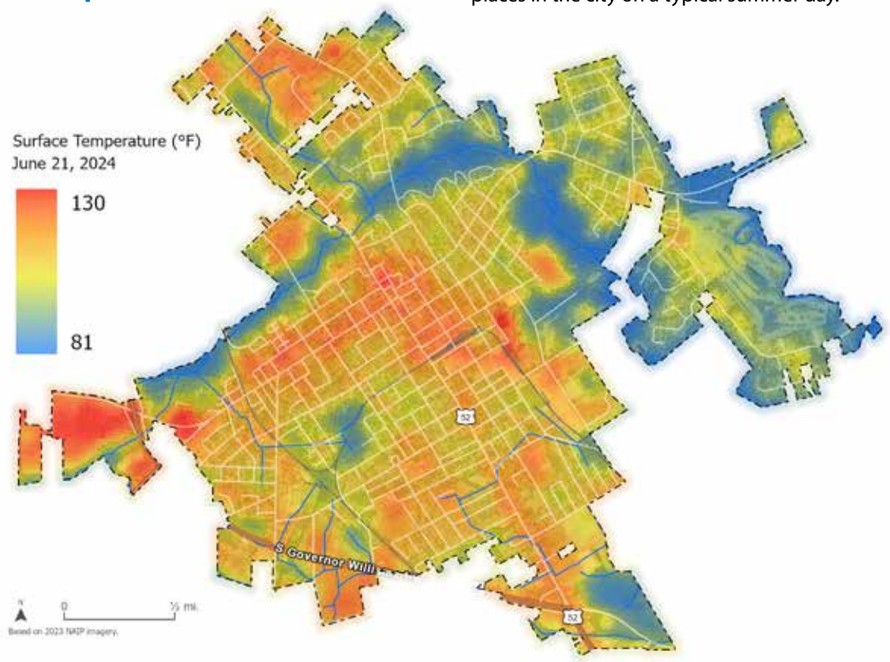
Source: Union of Concerned Scientists. *2019, Killer Heat Interactive Tool.*

What is tree equity?

Tree equity ensures all communities can have access to the benefits that trees provide. Areas that historically have been under-resourced, having fewer trees and more heat than the rest of the city, are the focus of tree-planting efforts.

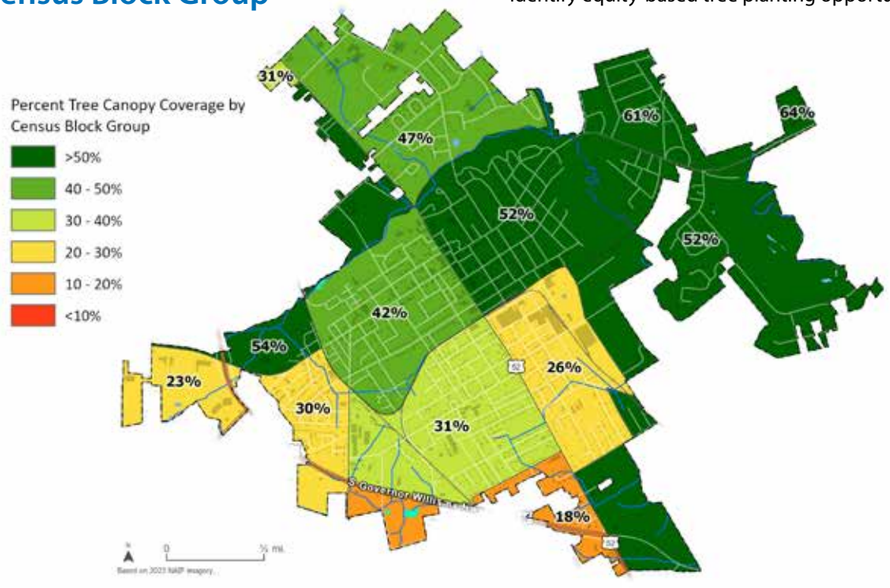
Surface Temperature

The surface temperature map captures the hottest to coolest places in the city on a typical summer day.



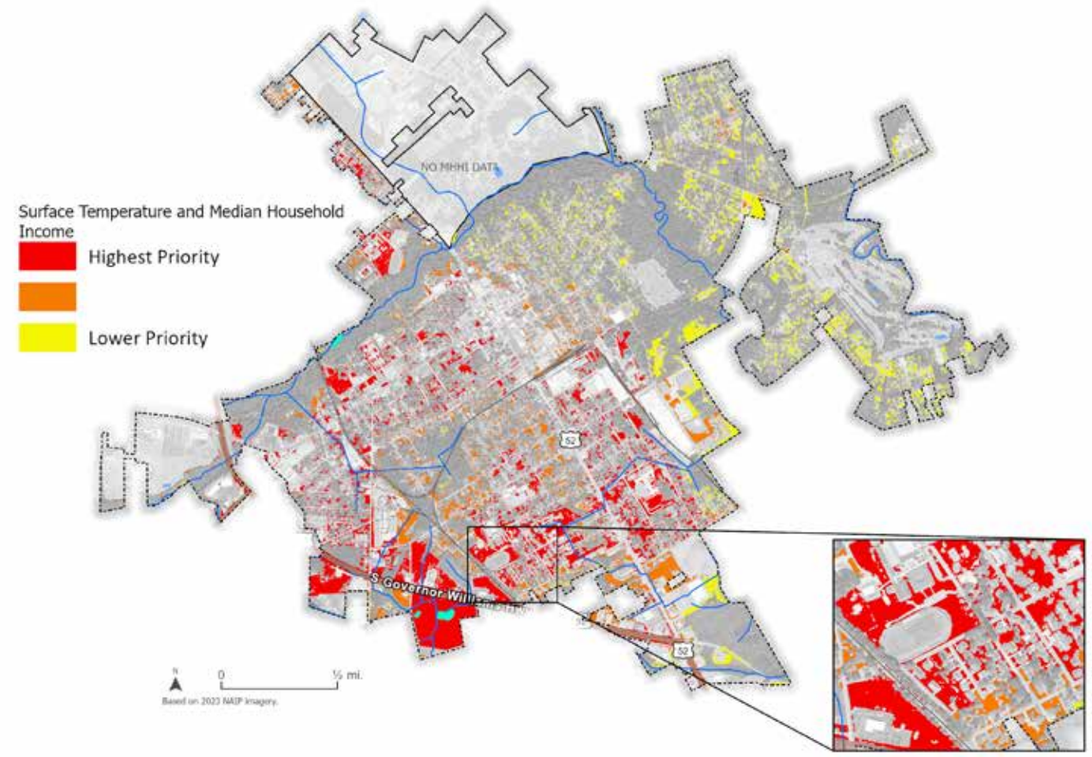
Tree Canopy Coverage by Census Block Group

Tree canopy cover percentages by Census Block Group. By combining U.S. Census and tree canopy data, the City can identify equity-based tree planting opportunities.



Heat and Income Priority Tree Planting Locations

This map uses surface temperature data and median household income data to prioritize potential tree planting areas.



Newly planted trees at the Darlington Housing Authority's Pine Village.

Planning and Engagement Process

The City of Darlington and the GIC partnered in a nine-month effort to create this *Strategic Tree Canopy Plan*. Advisory committees made up of representatives from City staff and local community partners met to discuss priorities. They engaged in a series of seven workshops from the winter of 2023 to the summer of 2024 to evaluate tree canopy cover, determine plantable areas, set a canopy goal and evaluate policies and practices that support tree canopy cover. In the fall of 2024, the GIC attended community events and held an open house.

Maps beginning on page 17 show the results of the *Tree Canopy Analysis*. An assessment of the ecosystem services provided by city trees included:

- **A stormwater analysis**
- **A surface temperature map**
- **An air quality analysis**

Results of these analyses are found on pages 24-31. They were then used to identify opportunities to maximize benefits from future tree planting and retention. In addition, GIC staff conducted a code and ordinances audit to evaluate the impact of city policies and ordinances on trees, tree care, and tree protection. The audit, developed by GIC and used across the U.S., shows which policies contribute to a healthy tree cover and which lead to excessive imperviousness and less green space. Results of the audit were used to inform the final tree canopy cover strategies.

Advisory Committee

During the planning process, an Advisory Committee was formed and consisted of: City staff, City Tree Board members, Beautification Board members, and a Clemson Extension agent. Local partners included the Darlington Housing Authority, Darlington Parks and Recreation Department and the SC Forestry Commission. Committee members attended workshops and check-in meetings throughout the planning process and assisted with event organization, information gatherings, and a public open house event. The advisory committee reviewed the maps, data, and community input to develop the Strategic Tree Canopy Plan goals and strategies for a healthier and greener Darlington.

GIC's Tom Knowles informing a local resident about the work being done to improve Darlington's community forest.

Community Partners

Throughout the planning process, the City and the GIC staff met with key community partners to discuss current initiatives and opportunities to work together for a healthier, greener Darlington. Community partners provided support with stewardship, plantings, and outreach. Community partner organizations included:

- **Darlington Housing Authority**
- **Clemson University Cooperative Extension**
- **Mayo High School**
- **Darlington Recreation Department**
- **Williamson Park Woodland Preserve**

Public Engagement

Community input and feedback are foundational to the *Strategic Tree Canopy Plan*. In addition to the planning work undertaken by the advisory committee, this planning process included opportunities for public learning, engagement, and feedback through the public Open House event, the annual Arbor Day celebration, a public tree giveaway and engagement at the *Annual 4th of July Freedom Festival*.

In October 2024, the City of Darlington hosted an open house at the Old Post Office facility, which included a presentation from the GIC that introduced the project and provided comment stations at which members could provide comments about tree canopy maps, ecosystem services, and potential planting areas. The open house was organized with support from the advisory committee, Mayo High School's Environmental Club leader, and the GIC. Several shade trees were given away and distributed during a free raffle for all Open House participants.

In addition to the open house, the GIC engaged in community outreach events. The GIC partnered with Darlington Recreation to give free trees to City of Darlington residents at a tree giveaway event. Tree recipients were educated on proper tree planting and care. A public gathering was held in the city square to celebrate Darlington's Arbor Day. Darlington's Garden Club presented information on arbor day and read a poem, GIC staff announced the recognition by Clemson University's *Champion Trees of South Carolina* program of the largest *Tilia cordata*, Littleleaf Linden on record in the state of South Carolina. Lastly, the GIC participated in Darlington's *Fourth of July Freedom Festival* event, where attendees were given handouts on the Trees4SC program and had the opportunity to sign up for volunteer opportunities to help plant or care for newly planted trees in Darlington.

The public open house included a mix of information sharing, discussion, and opportunities for feedback.

Summary of Community Findings

During the nine-month planning process, the City and GIC staff participated in several public outreach events: the Darlington Open House, the Fourth of July Freedom Festival, a community tree giveaway, and the annual Arbor Day celebration. More than 65 votes from community members were recorded. The questions below received the most input.

The following is a summary of public input, while a full suite of comments can be found in Appendix C.

Q1: Where should more trees be planted?

There were six options for this question: parks, schools, streets/sidewalks, neighborhoods, around churches and businesses. The results: parks and neighborhoods received votes.

Q2: Which benefit of trees is most important to you?

There were seven options for this question (# of votes): Less Flooding (5), Cleaner Air (4), Cleaner Water (4), Cooler Temperatures (3), Wildlife Habitat (2), Erosion Control (1), and Beautification (0).

Q3. Would you be willing to plant a tree in your yard?

Responses included:

- Yes, I love trees. The shade is great and it's cold. Good for climbing.
- Absolutely, I love trees, my dogs will love them, it adds value to my property.
- We would like to plant more trees on Cashua Street.

Q4. Which parks need more trees?

- Terrence Carroway Park needs more trees.
- Plant more trees at the Darlington Housing Authority.

Q5. Additional comments.

There were several individual comments given regarding specific areas and concerns.

- There has been a loss of canopy along Cashua Street.
- Plant trees along Orange St from Liberty Street to Lucas Street.
- N. Ervin has some trees but needs more along the treeless sections.

Goal and Implementation Strategies

Recent national data show urban and suburban tree canopy cover is trending downwards at a rate of **175,000 acres lost per year** – approximately 36 million trees lost annually (Nowack and Greenfield 2012). Trees are lost due to development, disease, storms, and old age. Darlington is no exception. Given potential development projects, Darlington may lose some of its tree canopy cover. Fortunately, this loss can be managed to maintain the city's tree canopy at 43%, and this plan outlines several strategies to do so.

The City of Darlington's goal is to manage loss by maintaining tree canopy coverage at 43% over the next 20 years.

Preserving overall city canopy coverage requires replacing trees that are lost. Achieving this goal requires a coordinated effort by both the city and private property owners. Since city-owned land makes up about 11% of the total land area, the city is committed to replanting 11% of any annual tree loss, while the remaining 89% will be replanted on private property by residents, businesses, and developers. Estimating annual tree loss at 500 trees, the city will plant approximately 55 trees (11%) per year on city owned land and will engage with private landowners and businesses through outreach, education, and tree giveaways to encourage the planting of 445 (89%) trees per year on private parcels.

Newly planted trees at Bowen Manor Park help meet the goal of planting 55 trees annually on City-owned land.

The City of Darlington's goal is to maintain tree canopy coverage at 43% over the next 20 years.

The tree canopy goal, objectives, and action items for Darlington's urban forest are on the following pages. These, and other practices, will provide long-term care, protection, and best planting practices for the urban forest, and will ensure that investments in city trees pay dividends by reducing stormwater runoff, cleaning the air and water, lowering energy bills, raising property values, and providing natural beauty long into the future.

Many streets and properties, such as this church, school, and the edges of this public football field, have room for more trees to add shade, beauty, and improve air quality.

Goal: Maintain tree canopy cover at 43% over the next 20 years.

1 OBJECTIVE 1:
Increase the City's tree canopy on public properties by planting more trees.

- **Action:** Partner with the Darlington County School District to plant trees on school properties. Develop stronger relationships with Darlington County School District to engage in annual tree plantings on school sites throughout the city. Darlington Middle School may be interested in developing and growing plants for a food forest and other plantings on school properties.
- **Action:** Plant trees at the Blue Street Sports Complex. This park recently was redeveloped and improved for Darlington's strong interest and commitment towards youth baseball programs. As a result, new trees will be planted at the park in the Winter of 2025-26 to help achieve the city's goal of planting 55 trees annually.
- **Action:** Plant trees at the Darlington Housing Authority (DHA) properties. New trees have been planted at two DHA sites to help achieve the city's annual planting of 55 trees/ year.
- **Action:** Plant trees on streets with less than 10% tree canopy. Focus efforts on the SW section of the city and Orange Street to establish more street trees in this part of Darlington. Trees are needed on Fountain Street and Hewitt Street.
- **Action:** Plant trees at the Darlington Public Library.

GIC, SC Forestry Commission, and City of Darlington employees work together to plant trees at Bowen Manor Park.

2 OBJECTIVE 2:
Expand community knowledge and support for tree planting and maintenance.

- **Action:** Continue to apply each year to the Arbor Day Foundation to designate Darlington as a Tree City USA.
- **Action:** Recruit city residents to volunteer on the City Tree Board, headed by a certified arborist, to expand the City's capacity to address tree-related matters.
- **Action:** Update the City's Tree Board webpage to include tree related topics and events.
- **Action:** Develop a recognition program for Heritage Trees within Darlington city limits.
- **Action:** Apply for the Clemson University Extension's Bradford Pear Bounty program for free tree giveaways to replace existing Bradford Pear trees in Darlington.
- **Action:** Host an annual Arbor Day event. Invite schools to participate in the Darlington's Annual Arbor Day Celebration.

TREE CITY USA®

Tree City USA Requirements

1. Establish a tree board or city department to oversee tree care.
2. Adopt a public tree care ordinance.
3. Allocate an annual budget for tree care and planting of at least $2 per capita.
4. Host an annual Arbor Day event and pass and recite a proclamation.

3 OBJECTIVE 3:
Expand community involvement in tree stewardship.

- **Action:** Create a tree information webpage on the city's website, providing links to helpful resources for tree care, certified arborists, the city tree list, and city policies.
- **Action:** Expand support for tree stewardship events and programs hosted by local organizations while recruiting volunteers.
- **Action:** Reach out to local public schools to organize tree related events such as Arbor Day, Earth Day and community tree planting events.

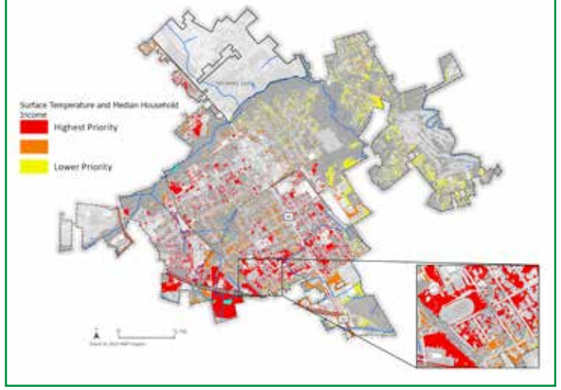
Darlington High School students help plant trees at the Blue Street Sports Complex.

4 OBJECTIVE 4:
Expand the equitable distribution of tree benefits across Darlington by increasing tree canopy in low-canopy communities.

- **Action:** Use urban heat maps to prioritize tree plantings that can offer the greatest cooling benefits to the city and solicit grants for trees and green infrastructure.
- **Action:** Apply for grants to plant trees to reduce urban heat in public parks.
- **Action:** Promote grant-funded tree giveaways for low-canopied communities. Potential partners include local Electric Coops, Clemson Extension Service, South Carolina Forestry Commission and the Green Infrastructure Center.
- **Action:** Plant food forests in various communities by coordinating with partners, including Darlington Housing Authority and The City of Darlington.
- **Action:** Encourage citizens to plant trees with locally supported incentives by partnering with local businesses to offer items such as free beverages and other prizes for planting a tree, as part of the Arbor Day celebration.
- **Action:** Plant more trees on private property for low-income households.
- **Action:** Host tree giveaways to residential property owners who agree to maintain the new tree(s).

Volunteers plant a food forest at a Darlington Housing Authority site to help address food insecurity.

Heat and Income Priority Tree Planting Locations



The *Annual 4th of July Freedom Festival* is an opportunity to hold a tree giveaway event.

Conclusion

Darlington has new data and strategies in this plan to guide the management of its urban forest. Implementing these tree strategies will ensure that current and future residents enjoy the continued benefits of trees and a healthy, sustainable, and beautiful city for all.

This plan is a living document that is intended to be integrated into on-going staff work plans, annual budgets, grant proposals, and partnerships with outside agencies. It is recommended that an implementation committee or Tree Board meet at least quarterly to document the plan's progress and adapt its strategies as needed.

Appendixes

Appendix A: Funding Opportunities

For tree campaigns to be successful, there must be dedicated funds. These funds can come from a variety of sources; including federal, state, local, and private resources. Examples of these opportunities are listed below.

Arbor Day Foundation

https://www.arborday.org/our-work

- **Community Tree Distribution programs**

Clemson University Cooperative Extension

- **Bradford Pear Bounty**
  https://www.clemson.edu/extension/bradford-pear

Duke Energy Foundation

https://foundation.duke-energy.com/grants

- **Natural disaster preparedness and response programming**
- **Resiliency projects that prepare communities for and mitigate against the effects of extreme weather**
- **Projects strengthening thriving natural environments, conservation, clean water and healthy ecosystems**

National Recreation and Park Association

https://www.nrpa.org/

- **Community Facilities Direct Loan and Grant Program – Rural Communities**
  https://www.nrpa.org/our-work/Grant-Fundraising-Resources/other-opportunities2/national-park-service-21st-century-conservation-service-corps2/community-facilities-direct-loan-and-grant-program-rural-communities/
- **Community Development Block Grant (CDBG) Program**
  https://www.nrpa.org/our-work/Grant-Fundraising-Resources/other-opportunities2/national-park-service-21st-century-conservation-service-corps/

South Carolina Department of Parks, Recreation and Tourism

https://www.scprt.com/grants

- **Park and Recreation Development Fund**
  https://www.scprt.com/recreation/recreation-grant-programs/park-and-recreation-development-fund
- **Land and Water Conservation Fund**
  https://www.scprt.com/recreation/recreation-grant-programs/land-and-water-conservation-fund
- **Recreational Trails Program**
  https://www.scprt.com/recreation/recreation-grant-programs/recreational-trails-program

South Carolina Forestry Commission

https://www.scfc.gov/management/urban-forestry/urban-forestry-grants/

- **Food Forest Project Grant**
- **Tree Inventory Grant**
- **Project Learning Tree**

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Appendix C: Community Feedback

The following questions were posed to the community at the Open House event in 2024. Attendees were given the opportunity to vote on specific questions, place dots on a map representing where they would like a tree planted and leave comments. Below is a compilation of all questions and public input not included in the Summary of Community Findings.

Q1. Where should trees be planted?

Community Spaces	Votes
Parks	1
Schools	0
Streets and Sidewalks	0
In Neighborhoods	1
Around Businesses	0
Around Churches	0

Q2: Which schools need more trees?

School	Votes
Darlington High	1
Brunswick Dargan Elementary	0
St. John's Elementary	0
Mayo High	0
Darlington County Intervention School	2
Cain Elementary	1

Q3: Which parks need more trees?

Park	Votes
Williamson Park	0
Hampton Park	0
Wells Park	0
City of Darlington Splash Pad/Bill Cain Tennis Center	0
Terrence Carraway Memorial Park	1
Bowen Manor Park	0
Fountain Park	0
Blue Street Sports Complex	0

Q4: Which benefit of trees is most important to you?

Benefit	Votes
Cleaner air	4
Cleaner water	4
Less flooding	5
Cooler temperatures	3
Erosion control	1
Wildlife habitat	2
Beautification	0

Q5: Place a dot on the top 5 strategies you think Darlington should use to achieve their goal of maintaining tree canopy coverage at 43%.

Strategies	Votes
Seek to partner with the Darlington County School District to plant trees on school properties.	3
Seek to partner with Darlington Middle to grow plants for the potential food forest and trees for the City.	2
Execute Darlington's March 1, 2025 Clemson Extension's Bradford Pear Bounty Exchange.	2
Recognize and map private property owners that have heritage trees.	4
Compete for SC Forestry Grant to create a food forest of fruit and nut trees and shrubs at the Darlington Housing Authority property on King Edwards St.	2
Plant additional trees at Terrance Carraway Memorial Park.	4
Hold an Earth Day event in conjunction with Mayo and seek to plant trees with the High Schools each year.	4
Reach out to residential private property owners in low-treed neighborhoods for tree giveaway events.	7
Plant trees along Orange St from Liberty Street to Lucas Street.	2
Seek to partner with Darlington County Public Library to plant trees at the North Main Street Branch.	3
Plant shade trees at Darlington Housing Authority properties.	3
Seek partnership to plant trees at the new County parking at Hewitt St. & Fountain Streets.	0
Update the City's Tree Board webpage to include more information and links to resources.	2
Recruit new members to the Tree Board.	4
Organize a volunteer database to support watering and caring for trees in the community.	2

Additional comments left by community members
Replace canopy on Cashua Street.
Half of N. Ervin has some trees but very bare around the curve.
Yes, I love trees. The shade is great and it's cold. Good for climbing.
Absolutely, I love trees. My dog will love them. It adds value to my property.