



DUBLIN ROAD CORRIDOR STREET TREE INVENTORY SUMMARY REPORT



THE CITY OF
COLUMBUS
RECREATION AND PARKS

SPRING 2023

TREE INVENTORY EXECUTIVE SUMMARY



DUBLIN ROAD CORRIDOR COMMUNITY

PROJECT OVERVIEW

In 2022, the City of Columbus Recreation and Parks Department commissioned an update to the city's existing street tree inventory in the Dublin Road Corridor neighborhood. This project directly supports the implementation of the recently completed Columbus Urban Forestry Master Plan, which establishes a vision and future goals for Columbus' urban forest.

COMMUNITY OVERVIEW

Dublin Road Corridor is a largely non-residential community along the Scioto River directly south of Fifth by Northwest. It is comprised of office parks and is the location of the City of Columbus' Water, Sewer, and Power facility. The estimated population of Dublin Road Corridor is 143 residents. The neighborhood has 4 miles of city-maintained vehicle roads. Dublin Road Corridor has an area of 0.54 square miles, which is 0.24% of the area of Columbus. Current canopy cover within Dublin Road Corridor is estimated to be 14%.

VISION FOR THE URBAN FOREST

To prioritize, preserve, and grow the tree canopy in Columbus equitably across neighborhoods, to improve health and quality of life for all residents.

COLUMBUS' URBAN FOREST GOALS



148

Sites Inventoried

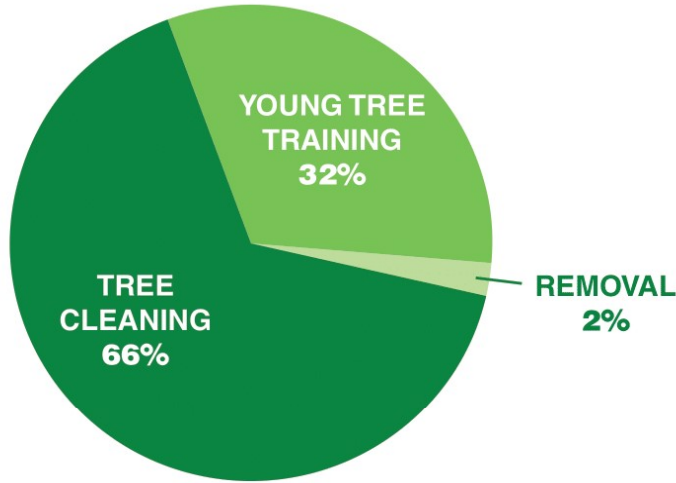
26	122	0
Trees	Planting Sites	Stumps



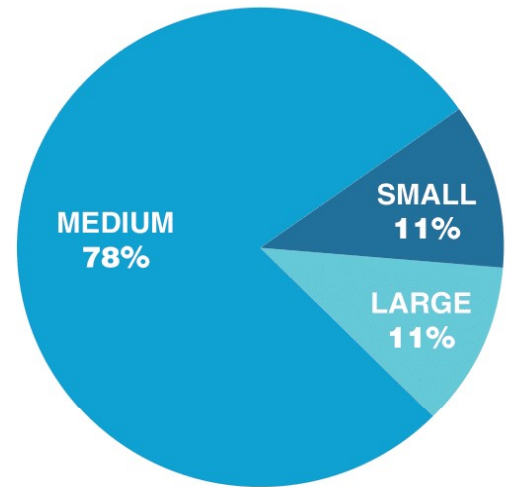
OVERALL CONDITION OF DUBLIN ROAD CORRIDOR'S INVENTORIED TREES: **GOOD**



TREES BY MAINTENANCE RECOMMENDATION



PLANTING SITES BY TREE SIZE



\$22,323

Estimated value of Dublin Road Corridor's inventoried street trees.

0.1 metric tons

Annual CO₂ captured

3 metric tons

Lifetime carbon storage

3,003 gallons

Annual stormwater runoff intercepted



CREATING EQUITABLE CANOPY COVER

Implementation of the following action steps will significantly increase canopy cover over time, provide greater value and more benefits to Dublin Road Corridor's residents, and help the city realize its vision and achieve its goals for the urban forest.

THE WAY FORWARD: ACTION STEPS

1. Preserve and maintain existing canopy.
2. Prioritize planting of large- and medium-size planting sites.
3. Develop neighborhood tree planting initiatives and community outreach focused on planting trees on private property.
4. Explore retrofitting existing street infrastructure and updating design standards to expand and improve available tree growing spaces.

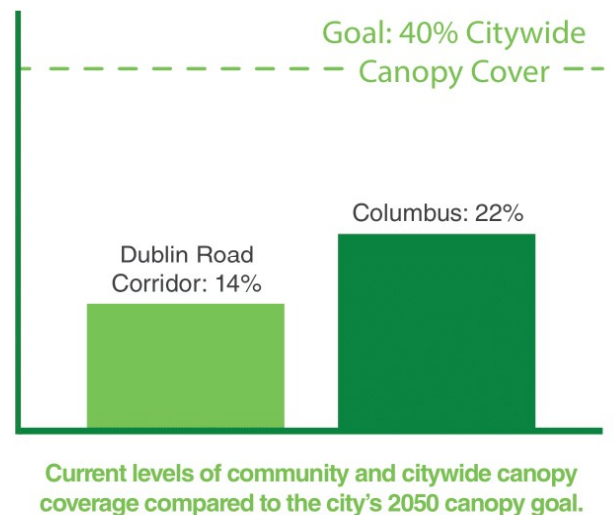


TABLE OF CONTENTS

Executive Summary i

Section 1: Structure, Composition, and Maintenance 4

Section 2: Tree Benefits 10

Section 3: Future Considerations 11

FIGURES

1. Quantity of inventoried sites by site type 4

2. Species distribution of inventoried trees 6

3. Genus distribution of inventoried trees 6

4. Condition of inventoried trees 7

5. Distribution of relative tree age by diameter size class 8

6. Primary maintenance recommendations for 26 trees in the Dublin Road Corridor neighborhood 9

7. Vacant planting sites by size 11

MAPS

1. Sites inventoried during the 2022 Dublin Road Corridor community street tree inventory 5

TABLES

1. Tree age by growing size at maturity and diameter at breast height (DBH) 8

2. Estimated benefits provided by Dublin Road Corridor’s street trees 10



Notice of Disclaimer: Inventory data provided by Davey Resource Group, Inc. “DRG” are based on visual recording at the time of inspection. Visual records do not include individual testing or analysis, nor do they include aerial or subterranean inspection. DRG is not responsible for the discovery or identification of hidden or otherwise non-observable hazards. Records may not remain accurate after inspection due to the variable deterioration of inventoried material. DRG provides no warranty with respect to the fitness of the urban forest for any use or purpose whatsoever. Clients may choose to accept or disregard DRG’s recommendations or to seek additional advice. Important: know and understand that visual inspection is confined to the designated subject tree(s) and that the inspections for this project are performed in the interest of facts of the tree(s) without prejudice to or for any other service or any interested party.

SECTION 1: STRUCTURE, COMPOSITION, AND MAINTENANCE

The City of Columbus Recreation and Parks Department (CRPD) designated the street rights-of-way (ROW) within the Dublin Road Corridor community as an area of interest for an on-going update to the city's existing GIS-based public tree inventory. The Dublin Road Corridor community street tree inventory supports the *Columbus Urban Forestry Master Plan* (CUFMP).

148 SITES INVENTORIED

In 2022, DRG arborists performed field data collection and catalogued new data on potential viable planting sites, existing trees, and tree stumps located within the ROW of the Dublin Road Corridor community (Figure 1 and Map 1).

Of the 148 total inventoried sites:

18% = Existing street trees

82% = Potential planting sites

0% = Existing stumps

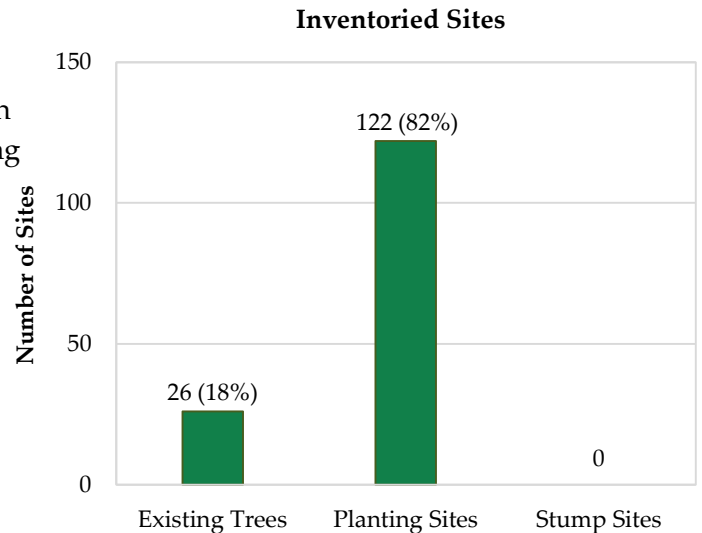


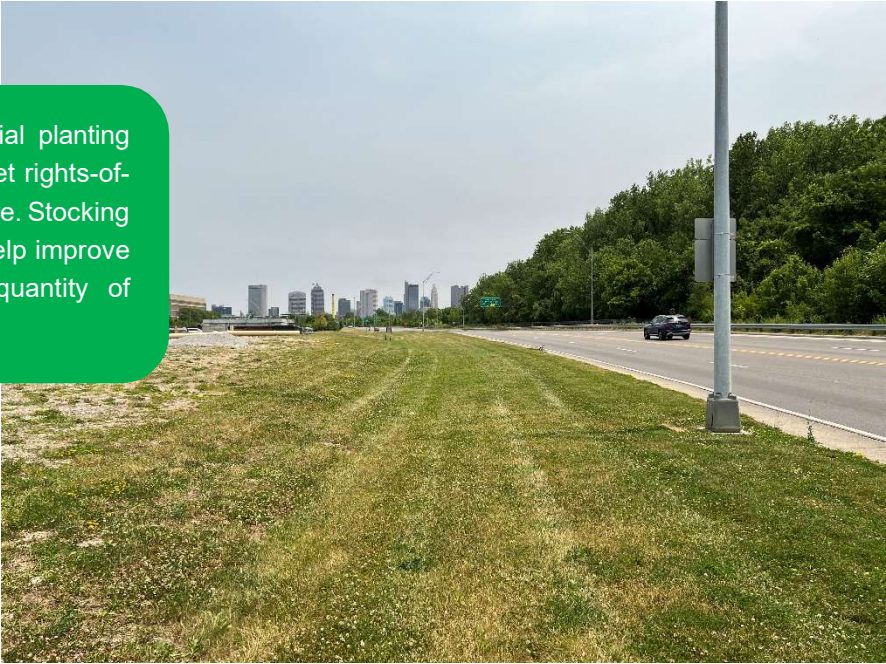
Figure 1. Quantity of inventoried sites by site type.

Available planting spaces provide an opportunity for canopy growth

Stocking level is a forestry term used to report the ratio of existing street trees to the total number of suitable tree locations within the street ROW, which includes trees, stumps, and vacant planting locations.

The stocking level of the Dublin Road Corridor right-of-way is currently 18%. This is very low relative to the available planting spaces. By planting in the available locations, CRPD can make an immediate difference in the canopy growth potential of the neighborhood. Additionally, partnerships with private landowners in Dublin Road Corridor could be explored for expanded planting outside of the right of way.

DRG arborists identified vacant potential planting sites within Dublin Road Corridor's street rights-of-way (ROW), such as the one pictured here. Stocking the ROW with new tree plantings will help improve canopy coverage and increase the quantity of benefits trees provide to the community.



Dublin Road Corridor 2022 Street Tree Inventory



Map 1. Approximate locations of sites inventoried during the 2022 Dublin Road Corridor community street tree inventory.

IMPROVE TREE POPULATION DIVERSITY

Urban forest resiliency is positively correlated with tree population diversity; greater diversity helps reduce exposure to harmful pests and disease which can target individual tree species, groups of species, or even entire tree genera.

Species and genus diversity distributions offer a critical measure of a tree population’s resiliency to such attacks and help managers to identify and remedy potential areas of overexposure.

When assessing tree population diversity, it is widely accepted that **no more than 10% of an urban tree population should be composed of a single species and no greater than 20% from a single genus.**

Species Distribution is Skewed

A total of 8 unique tree species were catalogued in the right-of-way (Figure 2). Although six species of trees exceeded the 10% threshold, the population of right-of-way trees is extremely small and thus does not provide a representative example that can guide management recommendations. Future tree planting should take citywide species diversity recommendations under consideration.

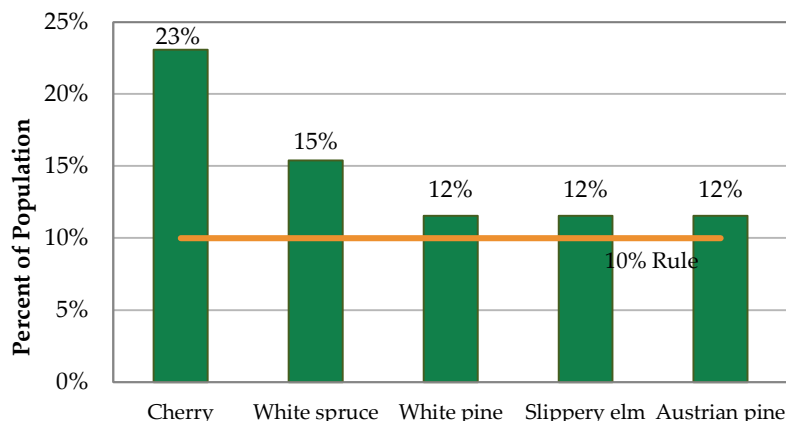


Figure 2. Species distribution of inventoried trees.

Genus Distribution is Skewed

Dublin Road Corridor has 6 unique tree genera, or groups of tree species that are closely related (Figure 3).

The genera *Pinus* and *Prunus*, which are composed of pine trees and cherries/plums respectively, account for 27% and 23% of the entire inventoried population—slightly above the suggested threshold of 20%.

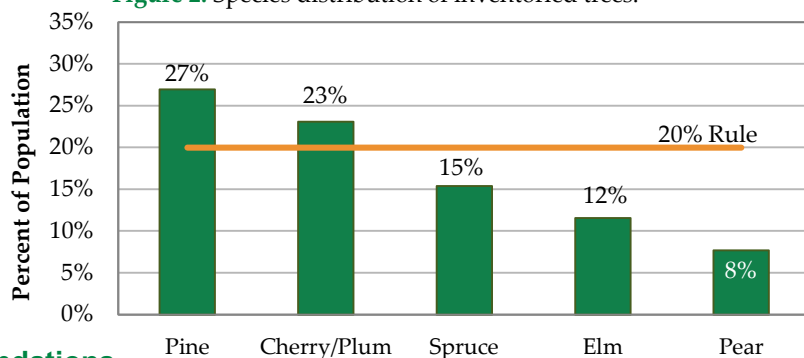


Figure 3. Genus distribution of inventoried trees.

A Small Population Skews Diversity Recommendations

Because the population of inventoried trees is so small, species and genus diversity statistics are highly impacted by each individual tree. As more trees are planted and the population grows, a more realistic representation of the community’s urban forest will emerge.

Future tree plantings in the Dublin Road Corridor neighborhood should focus on planting the largest tree appropriate for each planting space. Using citywide diversity data to guide species selection will help ensure that Dublin Road Corridor’s community forest is resilient to pests and disease.

Urban forest resiliency should be a top priority to planting selection; this means selecting hardy trees that add diversity. Forests that are not diverse are susceptible to pest and disease, such as the insect and fungal pests that target maples pictured to the right.



Above: Asian Longhorned Beetle. Photo: Jeff Tessner, DRG.

Left: Sugar maple with Verticillium wilt. Photo: Jerry Weiland, USDA-ARS.

OVERALL TREE CONDITION IS GOOD

The condition of each inventoried tree was evaluated and rated as good, fair, poor, or dead. Several factors affecting condition were considered for each tree, including root characteristics, branch structure, trunk, canopy, foliage condition, and the presence of pests.

The general health of the inventoried tree population is characterized by the median average condition rating. Overall, **Dublin Road Corridor’s street trees are in good condition** (Figure 4).

Routine Inspections Are Key

Proactive monitoring helps identify, prevent, and mitigate concerns. Routine tree inspections are necessary to monitor for changes in tree condition, the presence of pests and/or disease, or the worsening of existing defects – particularly among trees rated in poor condition.

Poor condition ratings are generally due to visible signs of decline and stress, such as decay, dead limbs, or discolored foliage. If retained, these trees will likely require corrective pruning and intensive plant health care to improve their vigor. Dead trees and trees with defects that cannot be remedied should be removed as soon as possible.

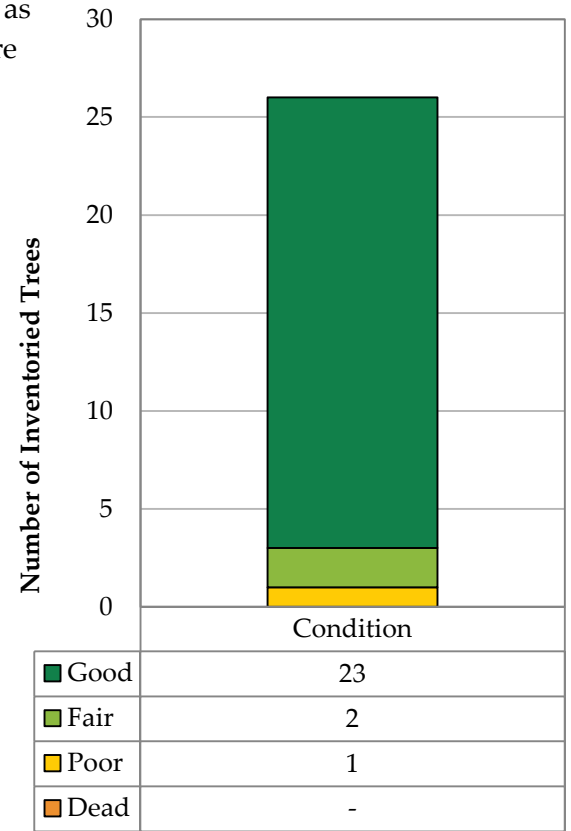


Figure 4. Condition of inventoried trees.



Routine inspection helps keep trees healthy, like the tree pictured here in the Dublin Road Corridor Community.

TREE DIAMETER-AGE DISTRIBUTION

Understanding the relative age of a tree population can help planners align future management strategies with current policy goals. To determine relative tree age, DRG first categorized Dublin Road Corridor’s inventoried tree population by small- and large-growing trees and then assigned each tree to an age grouping based on the tree diameter measured at breast height (DBH) as outline in Table 1.¹

Table 1. Tree age by growing size at maturity and diameter at breast height (DBH).

Relative Tree Age	Large-Growing		Small-Growing		Combined
	DBH	Quantity	DBH	Quantity	Quantity
Young	0–8"	14	0–4"	0	14
Established	9–17"	4	5–8"	2	6
Maturing	18–24"	0	9–12"	6	6
Mature	> 24"	0	>12"	0	0

The relative age distribution of Dublin Road Corridor’s inventoried tree population was then compared to an ideal distribution for an expanding urban forest, which suggests the tree population composition be equivalent to 40% young trees, 30% establishing, 20% maturing, and 10% mature trees (Figure 5).

A Small Tree Population Skews Age Distribution

All of the age classes of trees inventoried in the Dublin Road Corridor neighborhood are skewed from the ideal thresholds. 54% of trees are young, 23% established, and 23% maturing, with no mature trees inventoried. As more trees are planted and existing trees continue to grow and mature, these distributions will begin to stabilize.

All of the inventoried trees in the maturing age class are small-growing trees, which means that the maturing population of trees does not provide as many benefits as a mature population of large trees would provide. All of the young trees inventoried are large-growing trees. As CRPD explores planting opportunities within Dublin Road Corridor, care should be taken to continue planting the largest tree appropriate for the space .

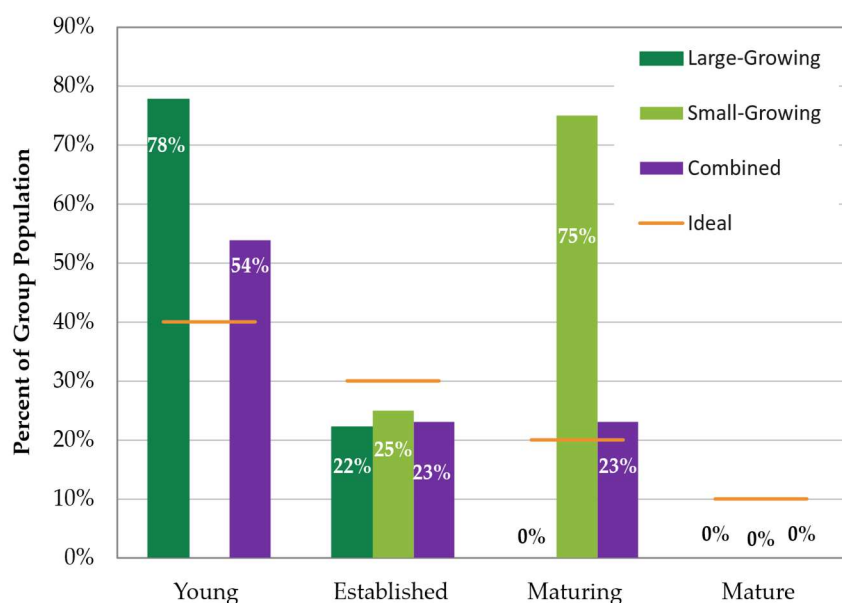


Figure 5. Distribution of relative tree age by diameter size class

¹ Tree size is only a rough approximation of tree age; tree size alone is not a definitive or appropriate measure of tree age. In the urban environment in particular, numerous factors play a role in determining tree size, including the availability of water, soil, and sunlight, proper tree care and planting techniques, the presence of pests and pathogens, etc.

TREE MAINTENANCE RECOMMENDATIONS

During the inventory, DRG arborists assigned a primary recommended maintenance activity to each of the 26 inventoried trees (Figure 6).

City managers generally prioritize maintenance activities by risk. For example, a large dead tree by a busy intersection should be removed before a small dead tree at the end of a little-used secondary street.

PRIMARY MAINTENANCE CATEGORIES

Tree Cleaning = 24 Trees

Tree cleaning describes pruning to remove dead, dying, broken, decayed, and/or crossing limbs. Trees in this category are recommended for inclusion in a regularly scheduled, routine maintenance program. Over time, routine pruning minimizes the occurrence of reactive maintenance.

Tree Removal = 1 Trees

Within Dublin Road Corridor, one tree is designated for removal. City Forestry only removes trees that are hazardous: either dead, dying, or dangerous to public safety.

Young Tree Training = 1 Trees

Younger trees can have branch structures that lead to potential problems as the tree ages. These trees should be pruned to train future growth patterns and correct or eliminate weak, interfering, or objectionable branches to minimize future maintenance requirements.

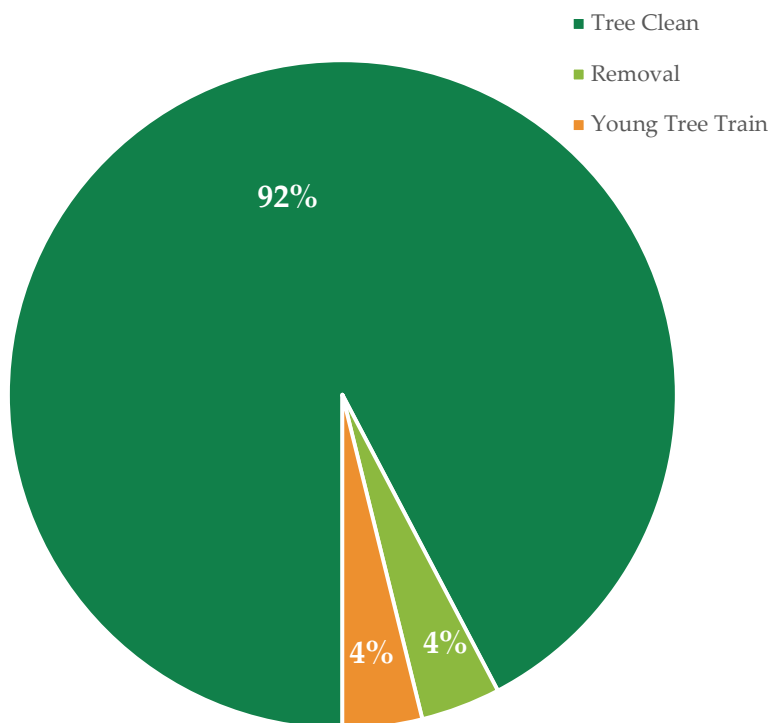


Figure 6. Primary maintenance recommendations for 26 trees in the Dublin Road Corridor neighborhood, by type.

SECTION 2: TREE BENEFITS

STRUCTURAL VALUE OF DUBLIN ROAD CORRIDOR'S STREET TREES: \$22,323

Trees are critical to public health and contribute significantly to quality of life for every community resident. In addition to improving air quality, water quality, and alleviating heat stress, trees provide significant social benefits such as reducing mental stress, encouraging greater neighborhood-level involvement, and fulfilling spiritual and aesthetic needs. **Structural value calculates the total cost it takes to replace trees, meaning that all of the street trees in Dublin Road Corridor are estimated at \$22,323.**

Because of the significant value of these benefits, cities across the country now recognize trees are critical infrastructure. In fact, they are the only type of infrastructure that increases in value over time and have been proven to pay for themselves. Urban trees in the Midwest consistently provide benefits value three times more than the cost to maintain them.²

The street trees inventoried within the Dublin Road Corridor community currently provide an ecosystem value of \$635 through air filtration, water quality improvements, and carbon storage—and those are just the benefits quantified by this analysis. Trees also boost property values, reduce energy costs, lower crime rates, and help create more successful business districts.³

Table 2. Estimated benefits provided by Dublin Road Corridor's street trees

Category	Value
Ecosystem Services	\$634.71
Structural Value	\$22,323.19
Combined Value	\$22,957.90
Per Tree Average	\$883.00

ECOSYSTEM SERVICES

Annual Carbon Captured – 287 pounds

As the primary greenhouse gas driving climate change, carbon dioxide (CO₂) impacts people, property, and the environment. Trees are carbon sinks—constantly absorbing CO₂ from the atmosphere and storing it within tree tissue. Over the course of their lifetime, Dublin Road Corridor's inventoried trees have captured over 3 metric tons of carbon. Using trees to sequester CO₂ is a key part of the *Columbus Climate Adaptation Plan's* goal to make the city more resilient.

Annual Air Pollution Removed – 22 pounds

Ozone and particulates can especially aggravate existing respiratory conditions (like asthma) and create long-term chronic health problems. Trees absorb gaseous pollutants such as ozone during respiration and intercept particulate pollutants, such as PM_{2.5}, from entering the atmosphere by trapping them on plant surfaces.

Annual Rainwater Intercepted – 3,003 gallons

As cities grow, land that naturally absorbs rainwater (i.e., lawns, parks, fields) tends to be replaced by hard surfaces that cause rain to runoff (i.e., roads, buildings, parking lots). Rainwater flowing over these hard surfaces accumulates pollutants, and the contaminated stormwater flows into overloaded sewers, ultimately reaching the local lakes and streams. Polluted water is a major cause of human health issues and degrades the local ecology. Tree leaves intercept rainwater as it falls, which slows the rate at which stormwater enters sewer systems.

Structural Value – \$22,323

Structural value represents the cost to replace a given tree with an identical one. Structural value increases over time as more trees are planted and existing trees mature. The total value of the Dublin Road Corridor community forest will grow considerably in future years as more trees are planted, existing trees are maintained and become healthier, and the city works toward achieving the goals of the *Columbus Urban Forestry Master Plan*.

² Peper, Paula J.; McPherson, E. Gregory; Simpson, James R.; Vargas, Kelaine E.; Xiao, Qingfu. 2009. Lower Midwest community tree guide: benefits, costs, and strategic planting. Gen. Tech. Rep. PSW-GTR-219. Albany, CA: U.S. Forest Service, Pacific Southwest Research Station. 115 p.

³ See the *Columbus Urban Forestry Master Plan* for in-depth discussion on tree benefits and their impact on the city's residents.

SECTION 3: FUTURE CONSIDERATIONS

Every neighborhood deserves access to the benefits trees provide. With an estimated 14% canopy cover in Dublin Road Corridor, retaining and growing canopy cover in the neighborhood is crucial for achieving citywide urban tree canopy goals. Realizing the vision and achieving the goals of the *Columbus Urban Forestry Master Plan* will take planned strategic effort guided, in part, by data analysis and application.

122 POTENTIAL PLANTING SITES

A key objective of the tree inventory update is to catalog and analyze growing spaces along the neighborhood's street ROW. Analysis results will inform future planting initiatives and help ensure the selection of the most appropriate tree species given the available growing spaces within the neighborhood.

DRG arborists found a total of 122 vacant sites suitable for planting trees. Vacant planting sites were evaluated for suitability for trees and characterized by size and type. DRG considered the presence of existing utilities, overhead lines, and distances from stop signs, fire hydrants, driveways, and other existing infrastructure in the evaluation of planting sites. Most of these sites (90%) can only accommodate trees that are small at maturity (Figure 7).

110 Small Planting Sites

- Best suited for small-maturing trees.
- Minimum width of 3 to 5 feet.
- Located at least 20 feet from another tree.
- Includes all sites with overhead utilities, regardless of site width.

1 Medium Planting Sites

- Best suited for medium-maturing trees.
- Minimum width of 5 to 7 feet.
- Located at least 30 feet from another tree.

11 Large Planting Sites

- Best suited for large-maturing trees.
- Minimum width of greater than 7 feet.
- Located at least 40 feet from another tree.
- The highest quality potential planting site.

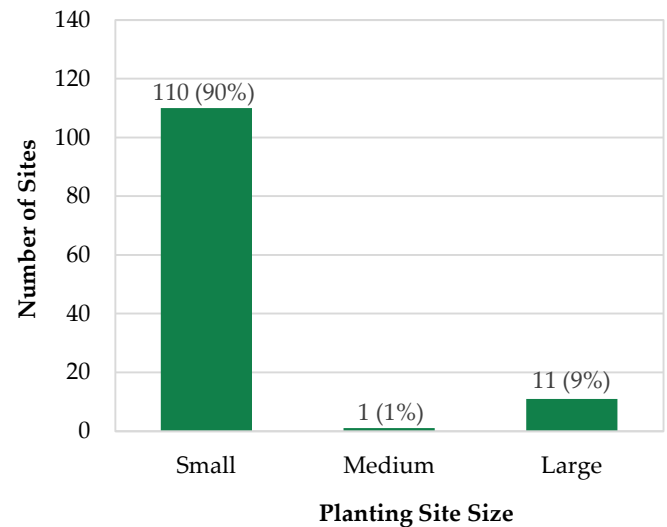


Figure 7. Vacant planting sites by size.

PLANTING CONSIDERATIONS

Site Selection: Urban environments constrain what tree species are appropriate. Existing infrastructure such as utilities and sidewalks, growing space size, and other trees all impact what tree is appropriate for a site.

Tree Selection: Tree species should be resilient to the urban environment, diverse, and the appropriate height and width for the growing space.

Blocking an unsightly view or creating shade may be a priority, but the impact of a tree on its environment – and vice versa – must be considered. Sustainable and successful planting initiatives select tree species that thrive and flourish in the chosen planting location in a way that harmonizes with the surrounding urban environment.



USING PLANTING SITES STRATEGICALLY

The good news: Dublin Road Corridor has an abundance of available planting sites where CRPD can plant trees to immediately benefit the community's tree canopy.

The less good news: The majority of these planting sites (90%) are only suitable for small-growing trees. Small trees do not provide as much canopy cover or environmental benefit as large-growing trees do.

THE WAY FORWARD: ACTION STEPS

Investing in equitable canopy does not just entail increasing overall tree canopy cover through planting, but also addressing the quality of the trees, caring for the existing trees, planning for trees within the different land uses and infrastructure, and reaching out to residents about the importance of trees.

In Dublin Road Corridor, tree planting is needed for the neighborhood to be in line with the city's canopy goals, and the community will benefit from equitable investment to maintain and grow that canopy. There are available planting sites but the majority of those sites are only suitable for small trees. Given this set of facts, what can be done in Dublin Road Corridor to maximize growth of the neighborhood forest for the benefit of its residents, visitors, stakeholders, and the entire City of Columbus?

Maintain and Preserve Existing Trees (Near-Term)

It takes a long time for a young tree to become a large, stately mature shade tree. Preserving what is already there is a major component of an urban forest growth strategy.

Prioritize Planting of Large and Medium Sites (Short-Term)

Larger trees provide residents with greater benefits. Within Dublin Road Corridor, 11 large sites and 1 medium site were identified. Planting in these locations will increase the amount of street trees by 46% and provide a solid foundation for maintaining and improving community canopy cover.

Explore Planting Beyond the Right-of-Way (Intermediate-Term)

Where insufficient space or overhead utilities restrict available planting options, planting on private property can allow for the selection of more desirable tree species. Urban forestry stewardship on private property will require education and outreach initiatives, as well as easy and low-cost access to trees.

Expand Right-of-Way Growing Spaces (Intermediate to Long-Term)

Future policy initiatives should consider options to improve available grow space, including retrofitting existing infrastructure and implementing design standards that provide adequate grow space for trees within street rights-of-way. Examples include the addition of bump-outs, expanding the size of tree lawns during utility or development projects, and exploring the use of green infrastructure technologies (e.g., silva cells, structural soils). Ensuring canopy equity requires sufficient growing space for trees to survive and thrive in an urban setting.