Urban Tree Canopy Assessment

Columbus, Ohio

SPRING | 2015

COLUMBUS
MICHAEL B. COLEMAN, MAYOR
RECREATION AND PARKS

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"Someone is sitting in
the shade today
because someone
planted a tree a long
time ago."

-Warren Buffet

An Assessment of Urban Tree Canopy in the City of Columbus, Ohio

April 2015

Prepared By
Plan-It Geo, LLC, Arvada, Colorado

Acknowledgements
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Prepared For
City of Columbus Recreation & Parks Department,
Forestry Section
1533 Alum Industrial Dr. West
Columbus, OH 43209

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EXECUTIVE SUMMARY

The City of Columbus is located in central Ohio, and as the state's capital, it is the largest city in the state with a population over 800,000 people. Its urban forest is comprised of trees, shrubs, gardens, green spaces and other natural areas. This "forest" is a critical component of the City's green infrastructure and contributes to environmental quality, public health, water resource management, local economies, and the beautification of often harsh, paved landscapes. Recognizing the value that trees provide and realizing the need for urban forest improvement is the first step in protecting this valuable resource. Like other valued assets, urban trees require proper planning and management to withstand pressures from urban, suburban, and exurban development as well as pests, diseases, storms and pollution. This urban tree canopy assessment provides a top-down view of Columbus' urban forest, analyzed not only citywide, but at a variety of geographic scales to inform various stakeholders, such as city officials, city staff, and residents alike. Recommendations are provided to guide the City in long term tree canopy goals, protection of existing trees, and target planting areas that will help accomplish greater citywide priorities such as urban heat island mitigation.

Urban Tree Canopy in Columbus

Urban tree canopy (UTC) covers **22%** of Columbus, at a total of 31,171 acres. These trees provide a multitude of economic, environmental, and social benefits, conservatively valued at more than **$12,151,446**. There are 57,665 additional acres of land available for possible plantings, offering a huge opportunity for new trees to be added throughout vegetated areas, in addition to surface parking lots.

Assessment Boundaries

This study assessed Urban Tree Canopy (UTC) and Possible Planting Areas (PPA) at multiple geographic levels in order to provide actionable information to multiple audiences. Metrics were generated at the following scales: The City of Columbus city limits, Zoning Use Classes, Planning Areas, Forestry Management Zones, Street rights-of-way, Parks and Parkland, Watersheds, BluePrint Columbus project areas, Neighborhoods, Census Block Groups, and Parcels (individual property boundaries).

The City Zoning Use analysis is particularly telling, identifying the residential zoned areas as the highest contributor of urban tree canopy, with 70% of all of the City's UTC. The industrial zoned areas follow, with 12% of the City's UTC, and then street Right-of-Way (ROW), which contain 11%. That said, the greatest opportunity for additional PPA remains in the residential areas, followed by industrial and commercially zoned areas. These three zone uses represent the greatest land areas in Columbus aside from ROW. As expected, the sparsest of the urban tree canopy is concentrated in areas of mixed-use urban zoning, which aligns with the city core, and where one will find the densest urban development.

31,171

Acres of Tree Canopy

22%

Average Tree Canopy Cover across Columbus

57,665

Acres of Possible Planting Area

Planning Areas break the city up into 27 areas, and is the foundation for the Canopy Planner tool that accompanies this report. Eastland/Brice, which is the largest Planning Area at 9,719 acres, contains the greatest amount of UTC with a total of 2,347 acres, as well as the greatest opportunity for additional plantings, with a total PPA of 4,247 acres.

Just over half of all the City's parks and parkland contains tree canopy, making up 12% of the City's total UTC with a total of 3,690 acres of UTC. The greatest opportunity for increasing the canopy in parks is found in Three Creeks Park, with 341 of its 1,073 acres, or 34% of the total park still open for planting.

Results also revealed that of the City's 284 Neighborhoods, close to half of them have less than the citywide average UTC of 22%. While many of these neighborhoods contain high levels of industrial activity, The Ohio State University and West Campus neighborhoods contain only 13% and 15% of UTC, respectively, and have a combined total PPA of 789 acres.

Socio-Economic Relationships

A comparison of tree canopy and socio-demographic data shows that in Columbus, as in many U.S. cities, residents of many lower-income neighborhoods have less access to the benefits that trees provide than residents of higher-income neighborhoods. Analysis against detailed census data revealed a clear relationship between tree canopy and economic vitality of households, as seen not only in income levels, but also home values, educational attainment, and rates of owner occupancy. In addition, areas with the highest levels of tree canopy also tend to have smaller minority populations. These findings were used to inform prioritization of tree planting efforts and to address equity issues.

Threats to Canopy

Natural and anthropogenic pressures threaten Columbus' trees and the benefits they provide. The forest canopy from ash trees in particular has been declining due to the tree pest Emerald Ash Borer (EAB), and the Asian Long-horned Beetle (ALB) threatens to diminish additional canopy cover. With the anticipated loss of at least 200,000 ash trees due to the EAB other invasive pests, as well as development pressures, the urban forest in Columbus is declining at a time when the City needs it most. The estimated total acres of Ash tree canopy on public and private lands combined totals 2,709 acres. The estimated total acreage of tree canopy from trees sensitive to the Asian Long-horned Beetle is 5,381 acres.

Planting Goals

Three scenarios were evaluated to guide future tree plantings. One was to establish no net loss in 5 years. The second of 27% UTC reflects the recommendation from the Columbus Green Community Plan—Green Memo III to increase tree canopy a minimum of 1% annually for the next five years. And the third scenario reflects a UTC

$12,151,446

Value of Ecosystem Benefits

~2,700

Total Acres of Ash Tree Canopy

71%

of Total UTC is in a Residential Use Zone

of 40% as recommended by American Forests. Considering the current distribution of UTC across the City by zoning use, goals were suggested for canopy increase within each class. To achieve no net loss in 5 years' time, the City of Columbus would need at least 13,000 new large trees. Increasing the canopy to 27% strategically according to the PPA available per zoning use class, the City would have to plant a total of 238,281 new trees over the course of 5 years, 291,663 new trees over the course of 10 years, 342,529 new trees over the course of 15 years, and 391,002 new trees over the course of 20 years.

Priority Planting Sites

Priority Planting Areas were recommended based on the priorities reported by the City of Columbus. These include mitigating the urban heat island, saving energy, reducing stormwater runoff, increasing water quality, social equity, and canopy connectivity.

Recommendations

This report presents a variety of UTC improvement scenarios, recommendations that target Columbus' broader citywide priorities, and specific strategies to assist in implementation of UTC goals. Strategies utilize the GIS data, tools, and findings. Additionally, the UTC assessment data is available in an online interactive map for planning and prioritizing tree planting and maintenance.

PROJECT BACKGROUND

The City of Columbus is located in Franklin County in central Ohio. As the state's capital, it is the largest city in the state with a population over 800,000 people. By signing the 2007 US Climate Protection Agreement and spearheading the Green Space Working Group (GSWG) and initiatives such as the Columbus Green Community Plan, the City of Columbus recognizes the need to identify solutions to climate change and strategies for resiliency. With the anticipated loss of at least 200,000 ash trees due to the Emerald Ash Borer (EAB), other invasive pests, development pressures, and current tree planting levels, the urban forest in Columbus is declining at a time when the City needs it most.

To inform management and planning, it is critical to inventory and assess trees and forests to identify safety concerns, maintenance needs, quality, and large trends which can be positive or negative and impact policies and outreach. An urban tree canopy assessment is a landscape-scale study rather than a localized plan and therefore requires "thinking big" about natural resources and the environment, development and regulatory practices, local economies, interdisciplinary collaboration, and the societal desires in our communities.

The City of Columbus commissioned this Emerald Ash Borer and Tree Canopy Analysis in 2014, taking a proactive approach to understand the existing conditions and vulnerability of their urban tree canopy. This study utilizes aerial imagery acquired in the summer of 2013 and provides an updated analysis of urban tree canopy and possible planting areas. It quantifies the net outcome of canopy growth from tree planting and canopy losses from storms, pests such as the Emerald Ash Borer (EAB), natural mortality, and development. Potential losses from the Emerald Ash Borer, the Asian Long-horned Beetle, and the invasive bush Honeysuckle are also assessed.

The results of this report will guide and inform Columbus' efforts to increase and sustain a robust urban forest canopy, determine an acceptable future canopy goal, and strengthen tree protection and preservation on both public and private properties.

PROJECT FUNDAMENTALS & METHODOLOGY

This section describes the 'how' and the 'why' of this urban tree canopy assessment. The process begins with mapping a land cover dataset, which is then used to generate metrics aggregated at various geographic scales, or assessment levels, which have been defined by the City of Columbus. By identifying what resources and opportunities exist, the current urban forest ecosystem benefits can be quantified, and future goals can be set.

Mapping Land Cover

The most fundamental component of this urban tree canopy assessment is the creation of an initial land cover data set. The process began with the acquisition of 2013 high-resolution (1-meter) aerial imagery from the USDA's National Agricultural Imagery Program (NAIP). An object-based image analysis (OBIA) software program called Feature Analyst (ArcGIS Desktop) was used to classify features through an iterative approach, where objects' spectral signatures across four bands (blue, green, red, and near-infrared), textures, and pattern relationships were taken into account. This process resulted in five initial land cover classes as shown in Figure 1. After manual classification improvement, additional data layers from the city, such as buildings, roads, and agricultural land, were utilized to capture finer feature detail and further categorize the land cover dataset.

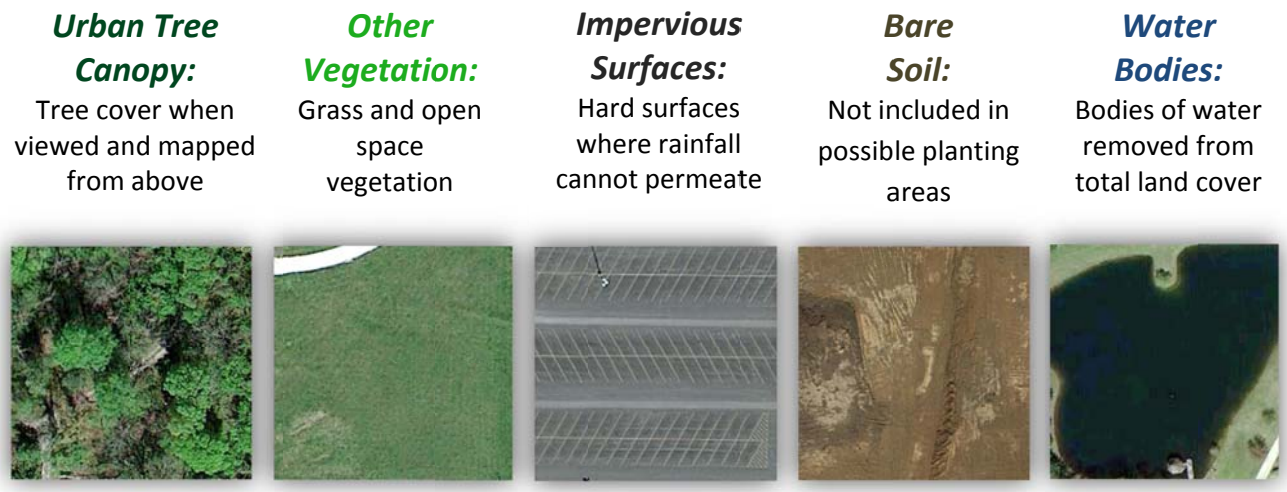


Figure 1: Five Primary Land Cover Classes were generated from Aerial Imagery-based Analysis

Identifying Possible Planting Areas

Once the land cover mapping results were finalized, and the existing Urban Tree Canopy (UTC) was established, Possible Planting Areas (PPA) were derived from the Other Vegetation and Impervious land cover classes. Areas in Columbus where it is not feasible to plant trees, such as sports fields, airports, and agricultural land were manually mapped or incorporated from existing data sources and defined as unsuitable planting areas. The resulting possible planting areas were identified as ***vegetated*** PPA or ***impervious*** PPA, with an aggegated value for ***total*** PPA.

Visualizing Urban Tree Canopy Results

Maps showing urban tree canopy (UTC) in this report express relative levels of canopy as a percentage of land area (not including water). UTC levels are divided into meaningful categories for each of the assessment area boundaries and may vary slightly depending on the distribution within the target geographies. For neighborhoods, UTC levels are broken up into four classes: Less than 20% UTC, 21-30% UTC, 31-40% UTC, and Greater than 40% UTC. Figure 2 provides a visual examples of what the varying levels of UTC look like against the aerial imagery.

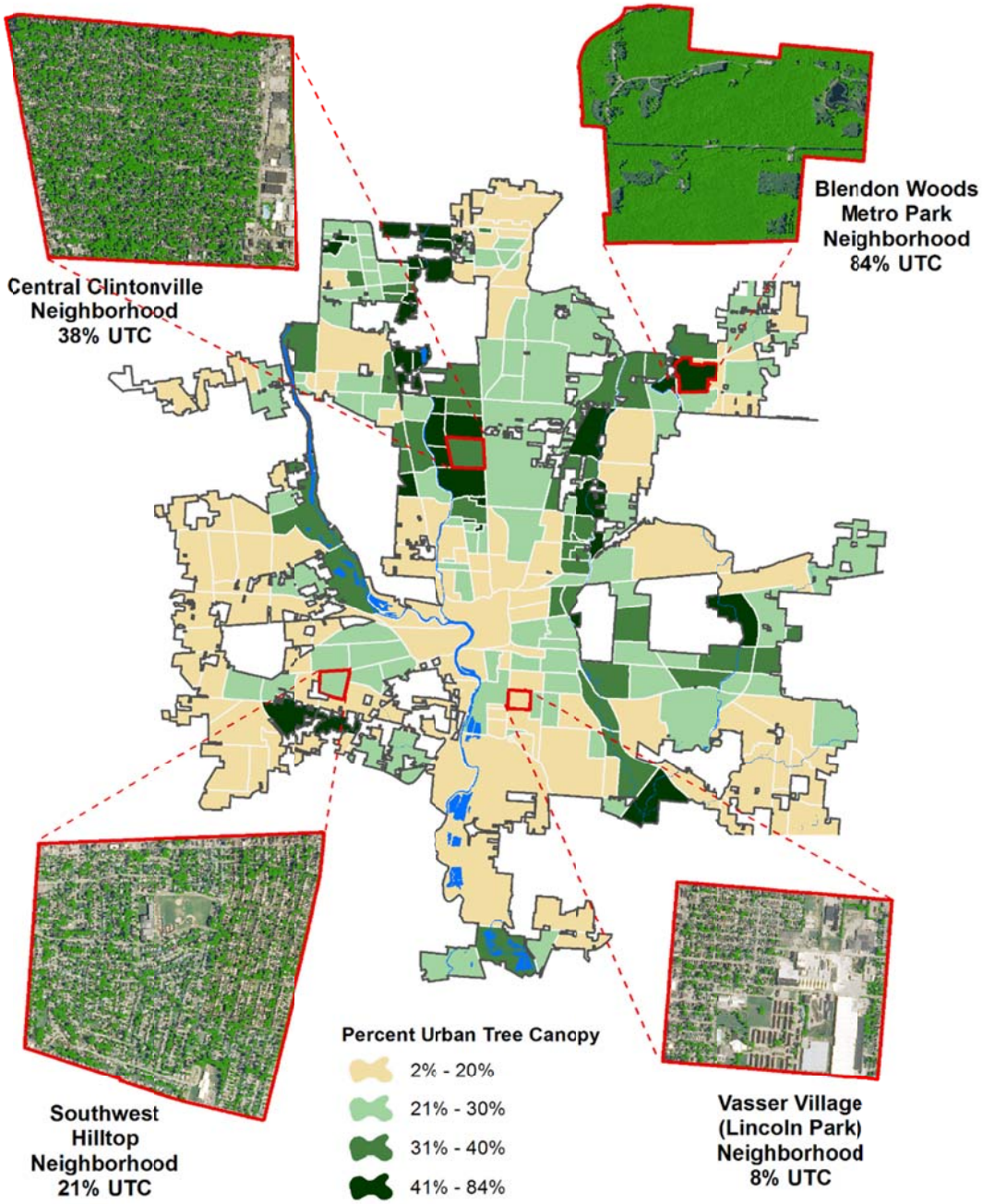


Figure 2: Examples of Urban Tree Canopy Coverage by Neighborhood

Defining Assessment Levels

In order to better inform various stakeholders, such as city officials, city staff, and citizens alike, urban tree canopy and associated information was calculated for a variety of geographic boundaries, in addition to the City of Columbus' primary study area. The citywide land cover dataset serves as the input for analysis at these finer assessment levels, and a series of values were summarized for each. Outputs include total area (in acres or feet) and relative values (as percentages) for tree canopy, possible planting areas, impervious surfaces, and unsuitable areas. Assessment levels include the following geographic boundaries:

Figure 3: Examples of Assessment Geographies

8 **Zoning Use Classes** were evaluated to identify the amount of tree canopy as it relates to the regulatory framework, and to help inform policy development.

27 **Planning Areas** and 76 **Forestry Management Zones** are useful for city foresters and planners to manage and develop the City's forest canopy resources.

343 **Parks or Parkland** spaces were also analyzed, identifying opportunities within the City's parkland. Although Columbus's parks often extended beyond city boundaries, they were clipped prior to analysis to provide an assessment accurate within the actual study area.

25 W**atersheds** (HUC12 Drainage Basins) were analyzed where they overlap with City of Columbus boundary. This assessment level has implications for a variety of groups vested in Columbus' water resources.

37 **BluePrint Columbus Project Areas** were the focus for evaluating where new plantings could support the City's stormwater management.

284 **Neighborhoods** provide actionable information to frame public outreach efforts, and 746 **Census Block Groups** take into account socio-demographic factors including income, home value, educational attainment, ethnicity, race, and tenure.

And finally, the most detailed assessment can be found at the parcel level. 274,532 **parcels** were evaluated within the City of Columbus. To more fully utilize this information and inform priority planting areas, zoning use classes were integrated into parcels allowing for a breakdown of residential, industrial, and commercial use properties.

Ecosystem Services

The urban forest is an integral part of the character for all those that live, work, or visit the City of Columbus. Benefits of trees are referred to as "ecosystem services" and describe the ways that urban forests impact our lives and the environment. Generally speaking, the return on investment of planting a tree is nearly **200%** (McPherson, et al., 1997). Figure 4 describes how trees can be valued in terms of public health, energy demand, and public infrastructure savings, and helps justify the many reasons to promote, establish, manage, and maintain a robust, "working" urban forest in Columbus. Quantifying these benefits helps to demonstrate the value of urban forests beyond their aesthetic appeal. To do this, the following software tools were used:

i-Tree Canopy, part of the i-Tree suite developed by the USDA Forest Service, estimates tree cover and tree benefits for a given area with a random sampling process that enables classification of ground cover types. This tool was utilized to estimate the carbon storage, annual carbon sequestration, and annual air pollution removal provided by the urban forest in Columbus.

i-Tree Hydro, also part of the i-Tree Suite**,** is a model designed to estimate runoff in different land cover scenarios by compiling data on various hydrologic parameters, soil properties, weather data, streamflow data, and more.

Environmental

Air quality:

Trees absorb, trap, offset, and hold pollutants such as particulates, ozone, sulfur dioxide, carbon monoxide, and CO2.

Water quality:

Soil aeration, evapotranspiration, and rainfall interception by trees improves water quality.

Erosion control:

Tree roots hold soil together along stream banks and slopes.

Wildlife habitat:

Trees promote urban biodiversity.

Economic

Property value:

Each 10% increase in tree cover increases home prices by $1,300+ (Sander, Polasky, & Haight, 2010).

Energy conservation:

Trees lower energy demand through summer shade and winter wind block, offsetting power plant emissions.

Stormwater mitigation:

Urban forests intercept stormwater, reducing the need for costly gray infrastructure.

Social

Public health:

Trees diminish asthma symptoms and reduce UV-B exposure by about 50% (Shade: Healthy Trees, Healthy Cities, Healthy People, 2004).

Crime and domestic violence:

Urban areas directly correlate with lower levels of fear, fewer incivilities, and less violent and aggressive behavior (Kuo, 2001).

Noise pollution:

Trees act as a buffer, absorbing up to 50% of urban noise (U.S. Department of Energy).

Figure 4: Ecosystem Services and Benefits provided by Urban Tree Canopy

Prioritizing Planting Areas

After generating metrics for UTC and PPA throughout the target geographies and considering environmental benefits, priority planting themes were identified to promote the City's greater goals. These include mitigating the urban heat island, saving energy, reducing stormwater, improving water quality, increasing canopy connectivity, and improving social equity. Feedback was gathered from members of the Greenspace Working Group in order to prioritize the themes. Generally, priority planting locations can be identified by looking at areas with low UTC and high PPA; however, this study strategically considered the themes and their associated priority levels to target locations that will not only increase the canopy, but also contribute to these greater goals. Table 1 outlines the themes and their associated priority level.

Table 1: Citywide Goals Guiding the Identification of Priority Planting Areas

Priority	Goal	Rationale	GIS Action
Very High	Urban Heat Island Mitigation	Tree canopy that covers impervious surfaces reduce the urban heat island effect, which is damaging to the environment and unhealthy for people; Disproportionately affects lower income populations	Identify areas of high UHI using percent total impervious; Locate priority planting areas in residential, commercial, and industrial areas
High	Energy Savings	Trees provide a reduction in energy use in the summer by providing shade and in the winter by reducing wind	Identify residentially zoned areas with low UTC and high PPA
High	Stormwater Reduction	Trees can be integrated to help manage stormwater, specifically when targeting impervious surfaces	Using the BluePrint Columbus project areas, identify locations with high PPA Impervious
Medium	Water Quality	Trees located adjacent to streams and water bodies improve water quality	Buffer all surface water, such as streams and ponds, by 100' to identify riparian zones with high PPA
Medium	Socio-demographic relationships	The presence of trees aligns with increased economic vitality and quality of life. Targeting tree plantings in low income areas may also help mitigate the UHI	Consider areas where there is below average UTC, and also have lower than citywide average levels of income, education, owner-occupancy, or age
Medium	Connectivity	Large tracts of connected canopy cover can improve habitat for local wildlife	Buffer large tracts of existing canopy (tracts of at least 5 acres) by 100' to target PPA that may help connect them

Detecting and Analyzing Urban Tree Canopy Change

Urban tree canopy (UTC) change analysis quantifies canopy loss due to natural events (i.e. disease) and anthropomorphic influences (i.e. development) and gains due to canopy growth and new plantings. Using i-Tree Canopy software and historical imagery, canopy and non-canopy was interpreted for 1,501 points for 2002 and 2014. The results yielded 24% for 2002 (1.1 standard error) and 23.5% for 2014 (1.09 standard error). The estimated urban tree canopy derived through this assessment was 22%. The consistency in these UTC estimates show that little or no canopy change has occurred within the past 12 years in Columbus.

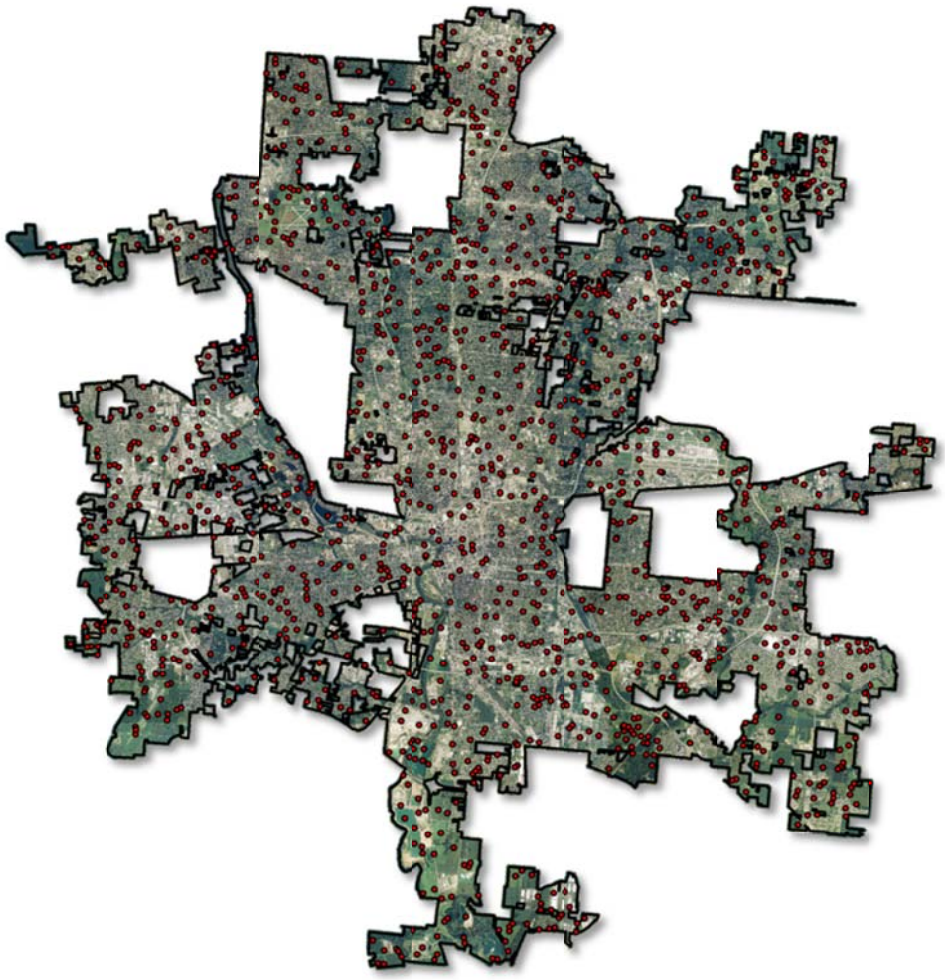


Figure 5: Distribution of Canopy Sample Points

Assessment Results & Key Findings

This section presents the results of this study, including the land cover base map as well as canopy analysis across the various geographic assessment boundaries. These results inform a strategic approach to future planting and priority planting areas, which are discussed in the Recommendations section of this report. Complete assessment results for target geographies and additional maps can be found in the Appendix.

Land Cover

In 2013, **22%** of Columbus was covered by tree canopy, **31%** was grass and open space, and **38%** impervious. The detailed land cover dataset further breaks down impervious into categories including roads (11%), parking lots (6%), buildings (10%), and other impervious (11%).

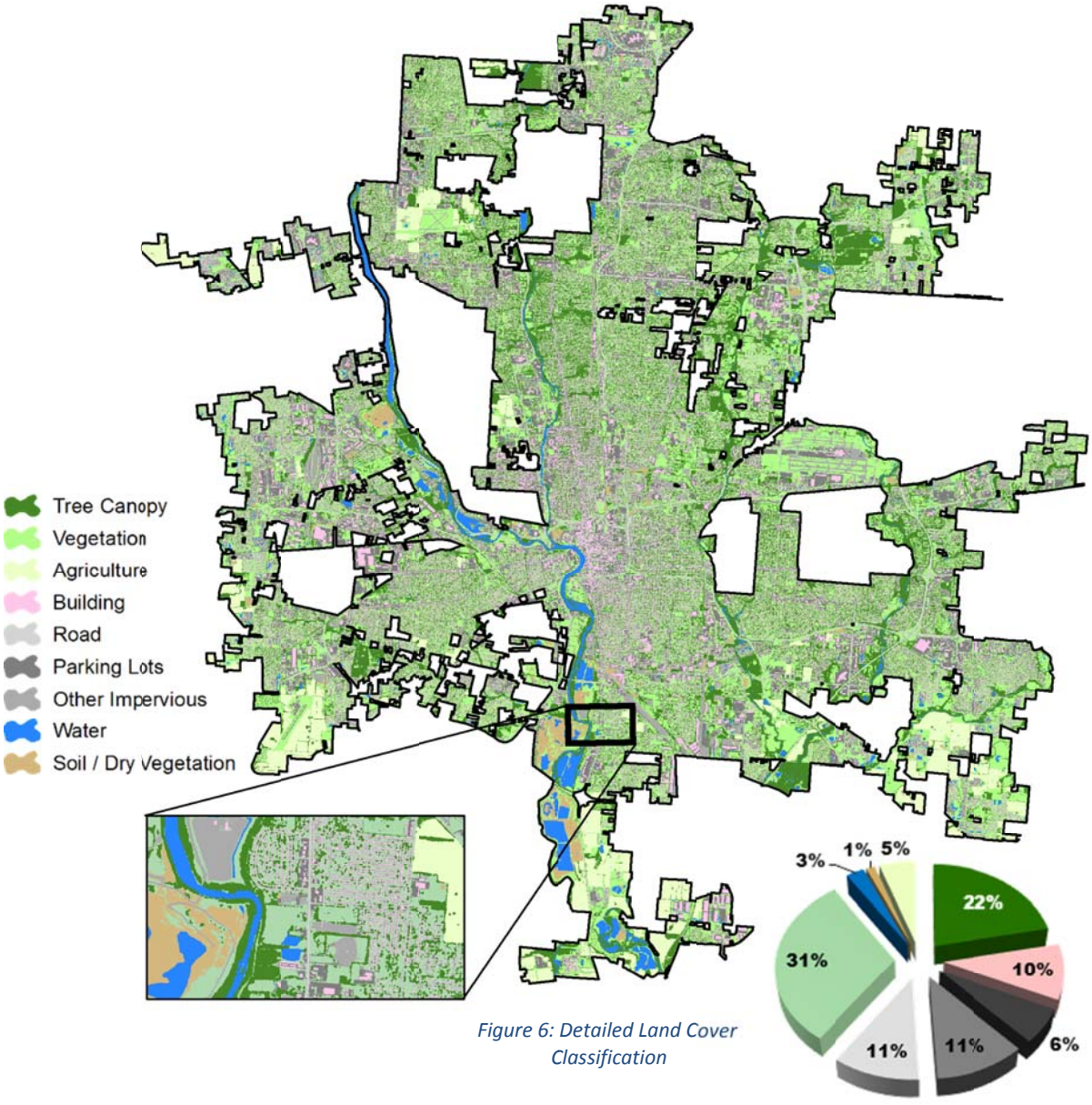


Figure 6: Detailed Land Cover Classification

Citywide Study Area

Within the City of Columbus, **22%** of the almost 140,000 land acres (excluding water) is covered by urban tree canopy (UTC), with **41%** of the remaining land area available for new plantings. Figure 7 illustrates relative levels of UTC throughout the city by parcel.

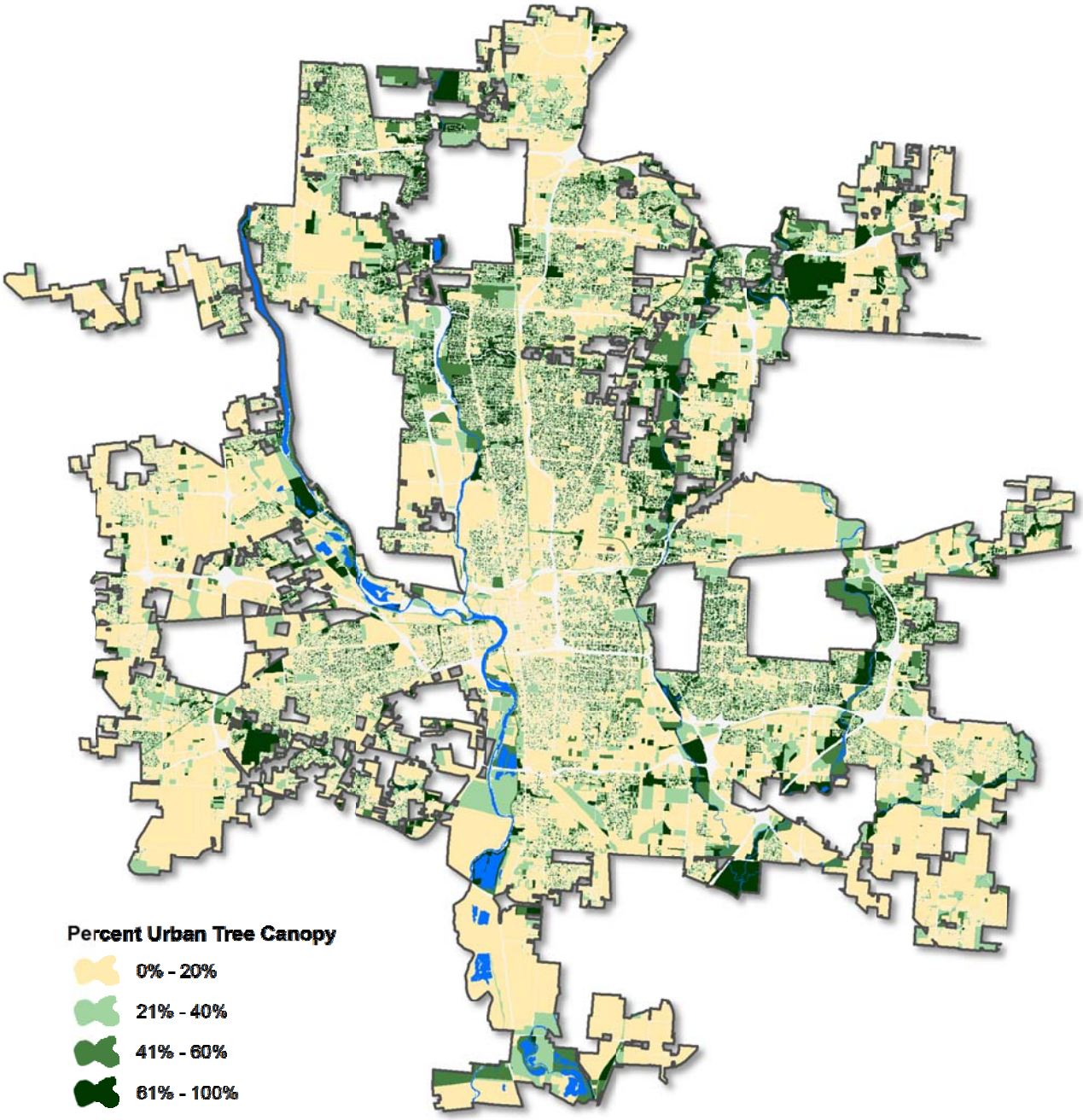


Figure 7: Percent Urban Tree Canopy by Parcel

Zoning

This study processed urban tree canopy (UTC) levels and Possible Planting Area (PPA) data at the level of 8 zoning use classes. These classes group official zone districts into categories based on land use. The locations and city-wide distribution of zoning use classes across Columbus are shown in the Figure 8 map and charts.

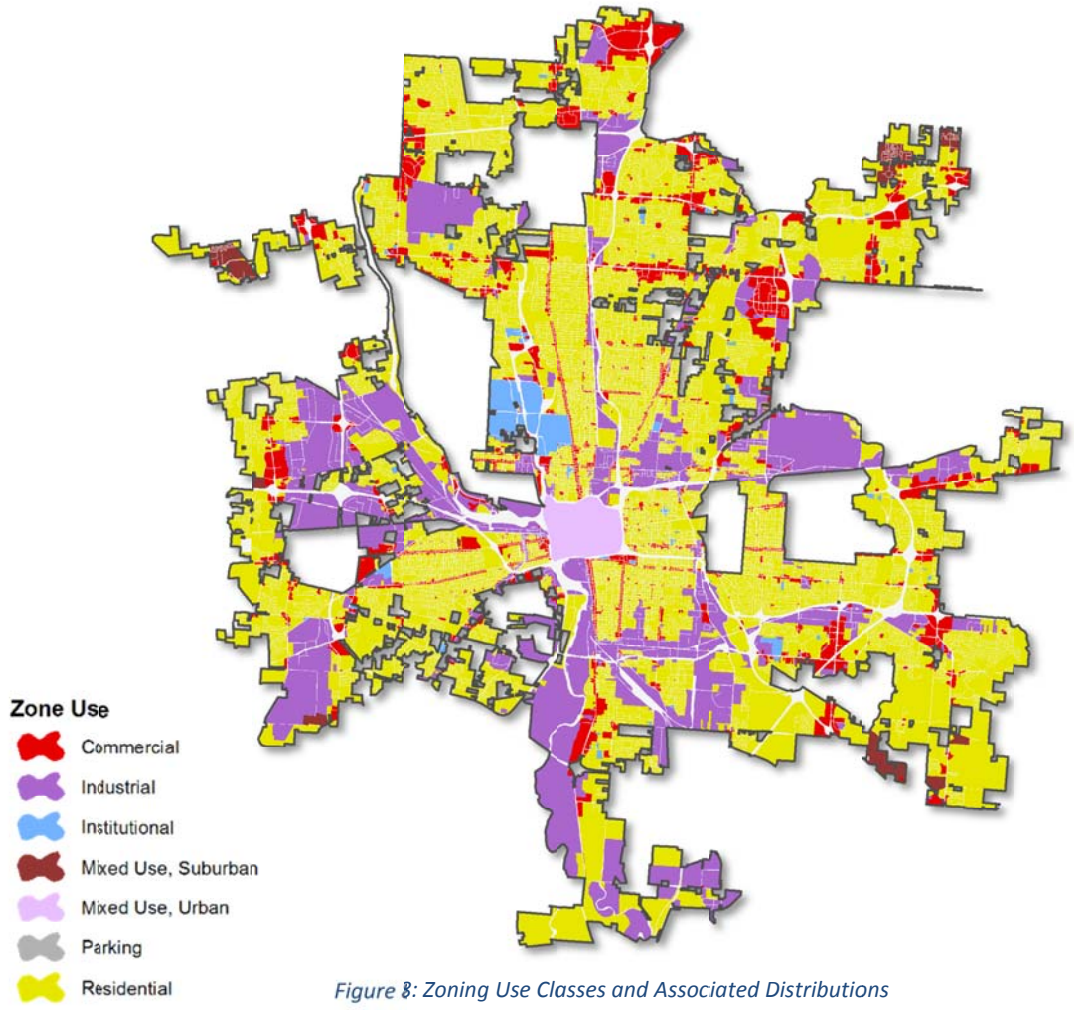
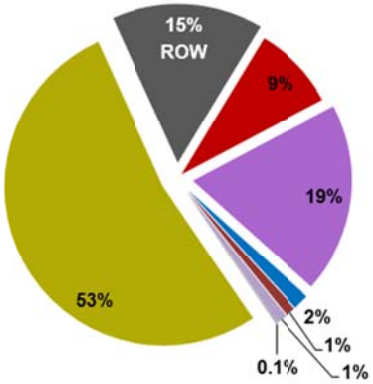
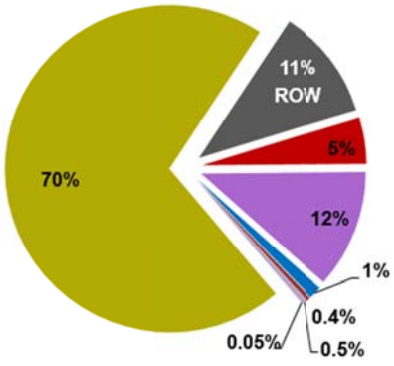


Figure 8: Zoning Use Classes and Associated Distributions of Urban Tree Canopy and Total Possible Planting Area

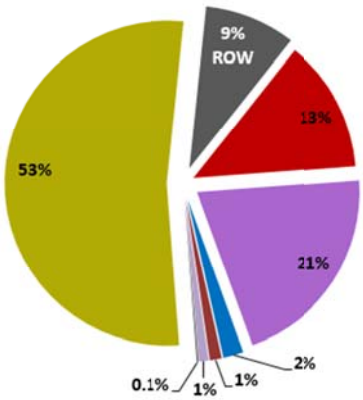
Distribution of Zoning Use Classes*



Distribution of Existing Urban Tree Canopy by Zoning Use Classes



Distribution of Total Possible Planting Area by Zoning Use Classes



**Note: Zoning Classes and Street ROW do not equal citywide total.*

As a key regulatory tool that impacts development in Columbus, zoning is important to consider when evaluating and promoting urban tree canopy. To provide data that advances urban forest policy and management, zone districts were generalized into land use classes and the resulting 8 classes were assessed for tree canopy and Potential Planting Area (PPA). Distribution of the total UTC between Zone Use Classes ranged widely from **less than 1% to 70%,** with residential zoned areas being the highest contributor of urban tree canopy, while also maintaining the greatest PPA. As expected, the sparsest or the urban tree canopy is concentrated in areas of mixed-use urban zoning, which align with the city core, and where one will find the densest development. The mixed-use suburban areas, however, are located on the outskirts of the City and have the highest percent PPA Vegetation, with 39%. See Table 2 for more details.

Table 2: Urban Tree Canopy Metrics by Zoning Use Class

Zoning Use Class	% UTC within Zoning Class	% PPA Vegetation	% PPA Impervious	% Total PPA	Total PPA Acres
Commercial	12%	23%	41%	63%	7,578
Industrial	13%	25%	19%	44%	11,889
Institutional	17%	29%	22%	51%	1,137
Mixed Use, Suburban	9%	39%	7%	46%	673
Mixed Use, Urban	9%	12%	23%	35%	559
Parking	15%	19%	57%	76%	71
Residential	30%	35%	7%	41%	30,263
Street ROW	16%	24%	0.1%	24%	5,113

Planning Areas

This study processed urban tree canopy (UTC) totals and Possible Planting Areas (Vegetation, Impervious, and Total PPA) data at the level of 27 Planning Areas. This target geography is also the foundation for data viewable on the associated Canopy Planner web tool, which is explained in greater detail in the Associated Tools section of the Appendix of this report. **Eastland/Brice (Area 24)** is the largest Planning Area at 9,719 acres, and contains the most UTC with a total of 2,347 acres, or 25% of its total area. This area also contains the most acreage of PPA, along with the Northland and Far South planning areas. Combined, these areas offer 11,398 acres of planting space, or 20% of the City's entire possible planting area. Table 3 highlights these top 3 Planning Areas with the greatest potential for planting.

Table 3: Top 3 Planning Areas for Total Acres of PPA

Plan Area ID	Planning Area	% UTC within Zone	% PPA Vegetation	% PPA Impervious	% Total PPA	Total PPA Acres
24	**Eastland/Brice**	25%	33%	12%	45%	4,247
6	**Northland**	25%	31%	15%	46%	3,847
23	**Far South**	20%	37%	10%	47%	3,304

The complete distribution of total acreage of existing UTC, as well as total acreage of PPA, for each Planning Area is shown in Figure 9.

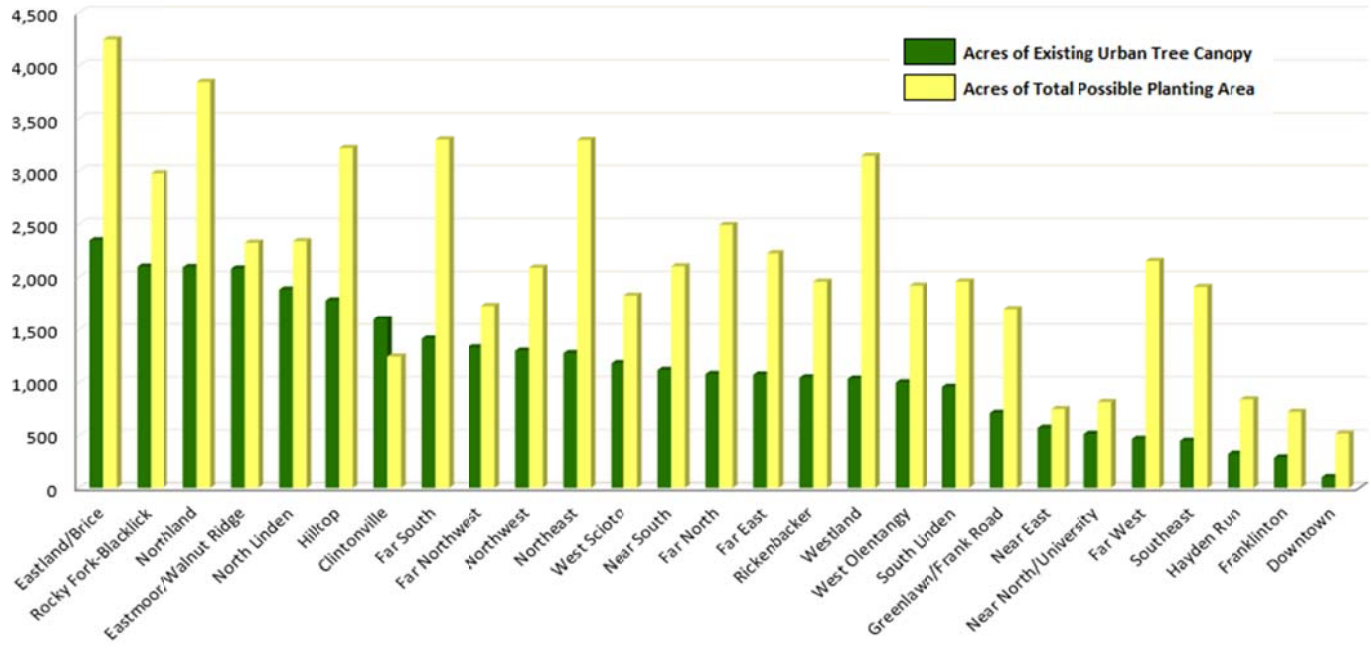


Figure 9: Acres of Urban Tree Canopy and Possible Planting Area by Planning Area

Forestry Management Zones

This study processed urban tree canopy (UTC) totals and Possible Planting Areas (Vegetation, Impervious, and Total PPA) data at the level of 76 Forestry Management Zones. The Forestry Management Zones are subsets of the Planning Area assessment boundaries. This concept is illustrated in Figure 10. In the subset of this map, it is clear that the Near East Planning Area, or Planning Area 19, contains Forestry Management Zones 19A and 19B. Similarly, the Downtown Planning Area, or Planning Area 18, contains Forestry Management Zones18A and 18B.

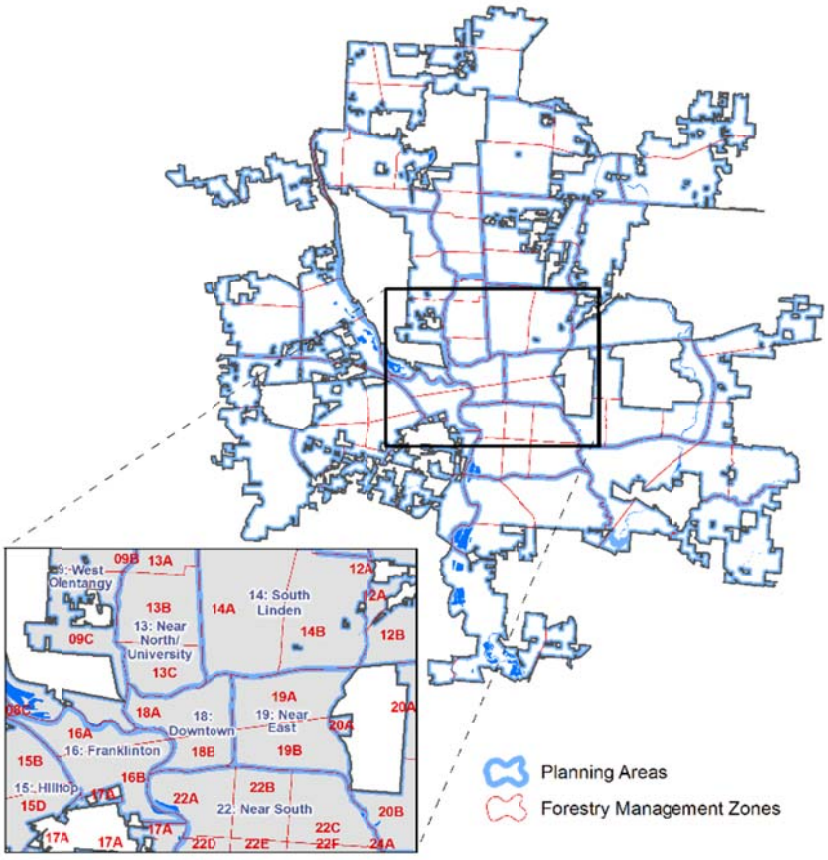


Figure 10: Planning Areas and Forestry Management Zones

Forestry Management Zones **10C**, **05C**, and **10D** have the greatest percent UTC, while the greatest amount of PPA acreage, as shown in Table 4, is found in zone **25B**, followed by **12A**, and **27**. Complete assessment results can be found in the Appendix of this report.

Table 4: Top 3 Forestry Management Zones for Total PPA Acres

Forestry Management Zone	% UTC within Zone	% PPA Vegetation	% PPA Impervious	% Total PPA	Total PPA Acres
25B	13%	29%	9%	38%	2,161
12A	24%	38%	15%	53%	2,009
27	10%	38%	4%	42%	1,907

Right-of-Way

Urban Tree Canopy (UTC) and Possible Planting Areas (Vegetation, Impervious, and Total PPA) metrics have also been evaluated for City's Right-of-Way at a variety of scales. These include citywide, as well as for each of the Planning Areas and for each of the Forestry Management Zones. The total land area of ROW in Columbus (excluding water) is **21,283 acres**. 3,389 of these acres contain UTC (or 16% of the ROW), with an additional total PPA of **5,113 acres**, or 24%. While much of the ROW is impervious road surface, this PPA offers an opportunity to help increase air quality and combat the urban heat island. In addition, the ROW is land owned and managed by the City, providing opportunity for the City to be proactive in new plantings. Table 5 shows the top 3 Forest Management Zones for total possible planting area acres within the right-of-way. Forest Management Zone 24A has the greatest potential with 249 acres of PPA. Additional maps can be found in the Appendix section of this report.

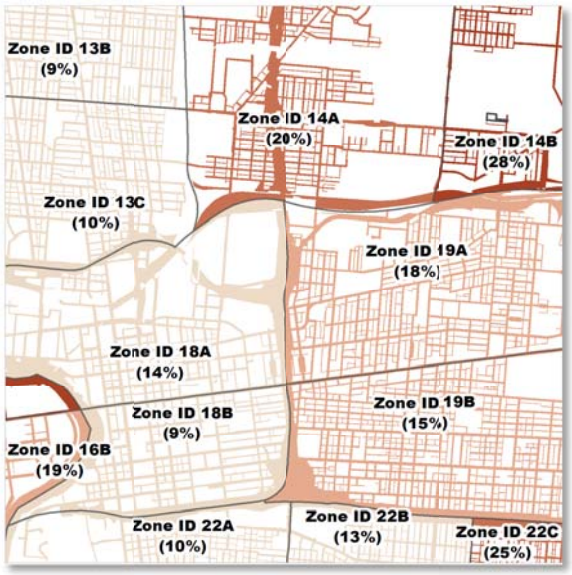


Figure 11: Percent Total Possible Planting Area within the ROW of Forestry Management Zone

Table 5: Top 3 Forest Management Zones for Total PPA Acres within the Right-of-Way

ROW by Forestry Management Zone	% UTC within Zone	% PPA Vegetation	% PPA Impervious	% Total PPA	Total PPA Acres
24A	15%	37%	0.003%	37%	249
04B	12%	34%	0.002%	34%	181
12A	10%	30%	0.006%	30%	146

Parks and Parkland

This study processed urban tree canopy (UTC) totals, and Possible Planting Area (PPA) data for Parks and Parkland throughout the City of Columbus. Just over half of all the City's parks and parkland contains tree canopy, making up **12% of the City's total UTC** with a total of 3,690 acres of UTC. While parks are often great spaces to plant trees, these lands also include golf courses and sports fields that fall into the unsuitable areas category and thus were removed from PPA.

Figure 12: Sports fields, such as this baseball diamond, are considered unsuitable for planting

Three Creeks Park has the greatest amount of urban tree canopy with **575 acres**, followed by Big Run Park, Champions Golf Course, Big Walnut Park, and Griggs Park. Table 6 lists the top 5 parks or parkland with the greatest amounts of total UTC acres. Table 7 shows the top 5 parks or parkland with the greatest amount of possible planting area in acres. While Three Creeks Park contains the most acres of existing UTC, it also contains the most acres of PPA with **341 total acres** available. Griggs Park also contains a high amount of PPA, in addition to having a high existing UTC, with **57 acres** still available for planting. Figure 13 shows the parks and parkland in Columbus shaded by percent urban tree canopy, and calls out Three Creeks Park.

Table 6: Top 5 Parks or Parkland for Total UTC Acres

Parks or Parkland	UTC Acres	% UTC within Area	% PPA Vegetation	% PPA Impervious	% Total PPA
Three Creeks Park	575	57%	33%	1%	34%
Big Run Park	231	85%	12%	2%	13%
Champions Golf Course	111	54%	20%	3%	23%
Big Walnut Park	106	70%	25%	2%	28%
Griggs Park	95	59%	31%	5%	36%

Table 7: Top 5 Parks or Parkland for Total PPA Acres

Parks or Parkland	% UTC within Area	% PPA Vegetation	% PPA Impervious	% Total PPA	Total PPA Acres
Three Creeks Park	57%	33%	1%	34%	341
Berliner Sports Park	26%	36%	5%	41%	94
Raymond Memorial Golf Course	19%	33%	3%	36%	76
Nafzger Park	56%	43%	1%	44%	64
Griggs Park	59%	31%	5%	36%	57

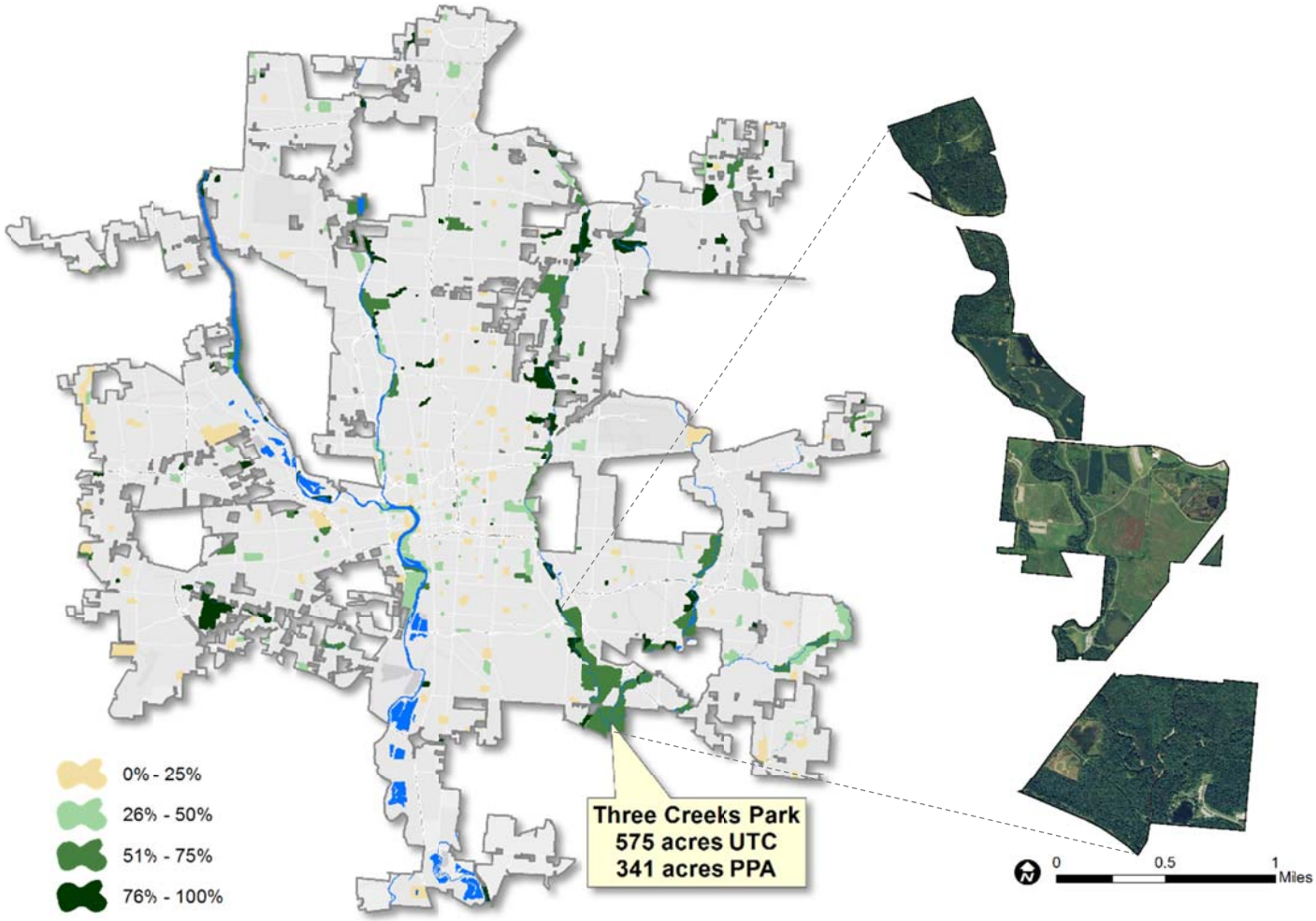
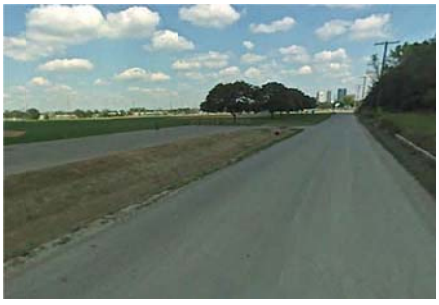


Figure 13: Percent Urban Tree Canopy in Parks and Parkland. Three Creeks Park has both the greatest amount of UTC acres and the greatest amount of PPA acres

Three Creeks Park

Raymond Memorial Golf Course (area outside of fairways)



Berliner Sports Park

Figure 14: Images of Parks or Parkland with High PPA (Source: Google Maps)

Watersheds

This study processed urban tree canopy (UTC) totals, and Possible Planting Area (PPA) data for 25 Watersheds (or HUC12 Drainage Basins). Findings at a watershed level can be used for any number of different studies and projects, including hydrologic modeling tools, water resource management plans, forest management plans, water quality studies, and more. Note that because the assessment levels were clipped to the boundary of Columbus, partial watersheds are included at this level. Figure 15 shows the percentage of urban tree canopy by watershed. Table 8 shows the top 3 watersheds for potential planting.

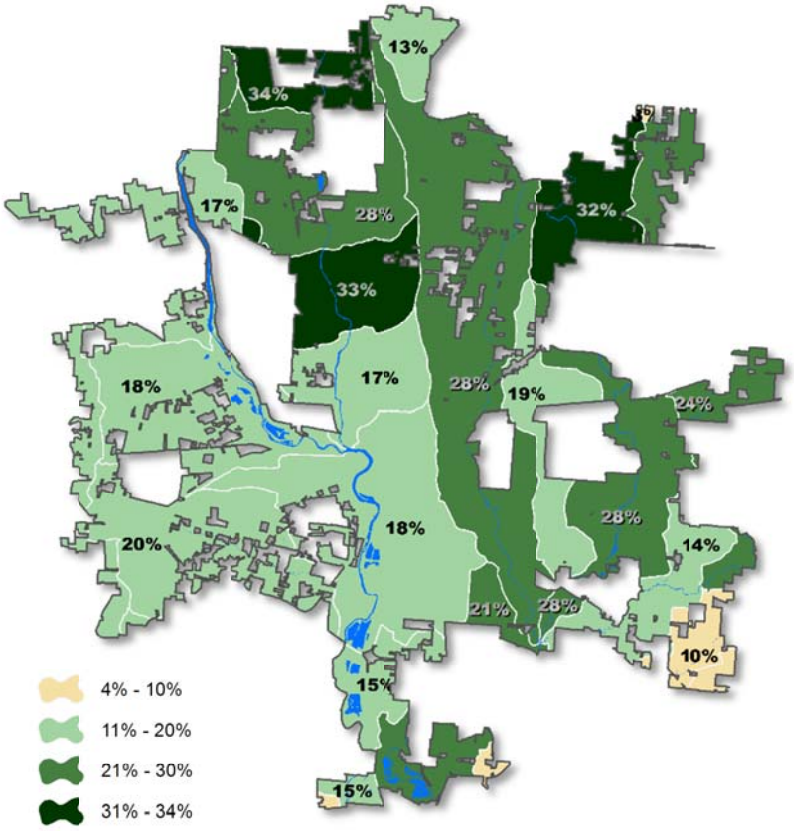


Figure 15: Percent Urban Tree Canopy by Watershed

Table 8: Top 3 Watersheds for Total PPA Acres

Watersheds	% UTC within Area	% PPA Vegetation	% PPA Impervious	% Total PPA	Total PPA Acres
050600011602	28%	33%	11%	44%	10,176
050600012301	18%	27%	11%	38%	6,127
050600010806	18%	27%	18%	45%	4,799

BluePrint Columbus Project Areas

To help give focus to potential stormwater improvement zones, metrics were generated for the City's BluePrint Columbus project areas, by assessing urban tree canopy (UTC) totals and Possible Planting Areas (Vegetation, Impervious, and Total PPA) within each area. This will help target new plantings where they are needed to manage stormwater.

The results revealed that project area **Fifth by Northwest (West Fifth)** has the one of the lowest percentages of UTC at only 14% and the greatest amount of impervious PPA, with 202 acres or 23% of the total project area. **Hilltop (Early Ditch)-4** and Hilltop **(Early Ditch)-1** have the next greatest amounts of impervious PPA area, with 176 and 168 acres, respectively. Impervious PPA is highlighted for these assessment area boundaries, due to the adverse effect of impervious surfaces on stormwater management. Percent UTC and Total PPA are also shown in Figures 16 and 17.

Table 9: Top 3 BluePrint Columbus Project Areas for Acres of Impervious PPA

BluePrint Columbus Project Area	% UTC within Area	% PPA Vegetation	% PPA Impervious	% Total PPA	Total PPA Impervious Acres
Fifth by Northwest (West Fifth)	14%	19%	23%	42%	202
Hilltop (Early Ditch)-4	16%	28%	22%	50%	176
Hilltop (Early Ditch)-1	19%	25%	18%	43%	168

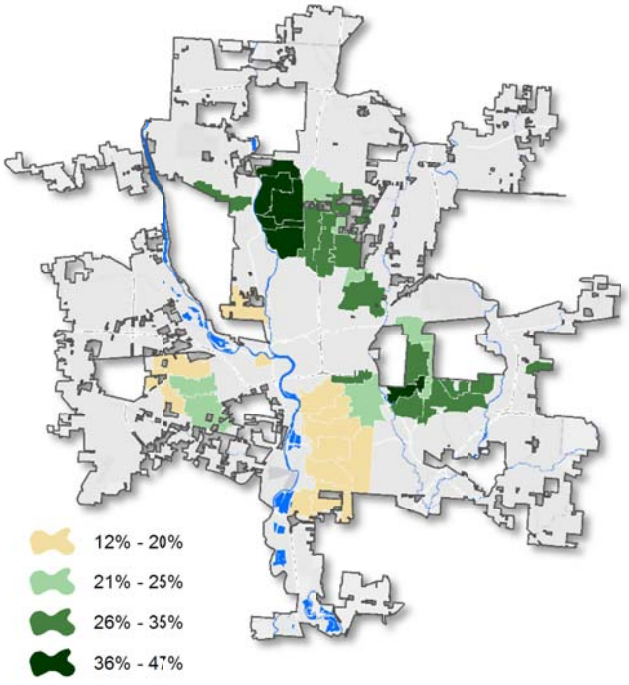


Figure 16: Percent Urban Tree Canopy within BluePrint Columbus Project Areas

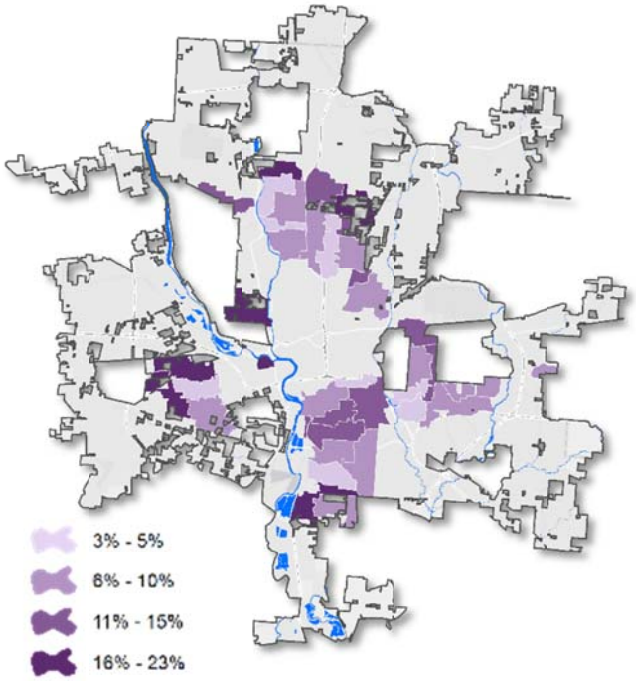


Figure 17: Percent Impervious Possible Planting Area within BluePrint Columbus Project Areas

Neighborhoods

This study generated urban tree canopy (UTC) totals and Possible Planting Areas (Vegetation, Impervious, and Total PPA) metrics for each the City's 284 Neighborhoods. There are a total of 133 neighborhoods that have less than the citywide average UTC of 22%, which is close to half of all the City's neighborhoods. Figure 18 identifies those neighborhoods with less than the average UTC, overlaid on the zoning use classes. It is clear that many of the neighborhoods with low UTC also contain high levels of industrial activity. In addition, the "Downtown" neighborhood, which consists of the downtown core and is zoned for mixed-use urban, has barely 8% UTC. The "Ohio State University" and "West Campus" neighborhoods, identified in Figure 18 by the blue institutional use zoning, contain only 13% and 15% UTC, respectively. Between the two campus neighborhoods, there are a combined total PPA of 789 acres.

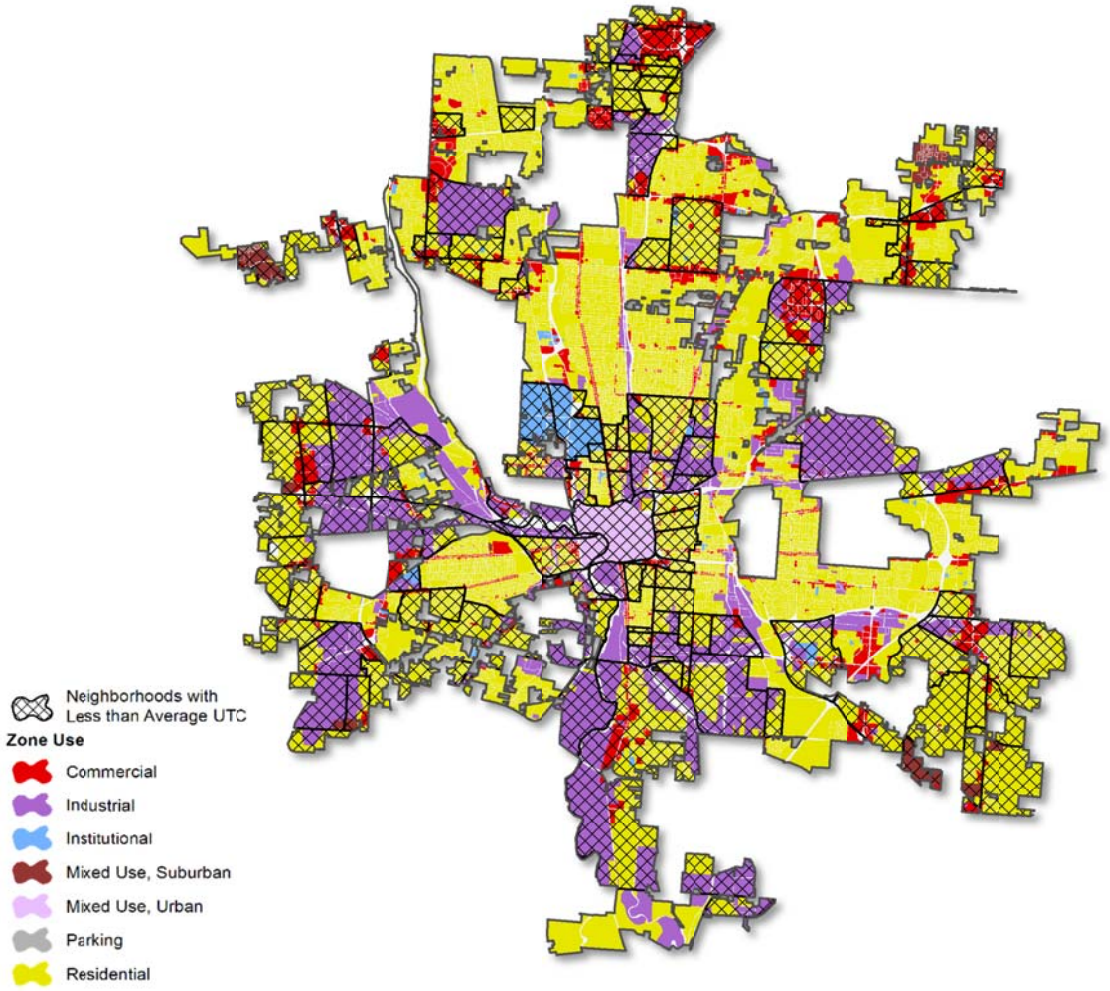


Figure 18: Neighborhoods with Less than the Citywide Average Urban Tree Canopy and Zone Use

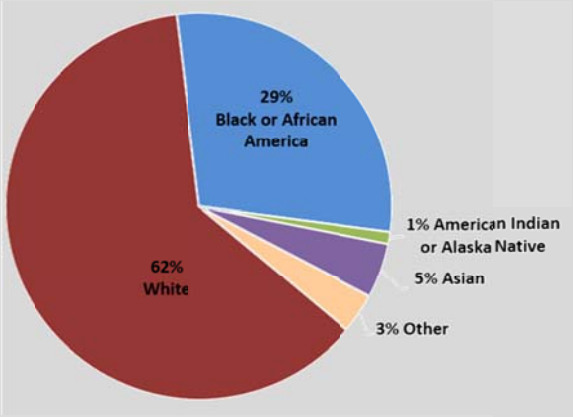
Census Block Groups and Socio-Demographics

Urban tree canopy (UTC) provides a multitude of direct and indirect benefits. Some of these benefits are more difficult to measure, such as how trees contribute to livability, health, and well-being. As part of this study, the relationship between tree canopy and economic vitality was explored. Urban Tree Canopy was related to data collected through the U.S. Census 2009-2013 American Community Survey (ACS) 5-year estimates at the Block Group level. The distribution of UTC by Block Groups was analyzed against a variety of ACS data, including median income levels, median home value, educational attainment, owner occupancy, and race. The study uncovered a clear relationship between canopy cover and socio-demographics.

This study revealed that as the amount of canopy cover increased, economic vitality also increased. Household incomes and home values were higher in areas with greater canopy cover. Educational attainment was also higher, as well as owner occupancy which often indicates stability of a given area or neighborhood. In addition, where the highest levels of tree canopy exist, the percentage of people who report being a race other than white is at its lowest, suggesting that not only is there a link between economic vitality and trees, but also that minority populations may be lacking the positive health effects of trees. Tabular results are shown in Table 10. Additional maps and tables can be found in the Appendix.

Demographic Overview

The City of Columbus had a total population of 787,033, as of the 2010 U.S. Census. Of that population, 7.6% were under 5 years of age, 23.2% were under 18 years of age, and 8.6% were over the age of 65. The Hispanic or Latino population within Columbus is 5.6%, compared to 3.1% for the State of Ohio.



The distribution of race yields a primarily white population, with 61.5% being white alone (as shown in the figure to the right). According to the Census' American Community Survey for 2009-2013, the population of Columbus has a higher educational attainment than that of Ohio as whole, with 33.1% of persons aged 25 and older having a Bachelor's Degree or higher, as compared to 25.2% in all of Ohio. The median household income is lower than the state's, however, with an ACS estimated $44,072 for Columbus, versus $48,308 for Ohio. The city's median value of owner-occupied housing units is about on par with Ohio at $130,700 compared to $130,800, respectively.

Table 10: Socio-Demographic data as they relate to Percent Urban Tree Canopy

% UTC	Average Median Income	Average Median Home Value	% with a Bachelor's Degree or higher	% Owner Occupied	% White
0-25%	46,141	138,391	34%	48%	66%
26-50%	49,986	140,573	35%	56%	65%
51-100%	79,307	241,534	51%	65%	79%

Ecosystem Services

Tree Canopy Ecological Benefits

Tree canopy and urban forests provide many benefits and ecosystem services that can be associated to economic costs or savings. While trees provide a multitude of benefits that cannot be valuated, such as wildlife habitat, mental and physical well-being, noise abatement, and energy savings from summer cooling and winter wind block, estimates here are drawn from those which have an associated monetary value. Of these quantifiable ecosystem services, it is estimated that trees in Columbus provide approximately **$12,151,446** in savings to the community each year from air pollution removal and carbon sequestration services alone. At 22%, the urban tree canopy provides an estimated value of **$9,614,191** in air pollution removal by the urban forest and **$2,537,254** in annual carbon storage and sequestration. These values were derived using the United States Department of Agriculture (USDA) i-Tree Canopy software tools. Using those monetary values provided by Columbus' current tree canopy, increases or decreases can be projected and quantified. Table 11 shows multiple scenarios of UTC change and the subsequent savings or loss in dollars associated with ecosystem service benefits. Considering the extent of benefits that cannot be measured, these estimates are very conservative.

Table 11: Urban Tree Canopy and Associated Ecosystem Service Values

Percent Canopy Cover	Ecosystem Services Estimated Value
40% American Forests Recommendation	**$22,502,677**
27.3% Green Memo III Goal	**$15,358,077**
22% Current Urban Tree Canopy	**$12,151,446**
16.5% Potential Loss due to EAB and ALB	**$9,282,354**
0% No Canopy Cover	**$0**

Ecosystem service benefits were also analyzed for Planning Areas. Since Eastland/Brice (Plan Area 24) has the greatest amount of UTC, it follows that it also provides the greatest value of ecosystem services, with an estimated value of **$915,571**. Table 12 lists the top 5 Planning Areas for value of ecosystem service benefits. The complete table can be found in the Appendix of this report on page 85.

Table 12: Top 5 Planning Areas for Ecosystem Services Benefits

Plan Area ID	Planning Area	UTC acres	Ecosystem Benefit Value
24	**Eastland/Brice**	2,347	$915,571
4	**Rocky Fork-Blacklick**	2,099	$818,896
6	**Northland**	2,093	$816,695
20	**Eastmoor/Walnut Ridge**	2,079	$811,373
11	**North Linden**	1,880	$733,673

Tree Canopy Hydrological Benefits

This assessment utilized i-Tree Hydro, a modeling program developed by the United States Department of Agriculture (USDA), to estimate streamflow response to land cover changes. Using United States Geological Survey (USGS) streamflow data, hourly weather data, digital elevation data, soil properties, and various other parameters, estimates were generated for the change in volume of water due to canopy change, as well as for pollution loads.

Columbus' urban tree canopy provides a host of benefits to the city and its inhabitants. Generally speaking, a healthy tree canopy leads to more regulated streamflow by slowing down the rate at which stormwater reaches the channel (through interception and soil infiltration). Trees along the banks of rivers and streams help promote stability, mitigating erosion during large storm events. They also help to promote general soil structure and quality through nutrient cycling and providing decomposed organic matter for topsoil (Dunne & Leopold, 1978). The photos on the right show a healthy stream ecosystem (top) and one that has lost bank stability due to erosion (bottom).

For the purposes of this study, a topographic index (TI) for the city of Columbus was used to estimate runoff values within the city. It should be noted that this is a generalized method; there are many different processes that influence the hydrology in such a large area and many assumptions had to be made. A few of the assumptions that had to be made for this particular study can be found below, with more discussion in the Appendix of this report on page 86.

- All runoff reaches treatment plants. In reality, not all of it will end up at the plants due to ponding, depression storage, evaporation, etc.
- The chosen weather station accurately represents the **entire** city. In an ideal world, the station would be centrally located, at an average elevation, and have an extensive and verified data record.
- Runoff in this case was treated as just impervious flow. In reality, pervious flow has the potential to reach treatment plants through subsurface flow or overland flow.
- Monetary benefit values vary based on the study area, literature values, types of stormwater treatment structures, whether or not there are existing structures already in place, and countless other things. Further research/study is recommended to obtain more localized, accurate estimations.
- Uniform soil texture/structure across the entire study area as an input in i-Tree Hydro.

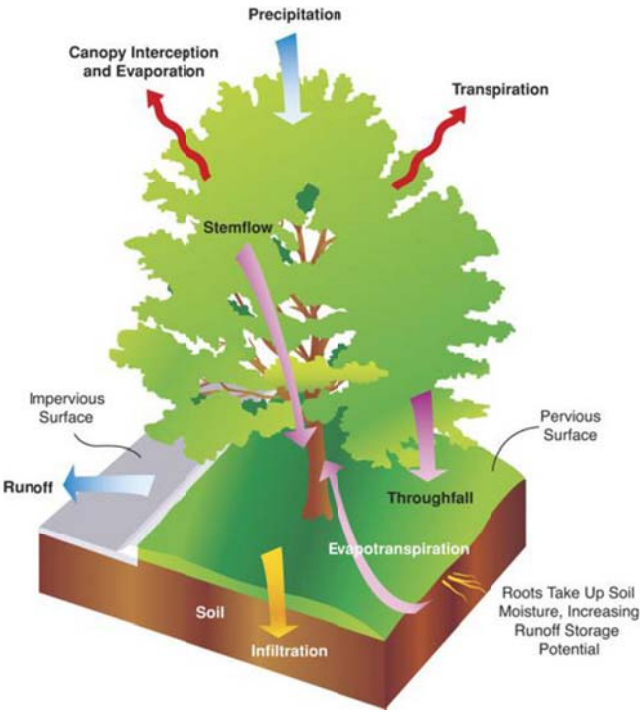


Figure 19: Graphic showing the hydrologic processes involving trees/tree canopy

Land Cover Scenarios:

1. **UTC increased to 40%:** Scenario in which UTC is increased to the American Forest recommended canopy value of 40%. Area was taken from impervious and vegetation land cover types based on the ratio between PPA Impervious and PPA Vegetation (determined to be approximately a 1:3 ratio).
2. **UTC increased to 27.3%:** Based on the Columbus' Green Community Plan, which recommends a minimum of 1% canopy growth annually over the next five years.
3. **Current Conditions (22.3%):** Determined from the UTC Assessment done as part of this study.
4. **Decrease to 16.5%:** This scenario is meant to illustrate the change in runoff in the event that every tree susceptible to the Emerald Ash Borer and Asian Long-horned Beetle pests were to be removed.
5. **Decrease to 0%:** All canopy in Columbus is removed and converted to impervious area and vegetation based on the determined ratio between PPA Impervious and PPA Vegetation.

Table 13: Summarized Hydro results for five separate land cover scenarios.
Included are UTC percentages, runoff values, percent change in volume, and estimated changes to treatment costs.

Scenario	UTC* (%)	Runoff** (m^3)	% Change	Change in Treatment Costs (Estimate)***
No Cover	0.0%	66,293,677	12%	$778,797,842
EAB/ALB Total Loss	16.5%	61,078,743	4%	$226,014,903
Current Conditions	22.3%	58,946,527	N/A	N/A
Green Memo Recommendation	27.3%	57,683,053	-2%	-$133,928,278
American Forest Recommendation	40.0%	53,588,290	-9%	-$567,973,171

** Land cover percentages for this model require that water area be included. Due to Plan-It Geo's established practice of using total land area for UTC metrics rather than total area, the percentages vary slightly when compared to the UTC Spreadsheet.*
*** For the purposes of this study, runoff was defined as i-Tree Hydro's impervious flow output.*
****Monetary values estimated at $106/cubic meter*

As shown in the table above, tree cover can have a dramatic effect on the hydrology of a city. Loss of all canopy in Columbus resulted in an estimated **12% increase** in the amount of runoff flowing over impervious surfaces. If all of this additional runoff were to reach treatment plants, the resulting added cost in treatment would be nearly **$779 million**. On the other hand, increasing canopy within the city limits to 40% would result in an estimated **9% decrease** to impervious runoff, saving the city approximately **$568 million**.

ANALYZING THREATS TO CANOPY

Figure 20: Emerald Ash Borer (Source: USFS)

The deleterious impacts to society from the associated loss of canopy include reduced property values, less mitigation of storm water runoff and air pollution, and increased urban heat island effect, to name just a few. Given the City's assumed decline in UTC for several decades, more needs to be done to preserve and enhance the existing tree canopy, and better information is needed to estimate the impact that the Emerald Ash Borer and other pests will have on UTC goals in Columbus.

Emerald Ash Borer

The Emerald ash borer (EAB) is one of, if not the most destructive forest pest in North American history, and it threatens billions of ash trees in landscapes and forests throughout Ohio and even as far west as Colorado. The EAB is an Asian tree pest which arrived in Michigan in 2002 (Miller, 2015) and is responsible for widespread destruction of valuable trees.

This study analyzed the potential Ash (Faxinus spp.) tree canopy loss from the EAB on both public and private lands, using canopy area averages from Ash trees inventoried within parks to estimate canopy loss. The results were reported both citywide as well as by Planning Areas. Private area canopy loss was estimated using the park inventory and validated by regional i-Tree Eco results. Based on the analysis, it is estimated that there are **218 acres** of total Ash tree canopy on public land, and an estimated **2,491 acres** of Ash tree canopy on private lands. These results suggest that the Ash tree canopy makes up an estimated **9%** of the total urban tree canopy.

Table 14: Estimated Canopy of Ash Trees on Public and Private Lands

Plan Area ID	Planning Area Name	Acres of Public Ash Canopy	% UTC Loss if Public Ash Trees are Removed	Acres of Estimated Private Ash Canopy (at 10.3%)	% UTC Loss if Public and Private Ash Trees are Removed
1	Hayden Run	9	12%	34	13%
2	Far Northwest	28	14%	117	11%
3	Far North	6	7%	101	10%
4	Rocky Fork-Blacklick	7	2%	178	9%
5	Northwest	11	4%	103	9%
6	Northland	8	2%	169	8%
7	Far West	10	16%	42	11%
8	West Scioto	9	3%	92	9%
9	West Olentangy	2	1%	80	8%
10	Clintonville	11	3%	122	8%
11	North Linden	10	2%	143	8%
12	Northeast	7	3%	107	9%
13	Near North/ University	6	4%	35	8%
14	South Linden	6	3%	79	9%
15	Hilltop	30	5%	124	9%
16	Franklinton	1	1%	19	7%
17	Greenlawn/ Frank Road	5	4%	59	9%
18	Downtown	1	2%	7	7%
19	Near East	6	4%	41	8%
20	Eastmoor/ Walnut Ridge	5	1%	170	8%
21	Far East	2	2%	98	9%
22	Near South	16	6%	89	9%
23	Far South	4	2%	126	9%
24	Eastland/Brice	4	0%	122	5%
25	Westland	11	8%	93	10%
26	Rickenbacker	0	0%	100	10%
27	Southeast	2	3%	41	10%
	TOTALS	218	3%	2,491	9%

Asian Long-horned Beetle

Figure 21: Asian Long Horned Beetle (Source: Johnson State College)

The Asian Long-horned Beetle (ALB) is another serious threat to Columbus's urban tree canopy. Similar to the analysis completed for the EAB, this study estimated the potential loss of urban tree canopy from the ALB on both public and private lands, considering the ALB sensitive tree population that is known to exist within the City's parks. The estimated canopy of ALB sensitive trees, as well as the potential percent canopy loss was reported citywide and within Planning Areas. On public lands, the estimated amount of ALB-sensitive trees make up **640 acres** of tree canopy, or 9% of the City's total UTC. On private land, the estimates yield **4,741 acres** of tree canopy. Combined, the estimated total citywide canopy of ALB-sensitive trees is **17%** of the entire urban tree canopy.

Table 15: Estimated Canopy of ALB-Sensitive Trees on Public and Private Lands

Plan Area ID	Planning Area Name	Acres Public ALB-Sensitive Canopy	% UTC Loss if Public ALB-Sensitive Trees are Removed	Acres of Estimated Private ALB-Sensitive Canopy (at 19.7%)	% UTC Loss if Public and Private ALB-Sensitive Trees are Removed
1	Hayden Run	9	12%	50	18%
2	Far Northwest	48	25%	224	20%
3	Far North	20	21%	194	20%
4	Rocky Fork-Blacklick	16	4%	339	17%
5	Northwest	20	7%	197	17%
6	Northland	67	15%	323	19%
7	Far West	12	19%	80	20%
8	West Scioto	13	5%	176	16%
9	West Olentangy	16	7%	153	17%
10	Clintonville	56	13%	232	18%
11	North Linden	29	6%	274	16%
12	Northeast	7	3%	205	17%
13	Near North/University	49	29%	68	23%
14	South Linden	19	10%	151	18%
15	Hilltop	57	10%	237	17%
16	Franklinton	9	8%	36	15%
17	Greenlawn/Frank Road	10	7%	112	17%
18	Downtown	6	13%	13	17%
19	Near East	36	20%	78	20%
20	Eastmoor/Walnut Ridge	64	15%	324	19%
21	Far East	5	4%	188	18%
22	Near South	37	14%	169	18%
23	Far South	13	7%	240	18%
24	Eastland/Brice	12	1%	233	10%
25	Westland	9	6%	177	18%
26	Rickenbacker	0	1%	191	18%
27	Southeast	1	2%	79	18%
	TOTALS	**640**	**9%**	**4,741**	**17%**

Bush Honeysuckle

The invasive bush Honeysuckle (Lonicera Mackii) grows rapidly and prevents sunlight from reaching plants attempting to grow underneath it. It inhabits abandoned fields, roadsides, woodlands, and edges of marshes. Data on its extent and distribution would help support and improve programs that remove it, such as the Columbus Ecological Restoration Program (CERP), and assist the City in managing this invasive species.

As part of this assessment, extensive exploration was done to investigate if it is possible to utilize leaf-off color-infrared (CIR) aerial photography and spectral remote sensing classification techniques to map areas with higher probability of honeysuckle. Known honeysuckle sites were provided by the City. While no specific mapping accuracy could be guaranteed, the task proved more problematic than initially understood. One of the challenges was managing the size of the CIR imagery to be used in the classification. Multiple attempts were made to resample the imagery to 1- and 2-foot resolution; however, the output imagery yielded 3-10 GB size files for each of 16 tiles. In addition to the resolution being too high for image classification and pre-processing, other concerns with the imagery included:

- Leaf-out had begun for native vegetation
- Confusion with lawn/turf grass with similar texture
- Confusion with branches and branch shadows
- Unknown shrubs exist with a similar texture, height and color
- Inconsistency in image quality among flight lines, such as graininess, shadow length, etc.

While masking out existing canopy might minimize confusion with conifers and branches, much of the targeted honeysuckle is below canopy, and such an approach would exclude most of the honeysuckle. Another challenge in this analysis was having a limited number of training samples available for classification and verification since they had to be collected from public lands. Figure 22 shows areas in Tuttle Park with medium-high (70%) honeysuckle density and Euonymus fortunei ground cover. The image on the left shows the 3-inch resolution CIR imagery and the image on the right shows the data resampled to 2-foot resolution.

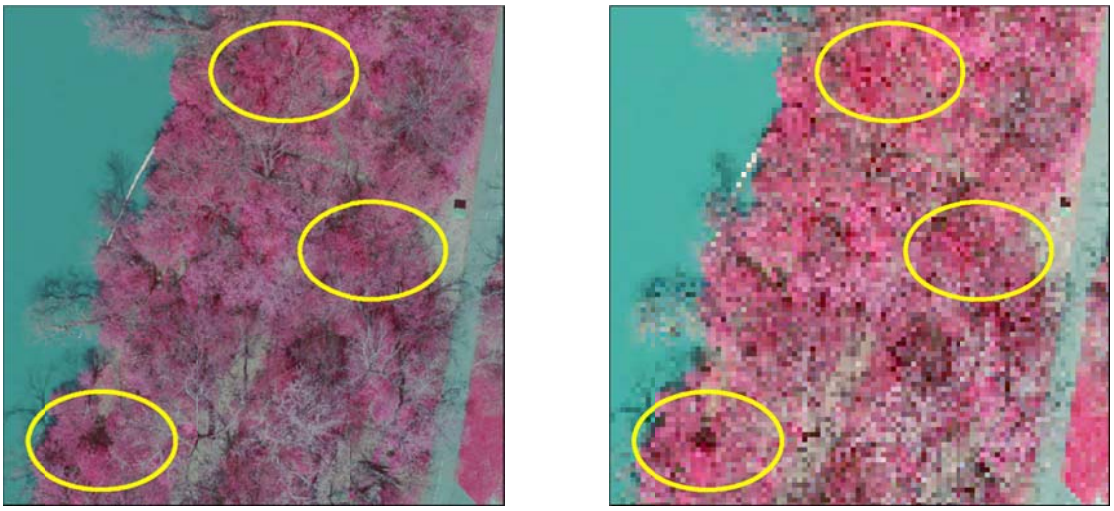


Figure 22: Honeysuckle Field Verification Sites in Tuttle Park against 3-inch and 2-foot Resolution CIR Imagery

Additional field verification sites in Alum Creek Parkland COH confirmed how challenging it is to distinguish honeysuckle from other types of vegetation in the imagery. In Figure 23, the green ellipse contains honeysuckle, goldenrod, burdock, and mid-story boxelder, black locust, ailanthus. The yellow ellipse in the top left corner contained Euonymus fortunei and no honeysuckle. The other three ellipses contained 50-60% honeysuckle.

Figure 23: Honeysuckle Field Verification Sites in Alum Creek Parkland COH

Considerations for future imagery collection

Considering the observations listed above, it was determined that if any imagery could work for this classification, the ideal specs would include satellite imagery between 0.5-1.0 meter resolution multispectral imagery (4-8 common spectral bands) acquired prior to native vegetation/canopy leaf-out. Many local invasive species including honeysuckle leaf-out roughly two weeks earlier than native vegetation and also maintain leaf-on roughly two weeks longer than native vegetation. Additionally, LiDAR data could be used to filter vegetation in the height range that honeysuckle grows. Where conifers were an issue, LiDAR could also help to separate them from honeysuckle with the proper timing of imagery collection. It may also be beneficial to collect aerial imagery during a drought year so that lawn/turf grass would be more distinguishable from honeysuckle.

Alternative Analyses

Alternatives exist to evaluate the magnitude of honeysuckle within Columbus. Since remote sensing analysis proved to be such a challenge, it may be more practical to perform an intensive ground sampling of honeysuckle in a handful of parks and then extrapolate the results to all others accordingly. The park samples should be distributed geographically and in terms of geology/ecology in order to create strata or stratifications. The City could use volunteers to assist with collection efforts, or create a web application to crowd-source the collection of honeysuckle abundance. Once estimates have been developed, a cost/benefit analysis should be done for removing and restoring honeysuckle areas.

RECOMMENDATIONS & STRATEGIES

The following recommendations and strategies address ways in which the City of Columbus can maximize the value of this report. The City should use these suggestions, along with the key findings in this report, as a starting point for an interdisciplinary goal-setting process and determination of priorities and strategies.

Recommendation 1: Columbus Forestry Takes the Lead in Growing Urban Canopy

The City of Columbus Forestry Division of the Recreation and Parks Department should take the lead in growing urban canopy within City owned lands, such as Parks and Right-of-Way (ROW). Urban tree canopy in ROW makes up 16% of the City's total UTC, but still offers 5,100 acres of additional vegetated planting area. Parks and parkland makes up 12% of the City's total UTC, and still offers 2,377 acres of additional vegetated planting area. Combined, this space provides an opportunity for the City to plant up to 259,182 total trees. If just half of this area was planted with 129,591 trees, the City could increase the UTC by 3,738 acres and bring the canopy cover up to 25%. Parks and ROW land only makes up 21% of the area of Columbus, however, limiting the impact the City can have on increasing UTC. It is critical that efforts are also made to engage private land owners.

Recommendation 2: Develop Future Canopy Goals Citywide and by Zoning Use Class

Suggested tree planting and canopy goals are presented citywide and within each zoning use class based on the distribution of UTC and PPA across each class. The following urban tree canopy scenarios have been evaluated:

1. No net loss of UTC in 5 years
2. 27% UTC which reflects the recommendation from the Columbus Green Community Plan—Green Memo III to increase canopy a minimum of 1% annually for the next five years
3. 40% UTC which reflects the average citywide recommendation from American Forests for cities east of the Mississippi River

The estimates to achieve these goals were derived from Plan-It Geo's Canopy Calculator spreadsheet tool. The following assumptions were used with growth, mortality, and regeneration rates based on urban forest research. Other parameters can easily be modified in the tool for additional scenarios.

- **Average Tree Size at Maturity:** 40-foot crown spread (20-foot radius)
- **New Tree Mortality:** 3%
- **Annual Mortality of Existing Canopy:** 7%
- **Annual Growth from Existing Canopy:** 6%
- **Natural Regeneration:** 3%
- **Annual Canopy Loss from New Development:** 10 acres

For the scenario of no net loss in 5 years, the City of Columbus would need a least 13,000 new large trees based on the assumptions above. No volume of new tree planting can offset a loss of canopy in a 5-year time period because the newly planted trees are small will not add substantially yet to overall canopy. Therefore, the most

effective means to control net loss in a short time span is by protecting existing canopy and maintaining (pruning, mulching, watering, etc.) existing trees with the potential to grow such as those planted within the past 10 or 20 years.

To increase canopy across the City to 27%, the City would have to plant and grow 238,281 large trees over the course of next 5 years. Spread out over 20 years, the City would have to plant and grow closer to 391,000 trees.

Table 16: Planting Time Table to Reach a 27% UTC Goal

Zoning Use Class	Total Land Acres	UTC Acres	Total Possible Planting (acres)	Current % UTC by Zoning Class	Future Canopy Goals	No Net Loss 5 years (22%)	# of Trees Required to Achieve 27% UTC Goal			
							5 Years	10 Years	15 Years	20 Years
Commercial	11,939	1,412	7,578	12%	20%	0	25,189	27,794	30,284	32,664
Industrial	26,883	3,613	11,889	13%	18%	0	37,613	43,880	49,853	55,545
Institutional	2,238	391	1,137	18%	23%	146	4,142	5,048	5,921	6,765
Mixed Use, Suburban	1,464	139	673	10%	15%	41	2,655	3,141	3,616	4,080
Mixed Use, Urban	1,578	147	559	9%	13%	0	1,987	2,487	2,974	3,451
Parking	94	14	71	15%	24%	206	507	786	1,063	1,339
Residential	73,037	21,748	30,263	30%	35%	11,714	142,099	178,544	213,216	246,201
Street ROW	21,283	3,389	5,113	16%	19%	1,292	24,089	29,984	35,602	40,957
Totals	**138,516**	**30,853**	**57,282**	**22%**	**27%**	**13,399**	**238,281**	**291,663**	**342,529**	**391,002**

To increase the canopy across the City to 40% as recommended by American Forests, the City would have to plant and grow 877,738 large trees over the course of 5 years, 931,120 new trees over the course of 10 years, 981,986 new trees over the course of 15 years, and 1,030,459 new trees over the course of 20 years. Achieving 30% or higher average UTC in Columbus will likely take at least 15 to 20 years. This will be impacted by planting, maintenance, protection (through ordinances and regulations), new development, storms, pests and diseases, and, ultimately, the community.

Table 17: Planting Time Table to Reach a 40% UTC Goal

Zoning Use Class	Total Land Acres	UTC Acres	Total Possible Planting (acres)	Current % UTC by Zoning Class	Future Canopy Goals	No Net Loss 5 years (22%)	# of Trees Required to Achieve 40% UTC Goal			
							5 Years	10 Years	15 Years	20 Years
Commercial	11,939	1,412	7,578	12%	39%	0	110,446	113,051	115,541	117,921
Industrial	26,883	3,613	11,889	13%	32%	0	171,988	178,255	184,228	189,921
Institutional	2,238	391	1,137	18%	39%	146	16,929	17,834	18,708	19,551
Mixed Use, Suburban	1,464	139	673	10%	29%	41	9,972	10,458	10,933	11,397
Mixed Use, Urban	1,578	147	559	9%	25%	0	8,746	9,245	9,733	10,209
Parking	94	14	71	15%	47%	206	1,277	1,556	1,833	2,109
Residential	73,037	21,748	30,263	30%	48%	11,714	481,098	517,544	552,216	585,201
Street ROW	21,283	3,389	5,113	16%	26%	1,292	77,282	83,176	88,795	94,150
Totals	**138,516**	**30,853**	**57,282**	**22%**	**40%**	**13,399**	**877,738**	**931,120**	**981,986**	**1,030,459**

Recommendation 3: Target New Plantings to Address City Priorities

Priority planting themes were developed by the Columbus Recreation and Parks Department in conjunction with the Greenspace Working Group (GSWG). Themes were ranked according to the members of the group, resulting in the following order of priorities. In addition to this report, a Canopy Planner website allows users to view and weight priorities at the Planning Area and Census Block Group scales (details on page 42), and a GIS dataset has been delivered that integrates priorities into parcel level data. The GIS dataset is discussed in more detail on page 38.

Priority 1: Urban Heat Island Mitigation

Development and urbanization is often an indicator of a healthy economy. One consequence of urban development is the increase of paved surfaces which also include deleterious environmental impacts such as increased storm water runoff, flooding, and increased temperatures experienced through the Urban Heat Island effect (UHI). Columbus' highest priority for locating potential planting sites are those that will help mitigate the urban heat island. Mitigating the impacts of urbanization through targeted tree planting and canopy growth can be a cost-effective strategy for government agencies, utilities, and the GSWG to improve public health for all Columbus residents. This study utilized the percent total impervious area by parcel to illustrate the concentration of heat emitting surfaces. This distribution is shown in Figure 24, representing the Urban Heat Island.

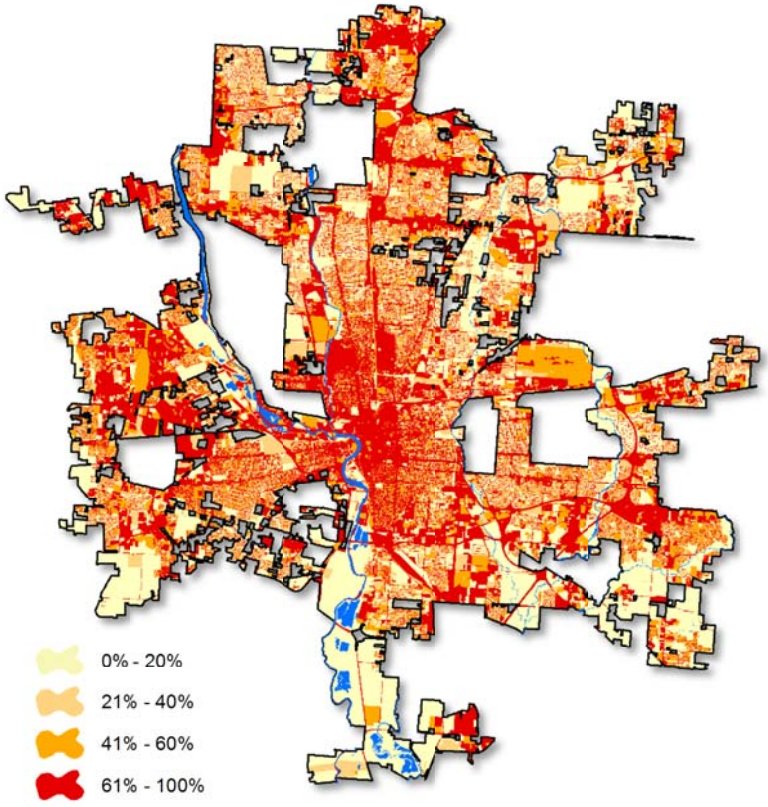


Figure 24: Percent Impervious by Parcel Illustrates the Urban Heat Island

By integrating zone use information into the parcel level data, we can highlight priority planting areas that may help mitigate the urban heat island broken out by residential, industrial, and commercial uses. This may help the City develop a more strategic outreach approach to encourage tree plantings on private property, and guide internal policies that could require tree plantings within new developments

Priority 2: Energy Conservation

Another high priority when identifying potential planting sites are those locations that may conserve energy. Trees provide a reduction in energy use in the summer by providing shade, and in the winter by reducing wind. By strategically planting trees in residential areas where the urban tree canopy is low, heating and cooling costs may be reduced, and the amount of energy required to achieve desired home temperatures will also be

reduced. A GIS dataset has been provided with this assessment that identifies residential properties where UTC is low (less than the Citywide average of 22%) and where the total PPA is greater than the average of residential parcels (greater than 38%).

Priority 3: Stormwater Reduction

The City of Columbus is addressing stormwater issues in a variety of ways. Planting trees where feasible within the City is one strategy to help manage stormwater by increasing absorption and reducing runoff. Many areas in the City contain wide arterial corridors and huge parking lots with sprawling impervious surfaces. By incorporating new plantings throughout parking lots and existing sidewalks, stormwater will be intercepted and the volume of water reaching storm sewers will be reduced. For example, the Target parking lot in the Consumer Square West Shopping Center contains very few trees as seen in Figure 25. Compare this to parking lots shown in Figure 26, where trees have been integrated throughout. There is a huge opportunity for the City of Columbus to integrate such plantings into the large surface parking lots. Planners and public officials should work with big box retailers to integrate plantings into surface parking lots, as well as work internally to add plantings to existing sidewalks within Rights-of-Way.

Figure 25: Target Parking Lot Lacking Trees in Columbus, Ohio (Source: Google Maps, 2015)

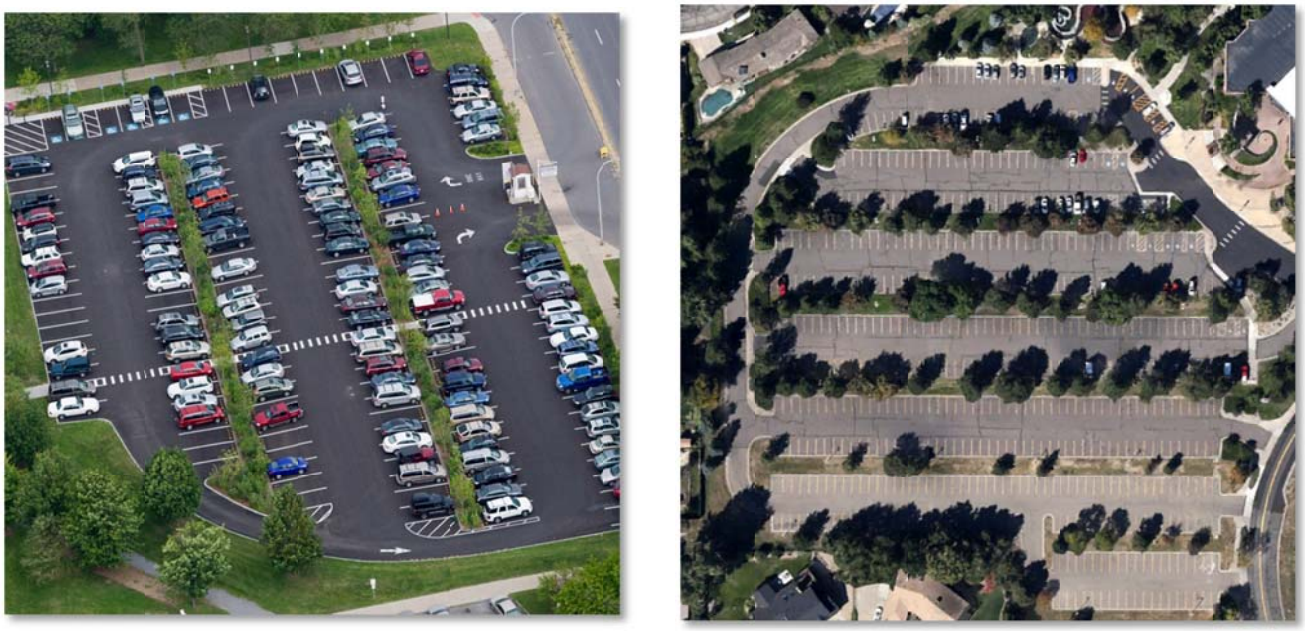


Figure 26: Parking Lots with Tree Plantings
Left: Trees in a Parking Lot in Onondaga County, NY (Source: Save the Rain website http://savetherain.us/)
Right: Trees in a parking lot in Arvada, Colorado (Source: Google Maps, 2015)

Priority 4: Water Quality

Trees and vegetation located adjacent to water resources provide a number of significant benefits to the natural environment. By focusing new tree plantings in the areas immediately surrounding rivers and streams (riparian areas) and other waterbodies, the City can improve water quality, help stabilize river banks and prevent erosion, and promote valuable habitats. As part of this assessment, riparian zones were mapped by buffering all surface water by 100 feet, and possible planting areas were determined within those zones. The total PPA within the City's riparian zones were then aggregated to the Planning Area and Census Block Groups and included in the Canopy Planner application tool. Through this tool, the City will be able to identify where the greatest planting opportunities are for improving water quality.

Priority 5: Socio-Demographic Relationships and Social Equity

This study identified a number of relationships between socio-demographics and urban tree canopy. New plantings should be targeted in areas with low income and low home values to improve the landscape and increase the ecosystem benefits in the poorer areas of Columbus. Figures 27 and 28 show Census Block Groups with below median income and below median home values, as well as less than the citywide average UTC of 22%. The Census data was obtained from the American Community Survey 5-year estimates from 2009-2013. Planning Area boundaries are overlaid for reference.

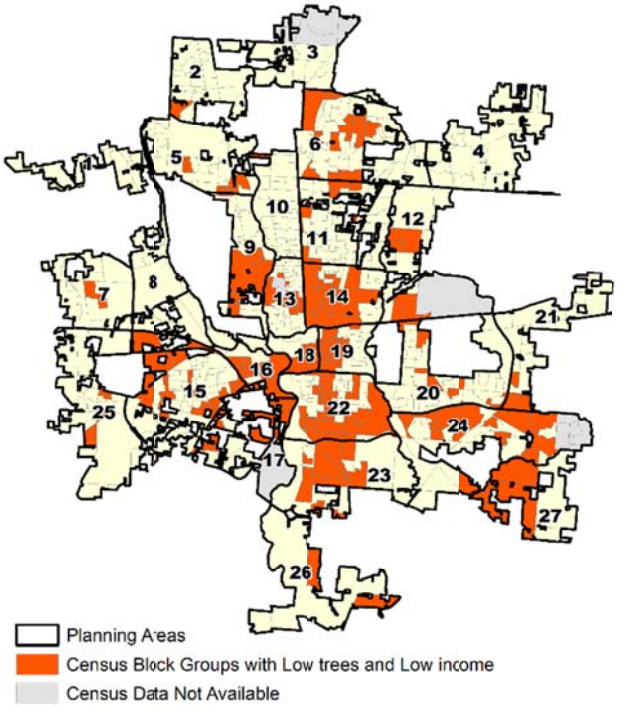


Figure 27: Census Block Groups Below Median Income and less than Average UTC

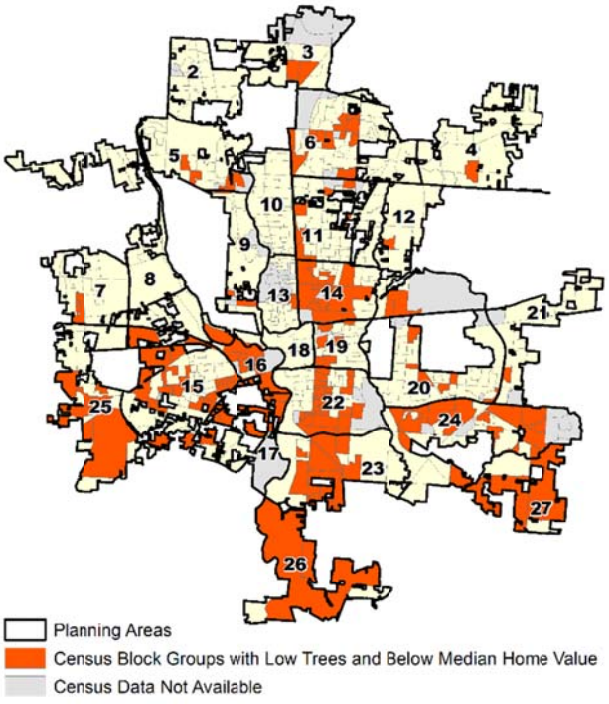


Figure 28: Census Block Groups Below Median Home Values and less than Average UTC

Priority 6: Improve Canopy Connectivity

Another priority for the City of Columbus is to increase connectivity among the existing tree canopy. Planting new trees adjacent to large tracts of existing canopy will help expand the greater canopy and fill in gaps over time. This is important for promoting wildlife migration and wildlife diversity supported by canopy connectivity. To guide this effort, canopy areas greater than or equal to 5 acres were identified and buffered by 100 feet. The PPA within these buffer zones were then summarized by Planning Areas and Census Block Groups and included in the Canopy Planner application tool.

Combined Priority Planting Areas by Parcel

Priority themes were integrated into parcel level data to identify where to target new plantings based on the greater citywide goals. Each parcel was given a total score depending on how many themes it addressed, and also given a weighted score considering the priority level. While the two resulting maps are quite similar, the weighted values draw more attention to the downtown area where the urban heat island is more intense, there are more impervious areas causing potential stormwater concerns, and where there is a greater number of households earning less than the median income. A GIS dataset was provided to the City allowing them to drill down to specific properties and to adjust the theme weighting as priorities change.

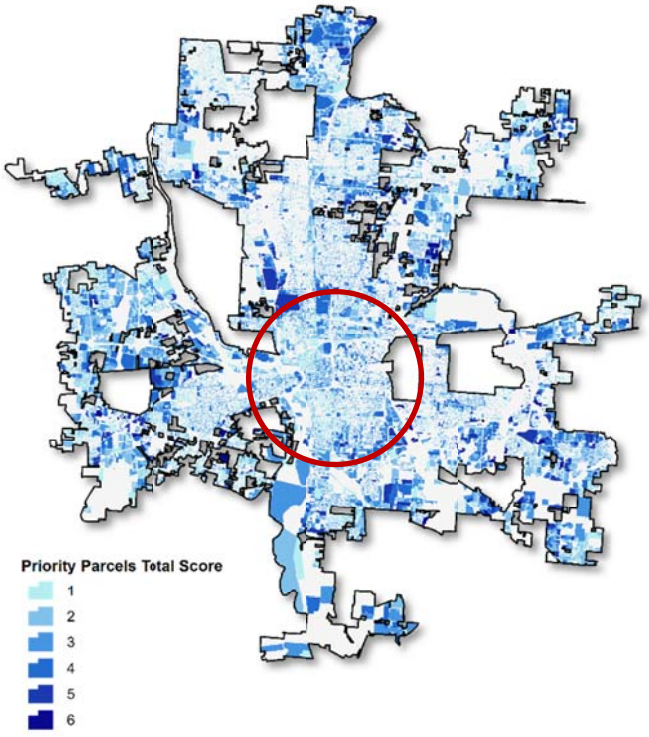


Figure 29: Priority Parcels Total Score

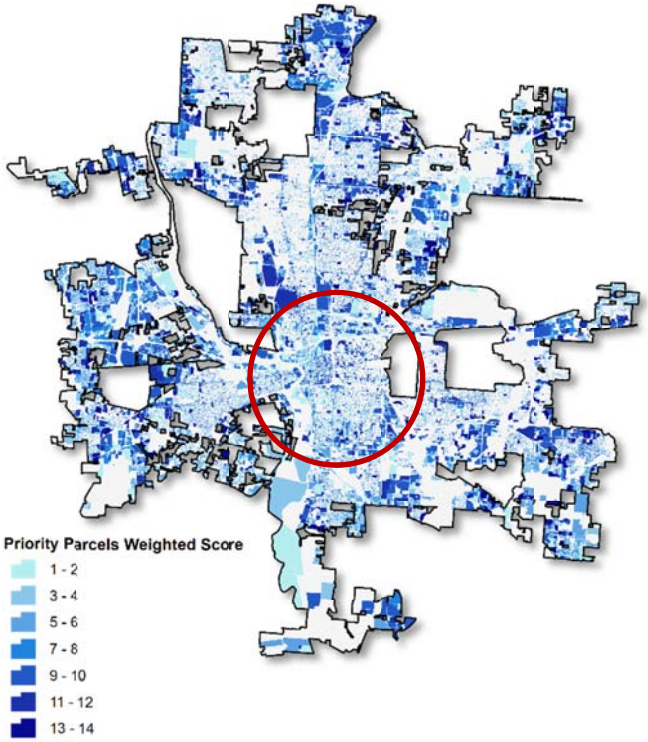


Figure 30: Priority Parcels Weighted Score

Recommendation 4: Develop an Urban Forest Management Plan

The City of Columbus Recreation and Parks Department should work with other city departments, partner agencies, and stakeholders to develop an official urban forest management plan to provide a shared vision and guide policy. The information presented in this report can be used to establish canopy cover goals for the short and long term, while an arborist, city forester, or urban forester will be needed to increase inspection, maintenance, and enforcement. Tree-related policies and ordinances should also be established to achieve management planning objectives and canopy goals.

Recommendation 5: Engage the Community

Community engagement is an important component of achieving planting goals and gaining support for new policies. Engage the community through continuing tree planting events targeting areas with low UTC and high PPA. Continue outreach to residents by expanding educational trainings and workshops and promoting this project's associated public web mapping applications. The City should also foster partnerships with local businesses, big box stores such as Target, community groups, vendors, the tree service industry, and Home Owners Associations.

Recommendation 6: Utilize this Assessment and Associated Tools

The results of this assessment can and should be used to encourage investment in forest monitoring, maintenance, and management, and to develop targeted presentations for city leaders, planners, engineers, resource managers, and the public on the functional benefits of trees in addressing environmental issues. The land cover data should be disseminated to diverse partners for urban forestry and other applications while the data is current and most useful for decision-making and implementation planning. The City should also utilize the additional tools provided, including the Canopy Calculator and the Canopy Planner web application to inform decisions and engage stakeholders. Canopy cover should be re-assessed in no less than 10-year intervals, and use LiDAR data if available, aiming for 95% minimum overall accuracy.

APPENDIX

Accuracy Assessment

Classification accuracy serves two main purposes: First, accuracy assessments provide information to technicians producing the classification about where processes need to be improved and where they are effective. Secondly, measures of accuracy provide information about how to use the classification and how well land cover classes are expected to estimate actual land cover on the ground. Even with high resolution imagery, very small differences in classification methodology and image quality can have a large impact on overall map area estimations. The classification accuracy error matrix illustrated in Table 18 contains confidence intervals that report the high and low values that could be expected for any comparison between the classification data and what actual, on the ground land cover was in 2013.

The internal accuracy assessment was completed in five (5) steps

1. One thousand (1,000) sample points were randomly distributed across the study area and assigned a random numeric value.
2. Sorting from lowest random value to highest, each sample point was referenced using the NAIP imagery and assigned one of the five land cover classes ("Ref_ID") mentioned above.
3. In the event that the reference value could not be discerned from the imagery, the point was dropped from the accuracy analysis.
4. An automated script was then used to assign values from the classification raster to each point ("Eval_ID"). The classification supervisor provides unbiased feedback to quality control technicians regarding the types of corrections required. Misclassified points (where reference ID does not equal evaluation ID) and corresponding land cover are inspected for necessary corrections to the land cover[1].

Accuracy is re-evaluated (repeat steps 3 & 4) until an acceptable classification accuracy is achieved.

Sample Error Matrix Interpretation

Statistical relationships between the reference pixels (representing the true conditions on the ground) and the intersecting classified pixels are used to understand how closely the entire classified map represents the Columbus, OH landscape. The sample error matrix (Table 18) represents the intersection of reference pixels manually identified by a human observer (columns) and classification category of pixels in the classified image (rows). The white boxes along the diagonals of the matrix represent agreement between the two pixel maps. Off-diagonal values represent the number pixels manually referenced to the column class that were classified as another category in the classification image. Overall accuracy is computed by dividing the total number of correct pixels by the total number of pixels reported in the matrix (For municipal areas: 261+311+342+10+28 = 952 / 991 = 96%), and the matrix can be used to calculate per class accuracy percent's. For example, 266 points

[1] Note that by correcting locations associated with accuracy points, bias is introduced to the error matrix results. This means that matrix results based on a new set of randomly collected accuracy points may result in significantly different accuracy values.

were manually identified in the reference map as Tree Canopy, and 261 of those pixels were classified as Tree Canopy in the classification map. This relationship is called the "Producer's Accuracy" and is calculated by dividing the agreement pixel total (diagonal) by the reference pixel total (column total). Therefore, the Producer's Accuracy for Tree Canopy is calculated as: (261/266 = .98), meaning that we can expect that ~98% of all tree canopy in the Columbus, OH study area were classified as Tree Canopy in the classification map.

Table 18: Sample error matrix for land cover classification within municipal areas in Columbus, OH

		Reference Data					
		Tree Canopy	Impervious	Vegetation	Soil / Dry Veg.	Water	Total Reference Pixels
Classification Data	Tree Canopy	261	6	5	0	0	272
	Impervious	3	311	13	1	0	328
	Vegetation	2	13	342	0	0	357
	Soil/Dry Veg.	0	4	1	10	1	16
	Water	0	0	0	0	28	28
	Total	266	334	361	11	29	1001
			Overall Accuracy =	95%			

Producer's Accuracy		User's Accuracy	
Tree Canopy	96%	Tree Canopy	96%
Impervious	95%	Impervious	95%
Vegetation	96%	Vegetation	96%
Soil/Dry Veg.	63%	Soil/Dry Veg.	63%
Water	100%	Water	

Conversely, the "User's Accuracy" is calculated by dividing the number agreement pixel total by the total number of classified pixels in the row category. For example, 261 classification pixels intersecting reference pixels were classified as Tree Canopy, but 5 pixels were identified as Vegetation and 6 pixels were identified as Impervious in the reference map. Therefore, the User's Accuracy for Tree Canopy is calculated as: (261/272 = 0.96), meaning that pixels classified as Tree Canopy in the classification were actual tree canopy in Columbus, OH. It is important to recognize the Producer's and User's accuracy percent values are based on a sample of the true ground cover, represented by the reference pixels at each sample point.

Results

Interpretation of the sample error matrix results indicates this land cover is accurately mapped in Columbus, OH. The most reliable classes are water and canopy cover. The largest source of classification confusion exists between impervious surfaces, vegetation, and soil / dry vegetation. This confusion is largely the result of human interpretation in that the interpreter must determine when a gravel parking lot should be considered pervious or impervious, or whether existing vegetation is living (green) or dry (brown).

Associated Tools

Plan-It Geo's Study Landing Page, Canopy Calculator, and Canopy Planner Tools provide additional value to this urban canopy assessment. These tools allow the general public and various stakeholders to not only view, but also interact with the tree canopy data that has been developed.

Page and Content Management System

The web tools provided as part of this assessment have been linked to through a landing page advertising the UTC assessment results, basic information, photos, and tool links. Visit the page at *ColumbusCanopy.com*

Canopy Calculator

The Canopy Calculator is a tool that allows users to input canopy goals and associated timeframes in order to quantify how many new trees are needed to reach those goals. The Calculator enables a user to adjust the average tree crown diameter, distribution of tree sizes, and the impact of tree planting, forest regeneration, development, and tree mortality. It can be used to determine (1) how many trees are required to reach a particular UTC goal or (2) what impact on UTC will planting new trees have (both operate citywide and by land use classes, forest management zones, etc.). Plan-It Geo has customized the Canopy Calculator tool for Columbus with current UTC and PPA metrics according to Zone Use Classes. It should be used long-term to reassess goals as conditions change over time and the City/GSWG need to adapt.

Columbus, Ohio

Land Use Classes	Current: Total Land (Acres)	Current: Existing UTC (Acres)	Current: Existing UTC (%)	Current: Total Possible Planting Area (Acres)	Current: Total Possible Planting Area (%)	Goals: Urban Tree Canopy (%)	Goals: Urban Tree Canopy (No. Trees)	Predictions: (+) Natural Regeneration (Acres)	(+) Natural Regeneration (%)	(+/-) Canopy Growth & Mortality (Acres)	(+/-) Canopy Growth & Mortality (%)	(-) Loss to Development (Acres)	(-) Loss to Development (%)	(+) Tree Planting Required (Acres)	(+) Tree Planting Required (No. Trees)	(=) Net UTC Increase (Acres)	(=) Net UTC Increase (%)	(=) UTC in 2025 (Acres)	(=) UTC in 2025 (%)
Commercial	12,025	1,412	11.7%	7,578	63%	20%	-	227	16%	(135)	-10%	(11)	-1%	942	32,668	993	70%	2,405	20%
Industrial	28,457	3,613	12.7%	11,889	42%	20%	-	357	10%	(345)	-10%	(11)	0%	2,144	74,317	2,078	58%	5,691	20%
Institutional	2,278	391	17.2%	1,137	50%	20%	-	34	9%	(37)	-10%	(11)	-4%	85	2,934	65	17%	456	20%
Mixed Use, Suburban	1,516	139	9.2%	673	44%	18%	-	20	15%	(13)	-10%	(11)	-10%	146	5,044	134	96%	273	18%
Mixed Use, Urban	1,693	147	8.7%	559	33%	15%	-	17	11%	(14)	-10%	(11)	-10%	122	4,232	107	73%	254	15%
Parking	95	14	14.7%	71	75%	17%	-	2	15%	(1)	-10%	(11)	-102%	16	559	2	15%	16	17%
Residential	74,028	21,748	29.4%	30,263	41%	40%	-	908	4%	(2,079)	-10%	(11)	0%	9,321	323,088	7,863	36%	29,611	40%
Street ROW	22,228	3,389	15.2%	5,113	23%	25%	-	153	5%	(324)	-10%	(11)	0%	2,424	84,009	2,168	64%	5,557	25%
Citywide Total	**142,320**	**30,853**	**22%**	**57,283**	**40%**	**31%**	**526,849**	**1,718**	**6%**	**(2,950)**	**-10%**	**(111)**	**0%**	**15,199**	**526,849**	**13,410**	**43%**	**44,263**	**31%**

*Change Calculated after 10 Years

Figure 31: The Canopy Calculator Tool Populated with Columbus Metrics

Canopy Planner

Canopy Planner provides an easily accessible web-viewer for visualizing and utilizing UTC data results. The core Canopy Planner tool includes the following functionality:

- Planner Dashboard: Quickly view City-Wide key findings through the Planner Dashboard.
- Canopy Viewer: Query data results by analysis area to gain a deeper understanding of key findings.
- Mapping: Drill down into results to view and print custom maps to facilitate forest management planning.
- Calculator: A web-version of our Canopy Calculator tool allows users to estimate tree planting and/or tree canopy as they relate to tree canopy goals.

The UTC data created in this study, i-Tree benefit values, Potential UTC, and priority planting areas have been used as inputs to Canopy Planner, and provide a summary interface of ongoing canopy cover trends in a web dashboard. These tools are accessible, visual, and easy to use by multiple users, with no software to install. They provide easy ways to make custom maps of canopy cover and more.

Figure 32: Image of the Canopy Planner Web Application, ColumbusCanopy.com

Comprehensive Assessment Area Results

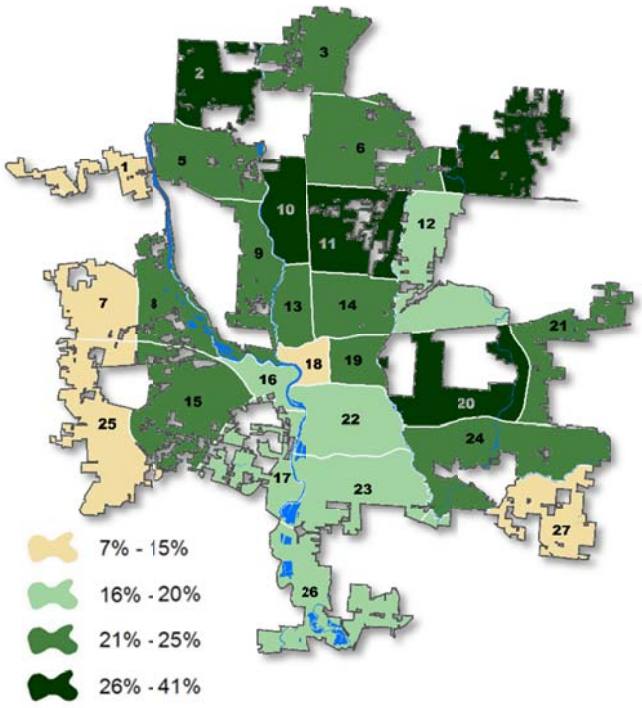
This Urban Tree Canopy (UTC) Assessment of Columbus, OH was conducted by Plan-It Geo, LLC for the City of Columbus. This assessment examined existing urban tree canopy (UTC) in Columbus across several geographic boundaries to assist in developing an urban forest management plan. This section provides the complete results for each target geography, as well as maps showing the distribution of the results of UTC, Total PPA, PPA-Vegetation, and PPA-Impervious.

Analysis results are as follows:

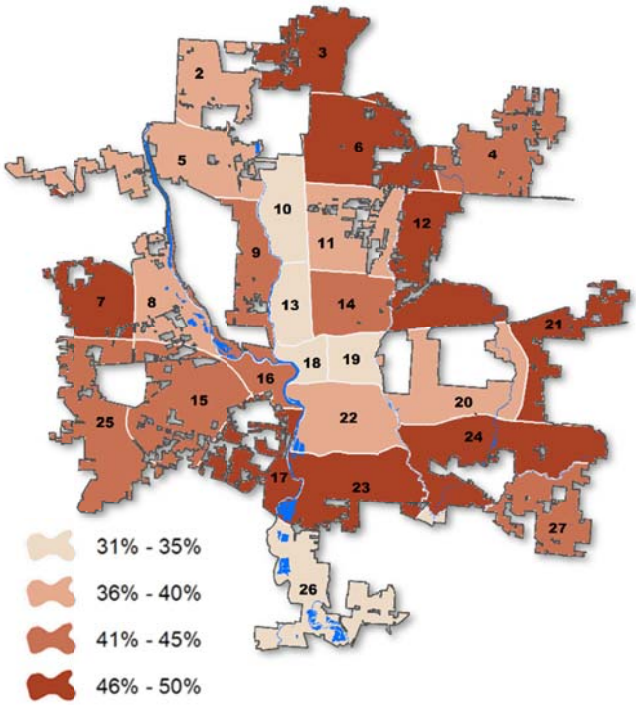
1. Planning Areas
2. Forestry Management Zones
3. Rights-of-Way within Forestry Management Zones
4. Parks and Parkland
5. Watersheds
6. BluePrint Columbus Project Areas
7. Neighborhoods
8. Census Block Groups and Socio-Demographics
9. Emerald Ash Borer Tree Canopy Estimates
10. Asian Long-horned Beetle Tree Canopy Estimates
11. Ecosystem Services Results

City of Columbus Geographic Summary: Planning Areas

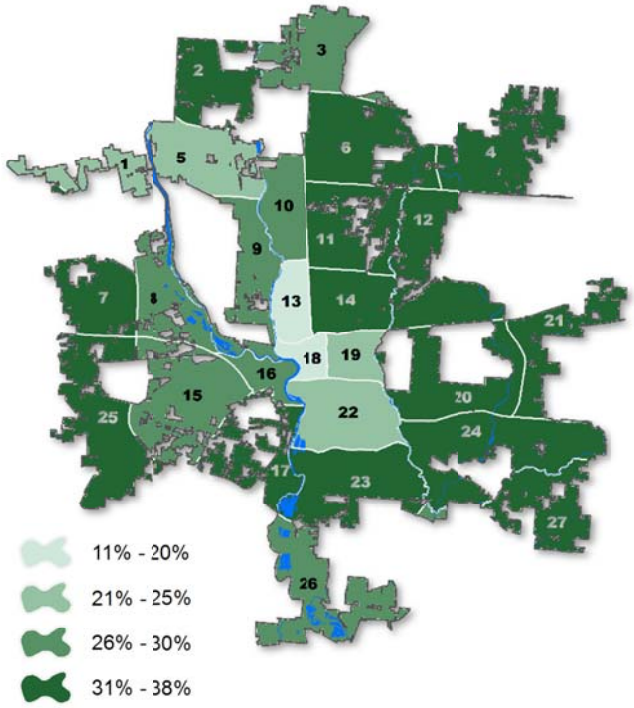
Percent Urban Tree Canopy



Percent Possible Planting Areas (Total)



Percent Possible Planting Areas (Vegetation)



Percent Possible Planting Areas (Impervious)

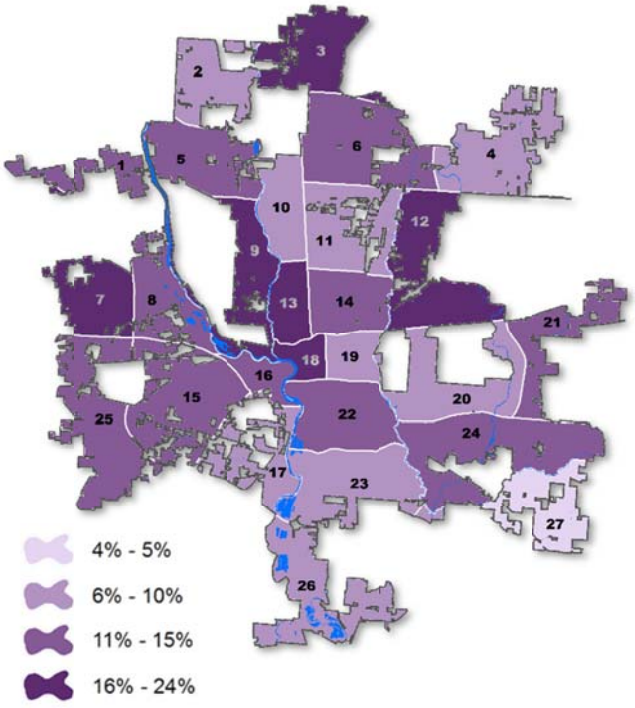


Figure 33: Planning Area Assessment Results

City of Columbus Geographic Summary: Planning Areas

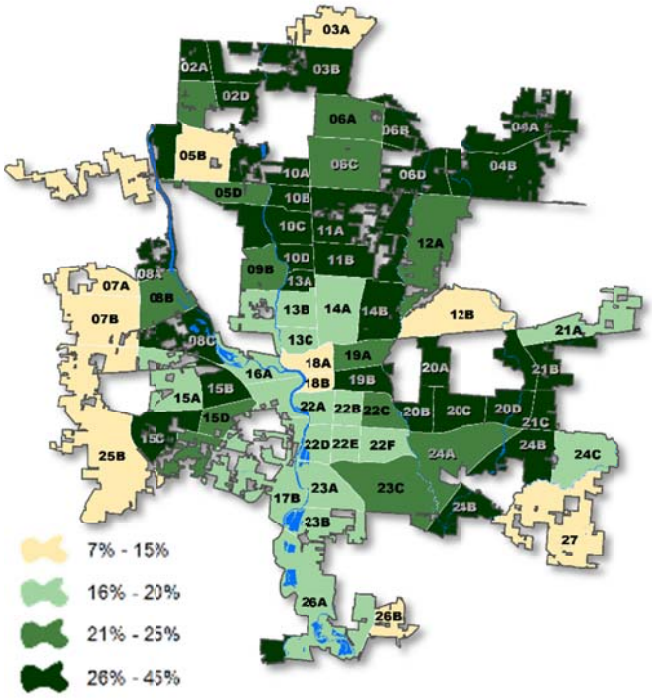
This table summarizes the UTC metrics by Columbus, OH Planning Areas in Acres and % including Urban Tree Canopy (UTC), Possible Planting Area Vegetation (PPA Vegetation), Possible Planting Area Impervious (PPA Impervious), Total Possible Planting Area (Total PPA), and Areas Unsuitable for Planting (Unsuitable)

Table 19: Planning Area Assessment Results

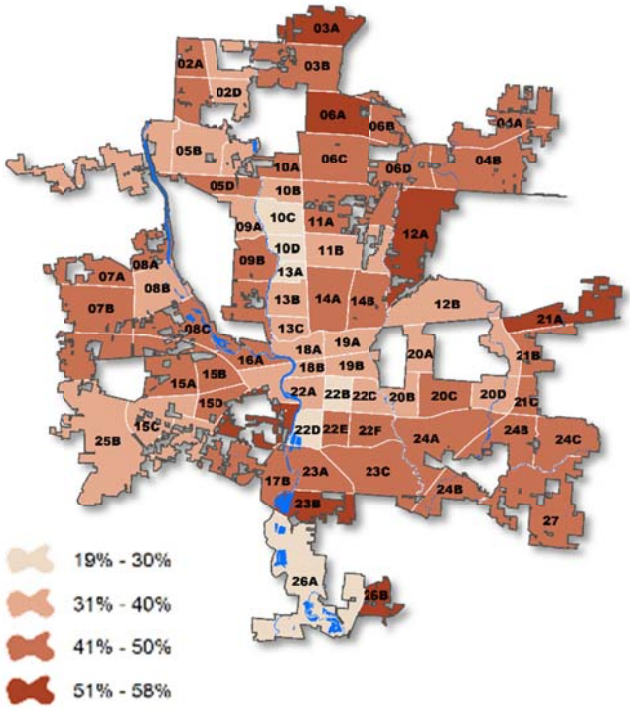
Plan Area ID	Plan Area Name	Total Land Acres	UTC Acres	UTC %	% of Total UTC	PPA (Veg.) Acres	PPA (Veg.) %	PPA (Imp.) Acres	PPA (Imp.) %	Total PPA Acres	Total PPA %	Unsuitable UTC (acres)	Unsuitable UTC %
1	**Hayden Run**	2,360	327	14%	1%	557	24%	283	12%	840	36%	1,320	56%
2	**Far Northwest**	4,405	1,332	30%	4%	1,352	31%	374	8%	1,726	39%	1,379	31%
3	**Far North**	5,264	1,079	20%	3%	1,491	28%	1,000	19%	2,491	47%	1,762	33%
4	**Rocky Fork-Blacklick**	6,923	2,099	30%	7%	2,399	35%	580	8%	2,979	43%	1,973	29%
5	**Northwest**	5,603	1,301	23%	4%	1,363	24%	726	13%	2,088	37%	2,407	43%
6	**Northland**	8,322	2,093	25%	7%	2,603	31%	1,245	15%	3,847	46%	2,446	29%
7	**Far West**	4,542	468	10%	2%	1,403	31%	749	16%	2,152	47%	2,008	44%
8	**West Scioto**	4,575	1,182	26%	4%	1,322	29%	502	11%	1,824	40%	2,015	44%
9	**West Olentangy**	4,432	1,001	23%	3%	1,168	26%	751	17%	1,918	43%	1,760	40%
10	**Clintonville**	3,880	1,600	41%	5%	990	26%	255	7%	1,245	32%	1,074	28%
11	**North Linden**	5,867	1,880	32%	6%	1,835	31%	503	9%	2,338	40%	1,670	28%
12	**Northeast**	7,237	1,277	18%	4%	2,189	30%	1,110	15%	3,299	46%	2,911	40%
13	**Near North/ University**	2,607	515	20%	2%	402	15%	414	16%	816	31%	1,318	51%
14	**South Linden**	4,507	959	21%	3%	1,400	31%	558	12%	1,958	43%	1,601	36%
15	**Hilltop**	7,807	1,777	23%	6%	2,274	29%	949	12%	3,223	41%	2,830	36%
16	**Franklinton**	1,787	292	16%	1%	471	26%	252	14%	723	40%	900	50%
17	**Greenlawn/ Frank Road**	3,741	713	19%	2%	1,366	37%	330	9%	1,696	45%	1,536	41%
18	**Downtown**	1,497	108	7%	0%	157	10%	361	24%	518	35%	929	62%
19	**Near East**	2,310	573	25%	2%	538	23%	211	9%	749	32%	998	43%
20	**Eastmoor/ Walnut Ridge**	6,235	2,079	33%	7%	1,888	30%	436	7%	2,324	37%	1,884	30%
21	**Far East**	4,449	1,074	24%	3%	1,588	36%	635	14%	2,223	50%	1,191	27%
22	**Near South**	6,003	1,118	19%	4%	1,416	24%	686	11%	2,102	35%	2,985	50%
23	**Far South**	7,104	1,415	20%	5%	2,600	37%	704	10%	3,304	47%	2,739	39%
24	**Eastland/Brice**	9,478	2,347	25%	8%	3,094	33%	1,153	12%	4,247	45%	3,132	33%
25	**Westland**	7,764	1,036	13%	3%	2,329	30%	813	10%	3,142	40%	3,730	48%
26	**Rickenbacker**	6,176	1,047	17%	3%	1,595	26%	361	6%	1,956	32%	4,043	65%
27	**Southeast**	4,559	450	10%	1%	1,741	38%	166	4%	1,907	42%	2,319	51%
	TOTALS	**139,435**	**31,143**	**22%**	**100%**	**41,533**	**30%**	**16,106**	**12%**	**57,639**	**41%**	**54,859**	**38%**

City of Columbus Geographic Summary: Forestry Management Zones

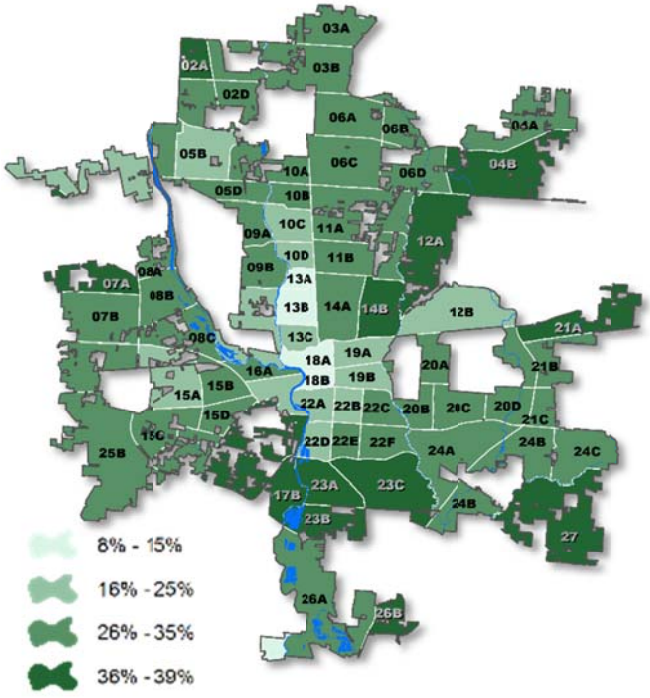
Percent Urban Tree Canopy



Percent Possible Planting Areas (Total)



Possible Planting Areas (Vegetation)



Possible Planting Areas (Impervious)

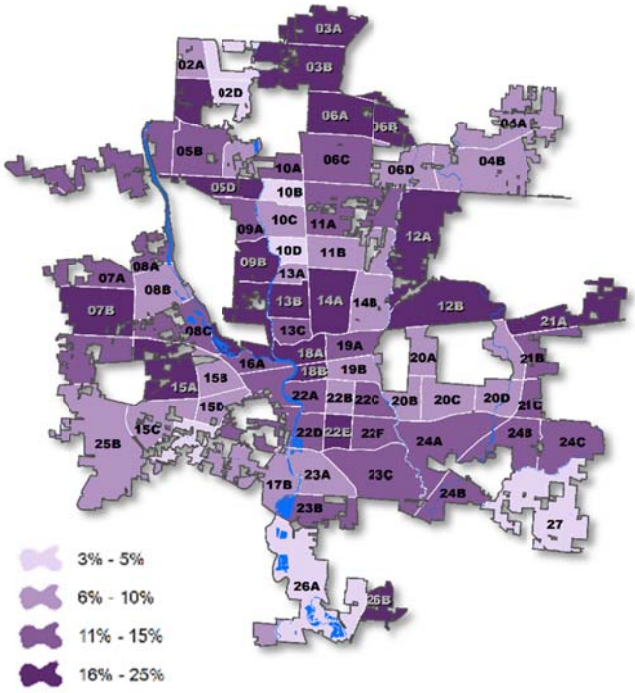


Figure 34: Forestry Management Zone Assessment Results

City of Columbus Geographic Summary: Forestry Management Zones

This table summarizes the UTC metrics by Forestry Management Zones in Acres and % including Urban Tree Canopy (UTC), Possible Planting Area Vegetation (PPA Vegetation), Possible Planting Area Impervious (PPA Impervious), Total Possible Planting Area (Total PPA), and Areas Unsuitable for Planting (Unsuitable).

Table 20: Forestry Management Zone Assessment Results

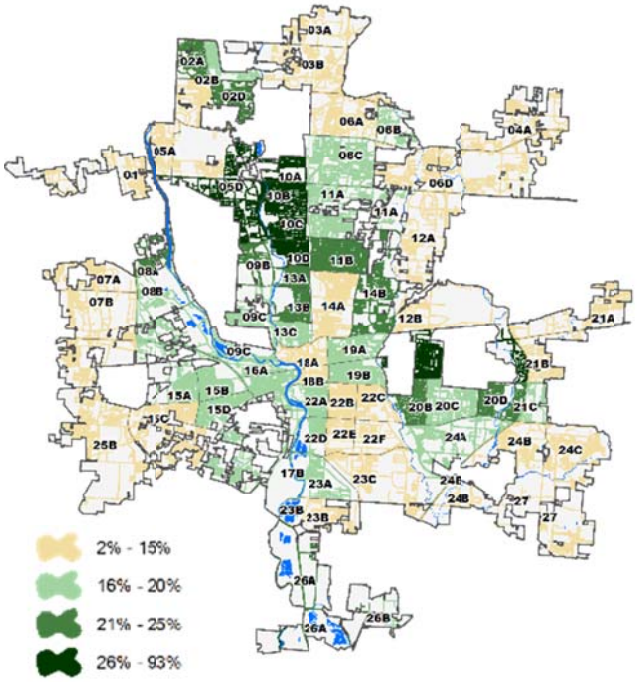
Forestry Mgmt. Zone	Total Land Acres	UTC Acres	UTC %	% of Total UTC	PPA (Veg.) Acres	PPA (Veg.) %	PPA (Imp.) Acres	PPA (Imp.) %	Total PPA Acres	Total PPA %	Unsuitable UTC (acres)	Unsuitable UTC %
1	2,360	327	14%	1%	557	24%	283	12%	840	36%	1,320	56%
02A	976	284	29%	1%	343	35%	65	7%	408	42%	290	30%
02B	1,073	373	35%	1%	320	30%	30	3%	350	33%	356	33%
02C	1,258	279	22%	1%	354	28%	241	19%	595	47%	397	32%
02D	1,098	396	36%	1%	335	31%	39	4%	374	34%	336	31%
03A	2,073	219	11%	1%	607	29%	504	24%	1,111	54%	780	38%
03B	3,191	860	27%	3%	884	28%	497	16%	1,381	43%	982	31%
04A	2,782	703	25%	2%	941	34%	254	9%	1,195	43%	927	33%
04B	4,142	1,396	34%	4%	1,459	35%	325	8%	1,784	43%	1,047	25%
05A	1,102	278	25%	1%	280	25%	154	14%	434	39%	451	41%
05B	2,306	329	14%	1%	485	21%	253	11%	738	32%	1,307	57%
05C	865	375	43%	1%	243	28%	51	6%	295	34%	246	28%
05D	1,329	318	24%	1%	354	27%	267	20%	622	47%	403	30%
06A	2,348	492	21%	2%	733	31%	441	19%	1,174	50%	696	30%
06B	1,112	319	29%	1%	319	29%	202	18%	521	47%	280	25%
06C	3,008	708	24%	2%	907	30%	418	14%	1,324	44%	1,003	33%
06D	1,854	574	31%	2%	644	35%	184	10%	828	45%	467	25%
07A	1,624	170	10%	1%	590	36%	219	13%	808	50%	665	41%
07B	2,919	298	10%	1%	814	28%	530	18%	1,344	46%	1,343	46%
08A	915	253	28%	1%	258	28%	110	12%	367	40%	491	54%
08B	1,935	449	23%	1%	545	28%	192	10%	738	38%	828	43%
08C	1,725	480	28%	2%	519	30%	200	12%	719	42%	696	40%
09A	1,057	356	34%	1%	299	28%	108	10%	406	38%	306	29%
09B	1,465	328	22%	1%	423	29%	223	15%	647	44%	520	35%
09C	1,910	317	17%	1%	446	23%	420	22%	865	45%	934	49%
10A	884	323	37%	1%	250	28%	109	12%	359	41%	207	23%
10B	841	339	40%	1%	237	28%	31	4%	269	32%	239	28%
10C	1,364	616	45%	2%	326	24%	78	6%	404	30%	361	26%
10D	790	322	41%	1%	176	22%	37	5%	213	27%	268	34%
11A	3,383	1,045	31%	3%	1,017	30%	376	11%	1,393	41%	959	28%
11B	2,484	835	34%	3%	818	33%	127	5%	945	38%	711	29%
12A	3,763	912	24%	3%	1,428	38%	581	15%	2,009	53%	893	24%
12B	3,474	366	11%	1%	762	22%	529	15%	1,290	37%	2,018	58%
13A	538	163	30%	1%	80	15%	41	8%	121	23%	263	49%
13B	1,262	209	17%	1%	181	14%	262	21%	443	35%	637	50%
13C	807	143	18%	0%	141	17%	111	14%	252	31%	418	52%
14A	2,476	388	16%	1%	649	26%	379	15%	1,028	42%	1,064	43%
14B	2,031	571	28%	2%	751	37%	180	9%	930	46%	536	26%
15A	2,379	375	16%	1%	592	25%	560	24%	1,152	48%	858	36%
15B	1,339	341	25%	1%	428	32%	110	8%	538	40%	462	34%
15C	1,907	571	30%	2%	508	27%	170	9%	679	36%	663	35%
15D	1,024	232	23%	1%	346	34%	66	6%	412	40%	381	37%
15E	1,158	258	22%	1%	401	35%	43	4%	443	38%	467	40%

Forestry Mgmt. Zone	Total Land Acres	UTC Acres	UTC %	% of Total UTC	PPA (Veg.) Acres	PPA (Veg.) %	PPA (Imp.) Acres	PPA (Imp.) %	Total PPA Acres	Total PPA %	Unsuitable UTC (acres)	Unsuitable UTC %
16A	729	125	17%	0%	218	30%	95	13%	313	43%	346	48%
16B	1,059	167	16%	1%	253	24%	157	15%	410	39%	554	52%
17A	1,331	236	18%	1%	509	38%	175	13%	684	51%	455	34%
17B	2,410	478	20%	2%	857	36%	155	6%	1,012	42%	1,080	45%
18A	1,017	73	7%	0%	118	12%	240	24%	359	35%	615	60%
18B	480	35	7%	0%	39	8%	121	25%	160	33%	314	65%
19A	1,191	288	24%	1%	280	23%	121	10%	401	34%	508	43%
19B	1,118	284	25%	1%	259	23%	90	8%	349	31%	490	44%
20A	2,227	863	39%	3%	661	30%	164	7%	824	37%	562	25%
20B	980	304	31%	1%	316	32%	53	5%	370	38%	316	32%
20C	1,686	436	26%	1%	539	32%	136	8%	675	40%	576	34%
20D	1,341	476	35%	2%	372	28%	83	6%	455	34%	430	32%
21A	2,320	464	20%	1%	910	39%	378	16%	1,288	56%	590	25%
21B	1,312	395	30%	1%	457	35%	135	10%	592	45%	339	26%
21C	817	215	26%	1%	221	27%	122	15%	343	42%	262	32%
22A	983	172	17%	1%	203	21%	106	11%	309	31%	562	54%
22B	862	170	20%	1%	188	22%	44	5%	233	27%	461	53%
22C	1,112	274	25%	1%	302	27%	117	11%	419	38%	428	38%
22D	872	146	17%	0%	144	17%	101	12%	245	28%	600	61%
22E	844	127	15%	0%	215	26%	128	15%	344	41%	375	44%
22F	1,329	229	17%	1%	363	27%	189	14%	552	42%	559	42%
23A	1,866	356	19%	1%	656	35%	104	6%	760	41%	825	43%
23B	1,570	272	17%	1%	614	39%	209	13%	823	52%	716	40%
23C	3,669	787	21%	3%	1,330	36%	391	11%	1,721	47%	1,198	32%
24A	3,610	901	25%	3%	1,190	33%	481	13%	1,671	46%	1,109	30%
24B	3,561	1,031	29%	3%	1,160	33%	420	12%	1,581	44%	1,093	30%
24C	2,306	414	18%	1%	743	32%	252	11%	996	43%	930	40%
25A	2,055	284	14%	1%	698	34%	283	14%	982	48%	835	40%
25B	5,709	752	13%	2%	1,631	29%	530	9%	2,161	38%	2,895	50%
26A	4,805	850	18%	3%	1,208	25%	129	3%	1,337	28%	3,469	61%
26B	924	83	9%	0%	338	37%	195	21%	533	58%	324	34%
26C	446	114	26%	0%	49	11%	37	8%	87	19%	250	56%
27	4,559	450	10%	1%	1,741	38%	166	4%	1,907	42%	2,319	50%
Total	139,435	31,143	22%	100%	41,533	30%	16,106	12%	57,639	41%	54,859	38%

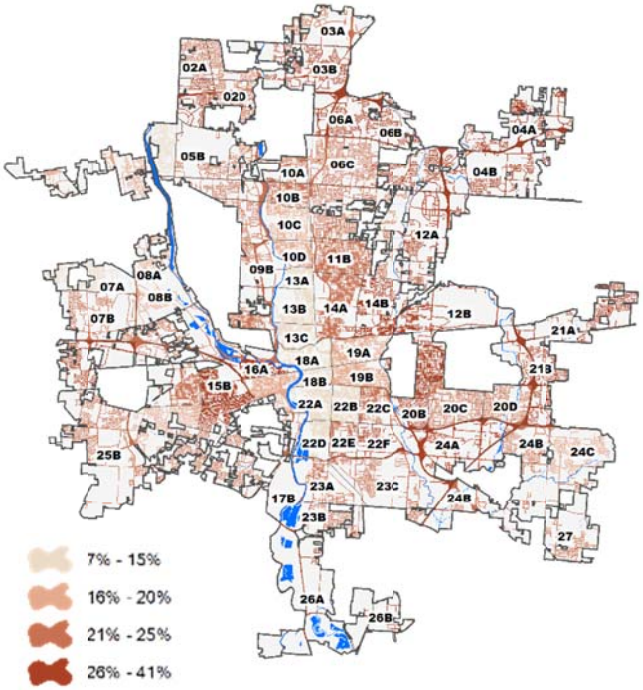
Forestry Management Zone Assessment Results – Continued from previous page

City of Columbus Geographic Summary: ROW within Forestry Management Zones

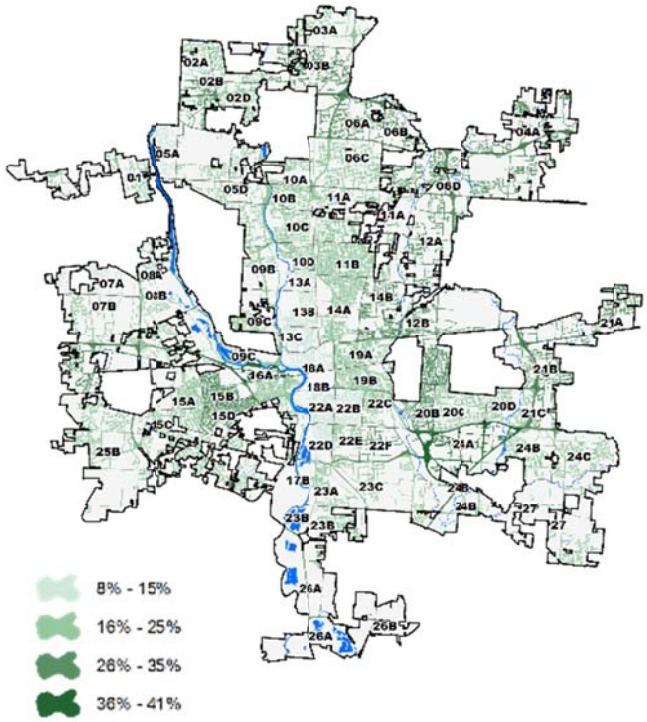
Percent Urban Tree Canopy



Percent Possible Planting Areas (Total)



Possible Planting Areas (Vegetation)



Possible Planting Areas (Impervious)

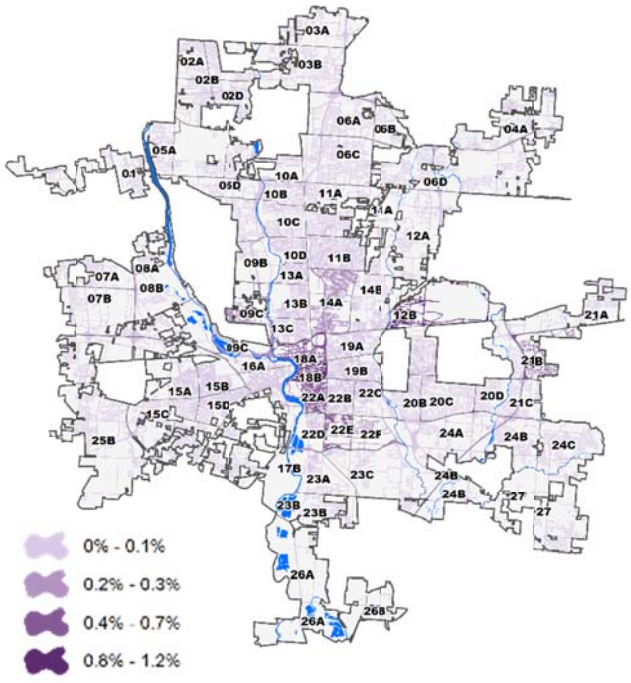


Figure 35: ROW within Forestry Management Zone Assessment Results

City of Columbus Geographic Summary: ROW within Forestry Management Zones

This table summarizes the UTC metrics for Rights-of-Way within Forestry Management Zones in Acres and % including Urban Tree Canopy (UTC), Possible Planting Area Vegetation (PPA Vegetation), Possible Planting Area Impervious (PPA Impervious), Total Possible Planting Area (Total PPA), and Areas Unsuitable for Planting (Unsuitable).

Table 21: ROW within Forestry Management Zone Assessment Results

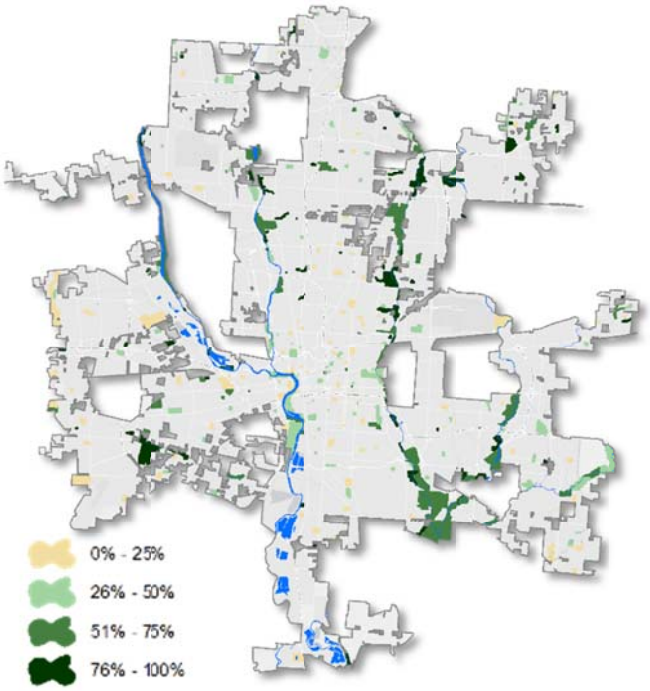
Forestry Mgmt. Zone	Total Land Acres	UTC Acres	UTC %	% of Total UTC	PPA (Veg.) Acres	PPA (Veg.) %	PPA (Imp.) Acres	PPA (Imp.) %	Total PPA Acres	Total PPA %	Unsuitable UTC (acres)	Unsuitable UTC %
1	285	36	13%	1%	57	20%	0.28	0.10%	57	20%	283	99%
02A	168	35	21%	1%	40	24%	0.03	0.02%	40	24%	93	55%
02B	142	27	19%	1%	34	24%	0.00	0.00%	34	24%	81	57%
02C	237	34	14%	1%	66	28%	0.02	0.01%	66	28%	137	58%
02D	234	56	24%	2%	56	24%	0.00	0.00%	56	24%	122	52%
03A	248	6	2%	0%	56	23%	0.09	0.04%	56	23%	186	75%
03B	471	57	12%	2%	125	27%	0.11	0.02%	125	27%	290	62%
04A	333	31	9%	1%	116	35%	0.01	0.00%	116	35%	188	57%
04B	524	62	12%	2%	181	34%	0.01	0.00%	181	34%	285	54%
05A	178	26	15%	1%	26	15%	0.00	0.00%	26	15%	184	103%
05B	127	18	14%	1%	31	25%	0.00	0.00%	31	25%	78	61%
05C	123	34	28%	1%	27	22%	0.06	0.05%	27	22%	64	52%
05D	265	80	30%	2%	61	23%	0.01	0.00%	61	23%	136	51%
06A	452	66	15%	2%	133	29%	0.00	0.00%	133	29%	252	56%
06B	136	24	18%	1%	38	28%	0.05	0.04%	38	28%	74	54%
06C	558	91	16%	3%	131	24%	0.07	0.01%	131	24%	336	60%
06D	309	34	11%	1%	93	30%	0.12	0.04%	94	30%	182	59%
07A	233	11	5%	0%	34	15%	0.14	0.06%	34	15%	188	81%
07B	388	17	4%	0%	83	22%	0.05	0.01%	83	22%	288	74%
08A	130	32	24%	1%	20	16%	0.07	0.05%	20	16%	262	201%
08B	208	41	20%	1%	41	20%	0.00	0.00%	41	20%	161	77%
08C	264	47	18%	1%	60	23%	0.00	0.00%	60	23%	177	67%
09A	233	70	30%	2%	50	22%	0.07	0.03%	50	22%	120	51%
09B	221	46	21%	1%	51	23%	0.00	0.00%	51	23%	128	58%
09C	454	81	18%	2%	111	24%	1.26	0.28%	112	25%	331	73%
10A	118	38	32%	1%	27	23%	0.05	0.04%	27	23%	55	47%
10B	191	72	38%	2%	40	21%	0.00	0.00%	40	21%	82	43%
10C	263	123	47%	4%	47	18%	0.02	0.01%	48	18%	100	38%
10D	185	64	35%	2%	36	19%	0.04	0.02%	36	19%	88	48%
11A	488	86	18%	3%	117	24%	0.04	0.01%	117	24%	285	58%
11B	527	110	21%	3%	130	25%	0.06	0.01%	130	25%	287	54%
12A	490	51	10%	1%	146	30%	0.03	0.01%	146	30%	295	60%
12B	276	39	14%	1%	97	35%	3.31	1.20%	100	36%	144	52%
13A	150	33	22%	1%	21	14%	0.00	0.00%	21	14%	97	64%
13B	241	49	21%	1%	21	9%	0.06	0.02%	21	9%	172	71%
13C	227	40	18%	1%	23	10%	0.18	0.08%	23	10%	167	73%
14A	515	69	13%	2%	102	20%	1.07	0.21%	104	20%	343	66%
14B	348	70	20%	2%	98	28%	0.09	0.03%	98	28%	180	52%
15A	353	60	17%	2%	78	22%	0.22	0.06%	78	22%	215	61%
15B	290	58	20%	2%	78	27%	0.00	0.00%	78	27%	154	53%
15C	308	32	10%	1%	58	19%	0.12	0.04%	58	19%	219	71%
15D	230	42	18%	1%	65	28%	0.01	0.00%	65	28%	123	53%
15E	169	13	8%	0%	39	23%	0.00	0.00%	39	23%	118	69%

Forestry Mgmt. Zone	Total Land Acres	UTC Acres	UTC %	% of Total UTC	PPA (Veg.) Acres	PPA (Veg.) %	PPA (Imp.) Acres	PPA (Imp.) %	Total PPA Acres	Total PPA %	Unsuitable UTC (acres)	Unsuitable UTC %
16A	211	33	16%	1%	77	37%	0.04	0.02%	77	37%	155	73%
16B	361	57	16%	2%	68	19%	0.02	0.01%	68	19%	305	84%
17A	156	28	18%	1%	38	24%	0.02	0.01%	38	24%	120	77%
17B	184	34	18%	1%	44	24%	0.03	0.02%	44	24%	150	81%
18A	331	21	6%	1%	44	13%	1.83	0.55%	46	14%	289	87%
18B	178	13	7%	0%	14	8%	2.02	1.13%	16	9%	179	100%
19A	331	52	16%	2%	58	18%	0.03	0.01%	58	18%	221	67%
19B	357	66	18%	2%	55	15%	0.03	0.01%	55	15%	237	66%
20A	420	120	29%	4%	124	30%	0.20	0.05%	124	30%	177	42%
20B	234	52	22%	2%	64	27%	0.00	0.00%	64	27%	118	50%
20C	350	66	19%	2%	76	22%	0.07	0.02%	76	22%	208	59%
20D	307	66	22%	2%	70	23%	0.01	0.00%	70	23%	172	56%
21A	303	21	7%	1%	100	33%	0.05	0.02%	100	33%	182	60%
21B	228	26	11%	1%	74	32%	1.23	0.54%	75	33%	128	56%
21C	195	30	16%	1%	57	29%	0.00	0.00%	57	29%	108	55%
22A	252	46	18%	1%	24	10%	1.33	0.53%	26	10%	236	77%
22B	261	32	12%	1%	35	13%	0.06	0.02%	35	13%	194	74%
22C	250	35	14%	1%	62	25%	0.02	0.01%	62	25%	153	61%
22D	168	28	16%	1%	22	13%	0.03	0.02%	22	13%	148	75%
22E	138	16	12%	0%	30	22%	0.93	0.67%	31	22%	91	66%
22F	165	19	12%	1%	51	31%	0.26	0.16%	51	31%	95	58%
23A	210	38	18%	1%	48	23%	0.02	0.01%	48	23%	150	63%
23B	178	21	12%	1%	43	24%	0.00	0.00%	43	24%	127	66%
23C	394	48	12%	1%	96	25%	0.09	0.02%	97	25%	250	63%
24A	680	105	15%	3%	249	37%	0.02	0.00%	249	37%	332	48%
24B	516	67	13%	2%	127	25%	0.05	0.01%	127	25%	325	63%
24C	342	18	5%	1%	68	20%	0.00	0.00%	68	20%	257	75%
25A	287	26	9%	1%	78	27%	0.00	0.00%	78	27%	184	64%
25B	526	32	6%	1%	117	22%	0.00	0.00%	117	22%	378	72%
26A	168	39	24%	1%	49	29%	0.11	0.07%	49	29%	116	57%
26B	77	15	19%	0%	32	41%	0.01	0.01%	32	41%	30	40%
26C	6	6	93%	0%	0	7%	0.00	0.00%	0	7%	5	42%
27	269	8	3%	0%	63	23%	0.00	0.00%	63	23%	199	74%
Total	**21,328**	**3,395**	**16%**	**100%**	**5,100**	**24%**	**16**	**0.08%**	**5,116**	**24%**	**13,762**	**62%**

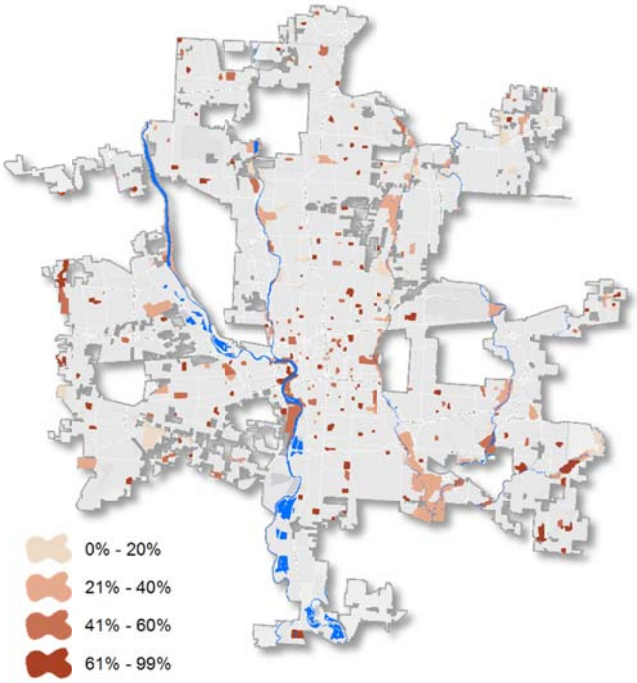
ROW within Forestry Management Zone Assessment Results – Continued from previous page

City of Columbus Geographic Summary: Parks and Parkland

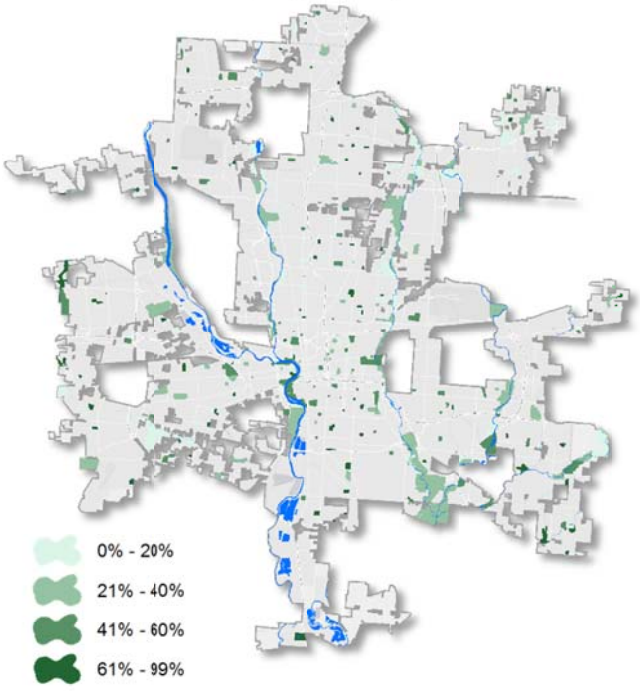
Percent Urban Tree Canopy



Percent Possible Planting Areas (Total)



Percent Possible Planting Areas (Vegetation)



Percent Possible Planting Areas (Impervious)

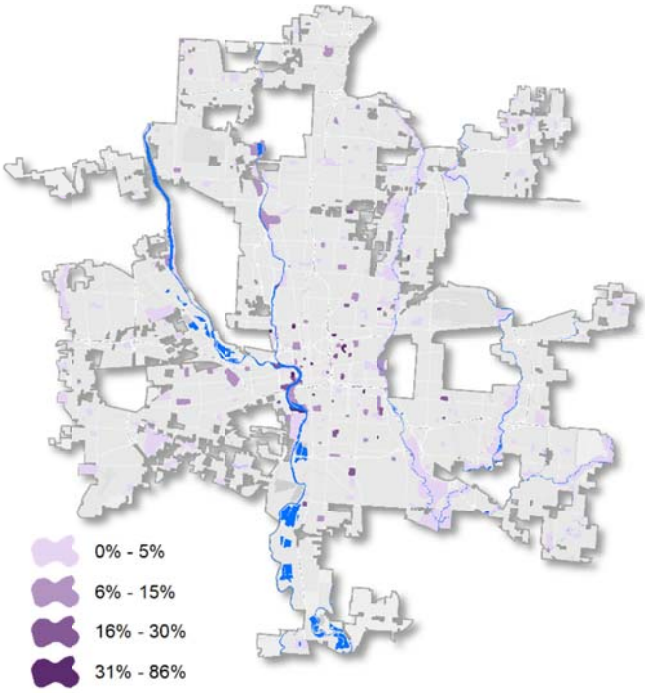


Figure 36: Parks and Parkland Assessment Results

City of Columbus Geographic Summary: Parks and Parkland

This table summarizes the UTC metrics by Parks and Parkland in Acres and % including Urban Tree Canopy (UTC), Possible Planting Area Vegetation (PPA Vegetation), Possible Planting Area Impervious (PPA Impervious), Total Possible Planting Area (Total PPA), and Areas Unsuitable for Planting (Unsuitable).

Table 22: Parks and Parkland Assessment Results

Park or Parkland	Total Land Acres	UTC Acres	UTC %	PPA (Veg.) Acres	PPA (Veg.) %	PPA (Imp.) Acres	PPA (Imp.) %	Total PPA Acres	Total PPA %	Unsuitable UTC (acres)	Unsuitable UTC %
Abbie Trails Parkland	30	20	68%	9	31%	0.0	0%	9	31%	2	7%
Academy Park	16	5	32%	5	30%	0.9	6%	6	36%	5	34%
Airport Golf Course	128	28	22%	32	25%	1	1%	33	26%	73	57%
Albany Crossing Park	10	0.04	0%	9	96%	0.3	3%	10	99%	1	12%
Albany Crossing Wetland	6	6	94%	0.4	6%	0.0	0%	0.4	6%	0.0	0%
Albany Wetlands	8	8	96%	0.3	4%	0.0	0%	0.3	4%	0.0	0%
Alexander/AEP Park	1	0.4	62%	0.2	30%	0.0	0%	0.2	30%	0.1	16%
Alkire Lakes Park	3	1	40%	2	59%	0.0	0%	2	59%	2	71%
Alkire Woods Parkland	16	4	23%	8	54%	0.0	0%	8	54%	4	23%
Alum Creek Drive Clean Ohio Parkland	28	26	95%	1	5%	0.0	0%	1	5%	3	10%
Alum Creek Parkland	12	8	65%	4	35%	0.0	0%	4	35%	0.8	7%
Alum Creek Parkland COH	17	17	97%	0.6	3%	0.0	0%	0.6	3%	0.6	3%
Alum Creek/ Hanford Parkland	0	0.5	100%	0.0	0%	0.0	0%	0.0	0%	0.0	2%
Alum Creek/ Holtzman Parkland	2	1	67%	0.6	27%	0.0	1%	0.6	28%	0.1	7%
Alum Creek/ Koch Parkland	7	6	87%	0.9	13%	0.0	0%	0.9	13%	0.1	1%
Alum Creek/ Livingston Parkland	4	4	100%	0.0	0%	0.0	0%	0.0	0%	0.2	5%
Alum Creek/ Miller Parkland	15	14	98%	0.3	2%	0.0	0%	0.3	2%	0.1	0%
Alum Creek/Refugee Rd Parkland	2	1	48%	0.9	44%	0.1	7%	1	52%	0.3	15%
Alum Creek/Smith Farms Westbank	4	3	78%	0.9	22%	0.0	0%	0.9	22%	0.0	0%
Alum Crest Park	5	1	30%	3	59%	0.5	10%	3	69%	0.0	1%
American Addition Park	5	0.2	3%	4	92%	0.1	1%	4	93%	0.2	3%
Amvet Park	3	0.8	33%	2	67%	0.0	0%	2	67%	0.0	0%
Anderson Farms Parkland	22	3	13%	19	84%	0.0	0%	19	84%	0.7	3%
Anheuser-Busch Sports Park	54	17	31%	18	34%	6	10%	24	45%	13	24%
Antrim Park	77	54	70%	15	19%	5	6%	19	25%	49	64%
Argus Park	2	0.8	45%	1	54%	0.0	0%	1	54%	0.0	1%
Audubon Park	7	2	22%	5	75%	0.2	3%	6	77%	0.0	0%
Avalon Park	2	0.7	40%	1	58%	0.0	0%	1	58%	0.0	1%
Barnett Park	12	2	19%	7	54%	2	17%	9	72%	1	9%
Battelle Riverfront Park	3	1	47%	0.8	24%	0.3	9%	1	33%	1	37%
Beatty Park	3	0.1	2%	1	43%	0.7	25%	2	68%	0.9	30%
Beechcroft Park	5	0.1	2%	4	96%	0.0	1%	5	97%	0.1	2%
Beechwold Park	10	10	97%	0.3	3%	0.0	0%	0.3	3%	1	10%
Berliner Sports Park	229	59	26%	83	36%	11	5%	94	41%	76	33%
Berwick Park	4	1	26%	3	74%	0.0	0%	3	74%	0.0	0%
Bicentennial/ Galbreath Park	4	0.6	14%	2	39%	1	26%	3	65%	0.9	21%

Park or Parkland	Total Land Acres	UTC Acres	UTC %	PPA (Veg.) Acres	PPA (Veg.) %	PPA (Imp.) Acres	PPA (Imp.) %	Total PPA Acres	Total PPA %	Unsuitable UTC (acres)	Unsuitable UTC %
Big Run Park	272	231	85%	31	12%	5	2%	36	13%	6	2%
Big Walnut - Noe Bixby	3	1	49%	1	51%	0.0	0%	1	51%	0.1	5%
Big Walnut - Ottawa Parkland	1	1	98%	0.0	2%	0.0	0%	0.0	2%	0.4	42%
Big Walnut Park	152	106	70%	38	25%	4	2%	42	28%	17	11%
Big Walnut South Corridor Coh	20	20	97%	0.6	3%	0.0	0%	0.6	3%	2	10%
Big Walnut-Williams Rd Parkland Coh	5	5	99%	0.1	1%	0.0	0%	0.1	1%	0.3	6%
Blackburn Park	6	1	21%	1	26%	1	23%	3	49%	2	31%
Brandywine Park	1	0.3	54%	0.3	46%	0.0	0%	0.3	46%	0.0	0%
Brentnell Ave Parkland	25	24	96%	1	4%	0.0	0%	1	4%	0.0	0%
Brentnell Park	2	0.00	0%	0.8	35%	1	45%	2	80%	0.5	20%
Brevoort Park	3	1	49%	1	46%	0.1	4%	1	50%	0.0	1%
Broad Street Parkland	30	0.2	1%	0.1	0%	0.0	0%	0.1	0%	30	99%
Brookside Woods Park	2	0.6	30%	1	66%	0.1	4%	1	70%	0.0	0%
Brownlee Circle Park	2	0.9	54%	0.8	46%	0.0	0%	0.8	46%	0.0	0%
Canini Park	2	1	81%	0.3	19%	0.0	0%	0.3	19%	0.0	0%
Cannongate Alum Creek Parkland	4	4	99%	0.0	1%	0.0	0%	0.0	1%	0.3	8%
Carriage Place Park	13	2	16%	9	68%	1	10%	10	78%	0.7	5%
Cassady Park	2	2	94%	0.2	6%	0.0	0%	0.2	6%	0.0	1%
Casto Park	45	33	73%	8	18%	1	2%	9	20%	4	10%
Catalpa Park	13	13	100%	0.0	0%	0.0	0%	0.0	0%	0.0	0%
Cedar Run Park	8	2	29%	6	70%	0.0	0%	6	70%	0.1	1%
Champions Golf Course	206	111	54%	42	20%	7	3%	48	23%	50	24%
Chaseland Park	4	3	86%	0.5	13%	0.0	0%	0.5	13%	0.0	1%
Chatterton Parkland	36	11	29%	25	69%	0.0	0%	25	69%	2	7%
Cherrybottom Park COH	87	85	98%	1	1%	0.0	0%	1	1%	9	11%
City Gate Park	5	5	93%	0.4	7%	0.0	0%	0.4	7%	0.0	0%
Clean Ohio Alton Parkland	44	29	67%	0.3	1%	0.0	0%	0.3	1%	14	33%
Clinton-Como Park	20	9	46%	8	39%	0.5	3%	8	42%	4	18%
Clover Groff Natural Area	18	5	25%	14	75%	0.0	0%	14	75%	1	7%
Clover Parkland	17	3	17%	14	81%	0.0	0%	14	81%	7	41%
Clover-Kenney Park	14	2	15%	11	82%	0.0	0%	11	82%	0.6	4%
Coaaa Property	1	0.01	1%	0.0	0%	0.7	76%	0.7	76%	0.2	23%
Cody Park	0	0.2	71%	0.1	29%	0.0	0%	0.1	29%	0.0	0%
Columbus Performing Arts Center	1	0.04	7%	0.0	0%	0.1	25%	0.1	25%	0.4	68%
Connor Park	13	10	78%	3	22%	0.0	0%	3	22%	4	31%
Cooke Park	9	2	16%	5	54%	2	23%	7	77%	0.7	7%
Cooper Park	35	12	34%	16	47%	0.8	2%	17	49%	6	18%
Cosi Parking Lot	5	0.4	8%	0.2	4%	3	67%	4	70%	1	21%
Crawford Farms Park	4	0.3	8%	3	92%	0.0	0%	3	92%	0.0	0%
Creek Ridge Parkland	12	11	96%	0.4	4%	0.0	0%	0.4	4%	0.4	3%
Creekstone Parkland	7	5	66%	2	34%	0.0	0%	2	34%	0.0	0%
Creekview Parkland	18	16	88%	2	12%	0.0	0%	2	12%	0.1	1%
Cremeans Park	7	0.7	11%	5	71%	0.8	12%	5	83%	0.4	6%
Cultural Arts Center	1	0.1	13%	0.1	10%	0.1	9%	0.1	19%	0.5	67%
Cumberland Woods Parkland	6	6	100%	0.0	0%	0.0	0%	0.0	0%	0.0	0%

Parks and Parkland Assessment Results – Continued from previous page

Park or Parkland	Total Land Acres	UTC Acres	UTC %	PPA (Veg.) Acres	PPA (Veg.) %	PPA (Imp.) Acres	PPA (Imp.) %	Total PPA Acres	Total PPA %	Unsuitable UTC (acres)	Unsuitable UTC %
Davis Property	45	13	29%	0.9	2%	0.0	0%	0.9	2%	31	69%
Deaf School Park	7	3	38%	4	60%	0.0	1%	4	60%	0.3	4%
Deer Lake Parkland	1	1	93%	0.1	7%	0.0	0%	0.1	7%	0.0	0%
Deffet Rentals Watercourse Ded	10	9	99%	0.1	1%	0.0	0%	0.1	1%	0.5	6%
Deshler Park	10	1	12%	8	82%	0.5	5%	9	87%	0.0	0%
Devonshire Park	7	2	27%	4	67%	0.4	6%	5	73%	0.0	0%
Dexter Falls Park	10	2	19%	8	77%	0.1	1%	8	78%	0.2	2%
Dodge Park	18	0.8	4%	8	43%	4	22%	12	65%	6	33%
Dream-Filled Park	5	0.3	7%	2	36%	0.4	8%	2	44%	3	55%
Driving Park	24	9	36%	10	41%	2	7%	11	48%	4	16%
Dry Run Levee Gate	1	0.1	12%	0.9	84%	0.0	0%	0.9	84%	0.1	12%
Duranceau Park	17	12	68%	4	24%	0.9	5%	5	30%	0.9	5%
Dysart Run And E Broad Parkland	7	7	99%	0.1	1%	0.0	0%	0.1	1%	0.0	0%
Eastern Glen Parkland	9	8	95%	0.4	5%	0.0	0%	0.4	5%	0.2	2%
Easthaven Park	5	2	44%	3	55%	0.0	0%	3	55%	0.0	0%
Elk Run Park	72	49	68%	22	31%	0.4	1%	22	31%	5	6%
Elk Run/ Winchester Pike Parkland	39	20	51%	19	49%	0.0	0%	19	49%	2	6%
English Park	1	0.2	30%	0.3	54%	0.0	0%	0.3	54%	0.1	16%
Fairwood Park	27	16	59%	9	35%	1	4%	10	39%	0.4	2%
Fisher Road Parkland	17	6	38%	9	51%	0.0	0%	9	51%	2	11%
Flint Park	6	2	39%	3	48%	0.6	10%	3	58%	0.2	3%
Forest Creek Park	4	1	26%	3	74%	0.0	0%	3	74%	0.0	0%
Forest Park East Park	4	1	31%	3	69%	0.0	0%	3	69%	0.0	0%
Frank Fetch Memorial Park	0	0.1	32%	0.1	42%	0.0	0%	0.1	42%	0.1	26%
Franklin Park	57	18	32%	30	53%	2	4%	32	57%	9	15%
Franklinton Cemetery	2	0.7	41%	0.9	56%	0.0	1%	0.9	57%	0.0	3%
Franks Park	44	5	11%	33	76%	2	4%	35	79%	14	32%
Freedom Park	8	0.4	6%	7	90%	0.1	2%	7	91%	0.3	3%
Galloway Ridge Park	4	0.1	3%	4	88%	0.2	5%	4	93%	0.2	4%
Gelpi Parkland	2	2	96%	0.1	3%	0.0	0%	0.1	4%	0.0	0%
Genoa Park	2	0.7	35%	0.8	38%	0.0	0%	0.8	38%	0.7	33%
Georgesville Green Parkland	8	6	80%	2	20%	0.0	0%	2	20%	0.2	2%
Georgian Heights Park	11	6	56%	5	44%	0.0	0%	5	44%	0.0	0%
Glen Echo Park	7	6	89%	0.7	11%	0.0	0%	0.7	11%	0.1	2%
Glen View Park	4	3	81%	0.7	19%	0.0	0%	0.7	19%	0.0	1%
Glenwood Park	17	11	69%	3	20%	0.9	5%	4	25%	1	6%
Golden Hobby Shop	1	0.1	16%	0.0	2%	0.3	53%	0.3	55%	0.2	29%
Goodale Park	32	13	41%	16	51%	2	6%	18	57%	1	4%
Gould Park	0	0.1	42%	0.1	58%	0.0	0%	0.1	58%	0.0	0%
Gowdy Field	2	0.03	1%	0.5	21%	1	48%	2	68%	0.7	31%
Granville Park	5	2	30%	4	70%	0.0	0%	4	70%	0.0	0%
Greene Countrie Park	17	3	20%	13	78%	0.0	0%	13	78%	0.4	2%
Greenlawn Park	18	10	56%	2	11%	6	31%	8	43%	2	9%
Griggs Nature Preserve	40	32	81%	7	18%	0.0	0%	7	18%	1	3%
Griggs Park	160	95	59%	49	31%	8	5%	57	36%	9	6%
Hamilton & Spring Park	0	0.1	29%	0.1	54%	0.0	0%	0.1	54%	0.0	17%

Parks and Parkland Assessment Results – Continued from previous page

Park or Parkland	Total Land Acres	UTC Acres	UTC %	PPA (Veg.) Acres	PPA (Veg.) %	PPA (Imp.) Acres	PPA (Imp.) %	Total PPA Acres	Total PPA %	Unsuitable UTC (acres)	Unsuitable UTC %
Hamilton Avenue Street Park	0	0.2	41%	0.1	33%	0.0	0%	0.1	33%	0.1	26%
Hamilton Heights Parkland	4	0.2	5%	3	95%	0.0	0%	3	95%	0.0	0%
Hamilton Road Wetland Nature Preserve	78	77	99%	0.9	1%	0.0	0%	0.9	1%	0.0	0%
Hanford Village Park	2	0.5	33%	0.8	52%	0.2	13%	1	65%	0.0	2%
Hard Road Park	40	17	44%	17	43%	0.3	1%	18	44%	5	13%
Harrison House	0	0.1	46%	0.1	27%	0.0	4%	0.1	31%	0.1	23%
Harrison Park	4	1	32%	2	44%	0.4	9%	2	54%	1	32%
Harrison Smith Park	22	14	64%	8	36%	0.1	1%	8	36%	0.0	0%
Harrison West Park	0	0.2	46%	0.2	51%	0.0	0%	0.2	51%	0.0	3%
Hauntz Park	6	2	27%	4	70%	0.1	2%	4	72%	0.1	1%
Hayden Falls Nature Preserve	3	3	93%	0.1	3%	0.0	1%	0.1	3%	0.2	5%
Hayden Park	9	6	66%	3	34%	0.0	0%	3	34%	1	10%
Hayden Trail Parkland	8	0.2	3%	8	96%	0.0	0%	8	96%	0.4	4%
Haydens Crossing Park	10	6	66%	3	30%	0.0	0%	3	31%	1	11%
Heer Park	8	1	12%	5	56%	2	26%	7	82%	0.5	6%
Helsel Park	38	26	68%	10	27%	2	4%	12	31%	4	9%
Hickory Woods Parkland	5	5	99%	0.0	1%	0.0	0%	0.0	1%	0.0	0%
Highbluffs Park	2	0.5	24%	2	73%	0.0	0%	2	73%	1	58%
Hilliard Green Park	17	4	24%	12	72%	0.4	2%	12	75%	0.2	1%
Hilliard Green/ Baycroft Walkway	0	0.01	33%	0.0	67%	0.0	0%	0.0	67%	0.0	33%
Hilltonia Park	10	1	12%	8	88%	0.0	0%	8	88%	0.0	0%
Holt Avenue Parkland	1	0.9	98%	0.0	2%	0.0	0%	0.0	2%	0.0	0%
Holton Park	9	5	55%	3	30%	0.8	9%	3	40%	0.5	6%
Huy Road Park	8	0.4	5%	3	42%	0.0	0%	3	42%	4	53%
Igel/Alum Creek Water Dedication	4	3	77%	0.5	14%	0.0	0%	0.5	14%	0.7	19%
Independence Park	10	2	19%	7	65%	0.1	1%	7	65%	2	16%
Indian Mound Park	20	2	11%	13	66%	2	10%	15	76%	3	14%
Indian Village Day Camp	12	5	45%	4	38%	0.7	6%	5	44%	2	13%
Indianola Park	1	0.1	7%	0.9	78%	0.0	0%	0.9	78%	0.2	14%
Innis Park	98	73	75%	24	25%	0.5	1%	25	25%	1	1%
Italian Village Park	1	0.4	43%	0.4	43%	0.0	0%	0.4	43%	0.1	13%
Iuka Park	4	4	91%	0.4	9%	0.0	0%	0.4	9%	0.0	1%
Jefferson Woods Park	2	0.1	4%	2	96%	0.0	0%	2	96%	0.0	0%
Jefferson Woods Ravine	7	5	65%	2	35%	0.0	0%	2	35%	0.1	1%
Joan Park	4	0.8	21%	3	75%	0.2	4%	3	79%	0.0	1%
Karns Park	2	0.3	15%	2	70%	0.1	7%	2	77%	0.2	7%
Keller Park	0	0.2	40%	0.3	54%	0.0	2%	0.3	56%	0.0	4%
Kenlawn Park	4	0.8	20%	3	71%	0.3	7%	3	78%	0.1	2%
Kenney Park	26	21	79%	2	9%	0.0	0%	2	9%	4	14%
Kilbourne Run Parkland	16	14	89%	2	11%	0.0	0%	2	11%	0.0	0%
Kirkwood Park	3	0.5	17%	2	83%	0.0	0%	2	83%	0.0	0%
Kobacker Park	0	0.1	35%	0.1	41%	0.1	18%	0.2	59%	0.0	6%
Krumm Park	36	10	27%	21	59%	2	5%	23	64%	4	11%
Lane Woods Parkland	2	2	97%	0.1	3%	0.0	0%	0.1	3%	0.0	1%
Lazelle Woods Park	44	15	35%	16	37%	5	11%	21	48%	7	17%

Parks and Parkland Assessment Results – Continued from previous page

Park or Parkland	Total Land Acres	UTC Acres	UTC %	PPA (Veg.) Acres	PPA (Veg.) %	PPA (Imp.) Acres	PPA (Imp.) %	Total PPA Acres	Total PPA %	Unsuitable UTC (acres)	Unsuitable UTC %
Lehman Estates Parkland	8	0.01	0%	8	97%	0.0	0%	8	98%	0.2	2%
Lincoln Park	16	2	10%	10	62%	3	18%	13	80%	2	11%
Lindbergh Park	8	2	28%	6	68%	0.1	1%	6	69%	0.3	3%
Linden Park	19	3	18%	8	41%	2	9%	9	50%	8	40%
Linwood Park	0	0.02	22%	0.1	56%	0.0	0%	0.1	56%	0.0	22%
Livingston Park	8	2	24%	5	56%	0.2	2%	5	58%	1	18%
Livingston/1-70 Parkland	15	13	90%	1	9%	0.1	1%	1	9%	8	57%
Liv-Moor Park	1	0.2	19%	0.5	59%	0.2	18%	0.7	77%	0.0	3%
Lockbourne Parkland COH	14	12	85%	2	15%	0.0	0%	2	15%	4	25%
Longwood Wetland Parkland	13	3	20%	10	77%	0.0	0%	10	77%	4	28%
Mackenbach Parkland	17	1	7%	16	93%	0.0	0%	16	93%	0.1	1%
Maintenance & Warehouse Operations	9	2	26%	0.6	7%	2	28%	3	35%	3	39%
Majestic Paint Parkland	5	3	68%	1	30%	0.0	1%	1	30%	0.1	1%
Maloney Park	24	4	17%	18	74%	2	8%	20	82%	0.4	2%
Marion-Franklin Park	24	3	13%	15	61%	5	19%	19	80%	2	7%
Martin Park	0	0.00	0%	0.2	100%	0.0	0%	0.2	100%	0.0	0%
Mason Run Parkland Coh	20	20	99%	0.2	1%	0.0	0%	0.2	1%	0.0	0%
Maybury Park	5	1	23%	4	73%	0.2	3%	4	76%	0.1	1%
Mayme Moore Park	5	1	28%	2	32%	0.8	16%	3	48%	1	24%
Maynard And Summit Park	0	0.1	23%	0.2	61%	0.0	0%	0.2	61%	0.1	16%
Mccoy Park	20	1	7%	11	58%	1	5%	13	64%	6	29%
Mcferson Commons	3	0.6	20%	2	66%	0.3	11%	2	77%	0.1	3%
Mckinley Park	7	1	16%	3	39%	0.6	8%	3	47%	3	37%
Mentel Memorial Golf Course	144	26	18%	38	26%	6	4%	44	31%	78	54%
M-Five Parkland	22	11	50%	11	48%	0.0	0%	11	48%	3	12%
Mifflin Park	5	0.6	13%	4	86%	0.1	1%	4	87%	0.0	0%
Millbrook Park	2	0.3	20%	0.8	50%	0.4	27%	1	77%	0.1	4%
Milo-Grogan Park	2	0.03	2%	0.2	10%	0.6	33%	0.8	44%	1	55%
Mock Park	107	86	81%	18	17%	2	2%	20	19%	1	1%
Moeller Park	2	0.6	34%	1	60%	0.0	0%	1	60%	0.1	6%
Moler Street Parkland	6	4	67%	0.8	12%	0.0	0%	0.8	12%	1	21%
Mt Vernon Plaza Park	1	0.2	21%	0.0	1%	0.6	73%	0.6	74%	0.1	6%
Nafzger Park	145	81	56%	62	43%	2	1%	64	44%	20	14%
Nelson Park	28	18	63%	9	33%	0.8	3%	10	36%	2	6%
North Bank Park	8	2	18%	5	59%	0.0	0%	5	60%	2	24%
North East Park	4	1	28%	1	34%	0.9	24%	2	58%	0.5	14%
Northcrest Park	18	4	23%	11	59%	0.7	4%	12	62%	3	14%
Northern Woods Park	2	2	100%	0.0	0%	0.0	0%	0.0	0%	0.0	0%
Northgate Park	5	4	68%	1	25%	0.3	6%	2	31%	0.0	1%
Northmoor Park	8	7	83%	1	14%	0.2	3%	1	17%	0.7	8%
Northtowne Park	4	1	35%	2	63%	0.1	2%	2	65%	0.0	0%
Oak Creek Parkland	6	6	98%	0.1	2%	0.0	0%	0.1	2%	0.0	0%
Ohio Ave Street Park	1	0.4	66%	0.0	7%	0.0	0%	0.0	7%	0.2	27%
Olde Sawmill Park	9	1	13%	6	73%	0.8	9%	7	81%	0.5	5%
Olenbrook Parkland	3	3	96%	0.2	4%	0.0	0%	0.2	4%	0.0	0%
Olentangy Meadows Parkland	8	7	79%	2	20%	0.0	0%	2	20%	0.1	1%

Parks and Parkland Assessment Results – Continued from previous page

Park or Parkland	Total Land Acres	UTC Acres	UTC %	PPA (Veg.) Acres	PPA (Veg.) %	PPA (Imp.) Acres	PPA (Imp.) %	Total PPA Acres	Total PPA %	Unsuitable UTC (acres)	Unsuitable UTC %
Olentangy Parkland	44	41	94%	1	3%	1	2%	2	5%	0.2	0%
Olentangy Parkland – Far North	11	10	91%	0.9	8%	0.1	1%	1	9%	1	12%
Olentangy River Canoe Portage	1	0.9	93%	0.1	6%	0.0	0%	0.1	6%	0.6	61%
Olentangy Trail – King To 5Th	23	10	44%	7	30%	0.3	1%	7	31%	15	68%
Olentangy-Broadmeadows Trail	0	0.1	27%	0.3	70%	0.0	0%	0.3	70%	0.0	3%
Overbrook Ravine Park	6	6	98%	0.2	2%	0.0	0%	0.2	2%	0.0	0%
Palsgrove Park	1	0.00	0%	0.0	4%	0.8	86%	0.9	91%	0.1	9%
Parkridge Park	42	32	78%	9	22%	0.1	0%	9	22%	1	3%
Parkview Parkland	4	4	98%	0.1	2%	0.0	0%	0.1	2%	0.0	0%
Perhar Parkland	5	0.1	1%	5	99%	0.0	0%	5	99%	0.2	4%
Pingue Park	5	0.8	16%	4	79%	0.1	2%	4	81%	0.2	3%
Portal Park	0	0.1	86%	0.0	7%	0.0	7%	0.0	7%	0.0	7%
Portman Park	86	34	39%	51	59%	1	1%	52	61%	3	4%
Preserve East Parkland	26	25	97%	0.8	3%	0.0	0%	0.8	3%	0.0	0%
Prestwick Commons Park	4	2	50%	2	49%	0.0	0%	2	49%	0.8	20%
Pride Park	0	0.05	56%	0.0	33%	0.0	0%	0.0	33%	0.0	0%
Pump House Park	4	2	58%	2	38%	0.1	1%	2	39%	0.1	3%
Pumphrey Park	1	0.5	76%	0.2	24%	0.0	0%	0.2	24%	0.0	0%
Quarry Pointe B Parkland	2	2	68%	0.8	32%	0.0	0%	0.8	32%	0.0	0%
Quarry Pointe C Parkland	4	4	96%	0.2	4%	0.0	0%	0.2	4%	0.0	0%
Raymond Memorial Golf Course	213	41	19%	69	33%	7	3%	76	36%	100	47%
Redick Park	23	18	76%	4	16%	0.4	2%	4	18%	2	8%
Retreat At Turnberry	17	11	65%	4	26%	0.8	5%	5	31%	2	12%
Reynolds Crossing Park	4	2	50%	2	49%	0.0	0%	2	49%	0.0	1%
Rhodes Park	80	19	24%	37	46%	5	7%	42	53%	19	23%
Richter Workers Memorial Park	0	0.1	37%	0.1	20%	0.1	17%	0.1	37%	0.1	27%
Rickenbacker House	1	0.2	26%	0.3	40%	0.0	0%	0.3	40%	0.2	32%
Rickenbacker Park	14	5	35%	3	18%	3	21%	6	39%	6	42%
Riverbend Park	5	0.9	19%	4	78%	0.1	2%	4	81%	0.0	0%
Riverfront Walkway/Bridge	0	0.00	0%	0.0	0%	0.0	0%	0.0	0%	0.0	100%
Riverside Green Park	6	4	77%	1	18%	0.3	5%	1	22%	0.0	0%
Riverside Green South Park	1	0.7	49%	0.7	51%	0.0	0%	0.7	51%	0.0	0%
Rocky Creek Parkland	6	5	85%	0.8	14%	0.0	0%	0.8	14%	0.3	6%
Rocky Fork Creek Parkland	11	7	61%	4	39%	0.0	0%	4	39%	0.2	2%
Roosevelt Park	3	0.9	31%	2	66%	0.0	1%	2	67%	0.1	2%
Rosemont Parkland	3	3	97%	0.1	2%	0.0	0%	0.1	2%	0.0	0%
Rush Run Parkland	0	0.03	100%	0.0	0%	0.0	0%	0.0	0%	0.2	700%
Sancus Park	1	0.5	42%	0.7	56%	0.0	0%	0.7	56%	0.0	2%
Sater Park	0	0.02	25%	0.1	63%	0.0	0%	0.1	63%	0.0	13%
Saunders Park	15	1	9%	8	58%	1	8%	10	66%	4	25%
Sawmill Road Parkland	6	3	45%	3	55%	0.0	0%	3	55%	0.0	0%
Sawyer Park	6	1	26%	0.9	17%	2	31%	3	48%	1	26%
Schiller Park	23	9	39%	11	49%	1	6%	13	55%	2	10%

Parks and Parkland Assessment Results – Continued from previous page

Park or Parkland	Total Land Acres	UTC Acres	UTC %	PPA (Veg.) Acres	PPA (Veg.) %	PPA (Imp.) Acres	PPA (Imp.) %	Total PPA Acres	Total PPA %	Unsuitable UTC (acres)	Unsuitable UTC %
Schirm Farms Parkland	27	3	12%	23	88%	0.0	0%	23	88%	13	49%
Scioto Audubon Park	62	18	29%	28	46%	5	8%	33	54%	12	20%
Scioto Canal Parkland	7	7	95%	0.2	3%	0.0	0%	0.2	3%	0.1	1%
Scioto Peninsula Parkland	5	0.3	5%	4	68%	0.8	16%	5	84%	0.6	11%
Scioto River Parkland	8	8	95%	0.2	3%	0.0	0%	0.3	3%	13	155%
Scioto Woods Park	9	3	30%	6	66%	0.0	0%	6	66%	0.3	3%
Sensenbrenner Park	1	0.1	18%	0.1	14%	0.2	23%	0.3	37%	0.4	46%
Shadeville Nursery	54	6	11%	43	80%	2	3%	45	83%	7	14%
Shady Lane Park	5	2	45%	3	55%	0.0	0%	3	55%	0.0	0%
Sharon Meadows Park	10	3	27%	6	55%	0.2	2%	6	57%	2	17%
Shelbourne Parkland	9	8	86%	1	13%	0.0	0%	1	13%	0.1	2%
Shepard Park	3	3	88%	0.4	11%	0.0	0%	0.4	11%	0.0	1%
Side By Side Park	0	0.1	68%	0.1	26%	0.0	0%	0.1	26%	0.0	5%
Sills Park	20	6	29%	8	37%	0.8	4%	8	41%	6	32%
Smith Road School-Park	6	1	20%	5	74%	0.3	5%	5	80%	0.1	1%
Sol Shenk Parkland	25	22	88%	3	12%	0.0	0%	3	12%	2	7%
Southeast Lions Park	1	0.3	26%	0.8	59%	0.1	8%	0.9	68%	0.1	7%
Southgate Park	4	0.2	4%	4	96%	0.0	0%	4	96%	0.0	0%
Southside Park/Head Start Facility	5	1	26%	3	62%	0.3	6%	3	68%	0.3	6%
Southwood Mileusnich Park	1	0.00	0%	0.3	22%	0.0	0%	0.3	22%	0.9	78%
Spindler Road Park	104	12	12%	51	49%	2	2%	53	51%	44	43%
St Clair Parkland/Uirf	1	0.01	1%	0.6	75%	0.0	0%	0.6	75%	0.2	24%
Stephen Drive Park	1	0.2	26%	0.7	73%	0.0	0%	0.7	73%	0.0	0%
Stevenson Cemetery	1	0.2	27%	0.0	0%	0.0	0%	0.0	0%	0.5	73%
Stockbridge Park	12	1	10%	10	86%	0.5	4%	11	90%	0.1	1%
Stonecliff Parkland	12	9	76%	3	24%	0.0	0%	3	24%	0.0	0%
Stoneridge Park	23	11	49%	8	37%	0.8	3%	9	41%	2	10%
Strawberry Farms Park	23	18	77%	5	23%	0.0	0%	5	23%	0.3	1%
Sugar Run Parkland	8	8	96%	0.3	4%	0.0	0%	0.3	4%	0.0	0%
Sullivant Gardens Park	2	0.8	37%	0.5	24%	0.5	23%	1	46%	0.3	17%
Summitview Park	9	3	33%	5	59%	0.6	7%	6	65%	0.2	2%
Sycamore Bottoms Parkland	37	37	99%	0.3	1%	0.0	0%	0.3	1%	1	3%
Sycamore Hills Park	8	2	28%	6	71%	0.1	1%	6	71%	0.0	0%
Tanager Woods Parkland	42	39	93%	3	7%	0.0	0%	3	7%	0.5	1%
Teaford Parkland	17	17	98%	0.2	1%	0.1	1%	0.4	2%	0.1	0%
Thompson Park	4	0.7	16%	0.8	18%	1	33%	2	52%	1	32%
Three Creeks Park	1014	575	57%	332	33%	9	1%	341	34%	158	16%
Thurber Park	1	0.4	55%	0.3	36%	0.0	0%	0.3	36%	0.1	9%
Tionda Drive Parkland	0	0.1	100%	0.0	0%	0.0	0%	0.0	0%	0.0	0%
Trabue Woods Park	6	5	80%	1	16%	0.0	0%	1	16%	0.2	4%
Turnberry Golf Course	201	64	32%	21	10%	5	3%	26	13%	121	60%
Turnberry Parkland	31	21	67%	10	31%	0.0	0%	10	31%	2	7%
Tuttle Park	44	27	61%	3	7%	2	4%	5	11%	17	38%
Tuttle/Lane Ave Mut Connector	1	0.6	47%	0.3	22%	0.4	29%	0.6	50%	1	108%
Upper Albany School Site	10	6	58%	4	42%	0.0	0%	4	42%	0.0	0%

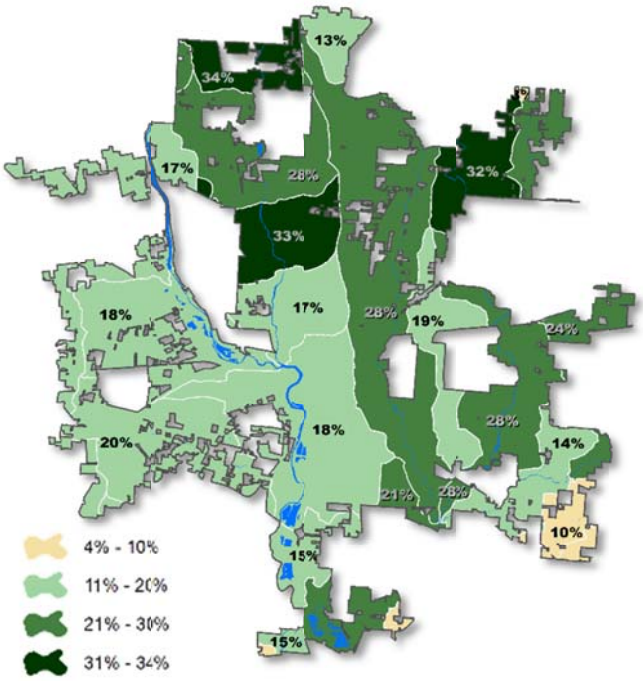
Parks and Parkland Assessment Results – Continued from previous page

Park or Parkland	Total Land Acres	UTC Acres	UTC %	PPA (Veg.) Acres	PPA (Veg.) %	PPA (Imp.) Acres	PPA (Imp.) %	Total PPA Acres	Total PPA %	Unsuitable UTC (acres)	Unsuitable UTC %
Upper Albany West Parkland	2	1	47%	1	49%	0.0	0%	1	49%	0.1	4%
Vaughn Farm Parkland	4	3	64%	1	37%	0.0	0%	1	37%	0.4	10%
Virginia Terrace Water Ded	8	6	78%	2	22%	0.0	0%	2	22%	0.6	8%
Waggoner Chase Parkland	5	4	76%	1	24%	0.0	0%	1	24%	0.0	0%
Walden Park	5	0.2	4%	5	95%	0.0	0%	5	95%	0.0	1%
Walnut Hill Park	71	19	26%	17	24%	1	2%	18	26%	34	48%
Walnut Street Parkland	10	0.5	5%	9	95%	0.0	0%	9	95%	0.0	0%
Walnut View Park	9	4	42%	5	54%	0.3	3%	5	57%	0.1	1%
Waltham Woods Park	2	0.3	21%	1	73%	0.1	5%	1	77%	0.0	1%
Wango Park	41	28	68%	13	32%	0.0	0%	13	32%	0.4	1%
Watercourse Dedication/Scioto	6	6	97%	0.2	3%	0.0	0%	0.2	3%	4	70%
Webster Park	2	2	100%	0.0	0%	0.0	0%	0.0	0%	0.0	0%
Weinland Park	4	0.7	19%	3	67%	0.3	7%	3	74%	0.3	7%
West Bank Walkway	8	2	19%	5	60%	0.5	6%	6	66%	2	22%
Westbank Park	8	4	49%	4	51%	0.0	0%	4	51%	0.1	1%
Westchester Parkland	2	1	89%	0.2	11%	0.0	0%	0.2	11%	0.0	0%
Westerford Village Parkland	5	5	99%	0.0	1%	0.0	0%	0.0	1%	0.4	8%
Westerville Woods Parkland	1	1	93%	0.1	6%	0.0	0%	0.1	6%	0.1	8%
Westgate Park	42	16	38%	16	37%	5	11%	20	48%	7	16%
Westmoor Park	17	2	14%	13	77%	1	8%	14	85%	0.2	1%
Wexford Green Park	10	9	96%	0.4	4%	0.0	0%	0.4	4%	0.0	0%
Wheeler Memorial Park	4	0.9	23%	3	72%	0.0	0%	3	73%	0.2	4%
Whetstone Park	141	76	54%	43	31%	8	5%	51	36%	24	17%
White Ash Parkland	14	5	39%	7	50%	0.0	0%	7	50%	2	11%
Williams Creek Park	6	0.01	0%	6	99%	0.0	0%	6	99%	0.1	1%
Willis Park	3	0.4	16%	0.7	27%	0.0	0%	0.7	27%	2	58%
Willow Creek Park	25	16	65%	9	35%	0.0	0%	9	35%	0.9	3%
Wilson Avenue Park	0	0.1	75%	0.0	17%	0.0	0%	0.0	17%	0.0	0%
Wilson Road Parkland	48	35	74%	12	25%	0.0	0%	12	25%	0.4	1%
Winchester Bend Parkland	5	5	95%	0.2	4%	0.0	0%	0.2	4%	0.5	10%
Winchester Meadows - Echelon Parkland	2	0.2	10%	1	89%	0.0	0%	1	89%	0.0	1%
Winchester Meadows Parkland	10	0.8	8%	9	90%	0.0	0%	9	90%	8	79%
Windsor Park	6	1	18%	2	32%	2	26%	3	58%	1	24%
Winward Farms Park	13	0.7	5%	12	94%	0.0	0%	12	94%	4	32%
Wolfe Park	44	17	38%	19	43%	4	9%	23	53%	7	15%
Woodbridge Green Park	6	3	40%	4	57%	0.1	1%	4	58%	0.1	2%
Woodstream Park	29	21	71%	8	29%	0.0	0%	8	29%	2	8%
Total	**7,276**	**3,690**	**51%**	**2,377**	**33%**	**216**	**3%**	**2,593**	**36%**	**1,365**	**19%**

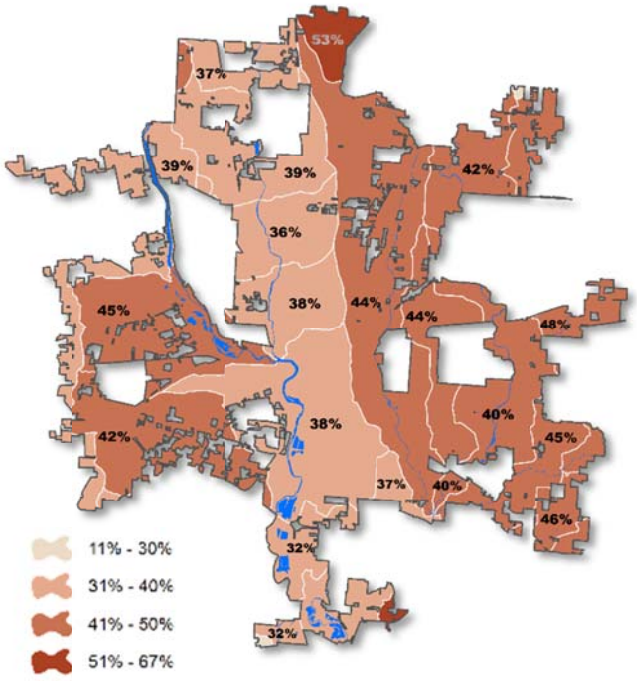
Parks and Parkland Assessment Results – Continued from previous page

City of Columbus Geographic Summary: HUC 12 Watersheds

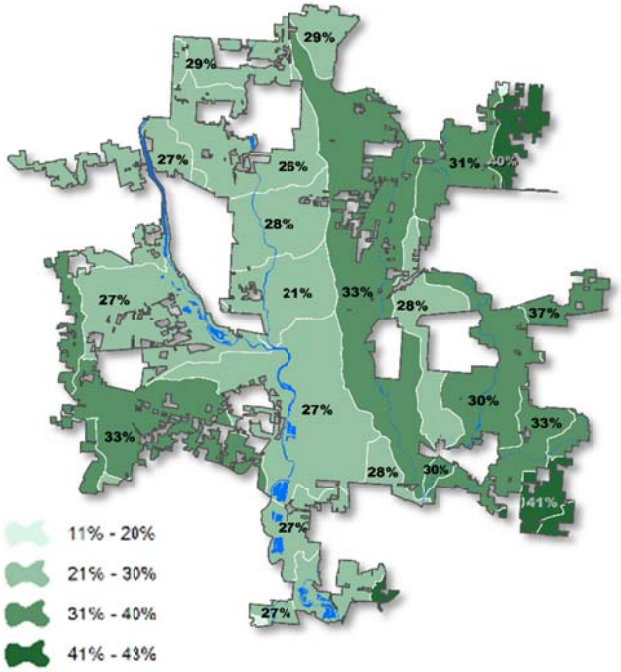
Percent Urban Tree Canopy



Percent Possible Planting Areas (Total)



Percent Possible Planting Areas (Vegetation)



Percent Possible Planting Areas (Impervious)

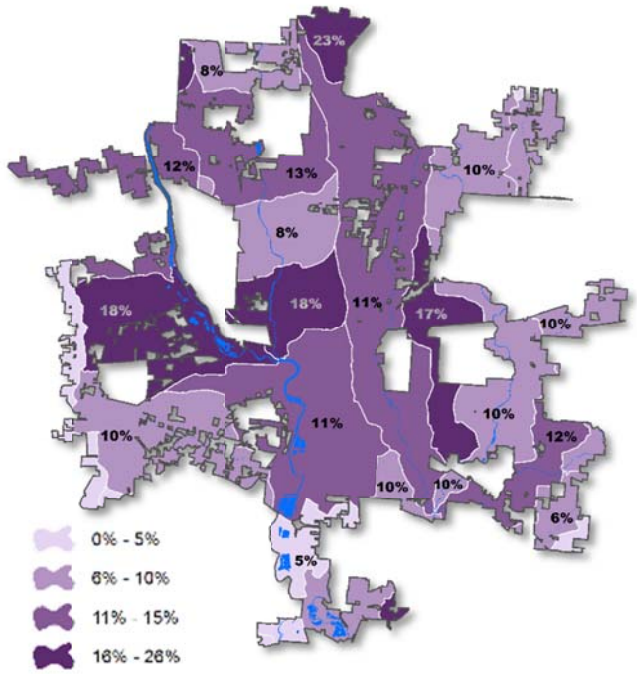


Figure 37: Watershed Assessment Results

City of Columbus Geographic Summary: HUC 12 Watersheds

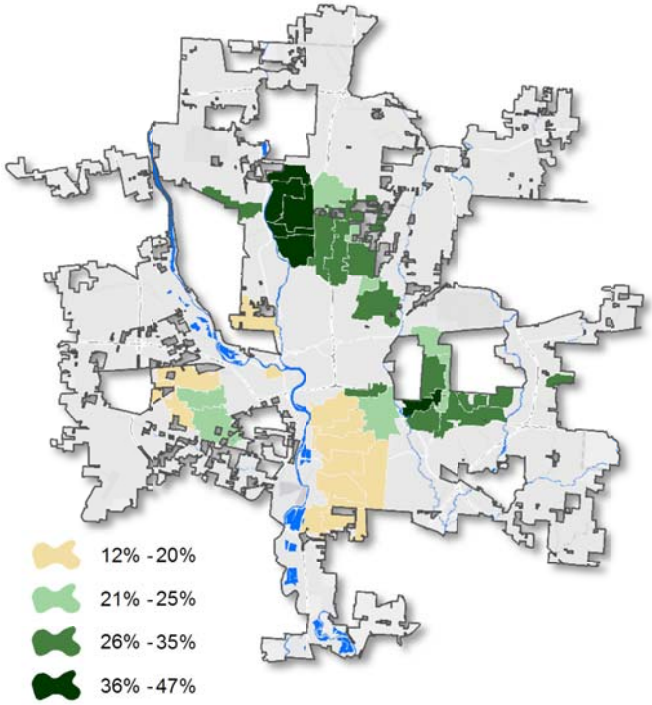
This table summarizes the UTC metrics by HUC12 watersheds in Columbus, OH in Acres and % including Urban Tree Canopy (UTC), Possible Planting Area Vegetation (PPA Vegetation), Possible Planting Area Impervious (PPA Impervious), Total Possible Planting Area (Total PPA), and Areas Unsuitable for Planting (Unsuitable).

Table 23: Watershed Assessment Results

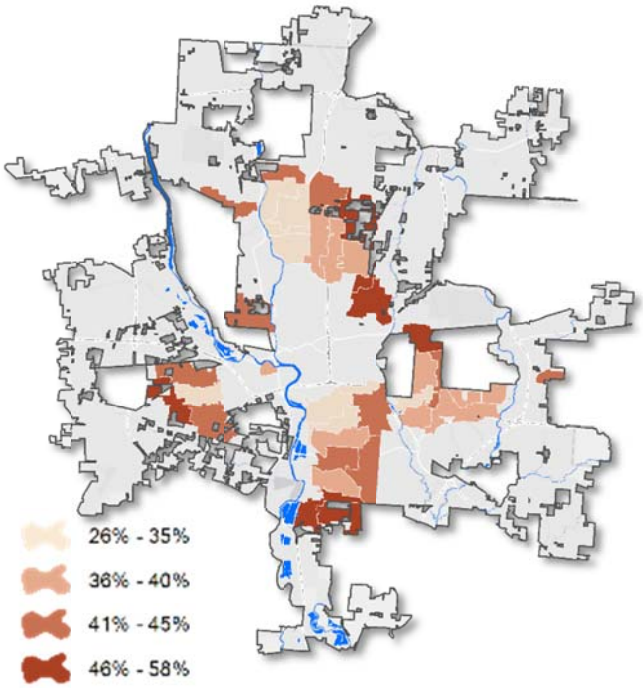
Watershed	Total Land Acres	UTC Acres	UTC %	% of Total UTC	PPA (Veg.) Acres	PPA (Veg.) %	PPA (Imp.) Acres	PPA (Imp.) %	Total PPA Acres	Total PPA %	Unsuitable UTC (acres)	Unsuitable UTC %
050600011405	3,105	730	24%	2%	1,153	37%	325	10%	1,478	48%	944	30%
050600011801	568	55	10%	0%	244	43%	2	0%	246	43%	273	48%
050600011803	354	13	4%	0%	146	41%	90	26%	236	67%	112	32%
050600011601	2,503	314	13%	1%	736	29%	584	23%	1,319	53%	910	36%
050600011204	8,775	2,433	28%	8%	2,284	26%	1,153	13%	3,436	39%	3,058	35%
050600011401	5,198	1,677	32%	5%	1,632	31%	536	10%	2,168	42%	1,451	28%
050600010805	6,094	1,047	17%	3%	1,618	27%	754	12%	2,372	39%	3,109	51%
050600012201	3,167	484	15%	2%	1,034	33%	124	4%	1,158	37%	1,612	51%
050600011205	6,578	2,185	33%	7%	1,831	28%	534	8%	2,364	36%	2,090	32%
050600011404	5,684	1,054	19%	3%	1,581	28%	945	17%	2,527	44%	2,254	40%
050600011403	9,350	2,598	28%	8%	2,851	30%	895	10%	3,746	40%	3,241	35%
050600011206	6,176	1,069	17%	3%	1,266	20%	1,098	18%	2,364	38%	2,839	46%
050600010806	10,587	1,858	18%	6%	2,896	27%	1,903	18%	4,799	45%	4,441	42%
050600012301	16,028	2,839	18%	9%	4,383	27%	1,744	11%	6,127	38%	7,880	49%
050600012302	10,105	1,973	20%	6%	3,294	33%	994	10%	4,288	42%	3,979	39%
050600011406	4,531	639	14%	2%	1,501	33%	525	12%	2,026	45%	1,972	44%
050600011802	2,082	210	10%	1%	845	41%	118	6%	964	46%	966	46%
050600011603	4,400	916	21%	3%	1,216	28%	422	10%	1,638	37%	2,242	51%
050600012303	3,924	585	15%	2%	1,048	27%	196	5%	1,244	32%	2,594	66%
050600012304	141	6	4%	0%	26	19%	2	1%	28	20%	106	76%
050600011203	3,602	1,229	34%	4%	1,032	29%	300	8%	1,332	37%	1,076	30%
050600011602	23,125	6,500	28%	21%	7,651	33%	2,525	11%	10,176	44%	6,640	29%
050600010803	518	123	24%	0%	149	29%	86	17%	235	45%	164	32%
050600011402	2,797	626	22%	2%	1,131	40%	251	9%	1,382	49%	834	30%
050600011307	106	9	8%	0%	12	11%	0	0%	12	11%	85	80%
TOTAL	**139,499**	**31,171**	**22%**	**100%**	**41,558**	**30%**	**16,107**	**12%**	**57,665**	**41%**	**54,872**	**39%**

City of Columbus Geographic Summary: BluePrint Columbus Project Areas

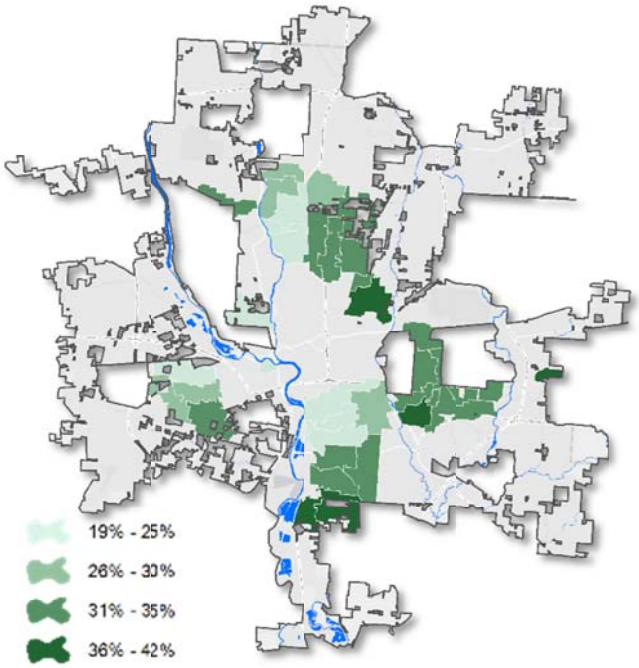
Percent Urban Tree Canopy



Percent Possible Planting Areas (Total)



Possible Planting Areas (Vegetation)



Possible Planting Areas (Impervious)

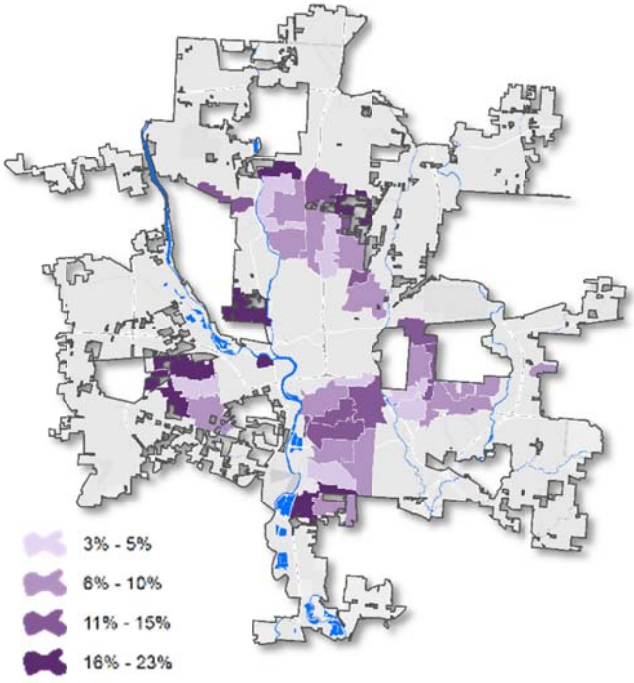


Figure 38: BluePrint Columbus Project Area Assessment Results

City of Columbus Geographic Summary: BluePrint Columbus Project Areas

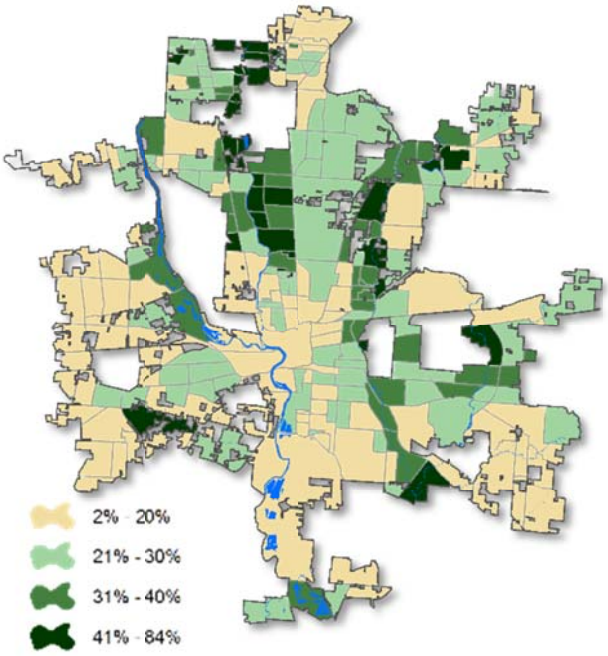
This table summarizes the UTC metrics by Columbus, OH BluePrint Columbus Project areas in acres and % including Urban Tree Canopy (UTC), Possible Planting Area Vegetation (PPA Vegetation), Possible Planting Area Impervious (PPA Impervious), Total Possible Planting Area (Total PPA), and Areas Unsuitable for Planting (Unsuitable).

Table 24: BluePrint Columbus Project Area Assessment Results

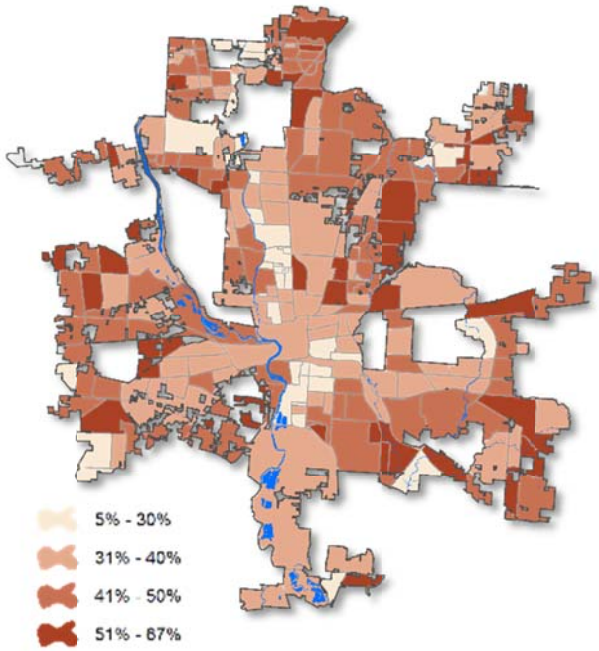
BluePrint Columbus Project Area	Total Land Acres	UTC Acres	UTC %	% of Total UTC	PPA (Veg.) Acres	PPA (Veg.) %	PPA (Imp.) Acres	PPA (Imp.) %	Total PPA Acres	Total PPA %	Unsuitable UTC (acres)	Unsuitable UTC %
Barthman Parson-1	969	180	19%	3%	182	19%	73	7%	255	26%	550	57%
Barthman Parson-2	645	100	15%	1%	158	24%	66	10%	224	35%	321	50%
Barthman Parson-3	937	133	14%	2%	211	22%	128	14%	339	36%	468	50%
Clintonville (includes Walhalla)-1	1,012	410	41%	6%	256	25%	60	6%	317	31%	287	28%
Clintonville (includes Walhalla)-2	780	336	43%	5%	222	28%	31	4%	253	32%	202	26%
Clintonville (includes Walhalla)-3	499	185	37%	3%	137	28%	81	16%	218	44%	97	19%
Clintonville (includes Walhalla)-4	335	158	47%	2%	77	23%	12	4%	90	27%	91	27%
Clintonville (includes Walhalla)-5	865	338	39%	5%	196	23%	46	5%	241	28%	289	33%
Driving Park	1,260	288	23%	4%	358	28%	149	12%	507	40%	468	37%
Far South (Williams Road and Castle Road)-1	1,320	255	19%	4%	401	30%	129	10%	530	40%	539	41%
Far South (Williams Road and Castle Road)-2	769	150	19%	2%	262	34%	64	8%	326	42%	295	38%
Far South (Williams Road and Castle Road)-3	831	129	16%	2%	278	33%	34	4%	312	38%	405	49%
Far South (Williams Road and Castle Road)-4	727	85	12%	1%	291	40%	72	10%	363	50%	282	39%
Far South (Williams Road and Castle Road)-5	826	140	17%	2%	340	41%	142	17%	483	58%	206	25%
Fifth by NW (West Fifth)	876	126	14%	2%	164	19%	202	23%	366	42%	398	45%
Franklinton (Sullivant)	159	30	19%	0%	35	22%	26	16%	61	38%	79	50%
Hilltop (Early Ditch)-1	926	176	19%	3%	229	25%	168	18%	397	43%	353	38%
Hilltop (Early Ditch)-2	711	167	24%	2%	208	29%	29	4%	237	33%	307	43%
Hilltop (Early Ditch)-3	1,103	243	22%	3%	385	35%	81	7%	465	42%	396	36%
Hilltop (Early Ditch)-4	782	125	16%	2%	218	28%	176	22%	394	50%	267	34%
James Livingston-1	622	149	24%	2%	215	35%	75	12%	290	47%	183	29%
James Livingston-2	722	246	34%	4%	217	30%	38	5%	255	35%	222	31%
James Livingston-3	696	193	28%	3%	214	31%	46	7%	259	37%	244	35%
James Livingston-4	1,220	325	27%	5%	384	31%	87	7%	470	39%	425	35%
James Livingston-5	355	88	25%	1%	113	32%	41	12%	154	43%	113	32%
James Livingston-6	561	163	29%	2%	202	36%	15	3%	216	39%	183	33%
James Livingston-7	445	162	36%	2%	136	31%	18	4%	154	35%	135	30%
Kenny Henderson (Francisco Teteridge)	574	155	27%	2%	173	30%	75	13%	248	43%	171	30%
Linden/NE Area (NW Alum)-1	619	160	26%	2%	197	32%	101	16%	298	48%	168	27%
Linden/NE Area (NW Alum)-2	784	247	32%	4%	242	31%	43	6%	285	36%	253	32%
Linden/NE Area (NW Alum)-3	497	110	22%	2%	164	33%	72	15%	236	48%	153	31%
Linden/NE Area (NW Alum)-4	1,154	335	29%	5%	489	42%	80	7%	569	49%	251	22%
Maize Morse-1	907	202	22%	3%	264	29%	125	14%	389	43%	317	35%
Maize Morse-2	1,016	264	26%	4%	316	31%	60	6%	376	37%	376	37%
Maize Morse-3	901	277	31%	4%	290	32%	30	3%	320	35%	304	34%
Miller Kelton-1	342	89	26%	1%	79	23%	13	4%	92	27%	161	47%
Plum Ridge	229	74	32%	1%	82	36%	14	6%	97	42%	59	26%
TOTALS	**27,974**	**6,996**	**25%**	**100%**	**8,302**	**30%**	**2,701**	**10%**	**11,086**	**40%**	**10,019**	**36%**

City of Columbus Geographic Summary: Neighborhoods

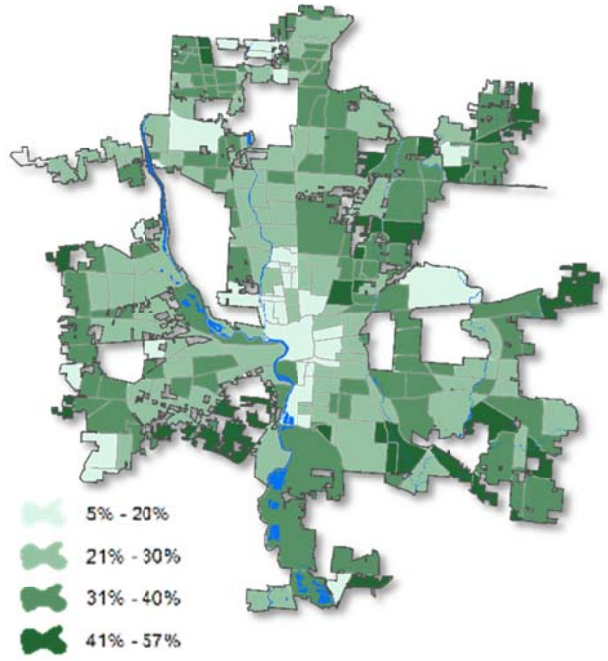
Percent Urban Tree Canopy



Percent Possible Planting Areas (Total)



Percent Possible Planting Areas (Vegetation)



Percent Possible Planting Areas (Impervious)

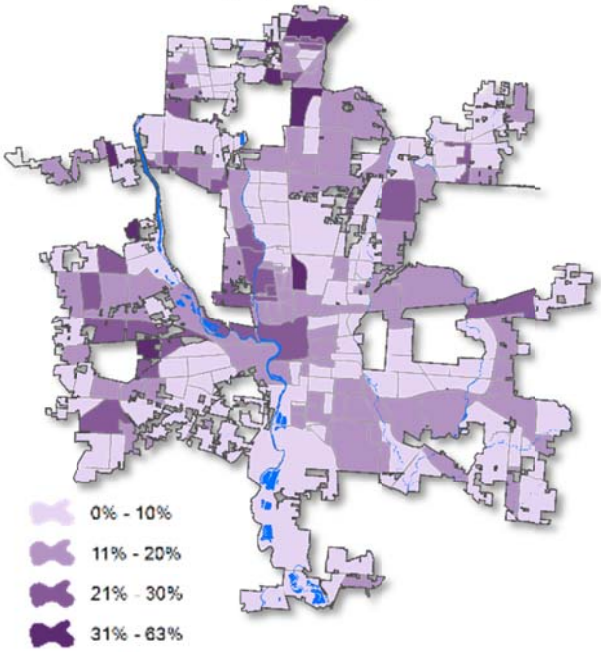


Figure 39: Neighborhood Assessment Results

City of Columbus Geographic Summary: Neighborhoods

This table summarizes the UTC metrics by Neighborhoods in Acres and % including Urban Tree Canopy (UTC), Possible Planting Area Vegetation (PPA Vegetation), Possible Planting Area Impervious (PPA Impervious), Total Possible Planting Area (Total PPA), and Areas Unsuitable for Planting (Unsuitable).

Table 25: Neighborhood Assessment Results

Neighborhood	Total Land Acres	UTC Acres	UTC %	PPA (Veg.) Acres	PPA (Veg.) %	PPA (Imp.) Acres	PPA (Imp.) %	Total PPA Acres	Total PPA %	Unsuitable UTC (acres)	Unsuitable UTC %
Abby Trails	569	80	14%	326	57%	37	7%	363	64%	145	26%
Airport	2,683	179	7%	446	17%	441	16%	887	33%	1,812	68%
Albany Commons	268	24	9%	144	54%	19	7%	163	61%	87	33%
Alum Crest Acres	247	66	27%	100	40%	46	19%	146	59%	35	14%
Amercrest	564	96	17%	248	44%	43	8%	291	52%	177	31%
Antrim	310	67	22%	105	34%	23	7%	128	41%	124	40%
Appian	313	80	26%	108	35%	44	14%	152	49%	104	33%
Argyle Park	357	59	16%	134	37%	55	15%	189	53%	112	31%
Arlington Park	180	53	30%	73	40%	11	6%	83	46%	43	24%
Beechwood	324	90	28%	105	32%	12	4%	117	36%	117	36%
Berwick	814	289	35%	260	32%	38	5%	298	37%	246	30%
Blendon Woods	444	127	29%	188	42%	18	4%	206	46%	112	25%
Blendon Woods Metro Park	592	496	84%	84	14%	10	2%	94	16%	12	2%
Bluff View	42	16	38%	13	31%	0	0%	13	31%	13	31%
Brandywine	371	84	23%	158	43%	12	3%	170	46%	117	32%
Brentnell	45	17	38%	17	38%	0	1%	17	39%	10	23%
Brentwood Park	167	65	39%	55	33%	3	2%	58	35%	44	26%
Brewery District (including Whittier Peninsula)	364	64	18%	113	31%	52	14%	165	45%	231	63%
Brice	475	43	9%	142	30%	21	4%	162	34%	274	58%
Bridgeview	549	264	48%	204	37%	35	6%	239	44%	51	9%
Brittany Hills	297	106	36%	114	38%	19	6%	133	45%	58	20%
Broadleigh	420	112	27%	155	37%	49	12%	204	49%	105	25%
Brookhollow	286	60	21%	71	25%	35	12%	106	37%	140	49%
Brookshire	749	148	20%	218	29%	74	10%	292	39%	310	41%
Brookside Colony	324	73	23%	105	32%	53	16%	158	49%	95	29%
Brookside Village	150	39	26%	55	37%	10	7%	65	44%	45	30%
Brookside Woods	522	128	25%	128	25%	113	22%	241	46%	159	30%
Busch	750	77	10%	237	32%	236	31%	473	63%	212	28%
Cambria Addition	8	1	17%	4	47%	0	0%	4	47%	3	36%
Central Clintonville	603	226	38%	148	24%	37	6%	185	31%	192	32%
Central College	654	98	15%	274	42%	124	19%	398	61%	169	26%
Central Hilltop	698	185	27%	233	33%	31	5%	264	38%	249	36%
Cherry Creek	565	134	24%	178	32%	60	11%	238	42%	195	35%
Christopher Woods	24	12	49%	6	26%	0	0%	6	26%	6	25%
Clintonville	720	295	41%	167	23%	30	4%	197	27%	250	35%
Cobleton	426	23	5%	180	42%	1	0%	181	42%	231	54%
Coppertree	42	11	25%	14	34%	3	8%	18	42%	15	34%
Cranbrook	224	97	43%	61	27%	11	5%	72	32%	56	25%
Cross Creek	525	59	11%	205	39%	22	4%	227	43%	238	45%
Crossroads	5	0	4%	0	9%	0	0%	0	9%	4	87%
Crosswoods	233	21	9%	37	16%	112	48%	148	64%	64	27%
Crown Ridge	88	17	19%	23	25%	16	19%	39	44%	33	37%
Cumberland Ridge	579	170	29%	212	37%	89	15%	301	52%	109	19%

Neighborhood	Total Land Acres	UTC Acres	UTC %	PPA (Veg.) Acres	PPA (Veg.) %	PPA (Imp.) Acres	PPA (Imp.) %	Total PPA Acres	Total PPA %	Unsuitable UTC (acres)	Unsuitable UTC %
Deer Creek	422	65	15%	150	36%	55	13%	205	49%	157	37%
Dennison Place	130	30	23%	17	13%	29	23%	46	35%	59	46%
Deshler Park	440	105	24%	134	30%	49	11%	183	41%	152	35%
Devon Triangle	224	26	12%	59	26%	28	12%	87	39%	111	49%
Devonshire	410	108	26%	130	32%	28	7%	158	39%	144	35%
Dexter Falls	470	110	23%	156	33%	30	6%	186	39%	180	38%
Don Scott	1,660	209	13%	272	16%	166	10%	438	26%	1,072	65%
Downtown	1,535	120	8%	164	11%	364	24%	528	34%	1,005	65%
Driving Park	508	116	23%	135	26%	31	6%	165	33%	227	45%
East	1,065	227	21%	319	30%	67	6%	385	36%	469	44%
East Beechwold	342	112	33%	103	30%	10	3%	113	33%	117	34%
East Broad I	1,251	238	19%	421	34%	303	24%	724	58%	312	25%
East Broad II	1,475	364	25%	599	41%	140	9%	739	50%	384	26%
East Columbus	789	184	23%	314	40%	87	11%	402	51%	204	26%
East Linden	213	80	38%	71	34%	9	4%	80	38%	53	25%
Eastgate	241	92	38%	57	24%	18	7%	75	31%	79	33%
Eastland	1,871	542	29%	443	24%	363	19%	806	43%	567	30%
Eastmoor 1	690	241	35%	208	30%	43	6%	251	36%	199	29%
Eastmoor 2	540	140	26%	176	33%	48	9%	224	42%	175	33%
Easton	1,468	280	19%	548	37%	305	21%	852	58%	346	24%
Edgewood	187	39	21%	64	34%	10	5%	74	40%	74	40%
Fairgrounds	443	36	8%	110	25%	161	36%	271	61%	139	31%
Far North	9	5	49%	2	20%	2	17%	3	37%	2	19%
Flint Road	28	13	46%	5	18%	5	18%	10	36%	6	23%
Fodor	243	57	23%	98	40%	15	6%	113	47%	73	30%
Forest Park East	1,499	329	22%	471	31%	230	15%	701	47%	471	31%
Forest Park West	431	123	28%	129	30%	41	9%	170	39%	139	32%
Foxboro	282	42	15%	74	26%	73	26%	147	52%	98	35%
Framingham	369	146	40%	149	40%	24	6%	173	47%	53	14%
Franklin Park	358	105	29%	105	29%	22	6%	127	36%	131	37%
Franklinton	1,057	159	15%	251	24%	140	13%	391	37%	511	48%
Galloway Ridge	492	58	12%	174	35%	49	10%	224	45%	218	44%
Gateway	164	77	47%	39	24%	29	18%	68	41%	20	12%
Georgian Heights	440	101	23%	128	29%	49	11%	177	40%	162	37%
German Village Commission	234	48	20%	30	13%	13	6%	44	19%	143	61%
Glen Echo	68	27	40%	13	18%	1	1%	13	19%	28	41%
Glenbrook	1,371	242	18%	495	36%	160	12%	655	48%	477	35%
Glenmeadows	127	41	32%	47	37%	1	1%	48	38%	38	30%
Golfview Woods	893	153	17%	257	29%	119	13%	376	42%	372	42%
Gould Park	219	134	61%	56	25%	7	3%	63	29%	44	20%
Governours Square	257	46	18%	62	24%	70	27%	132	51%	80	31%
Grandview South	548	109	20%	142	26%	111	20%	254	46%	361	66%
Grasshopper Creek	373	43	11%	38	10%	0	0%	39	10%	292	78%
Greenbriar Farm	835	400	48%	212	25%	35	4%	247	30%	200	24%
Greenhill Acres	178	34	19%	90	50%	7	4%	96	54%	49	27%
Harrison West	335	61	18%	63	19%	63	19%	126	38%	161	48%
Hayden Falls	90	25	28%	30	33%	8	9%	37	41%	53	59%
Henderson Heights	75	13	17%	23	31%	18	24%	41	55%	21	28%
Hickory Bluff Farms	229	107	47%	12	5%	0	0%	12	5%	110	48%
Highpoint-Glen	365	86	24%	117	32%	12	3%	129	35%	149	41%
Hilliard Green	724	66	9%	198	27%	177	24%	375	52%	289	40%

Neighborhood Assessment Results – Continued from previous page

Neighborhood	Total Land Acres	UTC Acres	UTC %	PPA (Veg.) Acres	PPA (Veg.) %	PPA (Imp.) Acres	PPA (Imp.) %	Total PPA Acres	Total PPA %	Unsuitable UTC (acres)	Unsuitable UTC %
Hilltop	26	0	2%	1	5%	16	63%	17	67%	8	31%
Hilltop 1	367	57	15%	157	43%	13	4%	170	46%	150	41%
Hilltop 2	366	61	17%	118	32%	98	27%	216	59%	92	25%
Hilltop 3	810	121	15%	191	24%	194	24%	385	48%	305	38%
Hilltop 4	372	27	7%	62	17%	148	40%	209	56%	136	37%
Holly Hill	356	58	16%	94	27%	38	11%	132	37%	166	47%
Holt-Alkire	465	51	11%	178	38%	49	11%	228	49%	193	41%
Hungarian Village	49	7	14%	11	23%	1	1%	12	25%	30	61%
Hyde Park	118	41	35%	35	30%	16	13%	51	43%	27	23%
Independence Village	1,716	225	13%	576	34%	336	20%	912	53%	604	35%
Indian Hills	241	108	45%	77	32%	5	2%	82	34%	52	22%
Indian Springs	508	236	47%	127	25%	29	6%	155	31%	117	23%
Indiana Forest	64	16	24%	7	11%	9	14%	16	25%	32	50%
Indianola Terrace	149	33	22%	23	15%	17	11%	40	27%	76	51%
Industrial Site	186	7	4%	15	8%	31	17%	46	25%	133	72%
Innis Garden Village	328	66	20%	101	31%	44	13%	145	44%	118	36%
Italian Village	281	32	11%	57	20%	39	14%	95	34%	154	55%
Iuka Ravine	27	16	59%	3	13%	1	3%	4	16%	7	26%
Kendale	197	65	33%	68	34%	12	6%	80	41%	52	27%
King-Lincoln-Bronzeville	355	60	17%	68	19%	48	14%	116	33%	179	50%
Knolls-Thomas	568	194	34%	148	26%	64	11%	212	37%	164	29%
Knolls West	385	95	25%	123	32%	47	12%	170	44%	121	31%
Laurel Greene	450	80	18%	178	40%	35	8%	213	47%	158	35%
Leawood	566	174	31%	164	29%	43	8%	207	37%	191	34%
Linwood	743	192	26%	242	33%	58	8%	300	40%	252	34%
Linworth Village	309	143	46%	69	22%	24	8%	93	30%	119	39%
Little Turtle	641	228	36%	174	27%	49	8%	222	35%	205	32%
Livingston - McNaughten	401	129	32%	105	26%	62	15%	167	42%	105	26%
Livingston Park North	228	43	19%	44	19%	30	13%	74	32%	112	49%
Madison Mills	215	48	22%	86	40%	14	6%	99	46%	72	33%
Maize-Morse	1,198	289	24%	340	28%	192	16%	532	44%	386	32%
Marble Cliff Crossing	1,051	316	30%	333	32%	147	14%	479	46%	431	41%
Marion Franklin	2,157	412	19%	638	30%	278	13%	915	42%	852	40%
Merion Village	739	167	23%	126	17%	71	10%	198	27%	525	71%
Milbrook	667	96	14%	173	26%	109	16%	282	42%	293	44%
Mill Run	206	20	10%	37	18%	78	38%	115	56%	82	40%
Milo-Grogan	618	95	15%	122	20%	89	14%	211	34%	313	51%
Minerva Park	3	0	2%	0	6%	0	0%	0	6%	2	92%
Misty Meadows	235	23	10%	56	24%	47	20%	103	44%	109	46%
Mount Vernon	371	60	16%	97	26%	36	10%	133	36%	178	48%
Necko	27	8	29%	3	12%	4	13%	7	25%	12	46%
North Campus	91	19	21%	10	11%	16	17%	25	28%	46	51%
North Franklinton	391	63	16%	131	34%	51	13%	182	47%	146	37%
North Hilltop	624	156	25%	184	29%	61	10%	244	39%	225	36%
North Linden	2,669	743	28%	851	32%	152	6%	1,003	38%	924	35%
North Rickenbacker	410	47	11%	194	47%	64	16%	258	63%	105	26%
Northbridge	85	41	48%	21	24%	0	0%	21	24%	23	27%
Northcrest	269	54	20%	70	26%	69	26%	139	52%	76	28%
Northern Woods	1,542	412	27%	437	28%	304	20%	741	48%	396	26%
Northgate	995	268	27%	311	31%	128	13%	439	44%	289	29%
Northmoor	232	123	53%	49	21%	6	2%	55	24%	62	27%
Northwood Park	26	11	43%	4	16%	0	1%	4	17%	10	40%

Neighborhood Assessment Results – Continued from previous page

Neighborhood	Total Land Acres	UTC Acres	UTC %	PPA (Veg.) Acres	PPA (Veg.) %	PPA (Imp.) Acres	PPA (Imp.) %	Total PPA Acres	Total PPA %	Unsuitable UTC (acres)	Unsuitable UTC %
Northwoods	187	121	64%	17	9%	23	13%	41	22%	28	15%
Norton Ridge	997	79	8%	173	17%	53	5%	226	23%	740	74%
Old Beechwold	147	89	60%	31	21%	2	1%	33	22%	30	20%
Old North Columbus	393	128	32%	61	15%	27	7%	88	22%	178	45%
Olde Orchard	940	274	29%	347	37%	101	11%	448	48%	225	24%
Olde Sawmill	451	108	24%	157	35%	49	11%	207	46%	142	31%
Olde Town East	497	103	21%	93	19%	51	10%	144	29%	251	50%
Olentangy	237	37	16%	93	39%	14	6%	107	45%	94	40%
Olentangy Commons	407	122	30%	96	24%	81	20%	178	44%	108	27%
Olentangy Glade	41	3	9%	15	38%	2	6%	18	43%	20	48%
Olentangy High Bluffs	265	150	57%	48	18%	23	9%	71	27%	51	19%
Olentangy Highlands	174	94	54%	44	25%	0	0%	44	25%	36	21%
Oriole Heights	155	53	34%	72	46%	6	4%	78	50%	24	16%
Park Club	84	13	16%	22	26%	16	19%	38	45%	33	40%
Parkview	589	184	31%	211	36%	66	11%	277	47%	132	22%
Pine Hills	271	73	27%	86	32%	19	7%	105	39%	95	35%
Pocono	7	2	33%	2	22%	1	17%	3	39%	2	28%
Polaris	1,039	56	5%	247	24%	381	37%	628	60%	374	36%
Polaris North	390	75	19%	137	35%	46	12%	183	47%	138	35%
Polaris South	228	15	7%	65	28%	50	22%	115	50%	107	47%
Preserve North	845	228	27%	302	36%	31	4%	333	39%	295	35%
Preserve South	457	53	12%	176	38%	90	20%	265	58%	145	32%
Preston Commons	83	12	15%	40	48%	6	7%	46	56%	26	32%
Reeb-Hosack	127	16	12%	28	22%	13	10%	41	32%	72	57%
River 1	42	31	73%	9	21%	2	4%	10	25%	108	255%
Riverbend	1,098	455	41%	286	26%	80	7%	366	33%	283	26%
Riverplace	143	46	32%	53	37%	7	5%	60	42%	71	50%
Riverside	848	256	30%	217	26%	84	10%	301	36%	365	43%
Riverview	465	115	25%	133	29%	100	22%	234	50%	119	26%
Salem Village	619	160	26%	175	28%	87	14%	262	42%	223	36%
Sanctuary	47	25	53%	9	19%	0	0%	9	19%	13	28%
Save Our Southside	7,234	1,064	15%	2,194	30%	515	7%	2,709	37%	4,310	60%
Sawmill Forest	128	55	43%	39	31%	3	3%	43	34%	30	24%
Sawmill Ravines	97	26	27%	17	17%	24	24%	40	42%	75	78%
Schirm Farm	482	22	5%	181	38%	82	17%	263	55%	223	46%
Schumacher Place	114	17	15%	15	13%	12	11%	27	23%	70	62%
Scioto Trace	1,199	371	31%	332	28%	85	7%	417	35%	544	45%
Scioto Woods	433	125	29%	127	29%	26	6%	153	35%	157	36%
Seven Oaks	42	15	36%	12	29%	1	1%	13	31%	14	33%
Shady Lane	756	296	39%	199	26%	54	7%	254	34%	217	29%
Shannon Green	1,333	182	14%	404	30%	26	2%	431	32%	757	57%
Shannon Heights	292	65	22%	80	28%	28	10%	109	37%	118	40%
Sharon Heights	891	323	36%	250	28%	109	12%	359	40%	214	24%
Shepard	233	61	26%	71	31%	24	10%	95	41%	77	33%
Slate Hill	261	54	20%	87	33%	43	17%	130	50%	79	30%
Smoky Mill Estates	38	13	33%	15	39%	0	1%	15	39%	10	27%
Smoky Ridge Estates	124	34	27%	50	41%	1	1%	51	41%	39	32%
Somerset	771	145	19%	365	47%	77	10%	442	57%	210	27%
South Campus	115	15	13%	10	9%	27	24%	38	33%	63	55%
South Central Hilltop	381	86	23%	140	37%	16	4%	156	41%	139	37%
South Franklinton	307	54	18%	85	28%	61	20%	146	48%	109	35%
South Hilltop	393	94	24%	112	28%	34	9%	146	37%	153	39%

Neighborhood Assessment Results – Continued from previous page

Neighborhood	Total Land Acres	UTC Acres	UTC %	PPA (Veg.) Acres	PPA (Veg.) %	PPA (Imp.) Acres	PPA (Imp.) %	Total PPA Acres	Total PPA %	Unsuitable UTC (acres)	Unsuitable UTC %
South Linden	1,032	221	21%	292	28%	82	8%	374	36%	437	42%
South London	790	293	37%	269	34%	15	2%	285	36%	530	67%
South of Main	260	71	27%	57	22%	17	7%	74	29%	114	44%
South Side CAN	390	74	19%	92	24%	15	4%	107	28%	211	54%
Southeast 1	542	207	38%	125	23%	62	11%	186	34%	170	31%
Southeast 2	916	281	31%	464	51%	9	1%	473	52%	203	22%
Southern Orchards	258	52	20%	53	21%	13	5%	66	26%	140	54%
Southside 5	457	79	17%	122	27%	86	19%	208	46%	171	37%
Southwest 1	394	76	19%	143	36%	37	9%	180	46%	140	36%
Southwest 2	1,126	162	14%	316	28%	64	6%	379	34%	688	61%
Southwest 3	443	65	15%	202	46%	37	8%	240	54%	151	34%
Southwest 4	281	55	20%	122	43%	19	7%	141	50%	86	31%
Southwest 5	104	19	19%	33	31%	21	20%	53	51%	32	30%
Southwest Airport	1,198	123	10%	366	31%	260	22%	626	52%	470	39%
Southwest Hilltop	399	85	21%	135	34%	13	3%	147	37%	167	42%
Springbourne	81	10	13%	15	18%	26	31%	41	50%	33	41%
St. Mary's	248	81	33%	75	30%	24	10%	99	40%	68	28%
Stambaugh-Elwood	51	13	25%	20	40%	1	1%	21	41%	17	34%
Stilson	100	31	31%	36	36%	0	0%	36	36%	34	34%
Stilson East	86	48	55%	22	26%	0	0%	22	26%	16	19%
Stonebridge	373	89	24%	174	47%	13	4%	187	50%	100	27%
Strawberry Farms	807	293	36%	253	31%	80	10%	333	41%	191	24%
Summerwood	163	50	31%	57	35%	6	4%	63	39%	50	31%
Summit View Forest	56	22	40%	21	39%	1	1%	22	40%	11	20%
Summit View Woods	255	75	30%	96	38%	8	3%	104	41%	76	30%
Sweetwater	927	107	12%	294	32%	139	15%	433	47%	413	45%
Sycamore Hills	317	124	39%	98	31%	23	7%	121	38%	75	24%
Teakwood	135	45	33%	38	28%	23	17%	62	46%	28	21%
The Gables	472	99	21%	162	34%	72	15%	234	50%	149	31%
The Ohio State University	932	123	13%	221	24%	246	26%	467	50%	399	43%
Three Corners	417	120	29%	39	9%	0	0%	39	9%	258	62%
Three Rivers	907	456	50%	185	20%	50	5%	235	26%	250	28%
Trabue Woods	393	47	12%	123	31%	65	16%	188	48%	159	40%
Tri-Village	696	96	14%	107	15%	172	25%	279	40%	323	46%
Trouville	409	81	20%	138	34%	91	22%	229	56%	104	25%
Tuttle	225	12	5%	46	20%	75	33%	121	54%	100	45%
Tuttle West	1,022	92	9%	281	27%	153	15%	434	42%	519	51%
University	144	31	21%	14	10%	28	19%	42	29%	72	50%
Valleyview	2	1	57%	1	24%	0	0%	1	24%	0	19%
Valleyview Heights	308	43	14%	80	26%	92	30%	172	56%	93	30%
Vasser Village (Lincoln Park)	233	19	8%	51	22%	41	18%	93	40%	121	52%
Victorian Village	285	65	23%	47	16%	31	11%	77	27%	143	50%
Village at Forest Ridge	7	2	27%	1	19%	2	25%	3	44%	2	31%
Village at Worthington	99	26	27%	32	32%	5	5%	37	38%	36	36%
Walnut Creek	810	384	47%	223	28%	56	7%	280	35%	153	19%
Walnut Heights	985	189	19%	418	42%	37	4%	455	46%	371	38%
Walnut Hills	413	86	21%	116	28%	61	15%	177	43%	153	37%
Weinland Park	203	24	12%	42	21%	23	12%	65	32%	114	56%
West Albany	1,274	330	26%	406	32%	73	6%	479	38%	479	38%
West Campus	744	108	15%	225	30%	97	13%	322	43%	318	43%
West London	924	214	23%	238	26%	74	8%	312	34%	432	47%

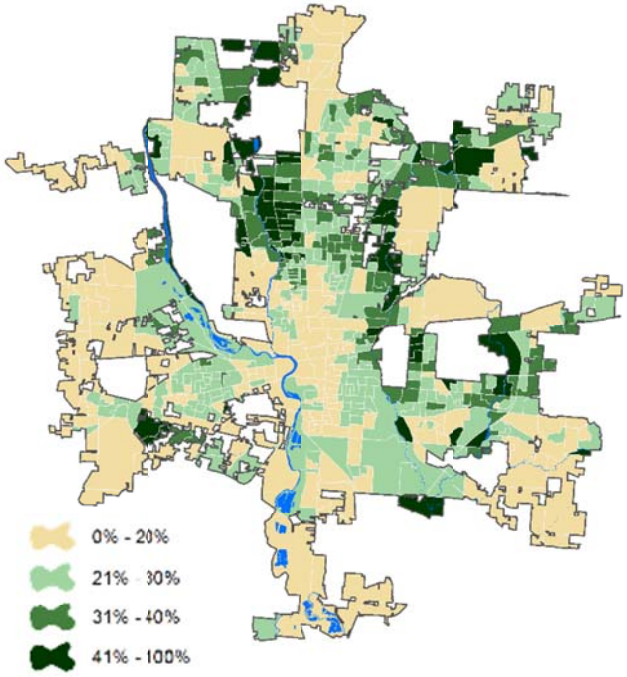
Neighborhood Assessment Results – Continued from previous page

Neighborhood	Total Land Acres	UTC Acres	UTC %	PPA (Veg.) Acres	PPA (Veg.) %	PPA (Imp.) Acres	PPA (Imp.) %	Total PPA Acres	Total PPA %	Unsuitable UTC (acres)	Unsuitable UTC %
Westbelt	628	63	10%	153	24%	177	28%	330	53%	238	38%
Westbend	221	21	10%	95	43%	0	0%	95	43%	114	51%
Westbrook	127	32	25%	31	24%	36	28%	67	52%	29	23%
Westbrooke-Heritage	388	35	9%	194	50%	8	2%	203	52%	165	43%
Westchester-Green Countrie	541	100	19%	196	36%	53	10%	248	46%	195	36%
Western Hills	206	53	26%	86	42%	1	0%	87	42%	65	32%
Westgate	553	124	22%	155	28%	46	8%	201	36%	229	41%
Westside 1	868	75	9%	180	21%	149	17%	328	38%	496	57%
Westside 2	804	101	13%	227	28%	164	20%	391	49%	321	40%
Westside 3	403	68	17%	76	19%	15	4%	91	23%	249	62%
Westworth Village	117	29	25%	46	39%	2	2%	48	41%	40	34%
Wexford-Thornapple	700	121	17%	268	38%	63	9%	331	47%	278	40%
Wexmoor	376	78	21%	117	31%	54	14%	171	45%	128	34%
Whetstone	391	179	46%	106	27%	26	7%	133	34%	99	25%
White Ash	1,462	169	12%	569	39%	30	2%	599	41%	718	49%
Williams Creek	324	28	9%	145	45%	55	17%	200	62%	99	31%
Willow Creek	817	196	24%	346	42%	60	7%	407	50%	223	27%
Winchester	621	100	16%	262	42%	89	14%	351	56%	217	35%
Windward Farms	489	51	11%	144	30%	4	1%	148	30%	294	60%
Wolfe Park	82	41	50%	27	32%	4	5%	31	37%	11	13%
Wood Bridge Green	122	29	24%	47	39%	12	10%	59	49%	34	28%
Woodland Holt	145	57	39%	50	34%	4	2%	53	37%	35	24%
Woodland Park	243	75	31%	58	24%	19	8%	77	32%	91	37%
Woods of Josephinium	363	159	44%	103	28%	22	6%	125	34%	87	24%
Woodstream	324	113	35%	157	49%	0	0%	157	49%	54	17%
Woodward Park	427	87	20%	129	30%	60	14%	189	44%	151	35%
Worthington Crossing	157	16	10%	57	36%	36	23%	94	60%	51	32%
Worthington Green	132	31	23%	47	36%	5	4%	53	40%	49	37%
Worthington Highlands	229	44	19%	65	28%	28	12%	93	41%	92	40%
Worthington Hills	139	62	45%	43	31%	1	0%	44	31%	34	24%
Worthington Park	189	40	21%	69	37%	18	9%	87	46%	64	34%
Worthington Village North	157	14	9%	41	26%	42	26%	83	52%	61	39%
Worthington Woods	98	23	23%	30	31%	16	16%	46	47%	29	30%
Worthingview	140	52	37%	45	32%	4	3%	49	35%	39	28%
Wynstone	131	22	17%	51	39%	10	8%	61	47%	48	37%
TOTAL	**138,436**	**30,986**	**22%**	**41,327**	**30%**	**16,048**	**12%**	**57,375**	**41%**	**54,227**	**41%**

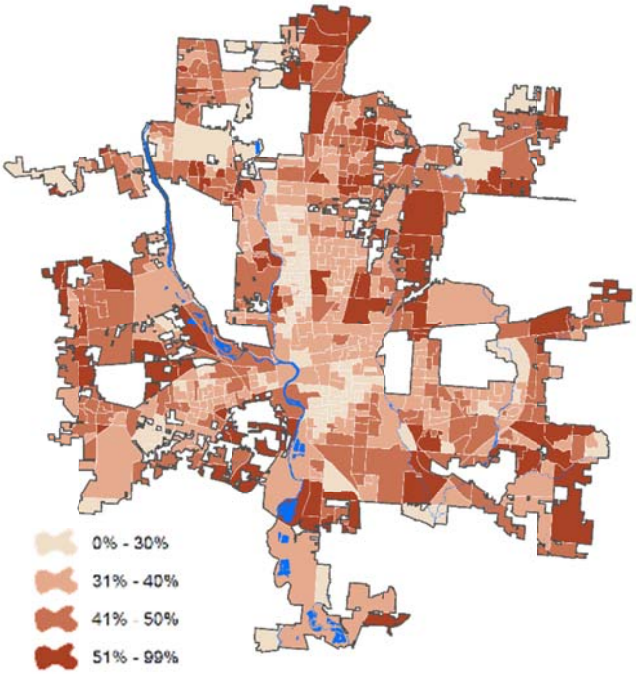
Neighborhood Assessment Results – Continued from previous page

City of Columbus Geographic Summary: Census Block Groups

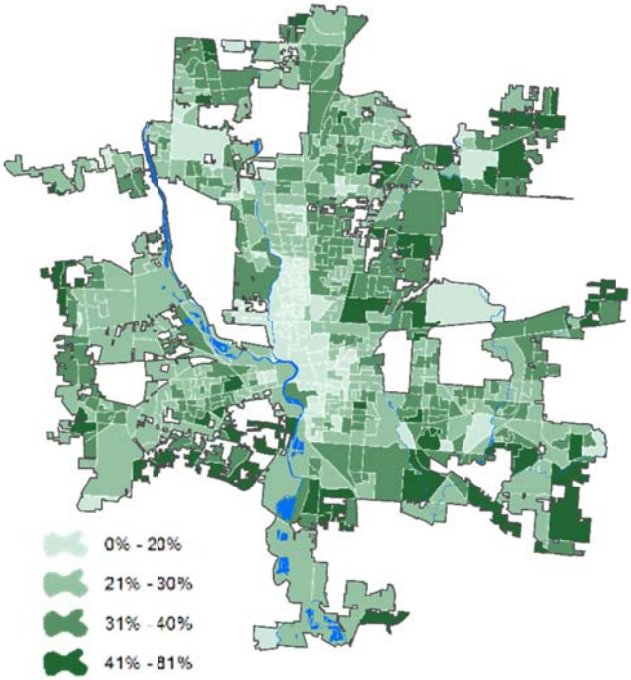
Percent Urban Tree Canopy



Percent Possible Planting Areas (Total)



Percent Possible Planting Areas (Vegetation)



Percent Possible Planting Areas (Impervious)

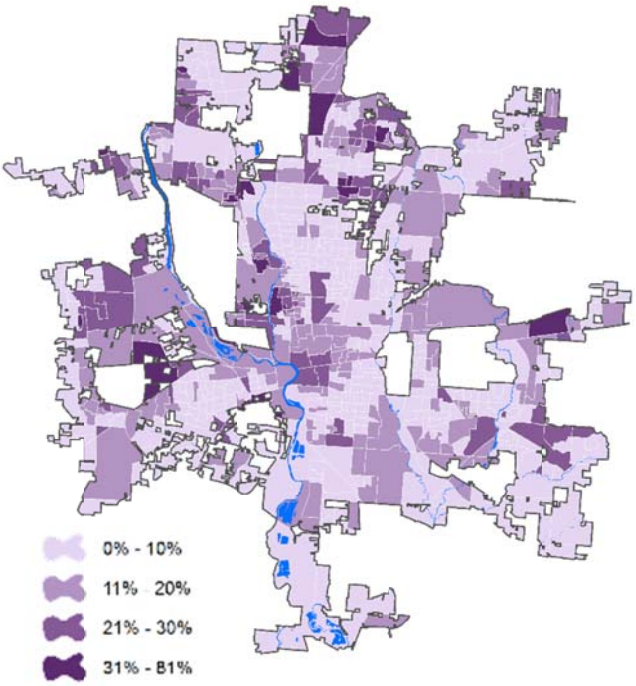


Figure 40: Census Block Group Assessment Results

City of Columbus Geographic Summary: Census Block Groups

MEDIAN HOUSEHOLD INCOME IN THE PAST 12 MONTHS (IN 2013 INFLATION-ADJUSTED DOLLARS)

As the percentage of urban tree canopy increases in census block groups, median income also increases. We have highlighted in orange those block groups that fall below the City's median household income level of $44,072, and contain less than the average amount of UTC. These areas might be considered for tree planting opportunities.

% UTC	Average Median Income
51-100%	79,307
26-50%	49,986
0-25%	46,141

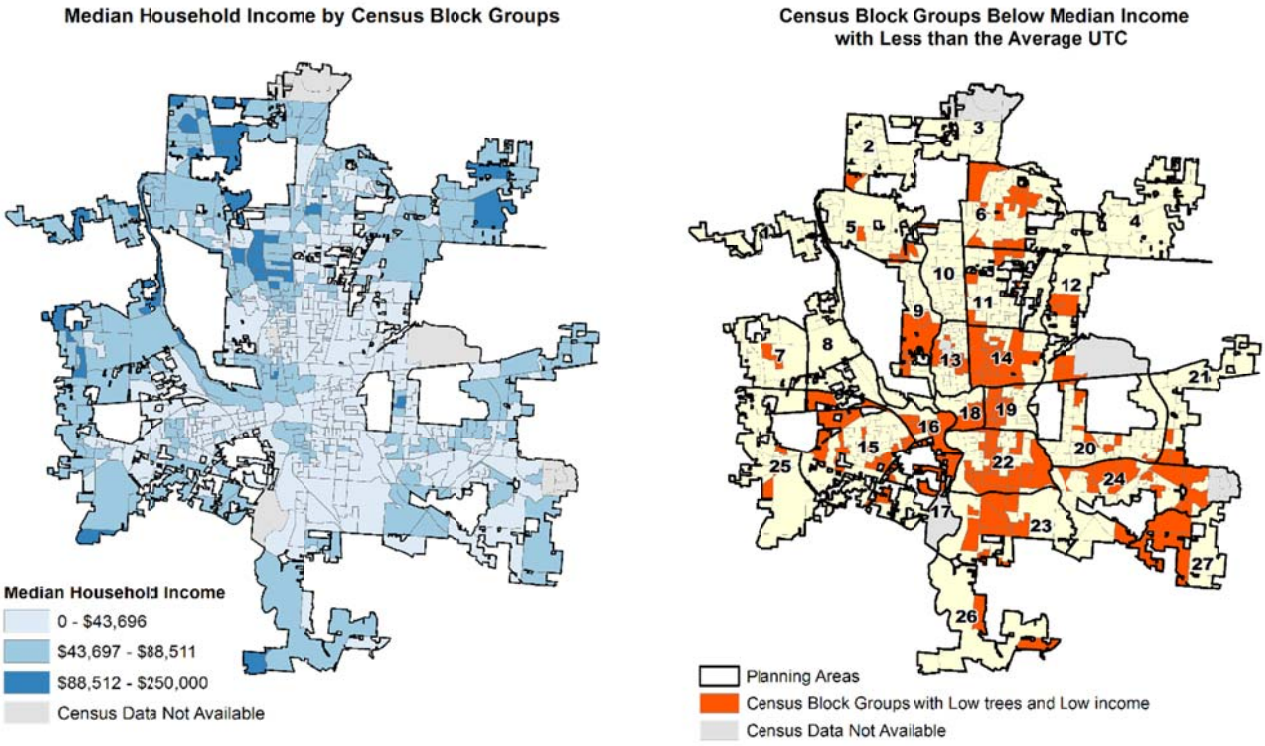


Figure 41: Median Household Income and Urban Tree Canopy

City of Columbus Geographic Summary: Census Block Groups

MEDIAN VALUE (DOLLARS) FOR OWNER-OCCUPIED HOUSING UNITS

As the percentage of urban tree canopy increases in census block groups, median home value also increases. We have highlighted in orange those block groups with median home values that fall below the City's median home value of $130,700, and contain less than the average amount of UTC. These areas might be considered for tree planting opportunities.

% UTC	Average Median Home Value
51-100%	241,534
26-50%	140,573
0-25%	138,391

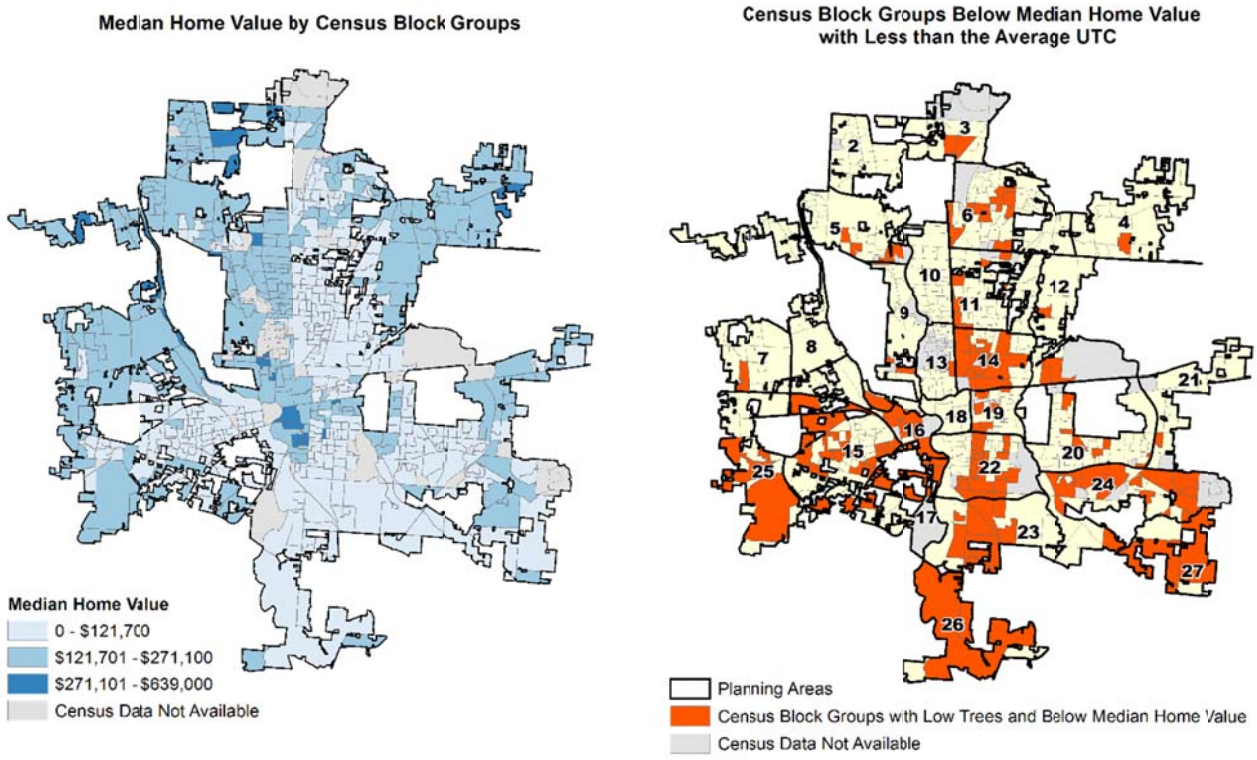


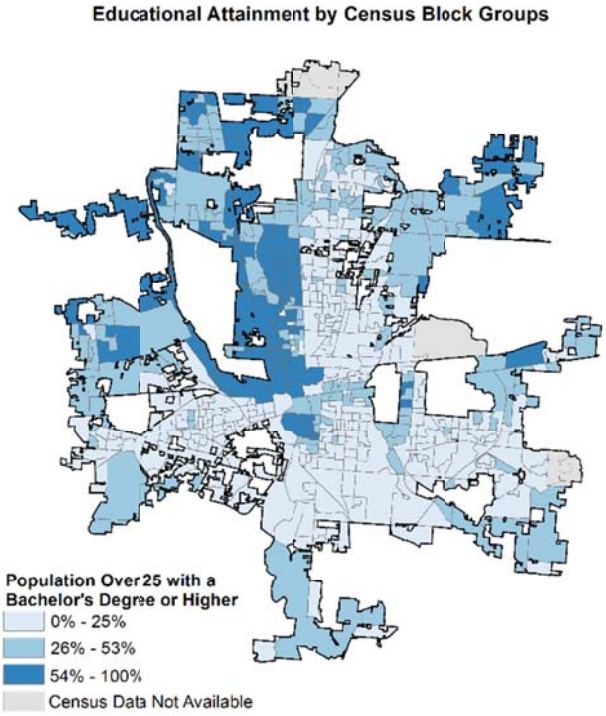
Figure 42: Median Home Value and Urban Tree Canopy

City of Columbus Geographic Summary: Census Block Groups

EDUCATIONAL ATTAINMENT FOR THE POPULATION 25 YEARS AND OVER

As one might expect based on income and home values, the educational attainment in areas of greater tree canopy is also higher. Across Columbus, 33.1% of persons aged 25 and older have a Bachelor's Degree or higher. Here, we have highlighted those census block groups where the percent holding a Bachelor's or higher is less than the citywide average, and where there is less than average UTC.

% UTC	Percent with a Bachelor's Degree or Higher
51-100%	51%
26-50%	35%
0-25%	34%



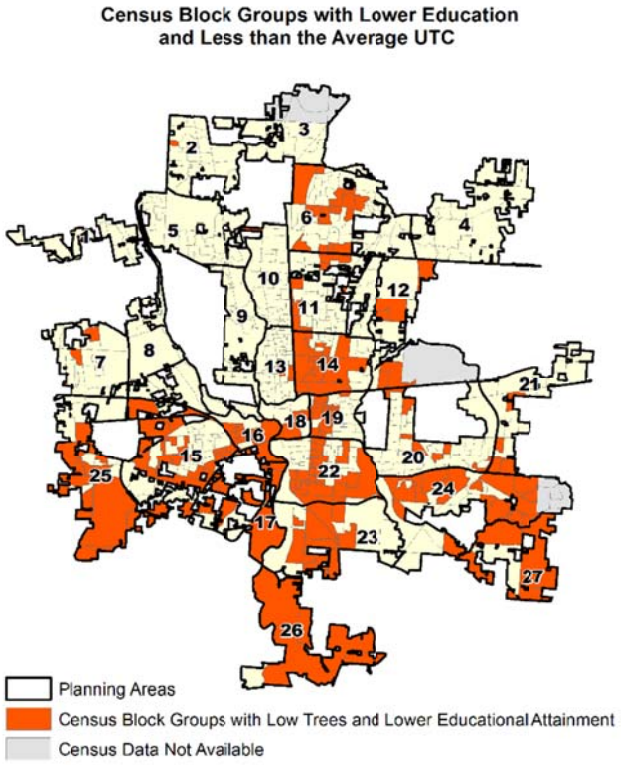


Figure 43: Education Level and Urban Tree Canopy

City of Columbus Geographic Summary: Census Block Groups

TENURE FOR OCCUPIED HOUSING UNITS

The rate of owner occupancy is greater in areas with a higher percentage of UTC. This indicator generally reflects the stability of a given area or neighborhood, as it is believed that there is more of a vested interest in personal property. For Columbus, the homeownership rate is 46.9%. We've highlighted in orange those census block groups with less than average owner occupancy and less than average UTC.

% UTC	Percent Owner Occupied
51-100%	65%
26-50%	56%
0-25%	48%

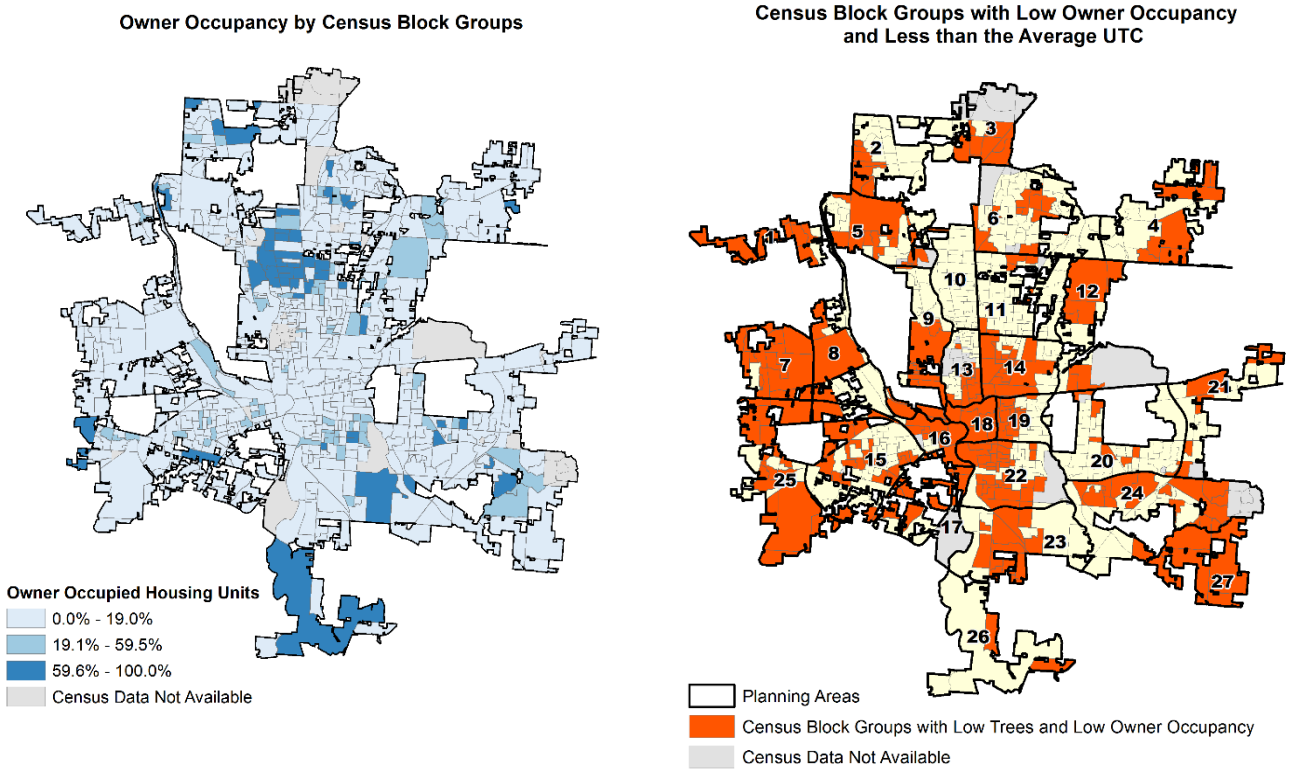


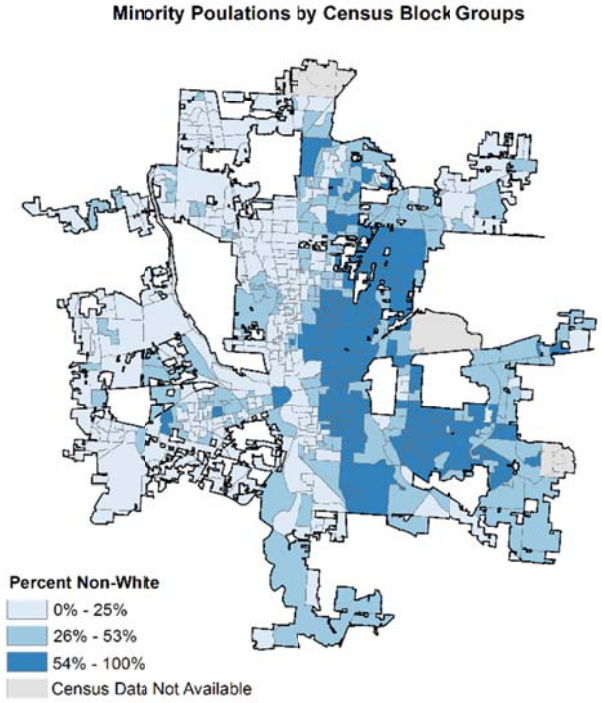
Figure 44: Owner Occupancy and Urban Tree Canopy

City of Columbus Geographic Summary: Census Block Groups

RACE

While there is not as clear a trend in the distribution of race, with the 26-50% UTC range being slightly higher than the 0-25% UTC range, there is notably less of a minority population in areas of the city with the greatest canopy cover. Considering that 62% of Columbus is white, we've highlighted census block groups where the non-white population (or any minority population) is higher than 38% and where the UTC is below average.

% UTC	Percent Non-White
51-100%	21%
26-50%	35%
0-25%	34%



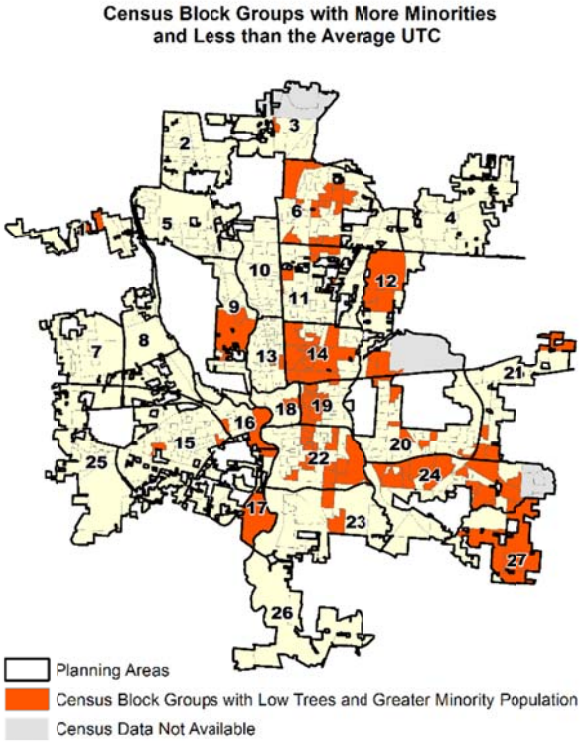


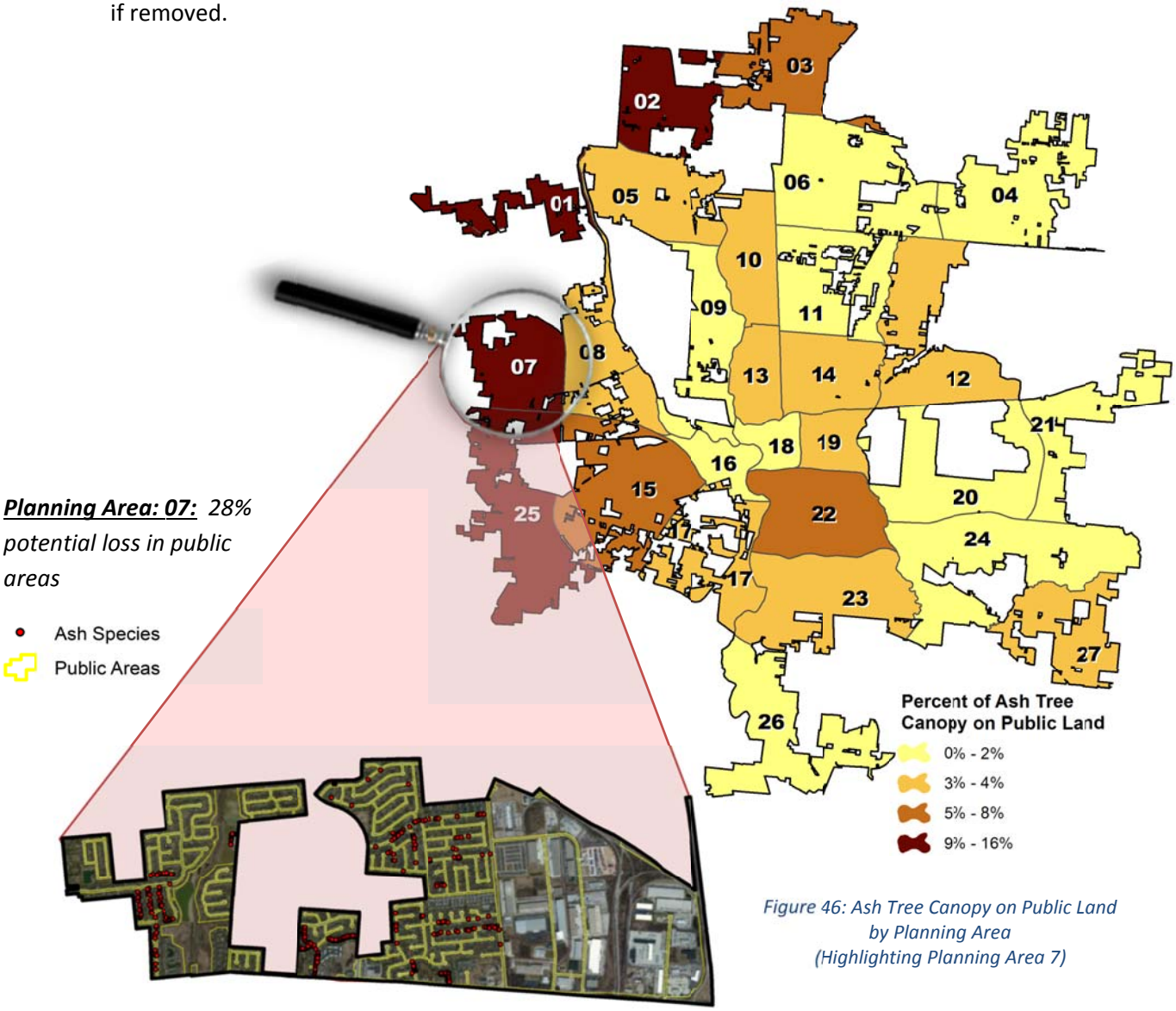
Figure 45: Minority Populations and Urban Tree Canopy

Canopy Threat: Emerald Ash Borer (Public Land)

Emerald ash borer (EAB) is one of, if not the most destructive forest pest in North American history, and it threatens billions of ash trees in landscapes and forests throughout Ohio and even as far west as Colorado. The deleterious impacts to society from the loss of canopy include reduced property values, less mitigation of storm water runoff and air pollution, and increased urban heat island effect, to name just a few. However, given the City's assumed decline in UTC for several decades, more needs to be done, and better information is needed to estimate the impact EAB and other pests will have on UTC goals in Columbus.

The ash population and canopy cover was estimated on public property (ROW and Parks). The following criteria were used in estimating potential loss in public spaces per Planning Area:

- All inventoried ash trees (Fraxinus spp.) will be removed or die eventually.
- Average canopy of 20-year ash tree is 907 square feet.
- This number is totaled for all ash trees and subtracted from overall UTC Metrics to get a loss percentage if removed.



Planning Area: 07: *28% potential loss in public areas*

Figure 46: Ash Tree Canopy on Public Land by Planning Area (Highlighting Planning Area 7)

Canopy Threat: Emerald Ash Borer (Private Land)

The ash population and canopy cover was estimated for private property. The following criteria were used in estimating potential loss on private land in Planning Areas:

- All inventoried ash trees (Fraxinus spp.) will be removed or die eventually.
- Average percent ash within the City's private lands is ~10.3% based on Ash percent in Columbus parks.
- This percentage will be subtracted from overall UTC metrics within Planning Areas.
- A plus/minus 2% error margin was used in our calculations.

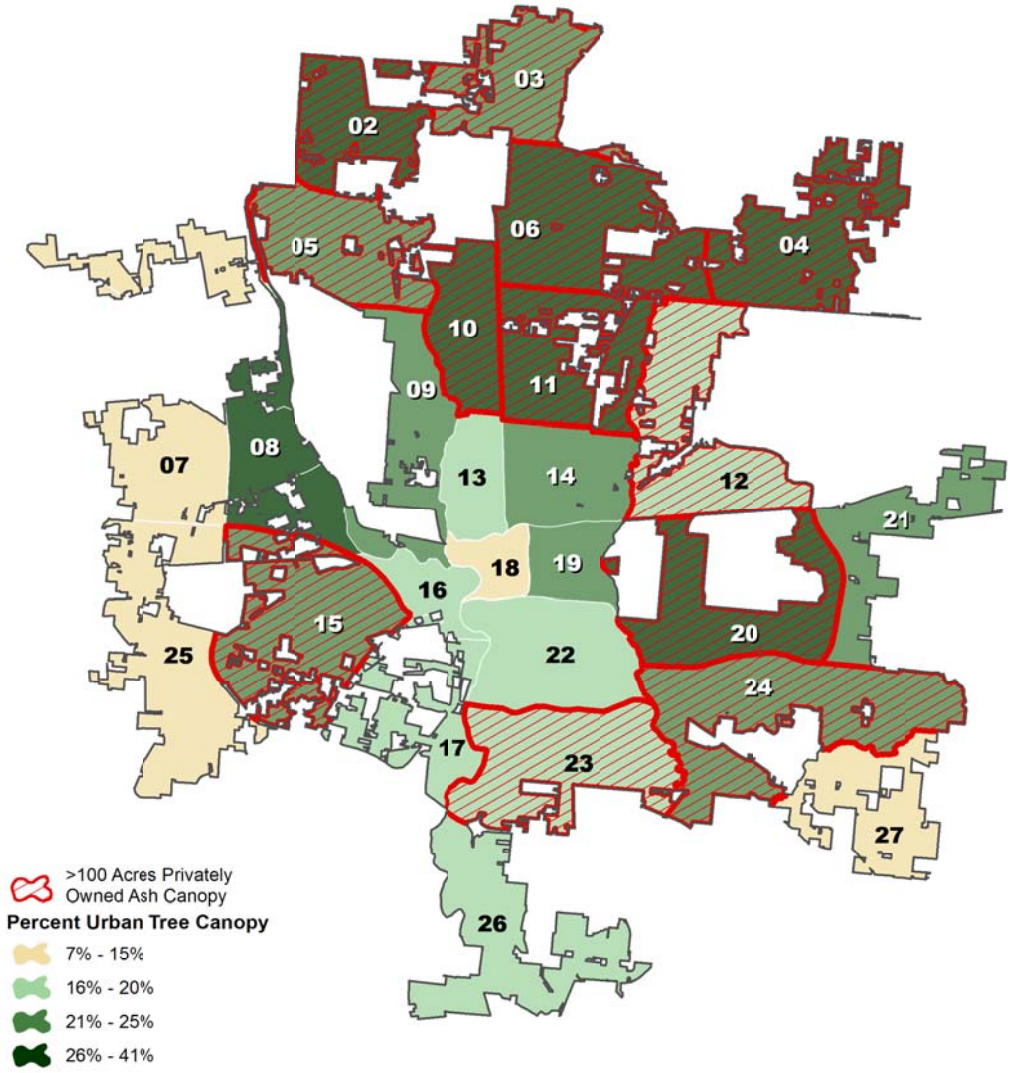


Figure 47: Planning Areas with More than 100 Acres of Privately Owned Ash Tree Canopy

Canopy Threat: Emerald Ash Borer Analysis Results

Plan Area ID	Planning Area Name	Acres Public Ash Canopy	% UTC Loss if Public Ash Trees are Removed	Acres of Estimated Private Ash Canopy (at 10.3%)	Est. Private Ash Canopy in Acres +2 %	Est. Private Ash Canopy in Acres -2 %	% UTC Loss if Public and Private Ash Trees are Removed
1	Hayden Run	9	12%	34	40	27	13%
2	Far Northwest	28	14%	117	140	95	11%
3	Far North	6	7%	101	121	82	10%
4	Rocky Fork-Blacklick	7	2%	178	212	143	9%
5	Northwest	11	4%	103	123	83	9%
6	Northland	8	2%	169	202	136	8%
7	Far West	10	16%	42	50	34	11%
8	West Scioto	9	3%	92	110	74	9%
9	West Olentangy	2	1%	80	96	65	8%
10	Clintonville	11	3%	122	145	98	8%
11	North Linden	10	2%	143	171	116	8%
12	Northeast	7	3%	107	128	86	9%
13	Near North/University	6	4%	35	42	29	8%
14	South Linden	6	3%	79	94	64	9%
15	Hilltop	30	5%	124	148	100	9%
16	Franklinton	1	1%	19	22	15	7%
17	Greenlawn/Frank Road	5	4%	59	70	47	9%
18	Downtown	1	2%	7	8	5	7%
19	Near East	6	4%	41	49	33	8%
20	Eastmoor/Walnut Ridge	5	1%	170	203	137	8%
21	Far East	2	2%	98	117	79	9%
22	Near South	16	6%	89	106	72	9%
23	Far South	4	2%	126	150	101	9%
24	Eastland/Brice	4	0%	122	146	98	5%
25	Westland	11	8%	93	111	75	10%
26	Rickenbacker	0	0%	100	119	81	10%
27	Southeast	2	3%	41	49	33	10%
	TOTALS	**218**	**3%**	**2,491**	**2,974**	**2,008**	9%

Canopy Threat: Asian Long-horned Beetle (Public Land)

The tree population sensitive to the Asian Long-horned Beetle was estimated for potential tree canopy cover loss in public spaces. The following criteria were used in estimating potential loss on public land in Planning Areas:

- Preferred host list in the US according to USDA-APHIS-PPQ (Acer, Aesculus, Betula, Salix, and Ulmus), will eventually die and be removed.
- Average canopy of 20-year tree is 907 square feet.
- This number is totaled for all ALB sensitive trees and subtracted from overall UTC Metrics to get a loss percentage if removed.

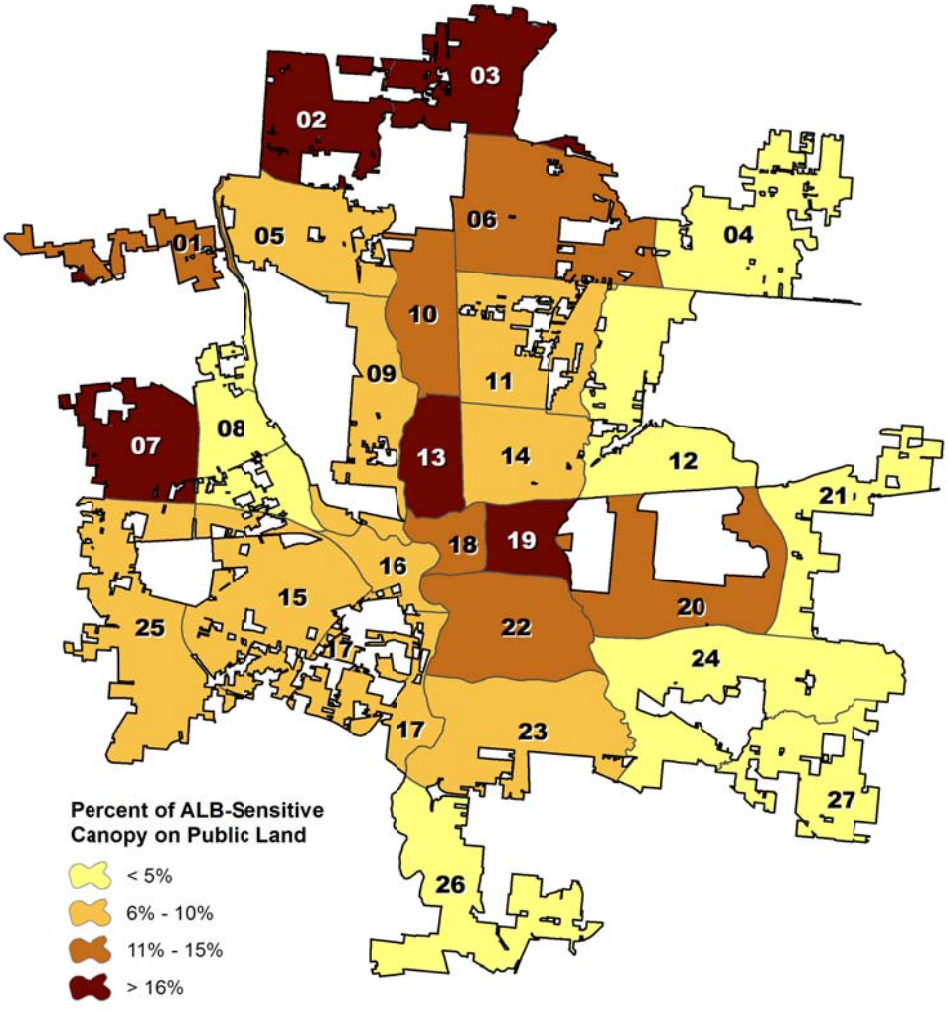


Figure 48: ALB-Sensitive Tree Canopy on Public Land by Planning Area

Canopy Threat: Asian Long-horned Beetle (Private Land)

This task involves estimating the ALB sensitive tree population and potential tree canopy cover loss in private spaces per Planning Area.

- All inventoried ALB hosts defined by USDA-APHIS-PPQ will be removed or die eventually.
- Average percent ash within the City's private lands is ~19.7% based on ALB hosts in Columbus parks.
- This percentage will be subtracted from overall UTC metrics within Planning Areas for private property.
- A plus/minus 2% error margin was used in our calculations.

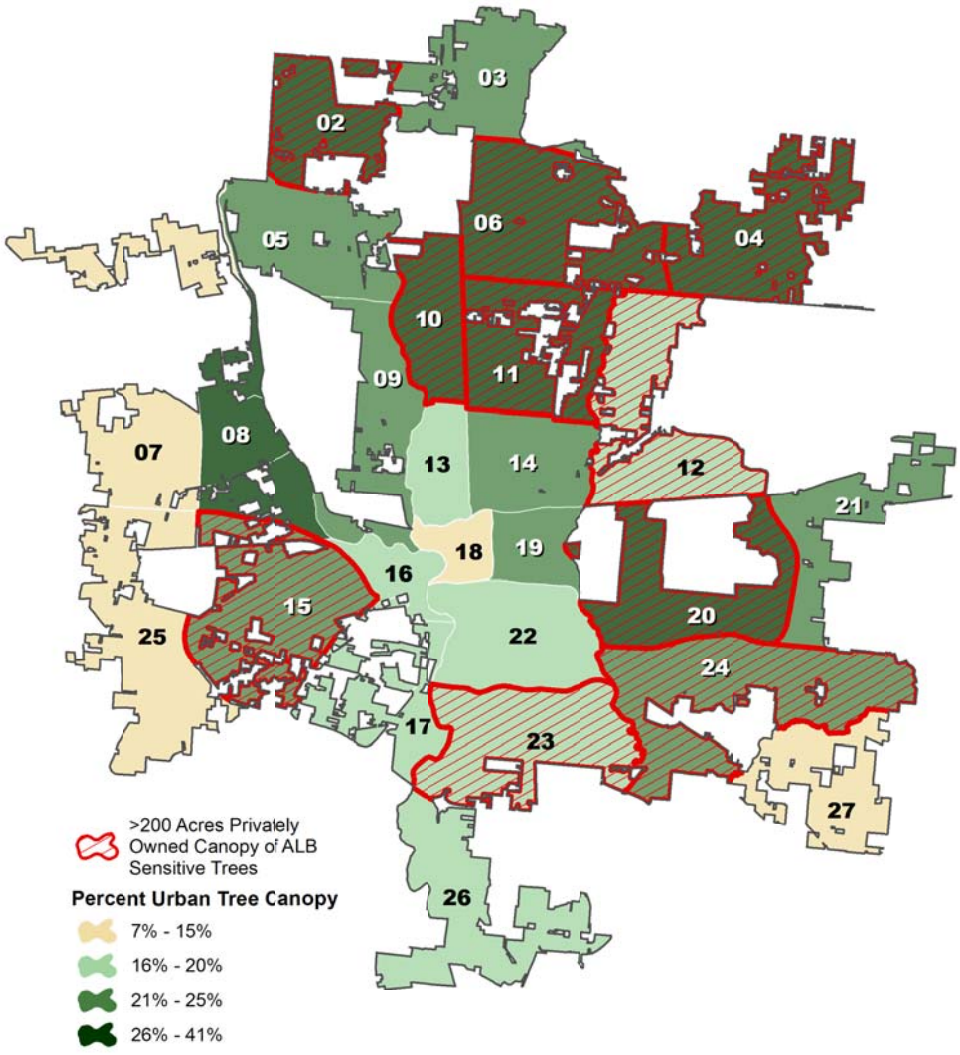


Figure 49: Planning Areas with More than 200 Acres of Privately Owned ALB-Sensitive Tree Canopy

Canopy Threat: Asian Long-horned Beetle Analysis Results

Plan Area ID	Planning Area Name	Acres Public ALB-Sensitive Canopy	% UTC Loss if Public ALB-Sensitive Trees are Removed	Acres of Estimated Private ALB-Sensitive Canopy (at 19.7%)	Est. Private ALB-Sensitive Canopy in Acres +2 %	Est. Private ALB-Sensitive Canopy in Acres -2 %	% UTC Loss if Public and Private ALB-Sensitive Trees are Removed
1	Hayden Run	9	12%	50	55	44	18%
2	Far Northwest	48	25%	224	247	201	20%
3	Far North	20	21%	194	213	174	20%
4	Rocky Fork-Blacklick	16	4%	339	374	305	17%
5	Northwest	20	7%	197	218	177	17%
6	Northland	67	15%	323	356	290	19%
7	Far West	12	19%	80	88	72	20%
8	West Scioto	13	5%	176	194	158	16%
9	West Olentangy	16	7%	153	169	138	17%
10	Clintonville	56	13%	232	256	209	18%
11	North Linden	29	6%	274	301	246	16%
12	Northeast	7	3%	205	225	184	17%
13	Near North/University	49	29%	68	75	61	23%
14	South Linden	19	10%	151	166	136	18%
15	Hilltop	57	10%	237	261	213	17%
16	Franklinton	9	8%	36	39	32	15%
17	Greenlawn/Frank Road	10	7%	112	123	100	17%
18	Downtown	6	13%	13	14	12	17%
19	Near East	36	20%	78	86	70	20%
20	Eastmoor/Walnut Ridge	64	15%	324	357	291	19%
21	Far East	5	4%	188	207	169	18%
22	Near South	37	14%	169	187	152	18%
23	Far South	13	7%	240	265	216	18%
24	Eastland/Brice	12	1%	233	256	209	10%
25	Westland	9	6%	177	195	159	18%
26	Rickenbacker	0	1%	191	210	171	18%
27	Southeast	1	2%	79	87	71	18%
	TOTALS	**640**	**9%**	**4,741**	**5,222**	**4,259**	**17%**

Comprehensive Ecosystem Services Results

Tree Canopy Ecological Services Benefits Results

Ecological services benefits were derived using the United States Department of Agriculture (USDA) i-Tree Canopy software tools. The values were then summarized by Planning Areas.

Table 26: Ecosystem Services Benefits by Planning Area

Plan Area ID	Planning Area Name	UTC acres	Ecosystem Benefit Value
1	**Hayden Run**	327	$127,624
2	**Far Northwest**	1,332	$519,609
3	**Far North**	1,079	$420,999
4	**Rocky Fork-Blacklick**	2,099	$818,896
5	**Northwest**	1,301	$507,596
6	**Northland**	2,093	$816,695
7	**Far West**	468	$182,596
8	**West Scioto**	1,182	$461,379
9	**West Olentangy**	1,001	$390,557
10	**Clintonville**	1,600	$624,243
11	**North Linden**	1,880	$733,673
12	**Northeast**	1,277	$498,387
13	**Near North/University**	515	$200,946
14	**South Linden**	959	$374,209
15	**Hilltop**	1,777	$693,508
16	**Franklinton**	292	$114,042
17	**Greenlawn/Frank Road**	713	$278,225
18	**Downtown**	108	$42,217
19	**Near East**	573	$223,381
20	**Eastmoor/Walnut Ridge**	2,079	$811,373
21	**Far East**	1,074	$418,982
22	**Near South**	1,118	$436,341
23	**Far South**	1,415	$552,045
24	**Eastland/Brice**	2,347	$915,571
25	**Westland**	1,036	$404,147
26	**Rickenbacker**	1,047	$408,533
27	**Southeast**	450	$175,670
	TOTALS	**31,143**	**$12,151,446**

Tree Canopy Hydrological Benefits Results

Above are the full annual results for the i-Tree Hydro model scenarios. Generally speaking, less tree cover not only leads to more runoff, but more pollution of various types as well. Table 19 shows the summarized runoff changes for the five scenarios while Table 20 shows annual pollutant loads for three relatively common water quality contaminants: Total Suspended Solids (TSS), Nitrogen, and Phosphorus. TSS is a common constituent found in water as a response to erosion in the area. With more tree cover, erosion can be mitigated and TSS concentrations can be kept at manageable levels well below EPA standards. Nitrogen and phosphorus typically come from sources including agricultural activity (fertilizers and pesticides) and livestock (decomposing waste from farm animals).

Table 27: Summarized Hydro results for five separate land cover scenarios. Included are UTC percentages, runoff values, percent change in volume, and estimated changes to treatment costs.

Scenario	Annual Pollutant Loads (kg)			% Change
	TSS*	P	N	
NO COVER (0%)	7,944,458	31,920	175,305	7%
EAB/ALB (16.5%)	7,559,422	30,373	166,809	2%
Current Conditions (22.3%)	7,431,992	29,861	163,997	0%
Green Memo (27.3%)	7,304,046	29,347	161,173	-2%
American Forest (40%)	6,991,879	28,092	154,285	-6%

**For the purposes of this study, runoff is defined as i-Tree Hydro's impervious flow output.*
***Monetary values estimated at $106/cubic meter*

Table 28: Summarized annual Hydro pollution results for three major constituents, with percent change values.

Scenario	UTC (%)	Runoff* (m^3)	% Change	Change in Treatment Costs (Estimate)
No Cover	0.0%	66,293,677	12%	$778,797,842
EAB/ALB Total Loss	16.5%	61,078,743	4%	$226,014,903
Current Conditions	22.3%	58,946,527	N/A	N/A
Green Memo Recommendation	27.3%	57,683,053	-2%	-$133,928,278
American Forest Recommendation	40.0%	53,588,290	-9%	-$567,973,171

**Total Suspended Solids: A measure of the amount of solid material suspended in a water sample. Generally, TSS is a byproduct of erosion.*

Recent developments to i-Tree Hydro have made it possible to estimate runoff within municipal/political boundaries (as opposed to hydrologic boundaries) through the use of topographic index (TI) files. This comes with a long list of assumptions, however. Hydro is an incredibly complex model that requires inputs ranging from soil surface texture to rooting zone to information on the connectivity of impervious areas. These kinds of values can be very difficult to characterize in the field, let alone remotely or empirically. In addition to this, using topographic indices removes the option of using USGS stream gauge data from the area to compare to the model's outputs. Even with these limitations, this approach was favored over using one single watershed.

Characterizing runoff within one watershed or drainage basin is the original and most consistent way to use i-Tree Hydro. As with any model, however, it is only as good as the data that is used as an input. In the case of this project, no full watersheds or sub-watersheds were present within the city limits to be used for modelling purposes. Additionally, land cover metrics being confined to within the city limits removed the option of using a full watershed outside of the city to estimate runoff within the boundary.

Spatial variability and data availability also play a huge role in the usefulness of Hydro's outputs. In an ideal modeling world, municipal boundaries would reflect hydrologic boundaries and a weather station with consistent data would be located at an average elevation. This is almost never the case. These contributed to the estimated streamflow values varying wildly from the actual observed USGS streamflow values in the area as well as other issues that are not as apparent or easy to fix (IE: Digital Elevation Model resolution and the effect that this has on the model).

The takeaway of all of this is that i-Tree Hydro can be a powerful tool to estimate streamflow, runoff, and pollution changes in response to land cover changes. But the outputs are estimates, and should be regarded as such.

Pictured on the right is a map intended to show the spatial reference for the i-Tree Hydro watershed-scale runs that, ultimately, were not used in this study. Note the spatial variability of the weather stations as well as the city boundary crossing multiple hydrologic boundaries in the area. In red are the selected weather and stream gauge stations that were used in the model testing as well as the selected sub-watershed intended to represent the city.

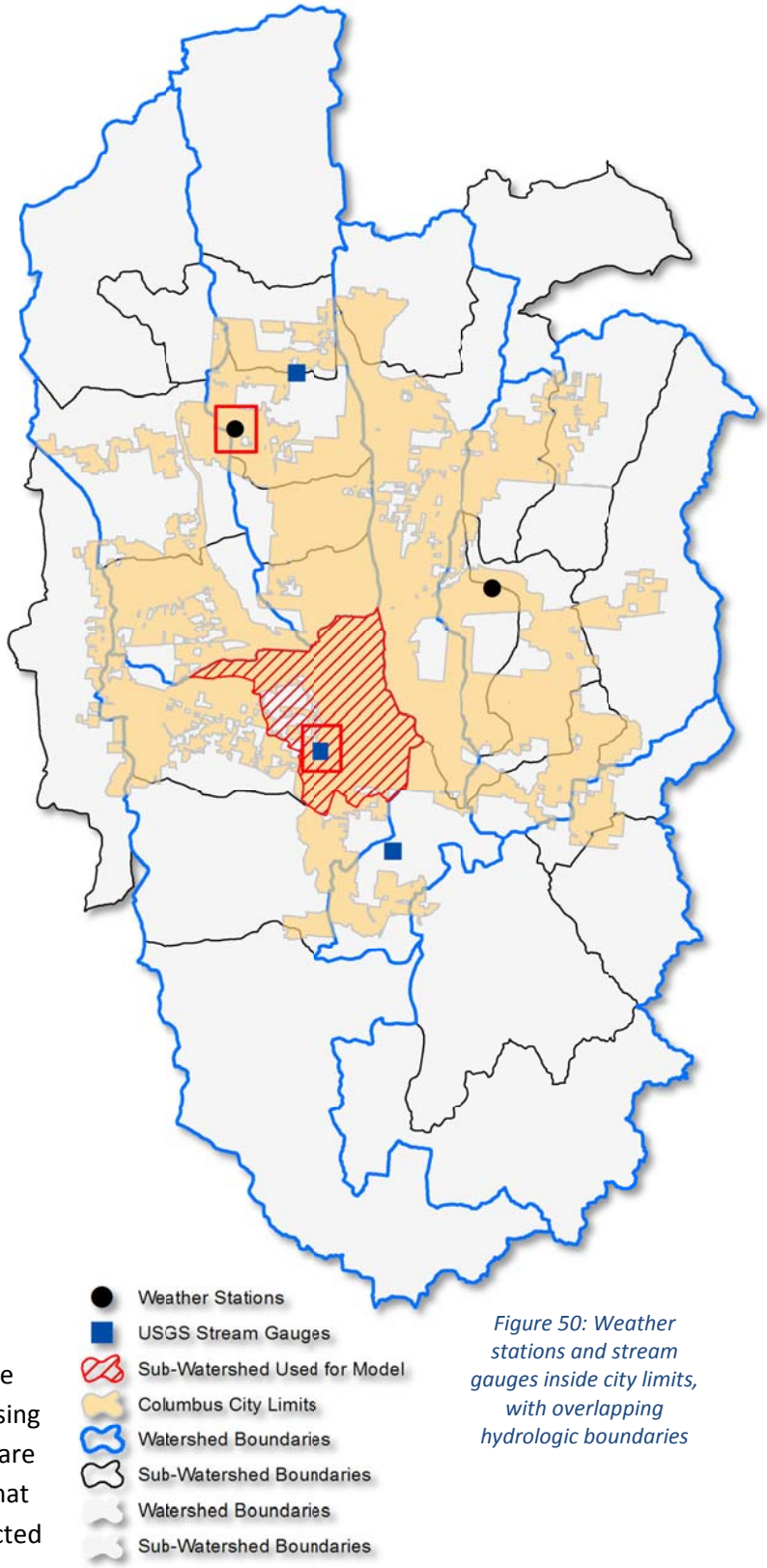


Figure 50: Weather stations and stream gauges inside city limits, with overlapping hydrologic boundaries

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