Strategic Tree Canopy Plan

JULY 2025

The City of

Buena Vista, Virginia

Prepared by the Green Infrastructure Center Inc.

BuenaVista

Green Infrastructure Center

The Green Infrastructure Center Inc., in partnership with the City of Buena Vista, completed this report, tree canopy analysis, and strategic planning process with grant funding provided by the U.S. Department of Agriculture (USDA) Forest Service and Virginia Department of Forestry. The mention of trade names, commercial products, services, or organizations does not imply endorsement by the U.S. Forest Service, Virginia Department of Forestry, or the City of Buena Vista, Virginia.

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Prepared by the Green Infrastructure Center Inc.
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Tree Canopy Analysis Maps and Findings *(continued)*

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, 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 Buena Vista.

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 staff and community partners. The public was engaged in this process through a community event and online survey. 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 the City's trees provide. Strategies for retaining, protecting, and restoring tree canopy coverage were created.

City Goal

The City of Buena Vista currently has 45% tree canopy coverage city-wide. **The City's goal is to maintain 45% tree canopy over the next 10 years.** Tree planting will be needed to maintain 45% canopy because trees will still die from pests, storms, landowner removals, additional development, or old age. The City will maintain 45% tree canopy coverage by:

1. Establishing a Tree Board tasked with assisting the City in the implementation of this plan.
2. Increasing tree planting and tree care on city property.
3. Encouraging tree planting on private property.
4. Designating a budgetary line item for tree and landscape maintenance to be used for contractors or staff hours.
5. Establishing a tree ordinance protecting City trees, establishing a Tree Board, and requiring tree planting in new and redevelopment projects.
6. Identifying important riparian buffers to restore in the upcoming Resilience Plan.
7. Working toward Tree City USA status.

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, Buena Vista's trees remove:

- 5,012 metric tons of carbon
- 30,094 lbs. of ground-level ozone (O_3)
- 8,928 lbs. of airborne particulate matter (including PM2.5 and PM 10)

Urban Cooling

Excessive pavement and lack of shade create urban heat islands. Buena Vista'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 (4.34 inches) the City's trees:

- soak up 15.7 million gallons of water
- reduce runoff pollution loads for nitrogen by 24%, phosphorus by 30%, and sediment by 15%

Canopy Goals

Buena Vista's goal is to maintain 45% tree canopy coverage over the next 10 years. This goal requires planting:

- 20 trees on city-owned land annually
- 80 additional trees on private property through education and tree giveaways

Tree Canopy and Potential Planting Area

The City of Buena Vista 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 Buena Vista is a small city at the western foot of the Blue Ridge Mountains. It was founded in 1890 as an industrial and manufacturing center on the eastern bank of the Maury River, a tributary of the James River. Historically, the City has been prone to flooding from the Maury River and mountain streams. After significant losses to flooding, the City sought assistance from the Commonwealth and the US Army Corps of Engineers to build the James R. Olin Flood Protection Project, completed in 1997 which has enhanced flood protection and warning systems to protect businesses and homes from future floods. Today the City is home to downtown businesses, residences and manufacturing as well as Southern Virginia University.

This City, partially surround by the George Washington and Jefferson National Forests, also has a wealth of natural features including urban trees, parks, forests, wetlands, streams, and rivers that provide social, economic, and ecological benefits to residents while creating a sense of place. Glen Maury Park is a 315 acre city park with hiking and biking trails, forests, pavilions, a pool and two campgrounds. The River Walk Trail is a 2.5 mile gravel path on top of the earthen levee and flood wall. And Laurel Park, on the edge of the City and the National Forest, has ball fields and forested areas. By protecting and restoring its natural features, Buena Vista can ensure a healthy, green, and vibrant future.

This Strategic Tree Canopy Plan supports the Comprehensive Plan, Viewpoints, by conserving the City's natural assets through the preservation and expansion of the City's tree canopy. This plan calls for the increased management, protection and planting of trees for increased environmental benefits and enhanced quality of life.

Viewpoints Natural Resources Goal 1:
"The City of Buena Vista will achieve a balanced and sustainable use of natural resources in the community to accommodate the economic and noneconomic needs of residents, industries and visitors."

Buena Vista Fast Facts

Population: 6,581 people*
Total City Area: 6.8 sq. miles
Land Area: 6.7 sq. miles
Open Water: 61 acres
Wetlands & Marshes: 5 acres
Streams: 18.2 miles
Tree Canopy: 1,958 acres
Potential Planting Area: 502 acres
Impervious Surfaces: 761 acres

**(U.S. Census 2024 estimate)*

The Historic Buena Vista Company Building currently serves as the City's public library.

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.

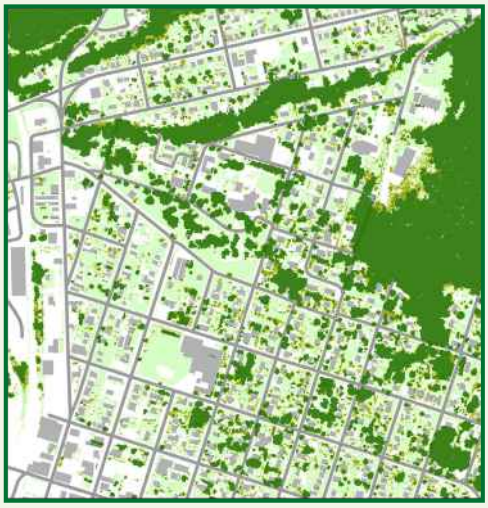
Large canopy trees provide greater benefits than smaller trees. The USDA Forest Service found that in 2025 dollars, a large tree is worth $7,411 in annual benefits while a small tree is worth just $450 (Center for Urban Forest Research and Southern Center for Urban Forestry Research & Information 2006).

Trees Are Green Infrastructure

Trees and other vegetation serve as the City's "green infrastructure." Just as localities manage gray 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.

Gray vs. Green

The image on the left shows the City of Buena Vista'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.



Trees filter and clean stormwater runoff before it enters surface waters, ensuring healthy rivers and creeks for recreation and habitat.

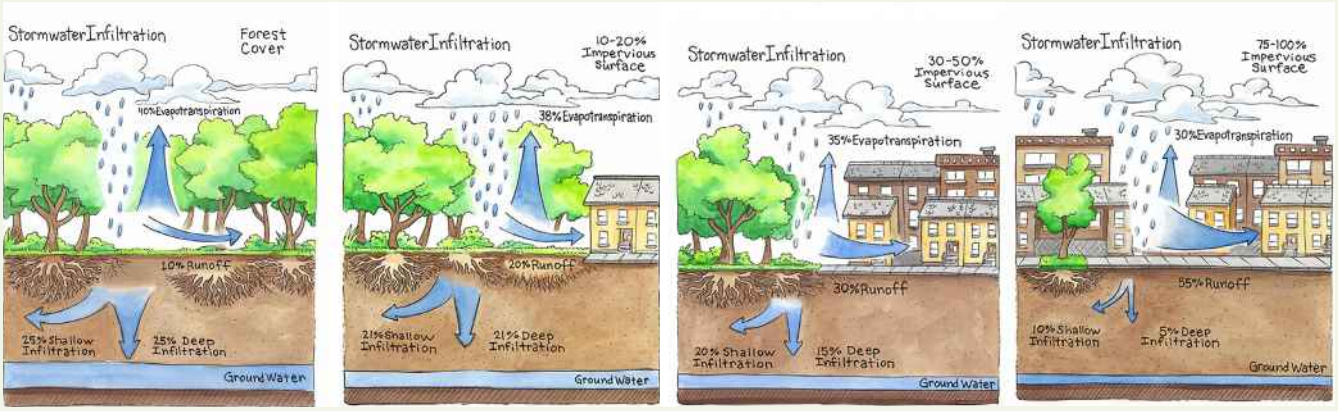
Reducing Stormwater Runoff and Filtering Pollutants

Trees protect cities 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 local streams, the Maury River, and eventually the James River and Chesapeake Bay.

The average annual precipitation in Buena Vista is 42.54 inches (National Weather Service 2025). Much of this runoff flows into the stormwater 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 rainfall release by detaining and filtering runoff, they do not fully replicate pre-development hydrology. In addition, older parts of the City may lack updated stormwater management practices required for new developments, so not all runoff is captured or treated before it flows into open waterways.

Infiltration Rates with Development



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

Impervious surfaces cause hotter temperatures and increased runoff. This parking lots at Parry McCluer High School (top) and downtown (bottom) could be retrofitted to add more trees, bioswales, and pervious surfaces that allow water to seep into the ground.

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.

The trees on this residential property provide stormwater management benefits for this home and the surrounding watershed.

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).

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, allowing children to learn to their best ability. People 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).

Trees Improve Walkability

Trees result in people walking more and walking farther. The cooler temperatures, aesthetics, and traffic slowing effect increase a community's walkability, which is a priority of the City of Buena Vista. 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).

Home buyers will pay more for homes with mature trees.

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

Trees and green space downtown encourage people to walk and shop.

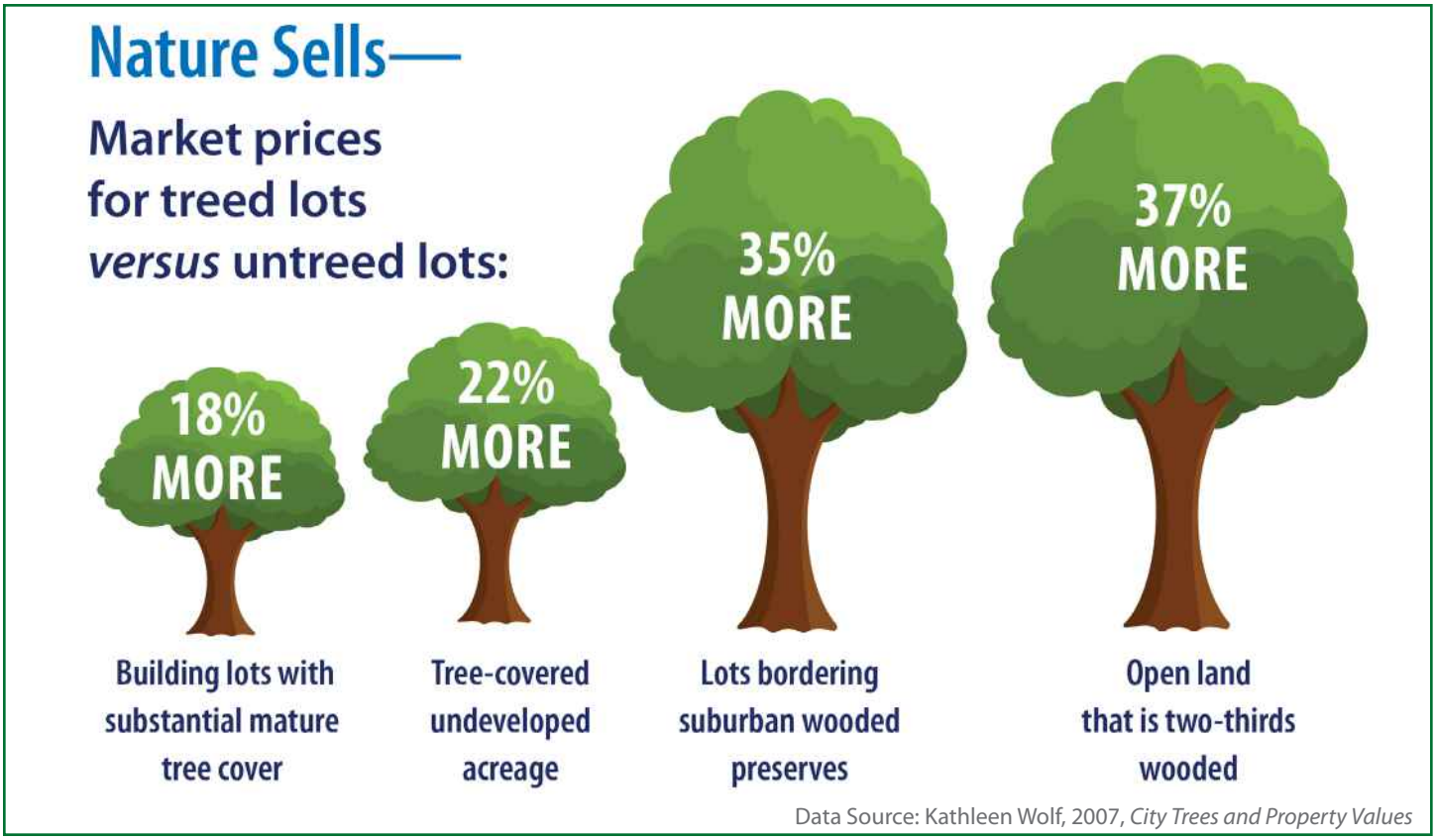
Trees Increase Property Values

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.*]

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 in property tax revenues, more tourism revenue, rejuvenation of business districts, and new businesses attracted to the City. 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.

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



Data Source: Kathleen Wolf, 2007, *City Trees and Property Values*

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. These 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 Comprehensive Plan updates.

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 Buena Vista. The land cover map was created at 1 meter resolution using NAIP imagery, from October 13, 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. The tree canopy was mapped at 97.7% accuracy, with an overall land cover accuracy of 96.1%.

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, soils conditioned, and then used to plant new trees. For example, a parking lot could

[1] LiDAR is a remote sensing method that uses light in the form of 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.

be redesigned in order to accommodate more tree canopy to absorb and clean stormwater runoff and provide shade for cars.

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, 12% of the City's land area, or 502 acres, could be planted with additional trees. The GIC recommends that no more than half the available PPA, 6% or 251 acres, is realistic to plant, since many other uses, such as vegetable gardens or swimming pools, require full sun.

Potential Planting Spots

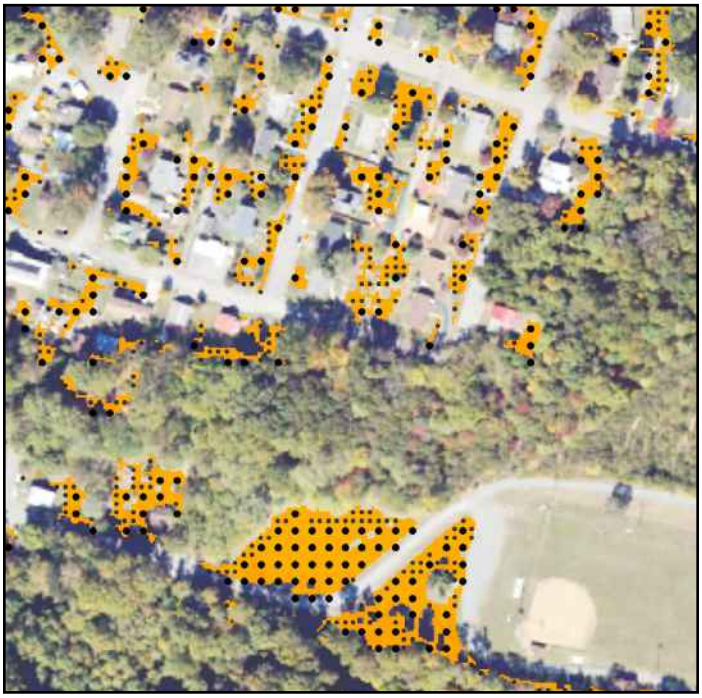
Potential Planting Spots (PPS) are created from the PPA. A GIS modeling process is applied to select spots where a tree can be planted, depending on the desired mature size. For this analysis, expected canopy spreads of 20ft. and 40ft. diameter for individual mature trees were used, with priority given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

NAIP Aerial Image, 2023

Potential Planting Area (PPA)



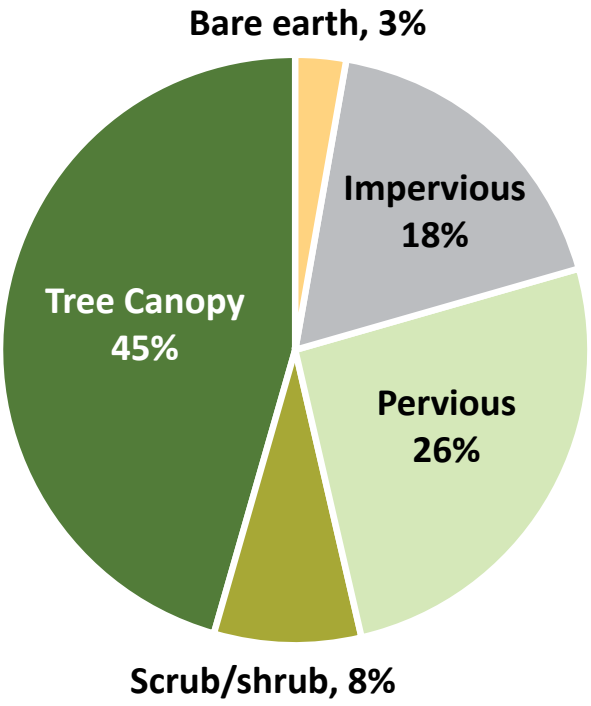
Potential Planting Spots (PPS)

Potential Canopy Area (PCA)

There are many places in the City where new trees can be planted,
such as at Parry McCluer High School (left) and Enderly Heights Elementary School (right).

Canopy Analysis Maps and Findings

One mature tree can absorb thousands of gallons of water per year.



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
- City-owned Land
- Streets

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

The following five pages contain Buena Vista's Tree Canopy Analysis Maps.

City Land Cover

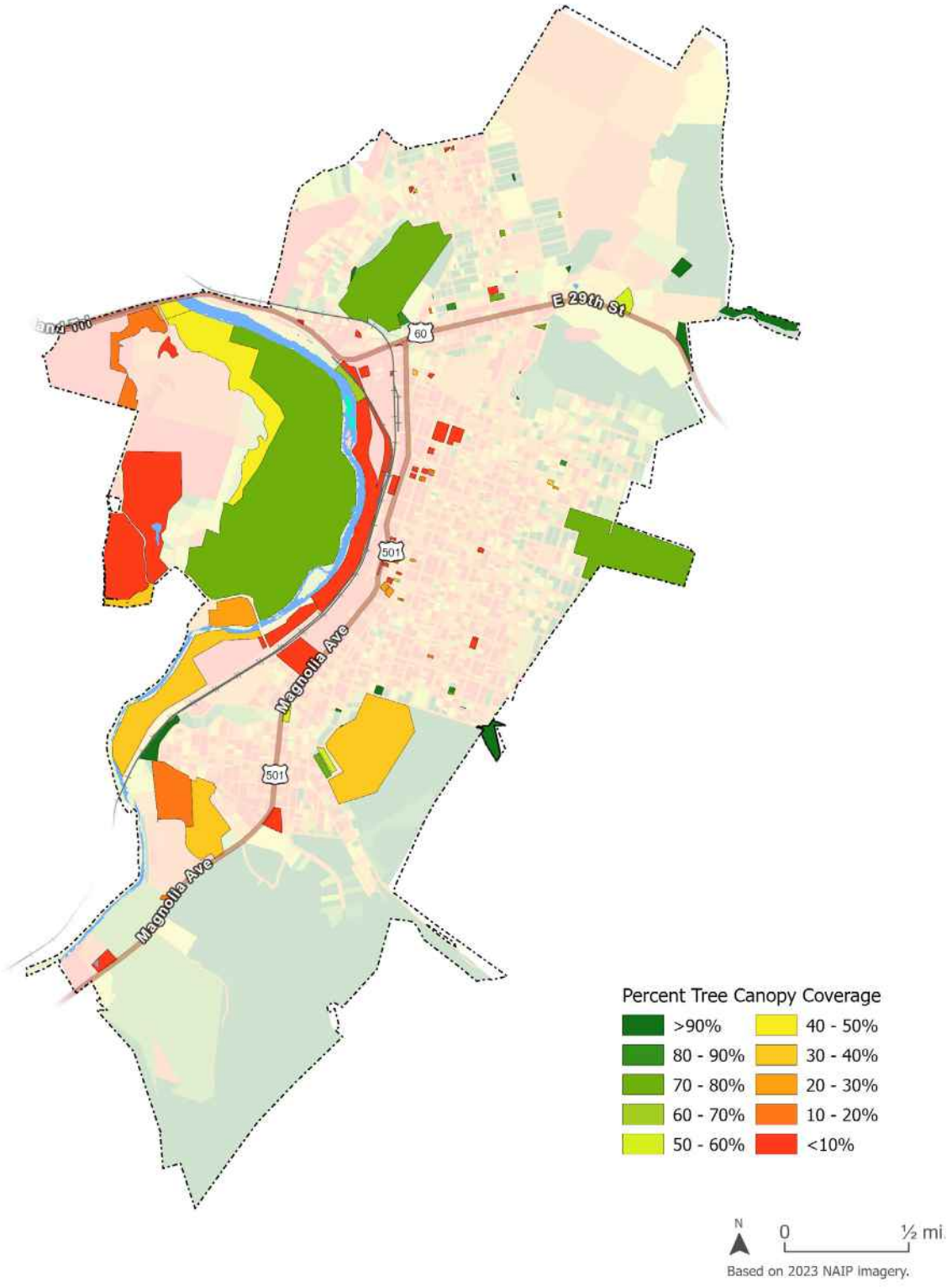
GIC classified 9 land cover types for the City of Buena Vista from 2023 NAIP aerial imagery.

City 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.

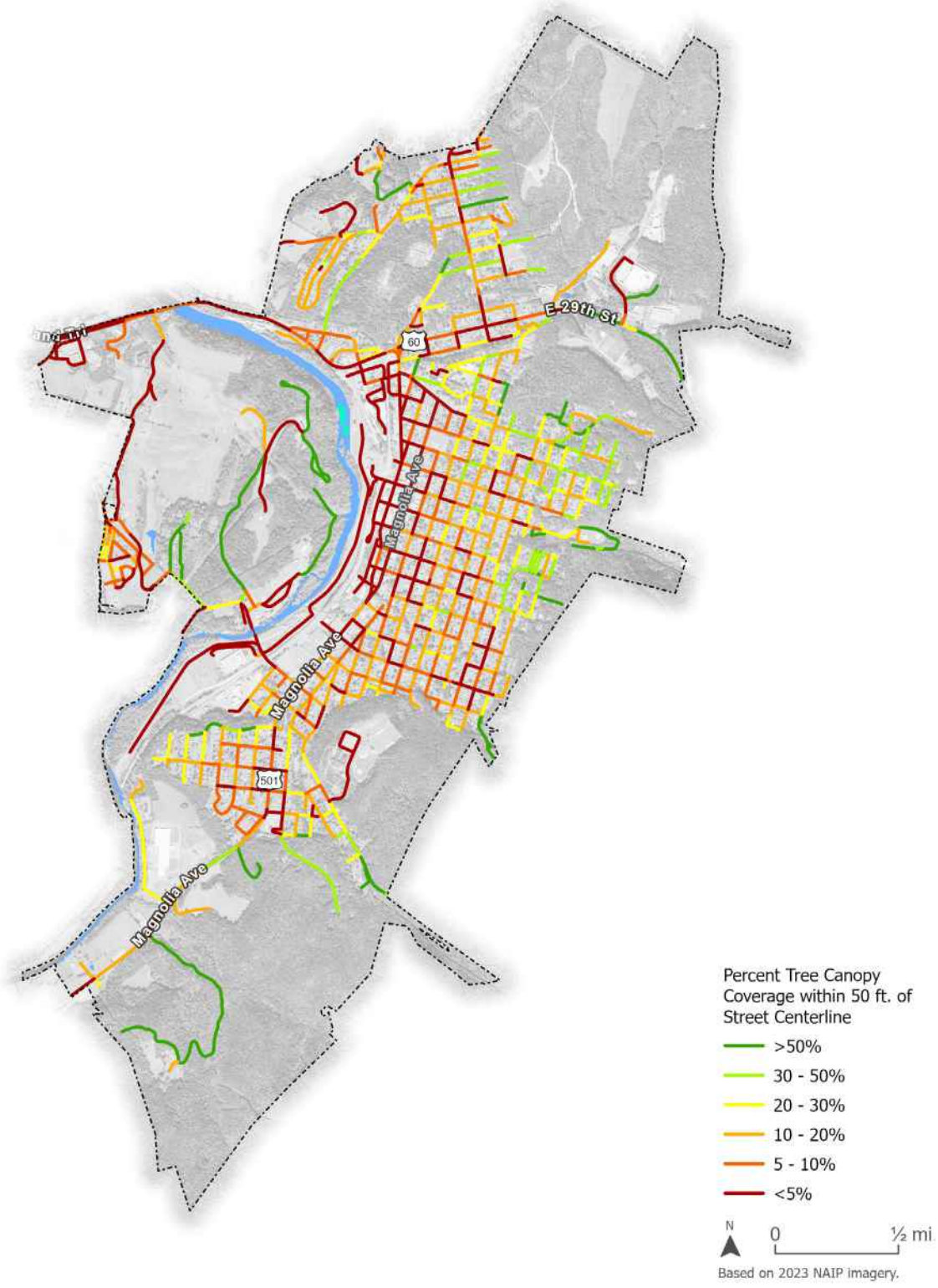
City-owned Land

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 tree canopy on public parcels in Buena Vista. To successfully meet the City's tree canopy goal, saving existing trees and planting trees must occur on both public and private land.



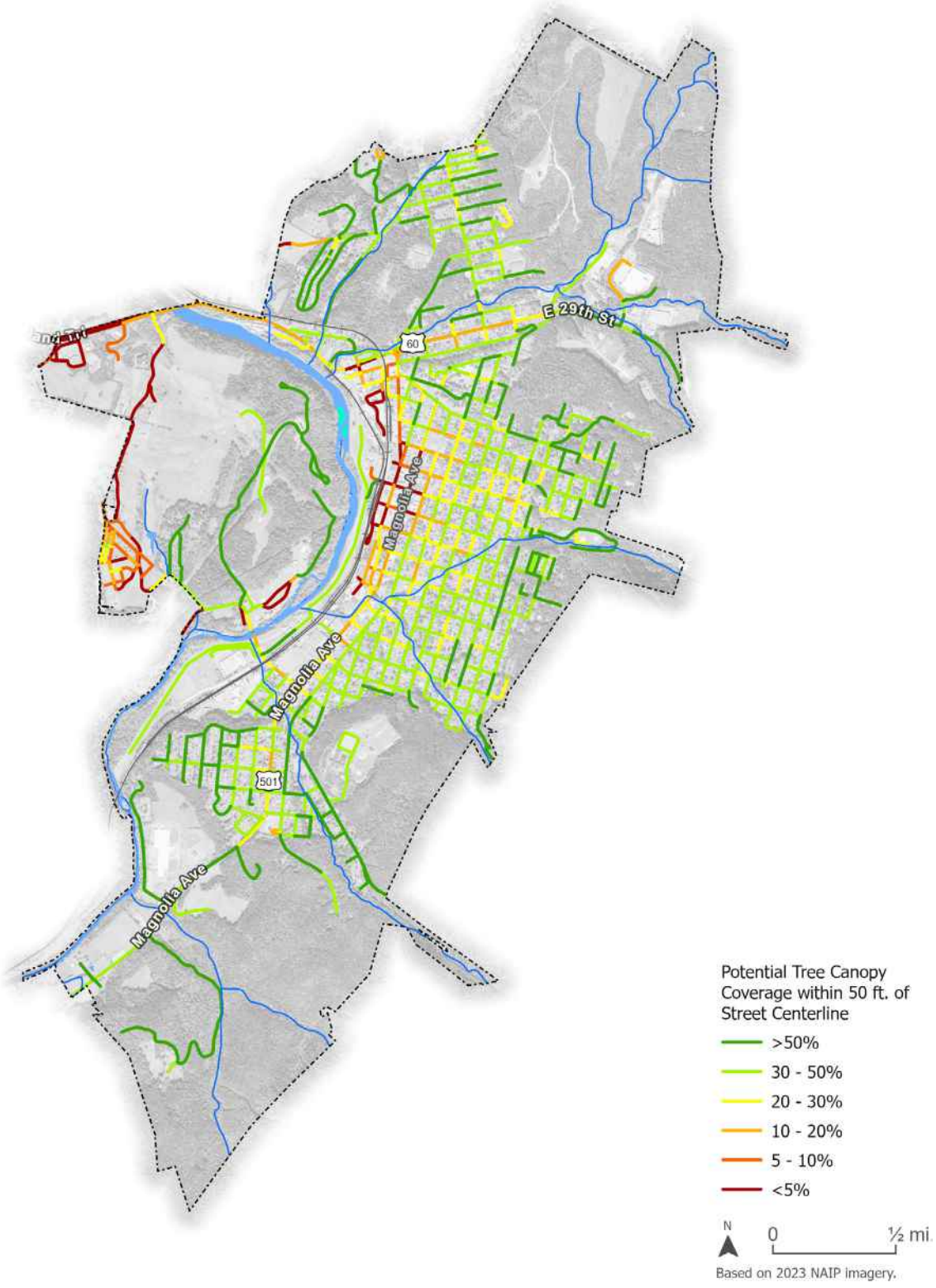
Existing Tree Canopy Coverage Along Streets

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 objectives, 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.



Calculating Environmental Benefits

Stormwater Uptake

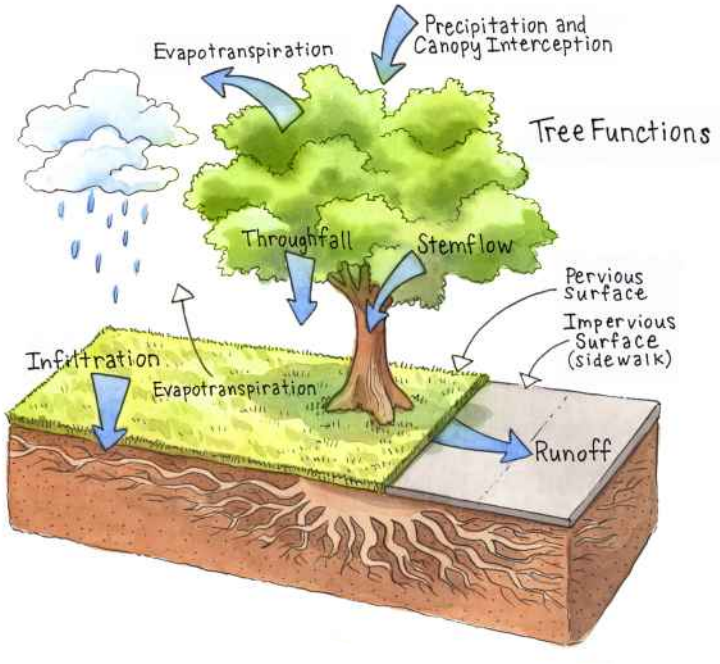
Trees and forests are the best land cover for taking up urban stormwater and are recognized as such by forestry scientists and civil engineers (Kuehler 2017, 2016). Tree canopy stormwater interception varies from 100% at the beginning of a rainfall event to about 3% at maximum rain intensity (Xiao et 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) 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 (4.34 inches), trees take up 15.7 million gallons of runoff, or about 85 Olympic swimming pools of water. Buena Vista's trees capture:

- **13,309 nitrogen lbs. annually**
- **1,104 phosphorus lbs. annually**
- **693 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.

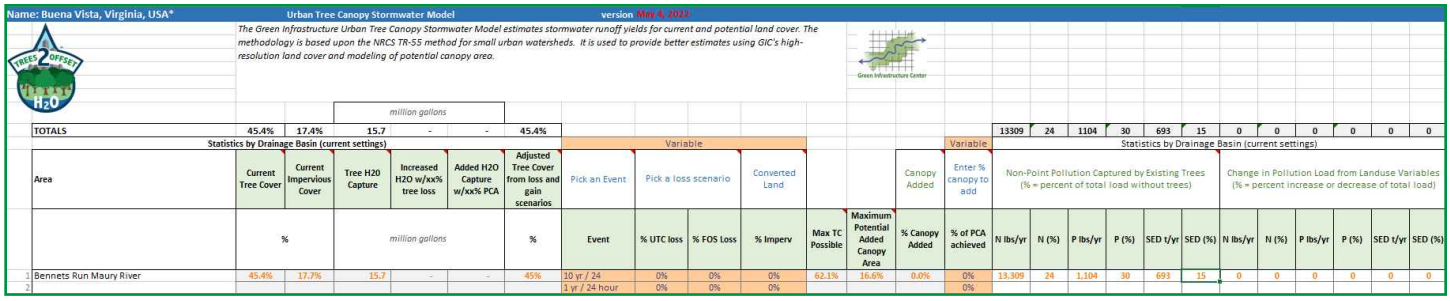


Lawn trees in a park soak up more stormwater than trees over pavement.

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 forests 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.



Name: Buena Vista, Virginia, USA* | Urban Tree Canopy Stormwater Model | version May 4, 2022

The Green Infrastructure Urban Tree Canopy Stormwater Model estimates stormwater runoff yields for current and potential land cover. The methodology is based upon the NRCS TR-55 method for small urban watersheds. It is used to provide better estimates using GIC's high-resolution land cover and modeling of potential canopy area.

			million gallons																															
TOTALS	45.4%	17.4%	15.7	-	-	45.4%														13309	24	1104	30	693	15	0	0	0	0	0	0			
Statistics by Drainage Basin (current settings)							Variable									Variable	Statistics by Drainage Basin (current settings)																	
Area	Current Tree Cover	Current Impervious Cover	Tree H20 Capture	Increased H20 w/xx% tree loss	Added H2O Capture w/xx% PCA	Adjusted Tree Cover from loss and gain scenarios	Pick an Event	Pick a loss scenario		Converted Land			Canopy Added	Enter % canopy to add	Non-Point Pollution Captured by Existing Trees (% = percent of total load without trees)						Change in Pollution Load from Landuse Variables (% = percent increase or decrease of total load)												
	%		million gallons			%	Event	% UTC loss	% FOS Loss	% Imperv	Max TC Possible	Maximum Potential Added Canopy Area	% Canopy Added	% of PCA achieved	N lbs/yr	N (%)	P lbs/yr	P (%)	SED t/yr	SED (%)	N lbs/yr	N (%)	P lbs/yr	P (%)	SED t/yr	SED (%)									
1 Bennets Run Maury River	45.4%	17.7%	15.7	-	-	45%	10 yr / 24	0%	0%	0%	62.1%	16.6%	0.0%	0%	13,309	24	1,104	30	693	15	0	0	0	0	0	0									
2							1 yr / 24 hour	0%	0%	0%				0%																					

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).

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.

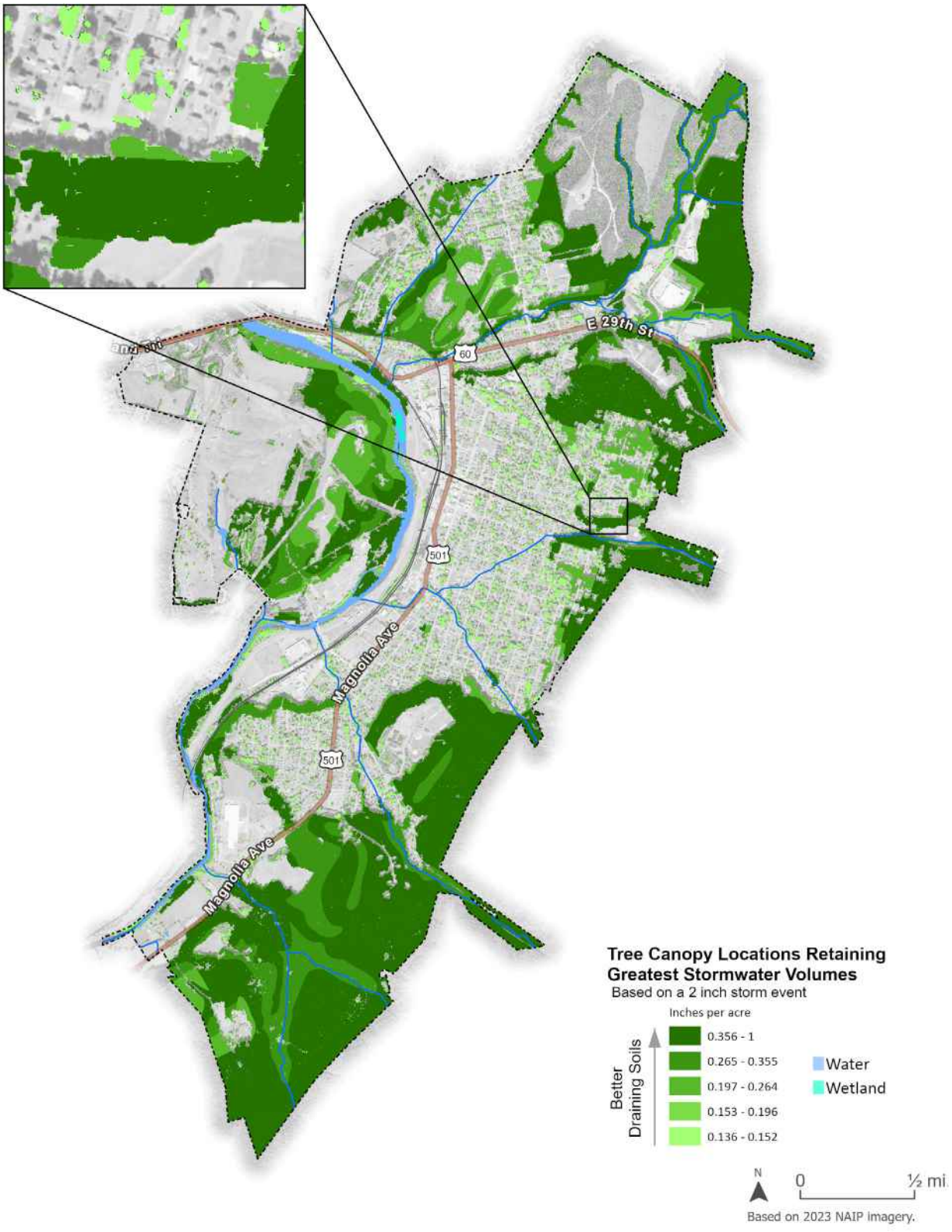
Trees mitigate climate change by storing carbon in their tissue and sequestering atmospheric carbon from carbon dioxide (CO_2) in new tree growth. Current trees in the City are storing 71,428 metric tons of carbon that will be released back into the atmosphere when these trees die. Trees also capture particulate matter, ground-level ozone (O_3), nitrogen dioxide, and sulfur dioxide from the air, resulting in better air quality and healthier neighborhoods.

Air pollution and greenhouse gases removed annually by trees in Buena Vista						
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)
450 lbs	2,898 lbs	30,094 lbs	7,597 lbs	1,331 lbs	998 lbs	5,012 MT

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

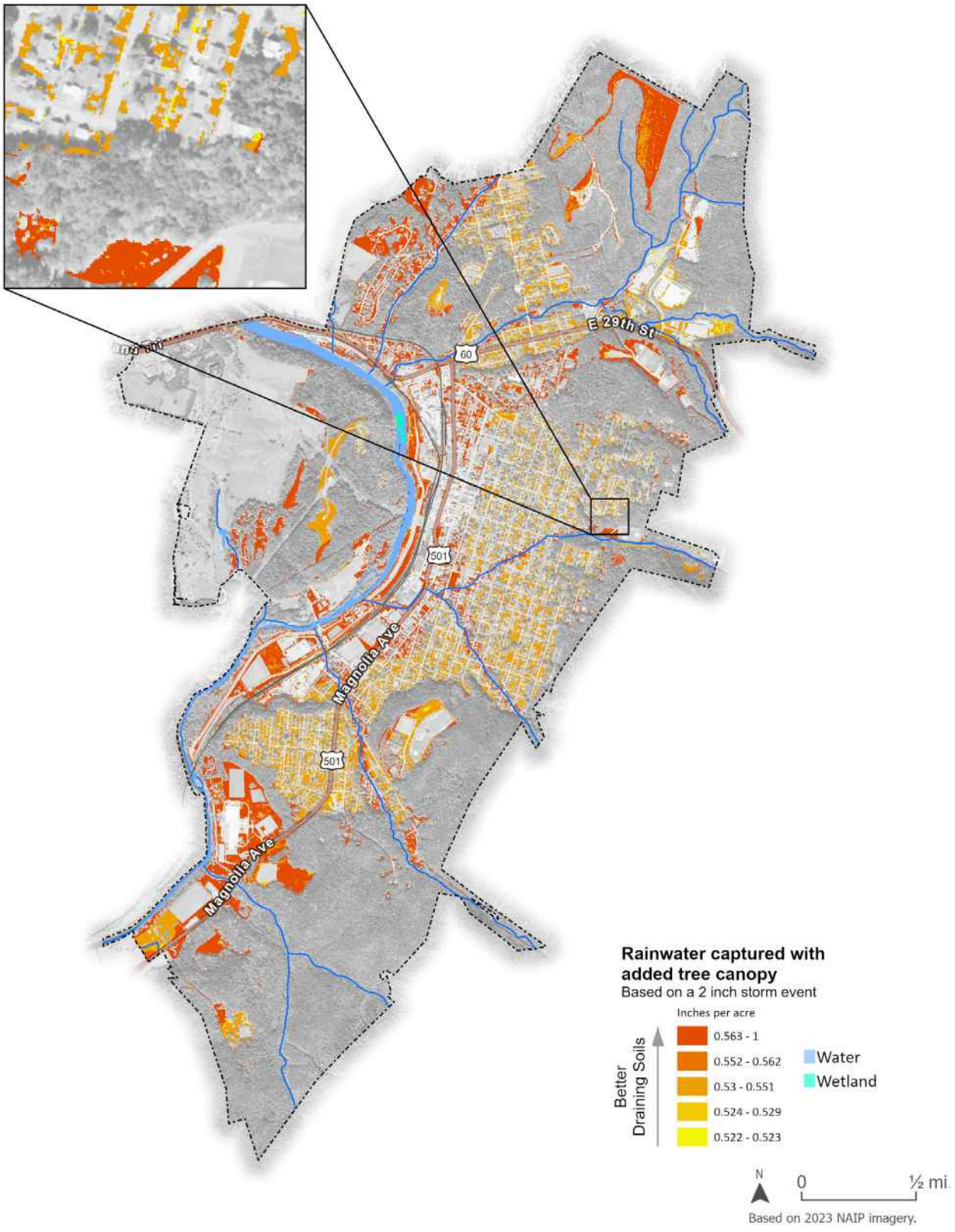
Best Tree Canopy to Save for Stormwater Infiltration

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).



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).

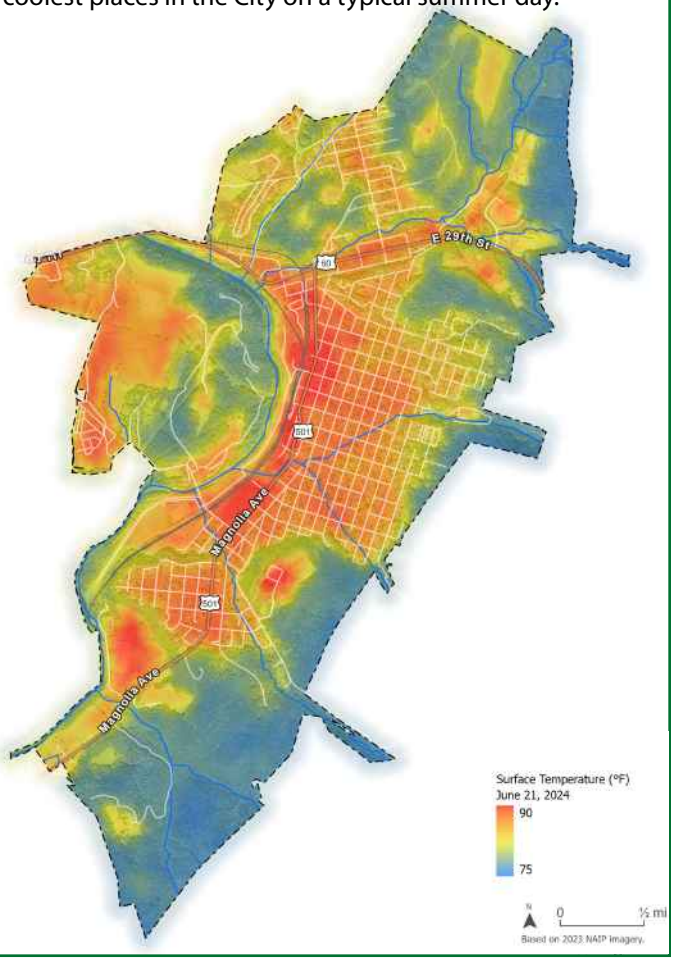


Urban Heat

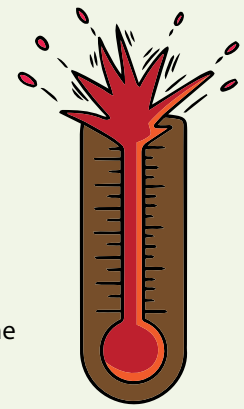
Urban heat is a growing concern as extreme heat continues to increase in Virginia with the changing climate. In Buena Vista, the number of days above 100˚F is projected to rise from the historic average of 5 per year to 70 per year by the year 2070. To reduce temperatures, the City can plant trees to cool the landscape.

Surface Temperature

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



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



This interactive online tool allows a user to put in their hometown and birthdate to see how their hometown 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-hometown.html

Extreme Heat

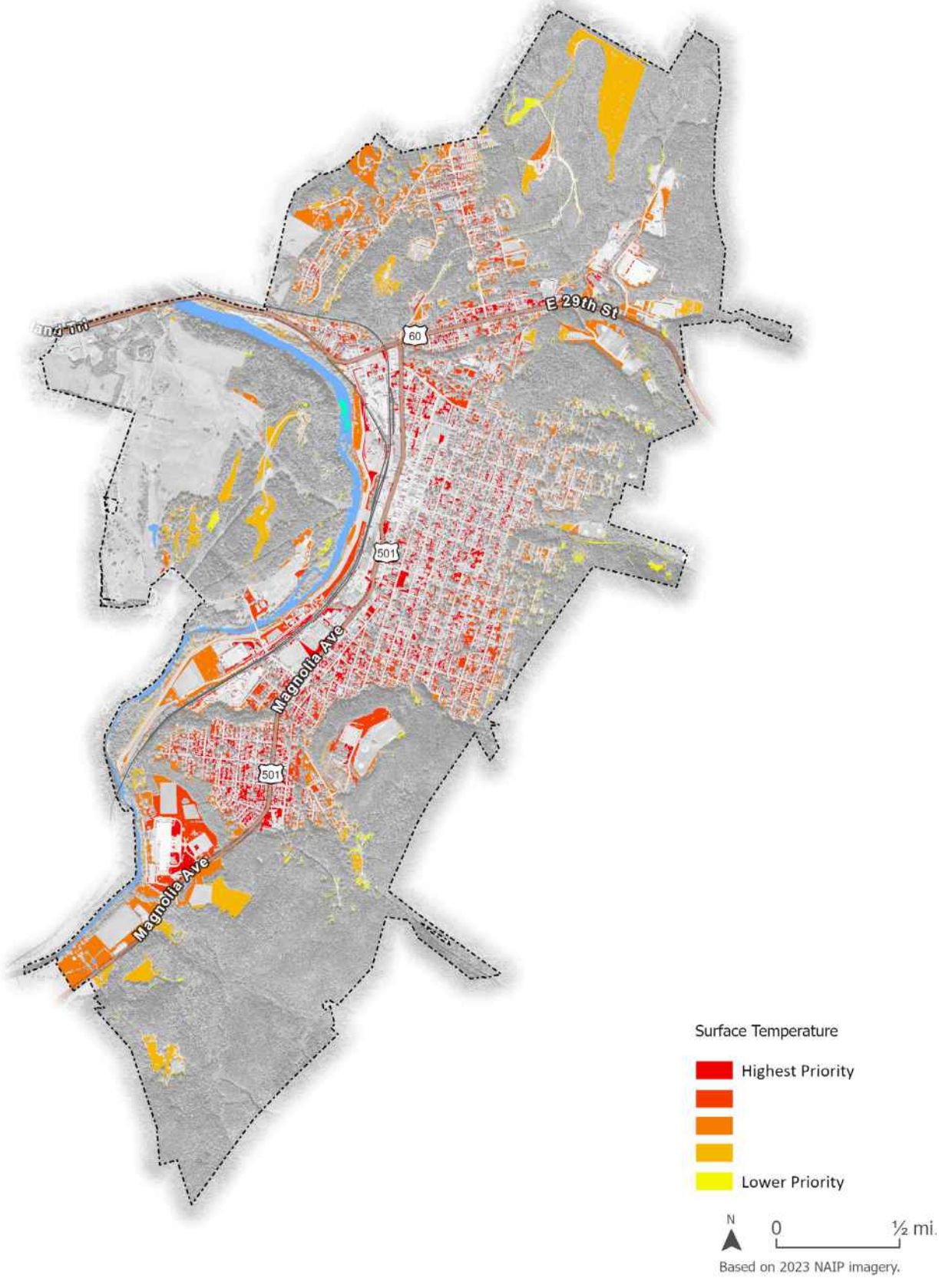
Where we are now	Where we are currently headed		If bold action is taken
Historically 1971-2000	Midcentury 2036-2065	Late Century 2070-2099	Extreme heat limited to
Average days per year temperatures over 100˚F			
5 days	**39** days	**70** days	**27** days

In this table "bold action" refers to reductions in greenhouse gases through energy conservation. It does not consider the effects of planting more trees. Source: Union of Concerned Scientists. *2019, Killer Heat Interactive Tool.*

The surface temperature map above shows downtown is the hottest area in the City. This is due to lots of pavement and buildings with little vegetation. Large trees would shade and cool this area creating an appealing area for walking and shopping.

Priority Tree Planting Locations by Temperature

This map uses surface temperature data to prioritize potential tree planting areas.



Planning and Engagement Process

The City of Buena Vista and the GIC partnered in a nine-month effort to create this Strategic Tree Canopy Plan. A committee made up of representatives from City staff and local community partners met to discuss priorities. They engaged in a series of six workshops from the spring of 2024 to the winter of 2025 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 Mountain Day Festival to share maps with the public. City leadership was briefed in a presentation to the City Council.

Maps beginning on page 15 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 20-25. 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.

The City and the GIC met with key community partner, Boxerwood and its BV Cool Trees Program to discuss current initiatives and opportunities to work together for a healthier, greener city. The BV Cool Trees program will continue to work in Buena Vista on education and planting initiatives to meet the canopy goal.

Summary of Community Findings

The City and GIC staff created an online survey to gather community input on trees. Twenty residents responded. The following is a summary of the findings.

Trees provide many benefits to Buena Vista. What do you feel are the most important reasons for increasing tree canopy in the city? (Choose top 3)

Beautify neighborhoods and downtown (14 votes, 70%)
Cool our streets and neighborhoods (10 votes, 50%)
Provide bird and wildlife habitat (10 votes, 50%)
Filter stormwater and reduce runoff pollution (7 votes, 35%)
Reduce air pollution (5 votes, 25%)
Improve community health (4 votes, 20%)
Capture stormwater and reduce flood risk (3 votes, 15%)
Capture and store greenhouse gases (2 votes, 10%)
Increase property values (2 votes, 10%)
Improve walkability (2 votes, 10%)
Reduce heating and cooling costs (1 votes, 5%)
Ensure equitable distribution of trees (0 votes, 0%)

Where do you think city government should prioritize tree plantings? (Choose top 3)

Parks (12 votes, 60%)
Along streets (11 votes, 55%)
Downtown (9 votes, 45%)
Parking lots (7 votes, 35%)
Municipal buildings (6 votes, 30%)
Private property (6 votes, 30%)
Schools (6 votes, 30%)
Neighborhoods (2 votes, 10%)
Other (1 votes, 5%)

Would you be willing to help increase tree canopy in the city by planting and caring for a tree on your property?

Yes (11 votes, 55%)
Maybe (3 votes, 15%)
No (6 votes, 30%)

Survey Question: **Where should we plant more trees in Buena Vista?**

Resident Response: **Everywhere. Trees cut out noise of traffic, provide better views and would keep the city from becoming a heat sink in summer. I'm all in on this project.**

Goal and Implementation Strategies

The City of Buena Vista's goal is to maintain tree canopy coverage at 45% over the next 10 years.

Newly planted trees in the new Magnolia Square help meet the goal of planting 20 trees annually on City-owned land.

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. Buena Vista is no exception. Fortunately, this loss can be reversed though active planning to maintain tree canopy at current levels, and this plan outlines strategies to do so.

The City of Buena Vista's goal is to maintain City tree canopy coverage at 45% over the next 10 years.

Achieving this goal requires a coordinated effort by both the City and private property owners. Since city-owned land makes up about 20% of the total land area, the city is committed to replanting 20% of annual tree loss, while the remaining 80% will be replanted on private property by residents, businesses, and developers. Estimating annual tree loss at 100 trees, the city will plant 20 trees per year on city owned land and will engage with private landowners and businesses through outreach, education, and tree giveaways with Boxerwood to encourage the planting of 80 trees per year on private property.

The tree canopy goal and objectives for Buena Vista'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.

Goal: Maintain tree canopy cover at 45% over the next 10 years.

1 OBJECTIVE 1: Establish a Tree Board tasked with assisting the City in the implementation of this plan.

The Tree Board is intended to extend the capacity of the City to plant and care for trees.

- **Action 1.1**: Bring Tree Board and list of appointees before City Council for approval.
- **Action 1.2**: Establish activities and actions desired from the Tree Board to support tree care and planting in the city. Potential activities of board:
  - Organize volunteer plantings and maintenance activities
  - Identify future projects and design tree and landscape plantings
  - Maintain plantings
  - Advise staff and Council on tree issues
  - Provide community outreach and education regarding trees
  - Develop management plans and track progress toward canopy goal
  - Provide grant writing assistance

2 OBJECTIVE 2: Increase tree planting and tree care on city property.

- **Action 2.1**: Plant trees in City Right-of-Way (ROW). Potential locations include:
  - Downtown
  - 29th St Corridor
  - Bluebird Lane
- **Action 2.2**: Plant and maintain trees in City Parks. Potential locations include:
  - River Walk- work around Army Corps requirements
  - Laurel Park
  - Penny Park- maintain recently planted trees
- **Action 2.3**: Create a master plan and tree management plan for Glen Maury Park.
  - Plan for future uses to determine areas for new tree plantings
  - Create a written management plan for the park with annual tasks for tree care and forest management
  - Identify meadows that can be transitioned to forest or butterfly meadows
- **Action 2.4**: Plant trees on other city-owned land.
  - Plant trees on FEMA buyout lots for beautification and soaking up stormwater
  - Investigate Hall Springs site for a potential wetland garden
  - Incorporate trees into new City Hall landscape plan
  - Plant at Greenhill Cemetery along 10th Street and within the cemetery for beautification
  - Identify a location for a bioretention or rain garden on city-owned property and install with trees as a demonstration project
  - Work with schools to plant on school properties focusing on perimeter planting, planting close to buildings and near parking lots

3 OBJECTIVE 3: Encourage tree planting on private property.

- **Action 3.1**: Send mailers to the public, hang fliers at libraries, and create a page on the City website on the benefits of trees, why tree planting is important, how to get involved and how to request a tree. *(With Boxerwood/BV Cool Trees)*
- **Action 3.2**: Create a goal for tree planting on private property and engage the community in meeting the goal- encourage reporting to see if the goal is met.
- **Action 3.3**: Share information with the public on Natural Bridge Soil and Water Conservation District's VCAP program which offers cost share up to 80% for conservation landscaping, rain gardens and other projects on residential properties.
- **Action 3.4**: Reach out to churches and other institutions such as SVU in the City to partner on tree planting on their property. *(With Boxerwood/BV Cool Trees)*

Boxerwood's BV Cool Trees interns planting a tree. This program will help the city meet tree goals for the next 2 years.

4 OBJECTIVE 4:
Designate a line item in the City budget for public tree and landscape maintenance to be used for contractor services or staff hours.

Currently, Public Works does not have staff capacity or training for maintenance of landscape plantings and public trees.

5 OBJECTIVE 5:
Establish a tree ordinance protecting City trees, establishing a Tree Board, and requiring tree planting in new and redevelopment projects.

6 OBJECTIVE 6:
Identify important riparian buffers to restore in the upcoming Resilience Plan.

7 OBJECTIVE 7:
Work toward Tree City USA status.

This designation recognizes cities that make a commitment to urban forestry by allocating resources to tree care and planting and engaging the public. The following items are required for designation.

- Organize annual Arbor Day events. *(With Boxerwood/ BV Cool Trees)*
- Establish a Tree Board *(see Objective 1)* or designate a staff member to oversee tree care and planting
- Allocate funding for trees to meet $2 per capita annually ($13,300) Some existing activities related to leaf/debris removal, tree removal or maintenance, etc. will count toward this *(see Objective 4)*
- Adopt a public tree ordinance *(see Objective 5)*

Tree City USA Requirements:

TREE CITY USA®

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.

Conclusion

Buena Vista 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 the 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.

Virginia Department of Forestry

- Virginia Trees for Clean Water Grant Program
- Urban and Community Forestry Grant Program
- Emerald Ash Borer Cost-Share Program

For more information: https://dof.virginia.gov/urban-community-forestry/urban-forestry-community-assistance/financial-assistance-for-urban-and-community-forestry-projects

Virginia Environmental Endowment

- James River Water Quality Improvement Program
- Virginia Program
- Various grants, updated yearly

For more information: https://www.vee.org

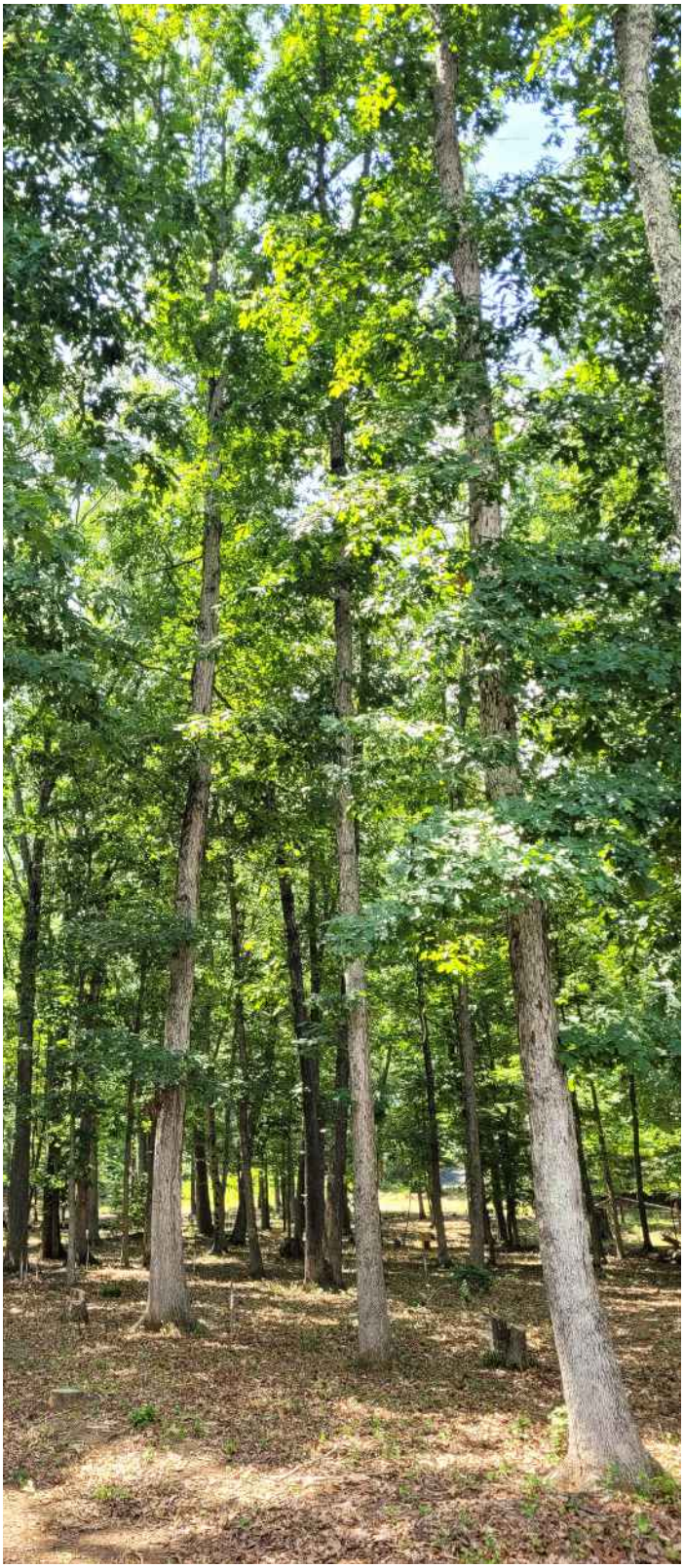
Dominion Energy Charitable Foundation

- A yearly fund awarded to environmental stewardship, educational, and community renewal projects.

https://www.dominionenergy.com/our-company/customers-and-community/charitable-foundation

Chesapeake Bay Trust

- Distributes various grants to improve the environmental health of the Chesapeake Bay. Sources of funds are dependent on specific grants. https://cbtrust.org/grants



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