DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

Philadelphia Street Tree Survey:

South Philadelphia and Whitman

January 2013

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The Delaware Valley Regional Planning Commission is dedicated to uniting the region's elected officials, planning professionals, and the public with a common vision of making a great region even greater. Shaping the way we live, work, and play, DVRPC builds consensus on improving transportation, promoting smart growth, protecting the environment, and enhancing the economy. We serve a diverse region of nine counties: Bucks, Chester, Delaware, Montgomery, and Philadelphia in Pennsylvania; and Burlington, Camden, Gloucester, and Mercer in New Jersey. DVRPC is the federally designated Metropolitan Planning Organization for the Greater Philadelphia Region — leading the way to a better future.

The symbol in our logo is adapted from the official DVRPC seal and is designed as a stylized image of the Delaware Valley. The outer ring symbolizes the region as a whole while the diagonal bar signifies the Delaware River. The two adjoining crescents represent the Commonwealth of Pennsylvania and the State of New Jersey.

DVRPC is funded by a variety of funding sources including federal grants from the U.S. Department of Transportation's Federal Highway Administration (FHWA) and Federal Transit Administration (FTA), the Pennsylvania and New Jersey departments of transportation, as well as by DVRPC's state and local member governments. The authors, however, are solely responsible for the findings and conclusions herein, which may not represent the official views or policies of the funding agencies.

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Introduction

DVRPC offers technical assistance to member governments for environmental planning and sustainability-related issues every year through the Environmental Planning Program of the DVRPC Work Program. Each year, DVRPC selects projects to work on that will further the goals of DVRPC's long-range plan, *Connections – The Regional Plan for a Sustainable Future*. In Fiscal Year 2013, DVRPC assisted the City of Philadelphia Parks and Recreation Department (PP&R) with a street tree inventory to promote the following goals of *Connections*:

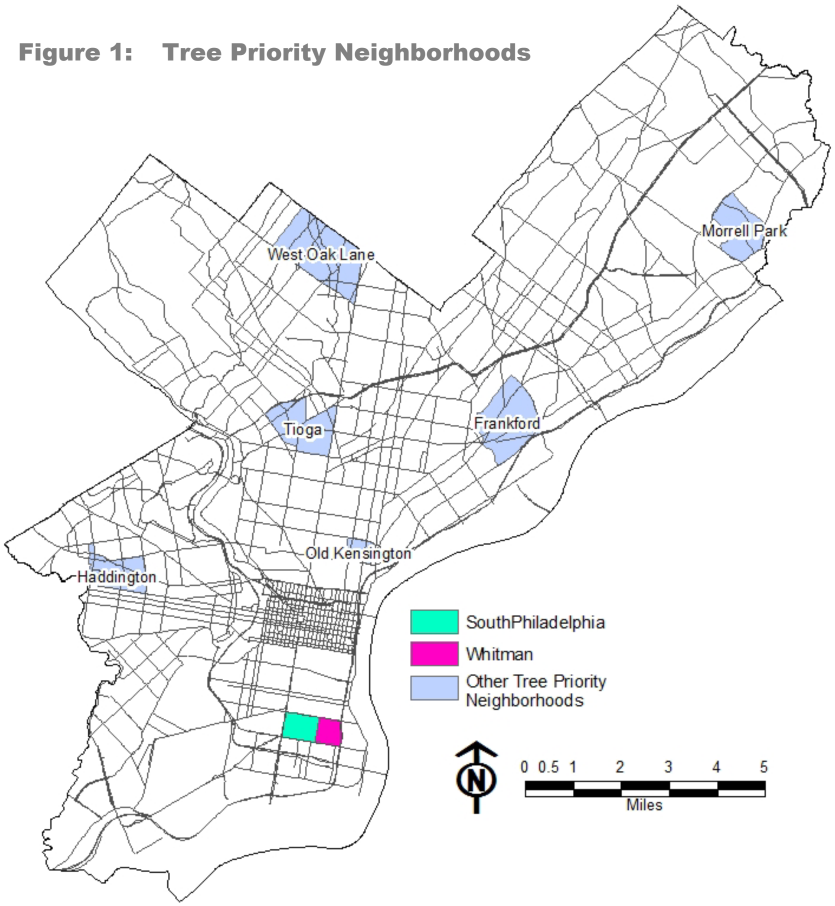
- Manage Stormwater and Improve Water Quality
- Promote Community Green Infrastructure

and specifically to promote the *Connections* policy:

- Promote the planting and stewardship of shade trees in suburban and urban areas to enhance property values, provide energy savings, store and sequester carbon, clean the air, and absorb stormwater.

Study Purpose and Need

Figure 1: Tree Priority Neighborhoods



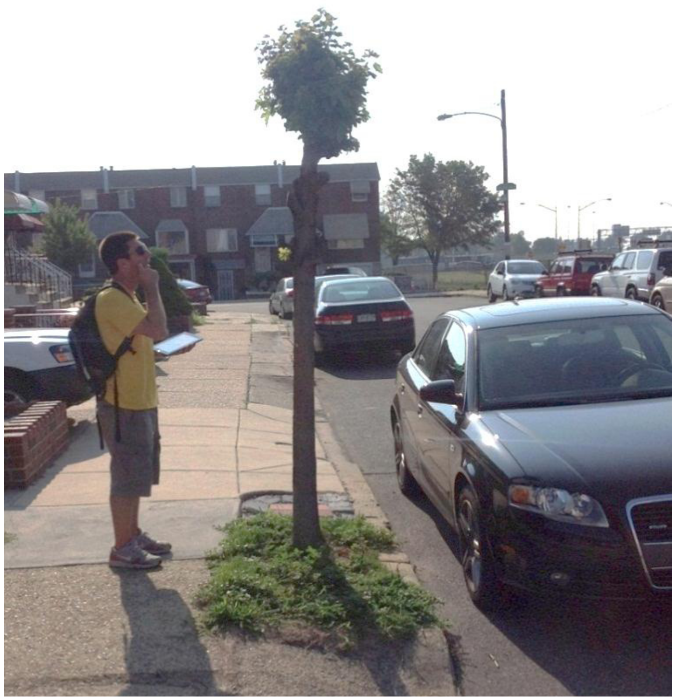
Source: DVRPC, 2012

The Philadelphia Parks and Recreation Department (PP&R) has identified eight neighborhoods in the city with the highest priority for new trees. These tree priority neighborhoods were selected due to their low percentage of existing tree canopy, population density, and other factors. In planning for increasing the tree canopy of these neighborhoods, it is important to have a baseline understanding of the existing conditions of the urban forest. What is the diversity and age of tree species? Which tree species are thriving, and which are stressed? Which specific blocks should be the focus of new planting initiatives? Where are empty tree pits located? DVRPC initiated a pilot study of two of the tree priority neighborhoods in order to answer these questions so that future tree planting efforts can be better informed, focused, and more effective.

This pilot study inventoried the street trees of the South Philadelphia and Whitman neighborhoods of southeast Philadelphia, located between Snyder and Oregon Avenues from Broad Street east to Delaware Avenue. A section south of Oregon Avenue between Broad and Randolph Streets (the northern part of the Packer Park neighborhood) was added due to additional time available. These adjacent neighborhoods have the highest population density of all tree priority neighborhoods. They are also the only tree priority neighborhoods located in South Philadelphia, a section of the city with challenges for new trees due to its very narrow streets and a population sector considered to be antagonistic toward trees.

Inventory Mechanics

DVRPC engaged a number of local stakeholders and partner agencies in conducting this inventory, including Philadelphia Parks & Recreation, the U.S. Forestry Service Philadelphia Field Station, Morris Arboretum, Azavea, and others. The inventory was compiled through the website PhillyTreeMap.org, developed by Azavea. Prior to the inventory, Azavea had developed a version of the website compatible for mobile devices. Azavea also generously donated the use of two iPads for use in the field to complete the study. DVRPC hired two Temple University landscape architecture graduate students to conduct the inventory.



Interns inspect an oddly pruned tree.

Using the donated iPads, the graduate student interns conducted field work during the summer of 2012. They worked together throughout as a two-person team. The data was recorded directly into the website PhillyTreeMap.org. At the beginning stages of the study, certain features of the website were not fully operational, and data was recorded manually and then entered later into the website. The species, size (DBH), plot condition, and tree condition of each tree was recorded.

The interns determined the tree species of each tree based on knowledge gained through their landscape architecture education and work experiences. In cases in which a tree species was not known, they consulted tree identification books they had brought with them. When a particular variant could not be identified, the genus was recorded. The size of each tree was recorded by the diameter at breast height (DBH), measured through a diameter scale tape measure. Measurements were in inches and rounded to the nearest quarter inch. Site conditions for the trees included the presence of overhead power lines and sidewalk damage. The tree condition, or health, was recorded as a range from dead to excellent. Trees were identified as in critical or poor health due to signs such as epicormic sprouts, leaf scorch, wilting, internal decay, dieback, or other signs of stress or disease.

In addition, empty tree pits where trees were removed were catalogued and provided to PP&R. A total of 120 empty tree pits and 35 dead trees were recorded.

Neighborhood Interactions

A tree-lined block provides shade and beauty.

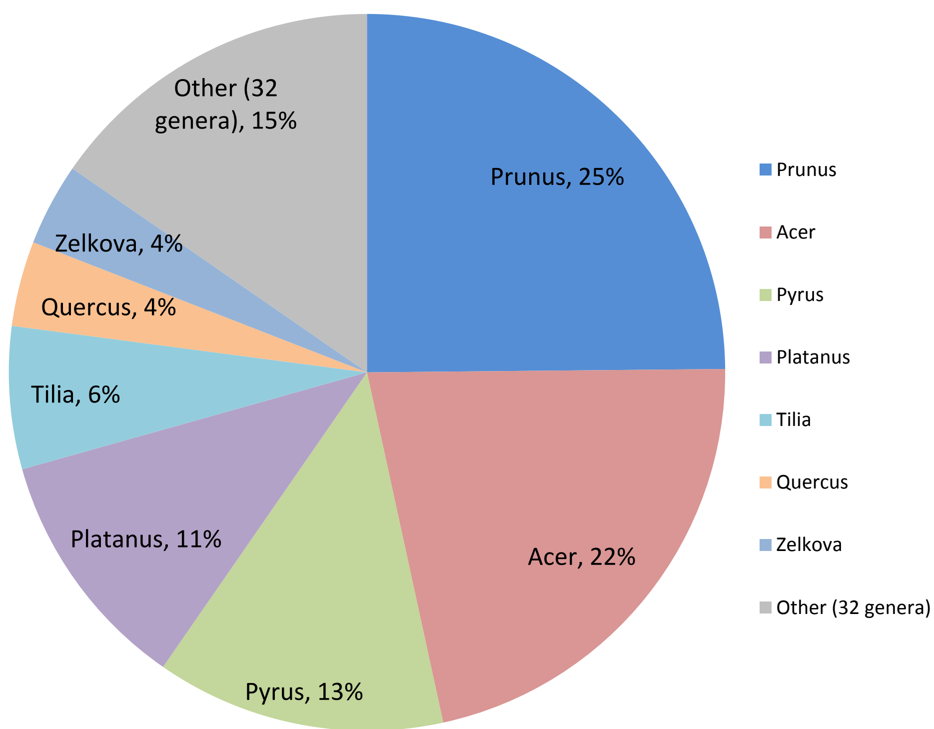
The interns engaged in conversation with interested neighbors curious about what they were doing. Many neighbors wanted to know what the species of their tree was. For newer trees, neighbors asked questions about how big the tree would grow, if it would cause a mess on the sidewalk, and if it would cause damage to underground utilities. The reaction from neighbors was about equally divided between people in favor of having more trees versus those wanting to get rid of the street trees.

From the neighbors in support of trees, they voiced the opinion that the shade and beauty that trees provide is worth any negative issues trees may cause. They felt that the trees made their blocks more attractive, and welcomed the birds and other animals the trees attracted. The overall environmental benefit of cleaner air and cooling due to shade was well understood and expressed. However, neighbors were unaware of or not concerned with the impact on stormwater.

Neighbors opposed to trees cited the nuisance caused by trees, including mess left by falling leaves, flowers, and fruit. The risk of underground pipes being broken by tree roots was cited many times. Some residents also feared the risk of property damage from falling tree limbs. The presence of dead trees that had not been removed in spite of requests to the city was also a point of contention.

Tree Inventory Results

Figure 2: Distribution of Trees by Genus



Source: DVRPC, 2012

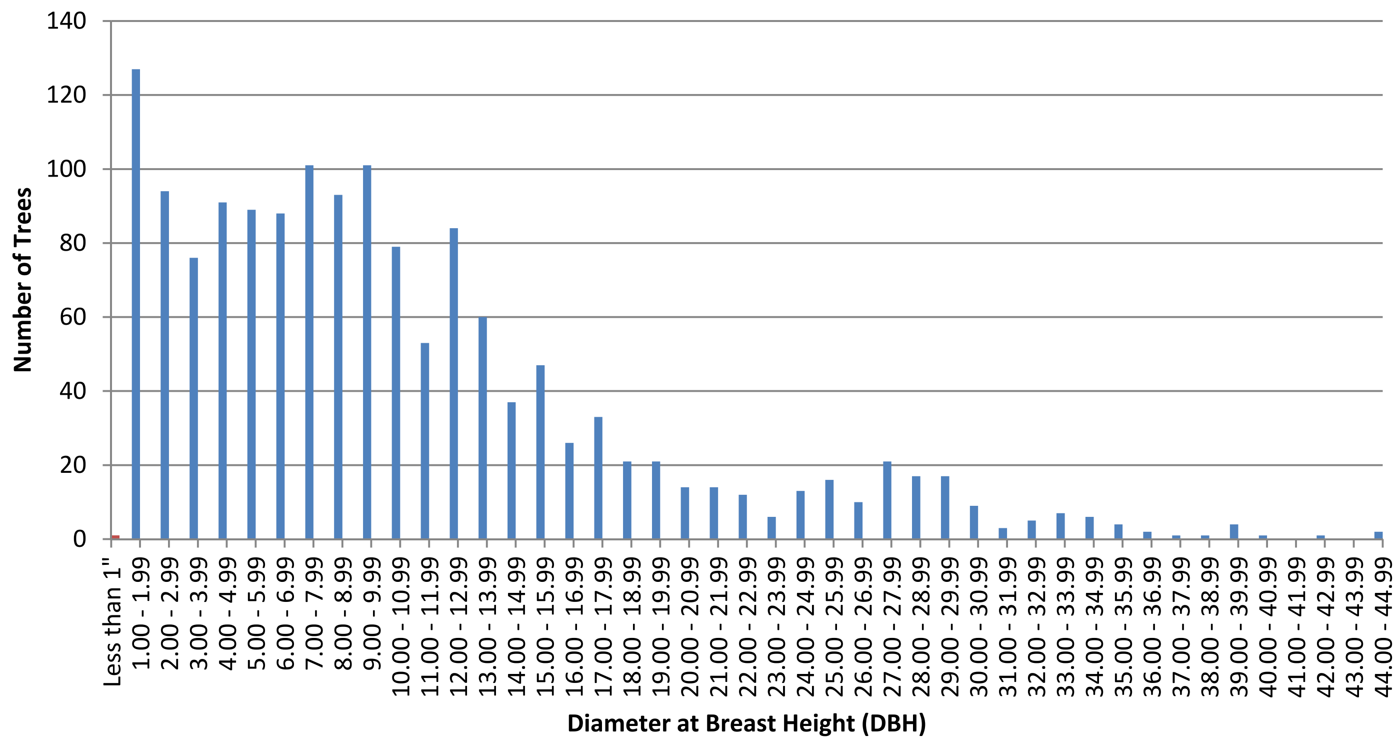
Through this street tree inventory, over 1,500 trees were identified and recorded. At a total time of approximately 90 hours, there was an average survey time of less than four minutes per tree. There were 79 different tree species identified within 40 genus classifications. Approximately three-fourths of all trees were one of five genus classifications: Prunus, Acer, Pyrus, Platanus, and Tilia. Quercus and Zelkova were also found in large numbers. Of all trees inventoried, the median size measured by DBH was 8.75″. The overall health of the street trees was good, with 63% of trees ranked as fair, good, very good or excellent. Due to technical difficulties, the health of 23% of trees was not recorded. Some trees, such as Prunus, were more likely to be ranked as good or fair, while other species, like Zelkova, were more likely to be considered very good. Another 13% were ranked as dead, critical, or poor.

Prunus and Acer were the two dominant genera of trees in the survey area, making up 25% and 22% of all trees, respectively. There were 12 species of Prunus that were found, with the vast majority being Sweet Cherry (Prunus avium). Ten species of Acer were recorded, with Norway Maple (Acer platinoides) being dominant. The median DBH was 6.75″ for Prunus trees and 7.75″ for Acer trees. The size distribution of these two genera was roughly similar, with a drop-off in population for trees larger than 12″ DBH.

Pyrus and Platanus made up 13% and 11% of all trees, respectively. The Pyrus trees were exclusively Callery Pear, with the exception of one Common Pear. The Platanus trees were exclusively London Planetree (AKA London Plane) (Platanus x acerifolia). The median DBH was 8.50″ for Pyrus trees and 27.00″ for Platanus trees. Most Pyrus trees were less than 11″ DBH, although there were some found to be greater than 20″ DBH. There were few small Platanus trees, with most being larger than 24″ DBH.

Tilia comprised 6% of all trees, and Quercus and Zelkova comprised 4% each. There were three species of Tilia (linden or basswood), seven species of Quercus (oak), and one species of Zelkova. The median DBH was 14.25″ for Tilia, 13.38″ for Quercus, and 12.00″ for Zelkova. All three genera ranged in size distribution from small to large.

Figure 3: Distribution of Trees by Size



Source: DVRPC, 2012

Table 1: Number of Trees Inventoried by Species

Scientific Name	Common Name	Number	Median	
			Health *	DBH (")
Acer campestre	Hedge maple	69	5	8.75
Acer negundo	Boxelder	2	4	1.25
Acer nigrum	Black maple	10	4	6.54
Acer palmatum	Japanese maple	4	6	1.75
Acer platanoides	Norway maple	118	4	10.83
Acer rubrum	Red maple	74	5	7.25
Acer saccharinum	Silver maple	25	5	4.50
Acer saccharum	Sugar maple	3	4.5	3.50
Acer tataricum	Tatarian maple	16	4	1.88
Acer x freemanii	Freeman maple	7	5	3.00
Ailanthus altissima	Tree of heaven	1	2	9.75
Amelanchier arborea	Downy serviceberry	1	6	7.71
Amelanchier laevis	Allegheny serviceberry	2	5.5	5.50
Betula nigra	River birch	1	3	13.40
Carpinus betulus	European hornbeam	4	5	2.63
Carpinus caroliniana	American hornbeam	7	6	2.13
Celtis occidentalis	Northern hackberry	2	4.5	1.88
Cercis canadensis	Eastern redbud	5	5	3.25
Cladrastis kentukea	Yellowwood	5	5	2.00
Cornus florida	Flowering dogwood	4	6	1.38
Cornus kousa	Kousa dogwood	8	5	1.63
Cornus spp	Dogwood	2	4.5	3.50

Scientific Name	Common Name	Number	Median	
			Health *	DBH (")
Corylus colurna	Turkish filbert	1	4	3.00
Cotinus obvatus	American smoke tree	1	3	4.50
Crataegus phaenopyrum	Washington hawthorn	17	4.5	5.75
Eucommia ulmoides	Hardy rubbertree	7	6	3.75
Ficus carica	Common fig	1	7	1.50
Fraxinus americana	White ash	6	5	9.75
Fraxinus pennsylvanica	Green ash	18	4	9.38
Ginkgo biloba	Ginkgo	3	5.5	5.00
Gleditsia triacanthos	Honeylocust	36	4.5	7.40
Gymnocladus dioicus	Kentucky coffeetree	1	NA	3.25
Halesia diptera	Silverbell	4	NA	1.50
Hibiscus syriacus	Rose-of-sharon	1	4	1.75
Juniperus virginiana	Eastern red cedar	1	6	9.00
Koelreuteria paniculata	Goldenrain tree	2	5	14.25
Lagerstroemia indica	Crapemyrtle	1	2	1.25
Lagerstroemia spp	Common crapemyrtle	1	NA	3.46
Liquidambar styraciflua	Sweetgum	2	5	9.29
Liriodendron tulipifera	Tulip tree	1	7	2.25
Maackia amurensis	Amur maackia	18	5	12.13
Malus spp	Apple	4	4	2.38
Malus transitoria	Golden raindrops crabapple	2	3.5	1.63
Malus tschonoskii	Crabapple	8	5	5.25
Morus rubra	Red mulberry	1	6	6.17

Scientific Name	Common Name	Number	Median	
			Health *	DBH (")
Ostrya virginiana	Eastern hophornbeam	4	4	1.54
Phellodendron amurense	Amur corktree	1	6	1.50
Platanus x acerifolia	London planetree	166	4	27.00
Prunus americana	American plum	5	4	4.25
Prunus avium	Sweet cherry	129	5	11.00
Prunus cerasifera	Cherry plum	72	5	6.25
Prunus maackii	Amur chokecherry	3	NA	1.50
Prunus padus	European bird cherry	27	4	6.00
Prunus sargentii	Sargent cherry	37	5	3.50
Prunus serrulata	Kwanzan cherry	32	5	5.75
Prunus spp	Plum	1	5	4.25
Prunus subhirtella	Higan cherry	1	3	2.33
Prunus virginiana	Chokecherry	4	5	2.25
Prunus x incam	Okame cherry	42	5	4.19
Prunus yedoensis	Yoshino flowering cherry	22	5	12.13
Pyrus calleryana	Callery pear	196	5	8.50
Pyrus communis	Common pear	1	4	7.37
Quercus acutissima	Sawtooth oak	9	5.5	10.75
Quercus bicolor	Swamp white oak	3	5.5	2.00
Quercus imbricaria	Shingle oak	4	6	8.13
Quercus palustris	Pin oak	1	6	17.25
Quercus phellos	Willow oak	12	6	9.63
Quercus rubra	Northern red oak	28	4	17.96

Scientific Name	Common Name	Number	Median	
			Health *	DBH (")
Quercus velutina	Black oak	1	4	5.75
Sorbus aucuparia	European mountain ash	6	5	5.75
Syringa reticulata	Japanese tree lilac	24	5	1.66
Tilia americana	American basswood	18	7	22.00
Tilia cordata	Littleleaf linden	41	3	13.66
Tilia tomentosa	Silver linden	38	5	13.53
Ulmus americana	American elm	2	6.5	38.25
Ulmus parvifolia	Chinese elm	4	5	4.63
Ulmus pumila	Siberian elm	2	5	5.38
Ulmus rubra	Slippery elm	10	5	7.63
Zelkova serrata	Japanese zelkova	56	5.5	12.00
Total		**1,509**	**5**	**8.75**

Source: DVRPC, 2012

Health*	Definition
1	Dead
2	Critical
3	Poor
4	Fair
5	Good
6	Very Good
7	Excellent
NA	Not Recorded

Planting Site Recommendations

Roots outgrow a small pit cut.

A tree guard protects trees from the urban environment.

Larger pit cuts where possible would be beneficial to the health of trees while reducing sidewalk damage. Many tree pits are smaller than the Philadelphia Parks & Recreation standard 3'×3' plot size. Some tree pits with trees had even been covered with concrete or asphalt to the base of the trunk. Where possible, pits should be enlarged to provide trees with the proper amount of soil, water, air, and ability to grow unhindered. Insufficient tree pits lead to more severe effects of drought, nutrient deficiencies, and damage to the tree, sidewalk, and underground pipes.

Tree guards, or fences, installed around trees would help protect trees in a number of ways, especially new trees. These guards should be constructed at the perimeter of the pit, not directly against the trunks, to allow healthy tree growth. Tree guards can protect against vehicular damage from opening doors, parking impact, and accidents. They can also discourage pet waste. Tree guards would also prevent bikes from being locked to trees, an all-too-common occurrence. These would also provide a barrier against pedestrians accidentally walking into trees and could discourage children from breaking branches.

Increased trash and recycling facilities throughout the city, particularly adjacent to local take-out businesses, could help reduce the amount of litter deposited in tree pits. In the absence of trash cans, tree pits become receptacles for trash deposited by pedestrians. Litter also enters tree pits through wind or stormwater runoff. Cigarette butts, dog excrement, cans and bottles, and other items of garbage are toxic to trees as well as public health. Providing the neighborhood with proper facilities to dispose of all forms of trash, as well as enforcing the fines associated with littering, could help protect tree health.

Maintenance and Establishment Issues

Over-pruning can cause twig dieback.

Pruning around overhead wires is a cause for concern in the study area. The quality of the pruning work appears to be destructive to many trees. Many pruning cuts are made in a way that prevents the tree from healing its wounds properly, which may increase susceptibility to pests and disease. The current practices observed remove far too many branches at once and prune more of the canopy than is necessary to protect the overhead wires. In particular, older, more substantial trees such as London Planes have great difficulty with such severe pruning cuts. For trees under overhead wires, greater care should be taken to prune them when they are smaller so they can be trained to grow around the wires. Evidence of older successful pruning jobs was found around Marconi Plaza on 13th Street.

Establishment of new trees is another cause for concern in the study area. Many newly planted trees were suffering signs of drought (leaf wilting, leaf scorch, etc.) due to lack of adequate watering. Many pits would benefit from mulching. A baseline level of tree pruning to remove dead branches and train leaders to grow properly would be beneficial.

The interns noted what appeared to be evidence of fire blight on Prunus trees in the study area. Where one Prunus tree was affected on a block, others were as well. Fire blight is a bacterial infection that can be spread by rain, wind, or pruning tools. Signs of fire blight include blackened leaves and cankers on the branches and trunk.

Improving dead tree response and removal would be helpful to prevent property damage and improve the street tree culture of the neighborhood. Neighbors of dead trees reported trying to get the trees removed for years unsuccessfully. Residents reported being less supportive of new trees being planted when there are dead trees that are not removed.

High Priority Planting Locations

Many blocks in the study area completely lack trees, like 10th Street shown here.

Streets entirely lacking trees were located throughout, but were found primarily in the center and in some eastern portions of the study area. Wider, more heavily used corridors would benefit most from new trees. These corridors include tree-deficient portions of Snyder Street, Moyamensing Avenue, Wolf Street, Ritner Street, Porter Street, and Shunk Street. Frequent driveways and garages, commercial signage, and overhead wires make Oregon Avenue a difficult corridor for tree plantings. North-south corridors with high priority for tree plantings include portions of South Broad Street, 13th Street, 12th Street, 10th Street, 8th Street, 7th Street, 6th Street, 5th Street, 4th Street, and 3rd Street.

These more prominent streets are less likely to have underground utilities and more likely to have wider sidewalks that can better accommodate tree pits. Corridor streets also tend to have less shade cover from buildings. As wider streets, they are also responsible for larger volumes of stormwater runoff. Corridor streets serve as main arteries for residents and nonresidents, and improving the streetscape aesthetics through tree plantings will add to the quality of life of the entire neighborhood. Many of these streets lead to parks, and tree-lined streets will increase the feeling of connectivity between these parks and the surrounding neighborhood.

For east-west streets, planting on the north side of the street would be most beneficial to allow for generous southern exposure. For north-south streets, trees on either side would receive adequate sunlight.

Figures 5 and **6** on pages 26-27 highlight the high priority planting streets in the study area.

Street Tree Recommendations

Based on the tree health assessment conducted through this study, the following list of recommendations for different growing conditions has been developed. The species recommendations are not limited to those conditions exclusively, as many species can thrive in a variety of settings. These recommendations indicate what species may grow best in these unique situations in the urban environment.

The superscript "[N]" denotes a species that is native to Southeastern Pennsylvania.

Overall: These species can handle a wide variety of growing conditions in the urban environment.

- Ginko (Ginko biloba)
- Honey Locust[N] (Gleditsia triacanthos)
- Cherry Plum (Prunus cerasifera)
- Silver Linden (Tilia tomentosa)
- Slippery Elm (Ulmus rubra)
- Japanese Zelkova (Zelkova serrata)

Narrow Streets or Below Power Line: These trees grow smaller and/or can handle significant pruning.

- Allegheny Serviceberry[N] (Amelanchier laevis)
- Eastern Redbud[N] (Cercis canadensis)
- Flowering Dogwood[N] (Cornus florida and other Cornus)
- Cherry Plum (Prunus cerasifera)
- Cherry Species (Prunus) – Do not handle severe pruning well, especially when mature.

Understory Trees: These trees are good for filling in gaps among rows of larger established trees. These trees can handle filtered/part-shade and competition as well as full sun later in the tree's life.

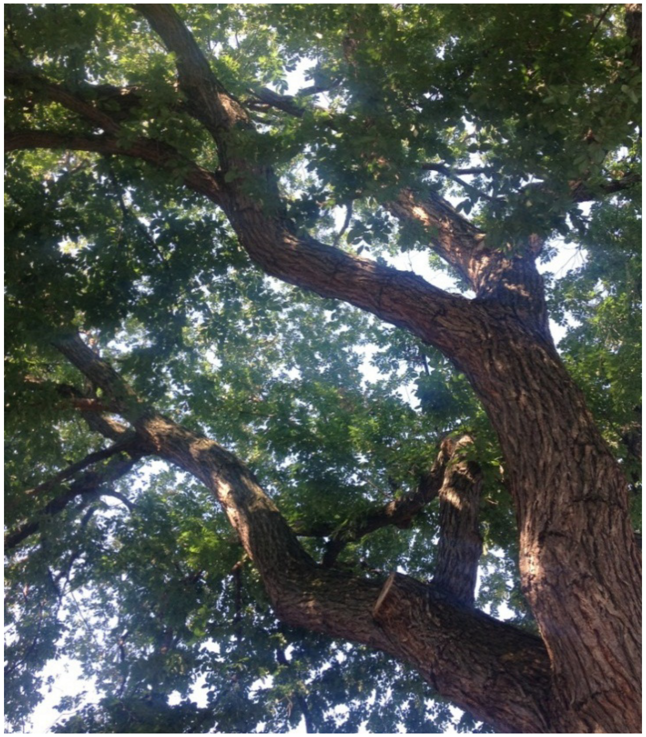
- Red Maple[N] (Acer rubrum)
- Sugar Maple[N] (Acer saccharum)
- Tatarian Maple (Acer tataricum)
- Boxelder Maple[N] (Acer negundo)
- American Hornbeam[N] (Carpinus caroliniana)
- Eastern Redbud[N] (Cercis canadensis)
- Flowering Dogwood[N] (Cornus florida)
- Native ash species (Fraxinus)
- Native oak species (Quercus)
- European Mountain Ash (Sorbus aucuparia)
- Japanese Zelkova (Zelkova serrate)

Northern Exposure Trees: These trees can survive in almost complete shade. The “*” denotes that the tree or shrub prefers a shadier environment and would not do well in other locations.

- Japanese Maple* (Acer palmatum)
- Eastern Redbud[N] (Cercis canadensis)
- Dogwood species (Cornus)
- Ginko (Ginko biloba)

Wide Streets: The following are larger tree species that can be supported on main arterial streets.

- Native maple species (Acer)
- American Hornbeam[N] (Carpinus caroliniana)
- Native ash species (Fraxinus)
- Ginko (Ginko biloba)
- Honey Locust[N] (Gleditsia triacanthos)
- Sweetgum[N] (Liquidambar styraciflua)
- Native oak species (Quercus)
- American Basswood[N] (Tilia americana)
- Chinese Elm (Ulmus parviflora)



The Slippery Elm is one of the hardiest trees in the urban environment.

Tree Inventory Maps

The following three maps illustrate the data collected as part of this street tree inventory. **Figure 4** displays the variety of tree genus classifications. The seven most common genera, making up 85 percent of all trees, are identified individually. The “other” category comprises 32 different genera. **Figure 5** highlights the tree planting priority streets, which were selected based on the criteria outlined on page 19. In **Figure 6**, the trees are represented proportionally based on their diameter at breast height (DBH) along with the highlighted tree planting priority streets.

These descriptive maps are intended to help guide the PP&R and local tree tending groups to better understand the existing urban tree canopy characteristics in the study area so that future planting efforts can be made strategically.

Figure 4:Tree Genus Distribution

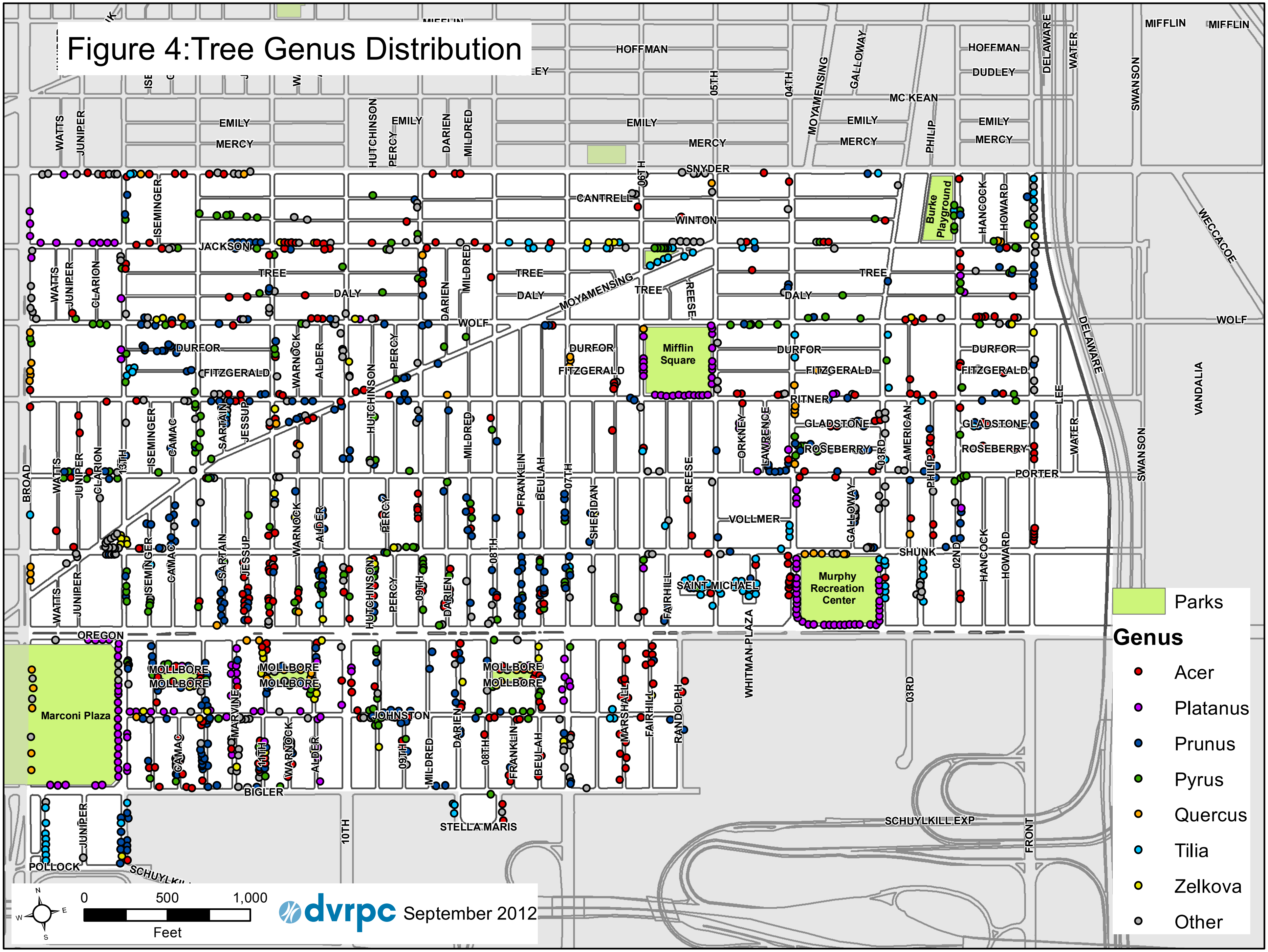


Figure 5: Tree Planting Priority Streets

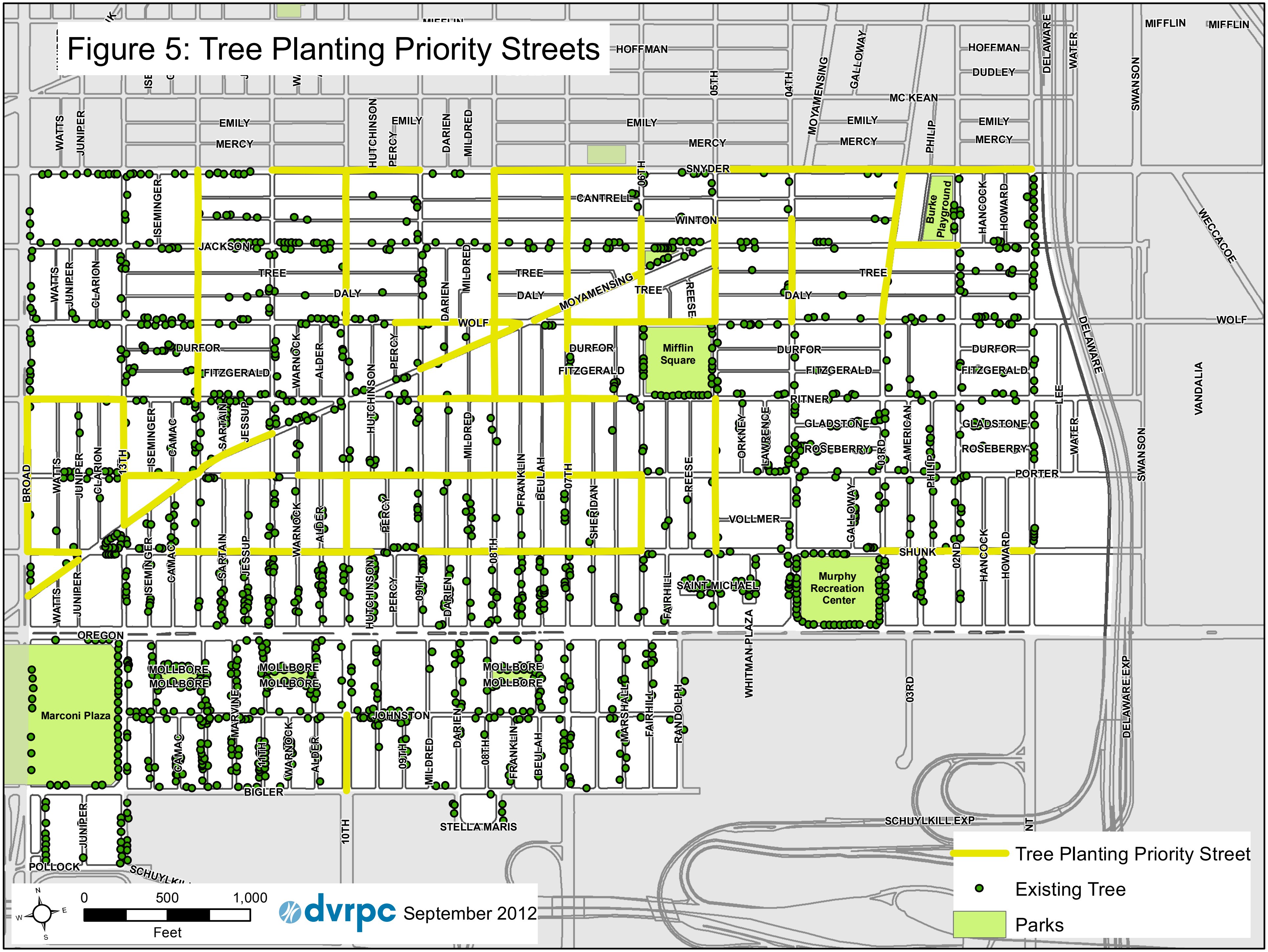
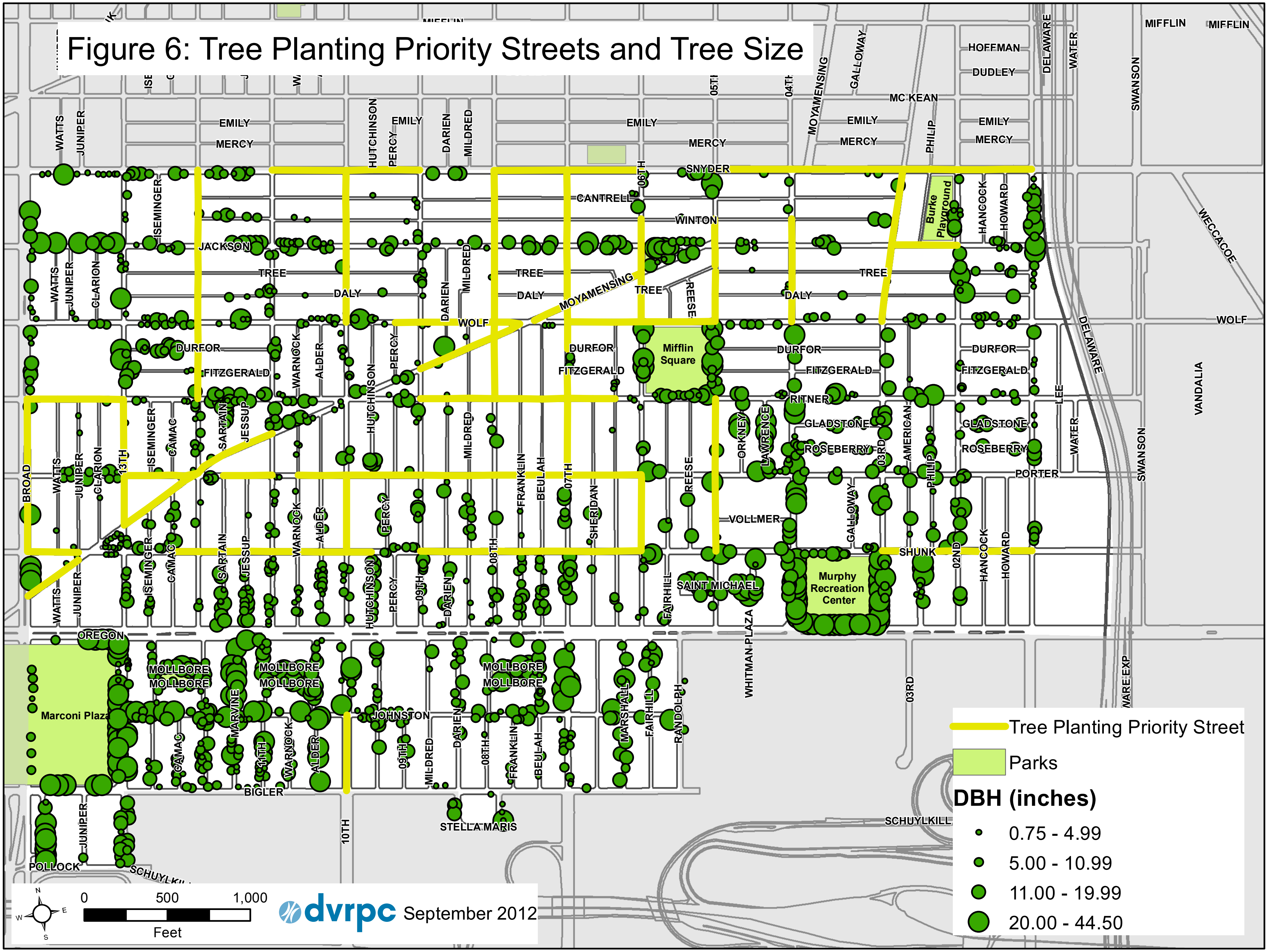


Figure 6: Tree Planting Priority Streets and Tree Size



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Staff Contact:

Amy K. Miller, AICP
Environmental Planner
☎ (215) 238-2930
AMiller@dvrpc.org

Delaware Valley Regional Planning Commission
190 N. Independence Mall West, 8th Floor
Philadelphia, PA 19106
Phone: (215) 592-1800
Fax: (215) 592-9125
Internet: www.dvrpc.org

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