

The Trees of the City of Cambridge:

An analysis of the City's Street and Park Trees



The City of Cambridge
Department of Public Works
Parks + Urban Forestry Division

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Cover photo by Adriana Chavez, 2011
Unless otherwise noted, photos by Linda Ciesielski

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Introduction

Since 2005, the City of Cambridge Department of Public Works (DPW) has been working to establish a comprehensive tree inventory of public street and park trees. This inventory will enable the Parks and Urban Forestry Division to better manage and assess the City's urban forest.

In 2011, a citywide survey of the City's street trees was conducted. As of December 2011, all of the City's street trees have been documented, as have nearly all of its park trees.¹ While things change quickly in the outdoor environment, especially in strong weather events such as Tropical Storm Irene, the current inventory provides a relatively accurate reflection of the City's trees.

This report represents the first comprehensive analysis of the City's trees, based on the updated inventory. This report provides an overview and analysis of the City's trees, at the scale of the city and individual neighborhoods. This includes the number of trees and empty wells, an analysis of tree size (DBH), species composition, recent plantings, and vulnerability to invasive insects. An update on the City's Urban Forestry Benchmarks is also included.

The final sections of the report include recommendations for expanding the use and purpose of inventory, and modifying its methodology. This includes using the inventory as a research and evaluation tool for the City's Urban Forestry and Engineering Divisions, a resource for local steward groups, and a teaching tool for school curriculum.

This report is also aimed at sharing detailed information on the City's trees with the public, so as to foster stewardship among local groups, neighborhood associations, and schools. An effort is underway to place the tree inventory online as an overlay on Google Maps, which would allow the public to more easily learn about the City's trees. Three short films on tree maintenance, watering young trees, and the City's Water-By-Bike Program, were recently added to the DPW website to further promote public involvement in caring for the urban forest.²

¹Several small parks are not yet inventoried

²DPW website: www.cambridgema.gov/services/theworks

Overview

There are over 19,000 trees in the tree inventory, including 13,497 street trees and 4,376 park trees. This total includes trees under the jurisdictions of the City of Cambridge and the Department of Conservation and Recreation (DCR), and does not include trees found on private property. There are 12,934 City-owned street trees and 3,517 City park trees (*see Maps 1 and 3*). Trees at public schools, city buildings, the Thomas P. O’Neill Municipal Golf Course, the Cambridge Cemetery and Old Burial Ground, contribute an additional 1,222 trees to the inventory. The DCR Parkway and Street trees make up 7% of the inventory, or 1,422 trees.

Jurisdiction

Within the City of Cambridge, the Massachusetts Department of Conservation and Recreation has jurisdiction over the land and trees on Memorial Drive, Fresh Pond Parkway, Alewife Brook Parkway, Land Boulevard and Monsignor O’Brien Highway. Many of these streets contain large distinctive trees, creating an image of Cambridge. While these trees are not under Cambridge’s jurisdiction, and therefore not managed by the city, for the purpose of understanding their contribution to the size and species of trees in the City, they have been included in the analysis below, and are noted as “DCR trees”. The charts in this report and Appendix distinguish City Trees from DCR Trees. *Map 2* shows the DCR Parkway and Street Trees in Cambridge, 1,422 of which have been documented in the inventory.

City Benchmarks

The following chart shows the City of Cambridge’s Urban Forestry Benchmarks from Fiscal Years 2009 through 2011 (*Figure 1*). The benchmarks tally the total number of street trees, park trees, cemetery trees, and newly planted trees. It also includes the number of empty tree wells, or spaces available for new street tree plantings. The notable increase in numbers across all categories is due to the completion of the citywide survey in the summer and fall of 2011. Only trees under the jurisdiction of the City of Cambridge are included in the City Benchmarks. Trees maintained by DCR have been parsed out from the total count, and noted below.

Figure 1: The Department of Public Works Urban Forestry Benchmarks

PERFORMANCE MEASURES	FY 09 ACTUAL	FY 10 ACTUAL	FY 11 PROJECTED	FY 11 PROPOSED	DEC 11 ACTUAL
Empty Tree Wells*	n/a	582	400	450	752
Number of new trees planted	490	271	550	300	328
Total number of street trees**	11,034	12,137	11,674	12,667	12,934
Total number of cemetery trees	630	n/a	840	655	834
Total number of park trees**	2,976	n/a	2,244	3,050	3,517

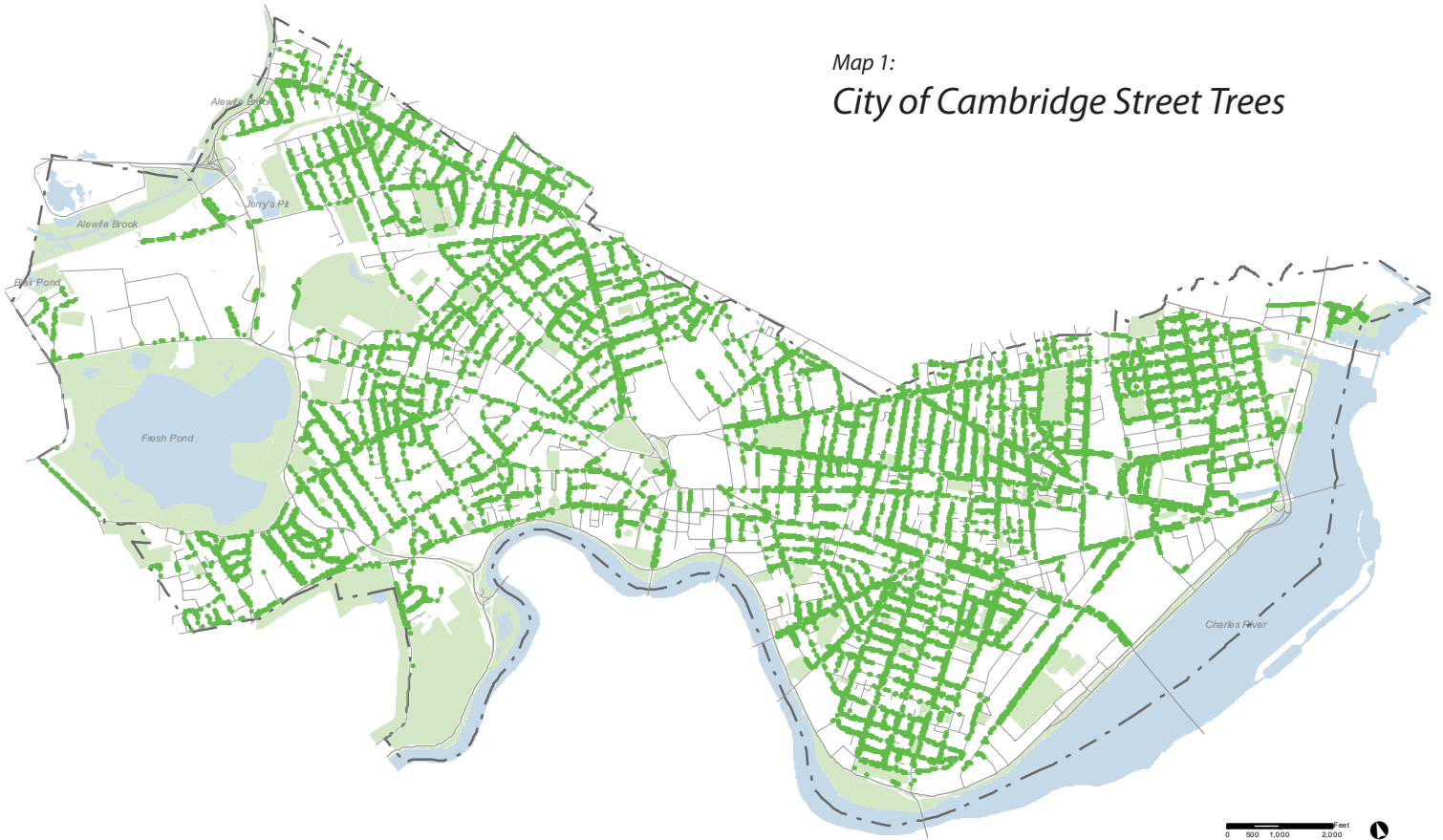
*does not include DCR empty wells (30); 126 of 752 Empty Wells are in Proposed Street Construction Areas

**does not include DCR street trees (540)

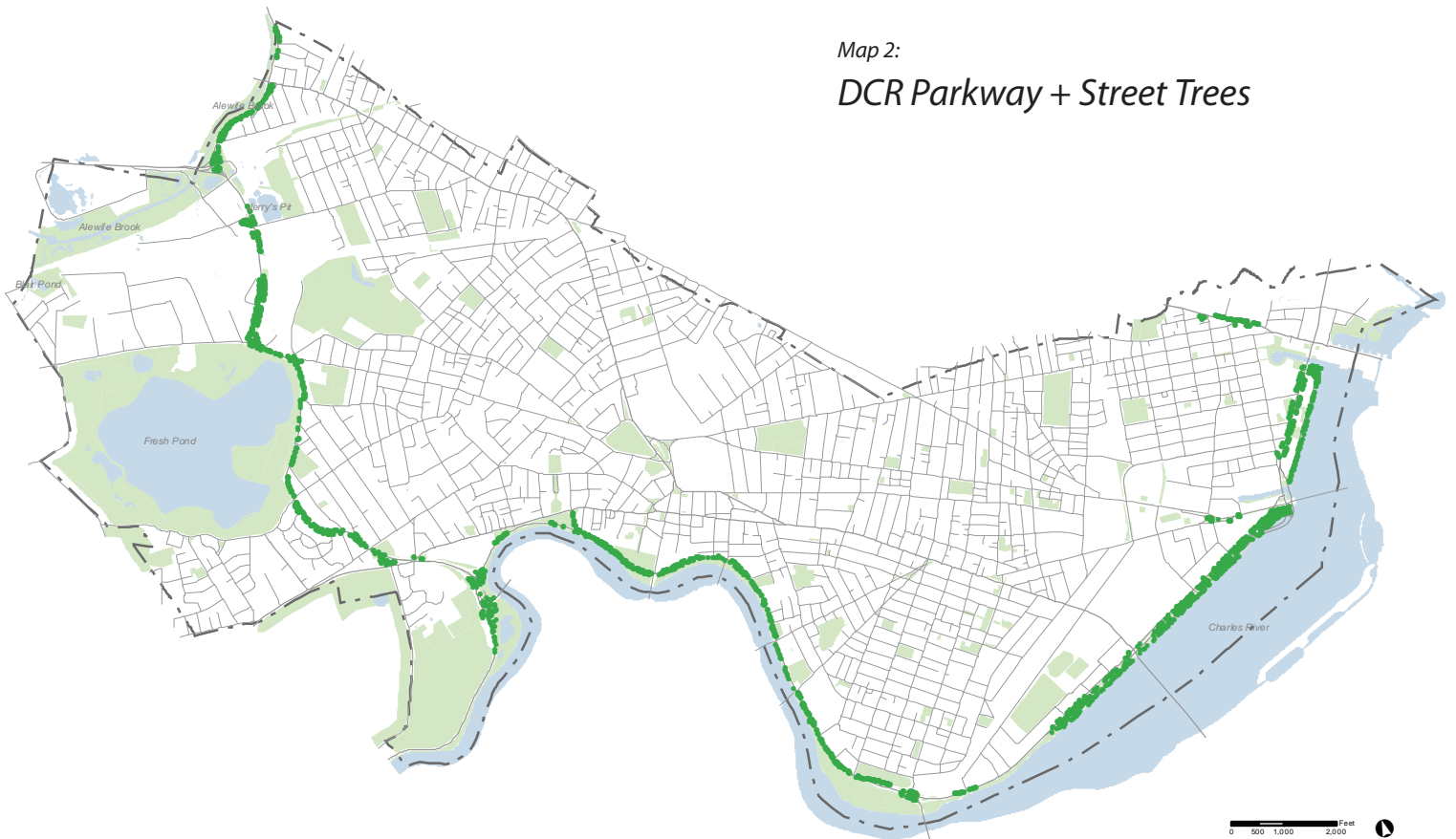
**does not include DCR park trees (859), does not include golf course, public school or city buildings
Golf Course (247) + Public Schools (138) + City Buildings (3) + City Park Trees (3,517) = 3,905

+ DCR Park Trees (859) = 4,764

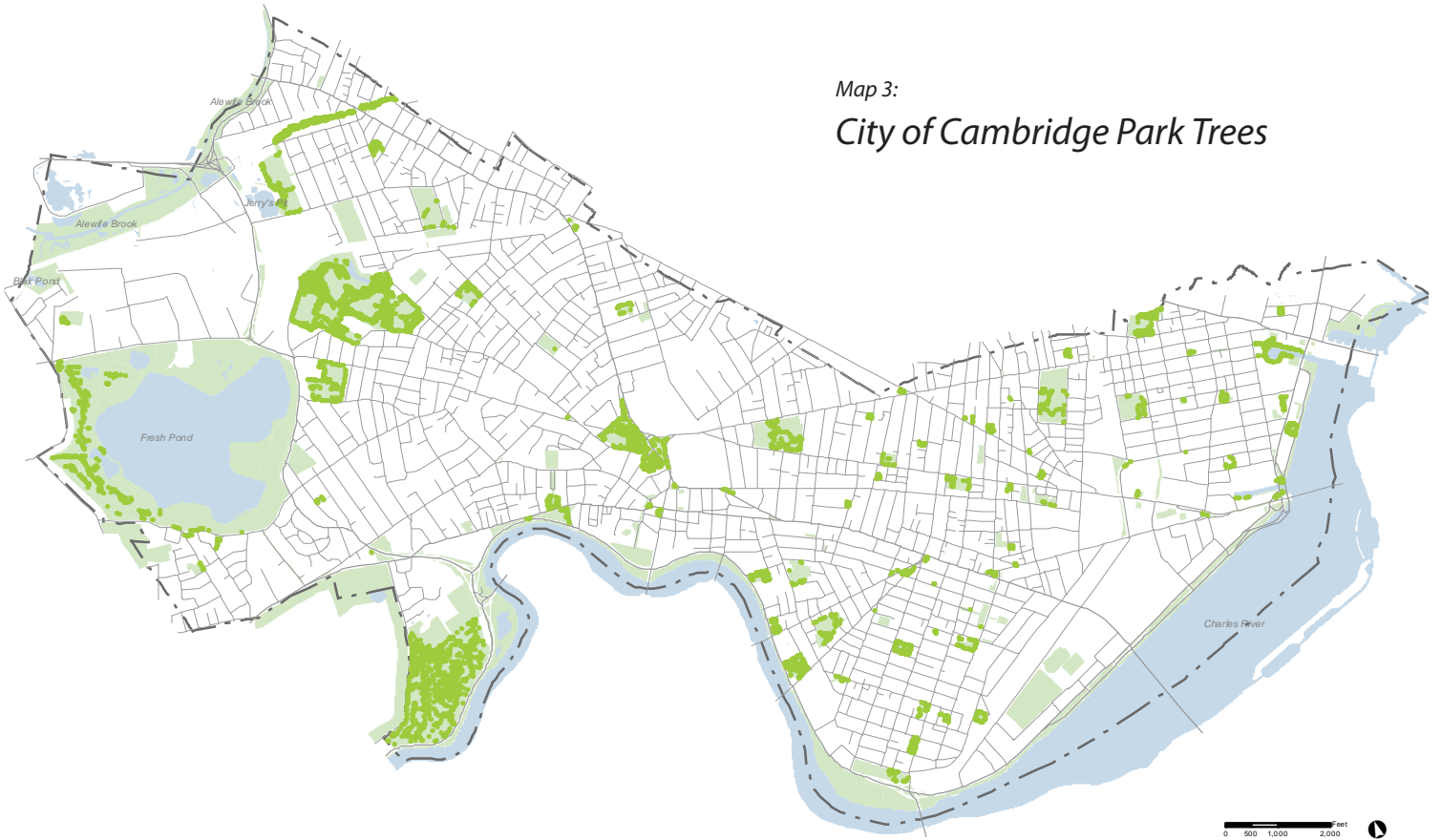
Map 1:
City of Cambridge Street Trees



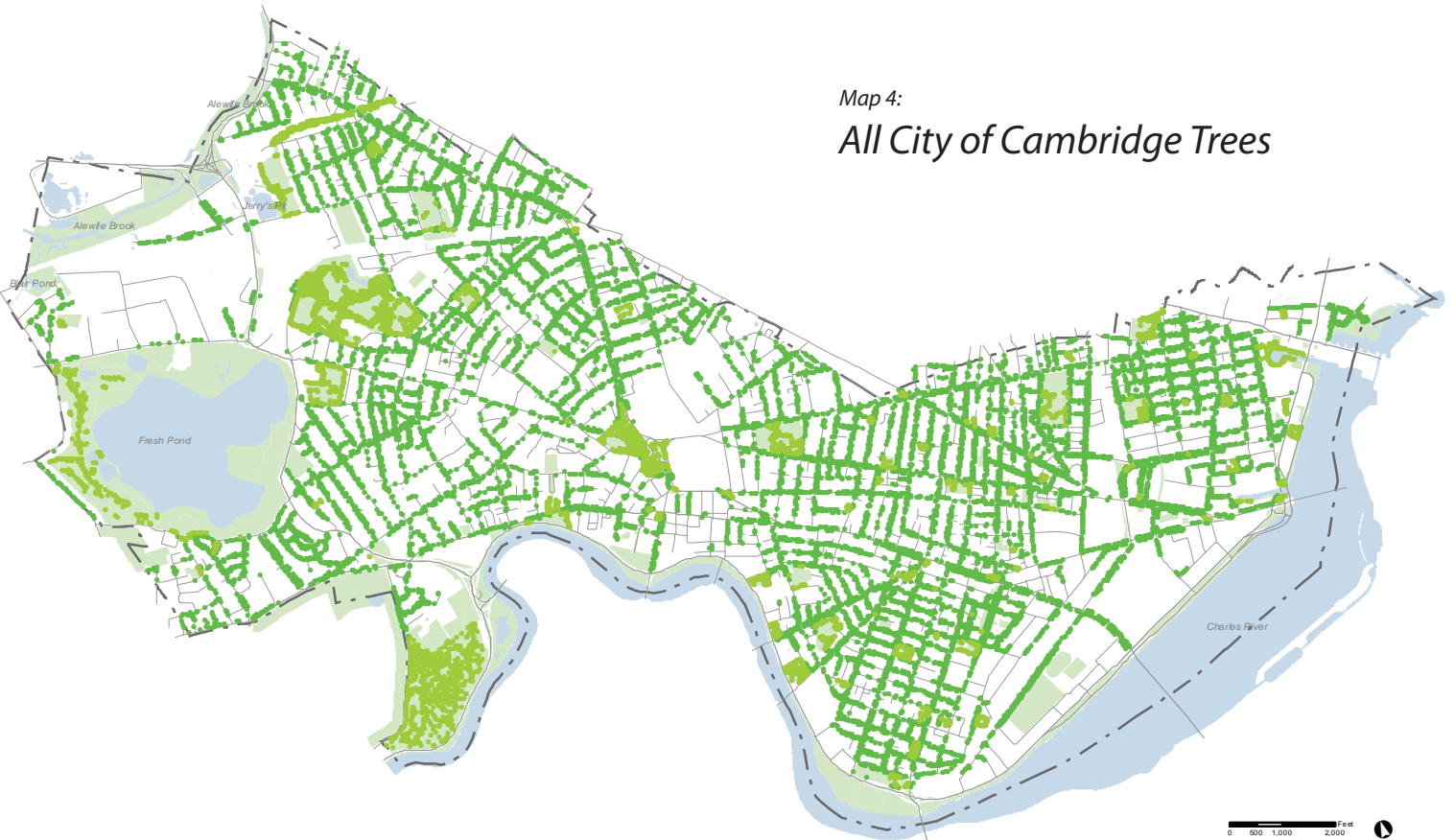
Map 2:
DCR Parkway + Street Trees



Map 3:
City of Cambridge Park Trees



Map 4:
All City of Cambridge Trees



Tree Size



Measuring the diameter of a sycamore tree using a "d-tape"

In the City's inventory, a tree's "size" is measured by the diameter of the trunk. This measurement is called diameter breast height (DBH), because the trunk diameter is recorded at breast height, 4.5 feet above the ground. Foresters and arborists typically measure DBH with a specially calibrated tape measure called a d-tape. The d-tape is two-sided; one side shows regular inches, the other "inches of diameter". To measure DBH, the d-tape is wrapped level around the circumference of the trunk 4.5 ft above the ground, and the number of "inches of diameter" is recorded. If you do not have a d-tape, you can still measure DBH with a regular measuring tape or a piece of string and ruler, using the measure of the tree's circumference to find the diameter.³

DBH can also serve as a proxy for the age and canopy of a tree. Generally, the larger the DBH measurement, the older the tree. However, urban street trees do not grow as quickly or as large as trees planted in lawn or park spaces, so DBH does not necessarily equate age.

³If you do not have a d-tape, wrap a regular measuring tape or string around the trunk and record the circumference in inches. Then divide the circumference by the number π (3.14), to find the diameter of the trunk: $\text{diameter} = \text{circumference} / \pi$.

Street Tree Size

Across Cambridge, forty-four percent of City street trees are below 6 inches in diameter. This shows that there are a considerable number of young trees in the City; since 2008, nearly 1,500 new trees between 1 to 2 inches in diameter have been planted. Twenty-seven percent of City street trees are between 7 and 12 inches in diameter; fifteen percent are between 13 and 18 inches in diameter; and eight percent are between 19 and 24 inches in diameter. Less than 7 percent of the city's street trees are over 25 inches in diameter. Of the nearly 13,000 City street trees, only 322 City street trees larger than 30 inches in diameter, and just 16 trees measure over 42 inches in diameter, or a mere 0.1 percent of street trees. These large street trees are scattered throughout the City, but many are located in Neighborhoods 9 and 10, and East Cambridge.

In addition, there are also a number of large DCR-owned street trees along Memorial Drive between Western Avenue and Hawthorn Avenue, and on Fresh Pond Parkway between Brattle Street and Huron Avenue. As seen in *Figures 2-4* below, DCR-owned street trees quadruple the total number of street trees over 42 inches in diameter.



Large Pin Oak on Linnean Street, photo: Adriana Chavez

CITY STREET TREES			
DBH range (inches)	count	total trees	% of trees
1-6	5,731	12,934	44.3
7-12	3,521	12,934	27.2
13-18	1,952	12,934	15.1
19-24	1,045	12,934	8.1
25-30	432	12,934	3.3
31-36	185	12,934	1.4
37-42	54	12,934	0.4
43-48	9	12,934	0.1
49-54	1	12,934	0.0

DCR STREET TREES			
DBH range (inches)	count	total trees	% of trees
1-6	224	563	39.8
7-12	128	563	22.7
13-18	70	563	12.4
19-24	40	563	7.1
25-30	18	563	3.2
31-36	25	563	4.4
37-42	20	563	3.6
43-53	31	563	5.5
49-54	5	563	0.9

CITY + DCR STREET TREES			
DBH range (inches)	count	total trees	% of trees
1-6	5,955	13,497	44.1
7-12	3,649	13,497	27.0
13-18	2,022	13,497	15.0
19-24	1,085	13,497	8.0
25-30	450	13,497	3.3
31-36	210	13,497	1.6
37-42	74	13,497	0.5
43-53	40	13,497	0.3
49-54	6	563	1.1

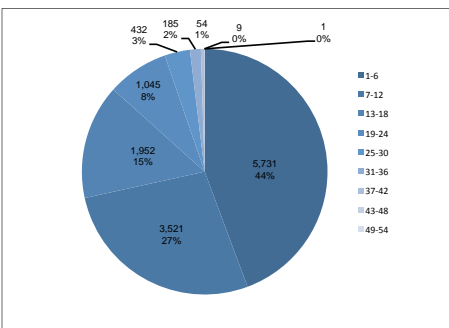


Figure 2. City Street Trees DBH range

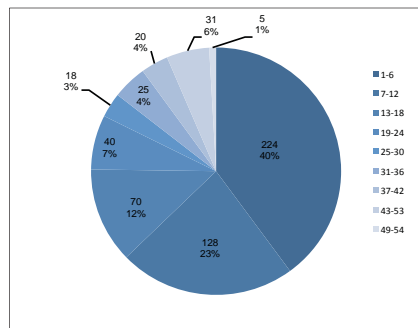


Figure 3. DCR Street Trees DBH range

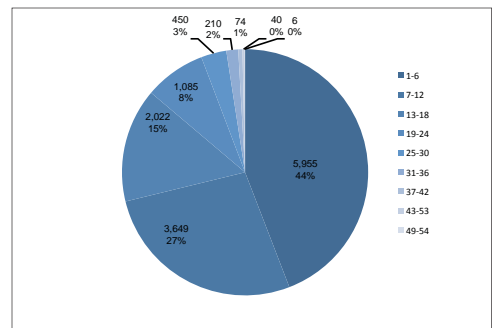


Figure 4. City + DCR Street Trees DBH range

Park Tree Size



Sycamore park tree

Of the 3,500 City park trees that have been inventoried, half are between 1 and 6 inches in diameter. Since 2008, over 100 new park trees have been planted. Nearly a third of City park trees are between 7 and 12 inches in diameter; nine percent between 13 and 18 inches in diameter; and the remaining six percent are over 19 inches in diameter. “Park trees” do not include trees on the City golf course, at the Cambridge Cemetery, or at public schools and city buildings. Also, of note, not all City park trees have been inventoried, including several small pocket parks, and in more naturalized areas of Danehy Park and St. Peter’s Fields.

Approximately 900 DCR-owned Park trees are found in the City’s inventory, and are mainly located along Memorial Drive by MIT and Cambridge Parkway in East Cambridge. There are a number of DCR owned park trees in Cambridge which are not included in the City’s tree inventory, including trees at Fresh Pond Reservation, along Alewife Brook, Magazine Beach, the parkland along Memorial Drive, and the new North Point Park in East Cambridge. These trees are managed by DCR, and not maintained by the City of Cambridge.

CITY PARK TREES			
DBH range (inches)	count	Total City Park trees	% of City Park trees
1-6	1,810	3,517	51.5
7-12	1,108	3,517	31.5
13-18	324	3,517	9.2
19-24	124	3,517	3.5
25-30	55	3,517	1.6
31-36	11	3,517	0.3
37-42	3	3,517	0.1
43-53	6	3,517	0.2

CITY + DCR PARK TREES			
DBH range (inches)	count	Total Park trees	% of Park trees
1-6	1,987	4,376	45.4
7-12	1,372	4,376	31.4
13-18	528	4,376	12.1
19-24	254	4,376	5.8
25-30	98	4,376	2.2
31-36	22	4,376	0.5
37-42	7	4,376	0.2
43-53	9	4,376	0.2

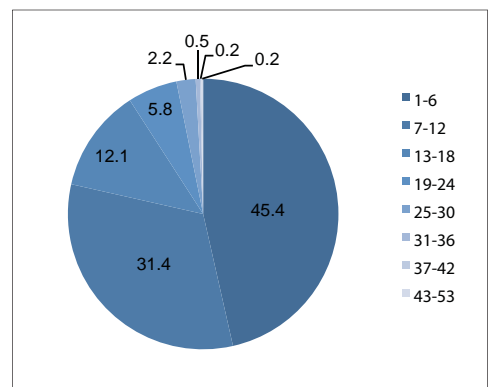
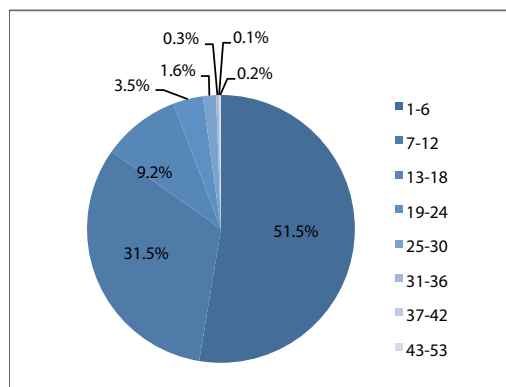


Figure 5. City Park Trees DBH range

Figure 6. City + DCR Park Trees DBH range

Species Composition

There are 87 unique street tree species and 94 park tree species in the City. The ten most common City street trees are: Norway maple (15.8%), honeylocust (11.8%), red maple (9.1%), pear (7.0%), littleleaf linden (6.7%), pin oak (6.0%), American linden (3.0%), London planetree (2.8%), ginkgo (2.6%), and the Japanese lilac tree (2.5%). The Norway maple and honeylocust make up 28% of the city street trees. Five species make up 50% of the city's street trees: Norway maple, honeylocust, red maple, pear, and littleleaf linden.

The ten most common City park trees are honeylocust (10.0%), red maple (7.8%), Norway maple (7.7%), white pine (7.3%), green ash (6.7%), pin oak (5.5%), crabapple (4.6%), red pine (3.5%), London planetree (2.6%), and Japanese zelkova (2.4%).

See the Appendix for a full list of street tree and park tree species.

Figure 7. Top 15 Most Common Street Trees Species

CITY STREET TREES			
SPECIES	count	total trees	% of trees
maple, norway	2,038	12,934	15.8
honeylocust	1,525	12,934	11.8
maple, red	1,178	12,934	9.1
pear spp	905	12,934	7.0
linden, littleleaf	870	12,934	6.7
oak, pin	781	12,934	6.0
linden, american	382	12,934	3.0
planetree, london	363	12,934	2.8
ginkgo	337	12,934	2.6
lilac, jap tree	326	12,934	2.5
ash, green	304	12,934	2.4
elm spp	269	12,934	2.1
zelkova, japanese	257	12,934	2.0
sophora	239	12,934	1.8
oak, red	232	12,934	1.8

DCR STREET TREES			
SPECIES	count	total trees	% of trees
oak, pin	128	563	22.7
oak, red	100	563	17.8
linden, littleleaf	83	563	14.7
sycamore	77	563	13.7
zelkova, japanese	60	563	10.7
honeylocust	26	563	4.6
planetree, london	22	563	3.9
maple, norway	14	563	2.5
oak, swamp white	13	563	2.3
oak, black	8	563	1.4
linden, american	7	563	1.2
elm spp	5	563	0.9
maple, red	5	563	0.9
unknown	5	563	0.9
cherry spp	2	563	0.4

CITY + DCR STREET TREES			
SPECIES	count	total trees	% of trees
maple, norway	2,052	13,497	15.2
honeylocust	1,551	13,497	11.5
maple, red	1,183	13,497	8.8
linden, littleleaf	953	13,497	7.1
oak, pin	909	13,497	6.7
pear spp	905	13,497	6.7
linden, american	389	13,497	2.9
planetree, london	385	13,497	2.9
ginkgo	337	13,497	2.5
oak, red	332	13,497	2.5
lilac, jap tree	327	13,497	2.4
zelkova, japanese	317	13,497	2.3
ash, green	304	13,497	2.3
elm spp	274	13,497	2.0
sophora	239	13,497	1.8

Figure 8. Top 15 Most Common Park Trees Species

CITY PARK TREES			
SPECIES	count	total trees	% of trees
honeylocust	352	3,517	10.0
maple, red	275	3,517	7.8
maple, norway	272	3,517	7.7
pine, white	257	3,517	7.3
ash, green	234	3,517	6.7
oak, pin	195	3,517	5.5
crabapple spp	162	3,517	4.6
pine, red	122	3,517	3.5
planetree, london	90	3,517	2.6
zelkova, japanese	84	3,517	2.4
pear spp	75	3,517	2.1
arborvitae	73	3,517	2.1
pine, austrian	69	3,517	2.0
oak, red	68	3,517	1.9
linden, littleleaf	65	3,517	1.8

DCR PARK TREES			
SPECIES	count	total trees	% of trees
maple, norway	160	859	18.6
sycamore	91	859	10.6
zelkova, japanese	84	859	9.8
oak, pin	78	859	9.1
planetree, london	68	859	7.9
cherry spp	57	859	6.6
linden, american	49	859	5.7
linden, littleleaf	41	859	4.8
maple, red	34	859	4.0
oak, red	25	859	2.9
honeylocust	23	859	2.7
elm, siberian	20	859	2.3
crabapple spp	16	859	1.9
pine, white	15	859	1.7
ash, white	13	859	1.5

CITY + DCR PARK TREES			
SPECIES	count	total trees	% of trees
maple, norway	432	4,376	9.9
honeylocust	375	4,376	8.6
maple, red	309	4,376	7.1
oak, pin	273	4,376	6.2
pine, white	272	4,376	6.2
ash, green	242	4,376	5.5
crabapple spp	178	4,376	4.1
zelkova, japanese	168	4,376	3.8
planetree, london	158	4,376	3.6
pine, red	131	4,376	3.0
linden, littleleaf	106	4,376	2.4
linden, american	104	4,376	2.4
sycamore	103	4,376	2.4
cherry spp	93	4,376	2.1
oak, red	93	4,376	2.1

Tree Diversity and Vulnerability



An ash tree in Cambridge

Tree diversity is important to the overall vigor of a forest, and reduces vulnerability to invasive insects and disease. The Emerald Ash Borer (EAB) has most recently been in the news for causing large-scale destruction to forests. The EAB is an iridescent green beetle about the size of a penny that burrows and feeds off all species of ash trees, causing them to quickly defoliate and die (see picture of beetle below). The EAB has quickly spread across the mid-west of the United States, resulting in the loss of 50 to 100 million ash trees in North America since the 1990s (www.emeraldashborer.com). Five percent of the City's trees are ash trees, or 855 trees. EAB is a great concern because of its rapid migration eastward.

Similarly, the Asian Longhorned Beetle (ALB), a black beetle with white dots on its back, threatens many of the City's trees. Unlike the Emerald Ash Borer, the Asian Longhorned Beetle travels more slowly, but attacks a wide range of species, including all elms, maples, birch, London planetree, sycamores, willows. Forty percent of the city's trees, or 7,182 trees are vulnerable to ALB: 5,805 are considered "Preferred Host Species" for the beetle, and 1,377 are "Occasional to Rare Host Species".⁵

Of the 7,000+ trees susceptible to the ALB, 2,038 of these trees are Norway maples. This tree is considered invasive and it is no longer legal to plant, sell or distribute the Norway maple in the state of Massachusetts.

See the Appendix for a full list of ALB and EAB vulnerable species.



Emerald Ash Borer (EAB)

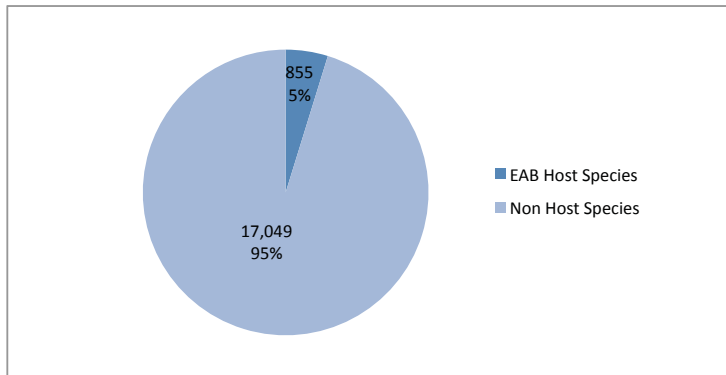


Figure 9. Percent of City Trees that are Host Species for EAB



Asian Longhorned Beetle (ALB)

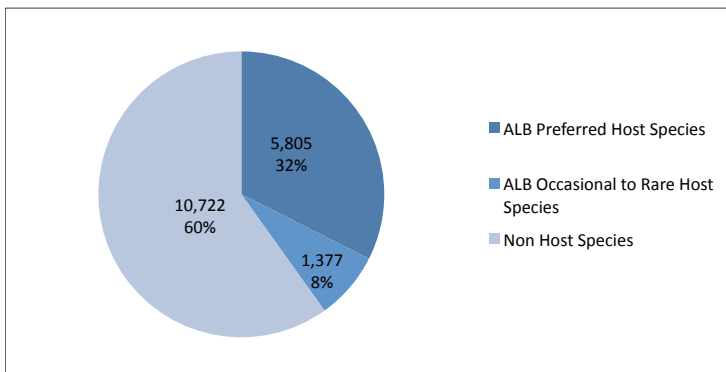


Figure 10. Percent of City Trees that are Host Species for ALB

⁵ ALB Host Species categories based on : Sawyer, Alan. "Asian Longhorned Beetle: Annotated Host List." USDA-APHIS-PPQ, Center for Plant Health Science and Technology, Otis Laboratory. Revised 3/11/ 2011.

Recent Plantings

Since 2008, 1,500 new trees have been planted across the city. This includes over 50 distinct species. The ten most commonly planted species are: honeylocust (10.9%), red maple (9.4%), pin oak (5.7%), elm species (5.7%), London planetree (4.6%), swamp white oak (4.3%), sargent cherry (4.1%), American elm (4.1%), littleleaf linden (3.9%), and Japanese zelkova (3.7%).

Of these recent plantings, 27 percent of the species, or 389 trees, are preferred-host species for the Asian Longhorned Beetle; 6 percent, or 89 trees, are occasional and rare host species; and 67 percent, or 1,013 trees, are non-host species. Approximately one percent of new plantings, 13 trees, are ash species and therefore vulnerable to the Emerald Ash Borer.

Promoting street tree diversity is the strongest assurance against vulnerability to invasive insects and disease.

See the Appendix for a complete list of new plantings.

TREES PLANTED SINCE 2008: 15 MOST COMMON SPECIES			
Species	Count	Total Plantings	% of Plantings
honeylocust	164	1,500	10.9
maple, red	141	1,500	9.4
oak, pin	86	1,500	5.7
elm spp	80	1,500	5.3
planetree, london	69	1,500	4.6
oak, swamp white	65	1,500	4.3
cherry, sargent	62	1,500	4.1
elm, american	61	1,500	4.1
linden, littleleaf	58	1,500	3.9
zelkova, japanese	56	1,500	3.7
ginkgo	50	1,500	3.3
maple, hedge	50	1,500	3.3
pear spp	43	1,500	2.9
golden raintree	40	1,500	2.7
cherry spp	35	1,500	2.3

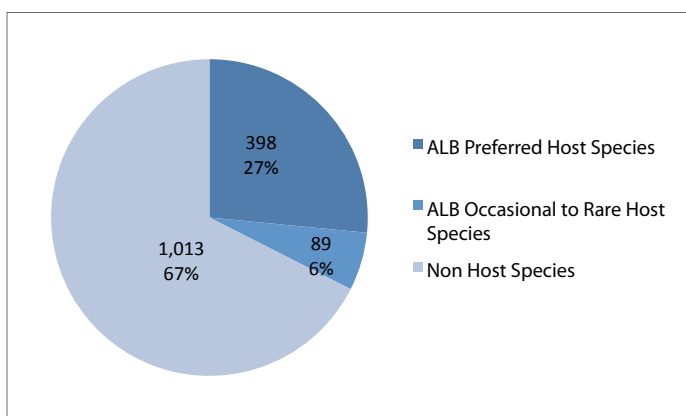


Figure 11. Percent of Recent Plantings that are Host Species for ALB

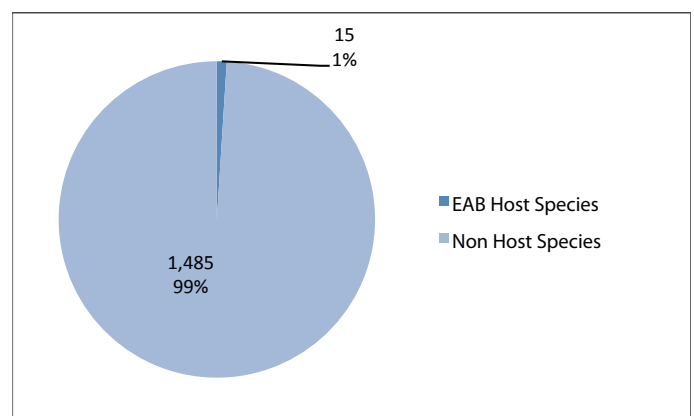


Figure 12. Percent of Recent Plantings that are Host Species for EAB

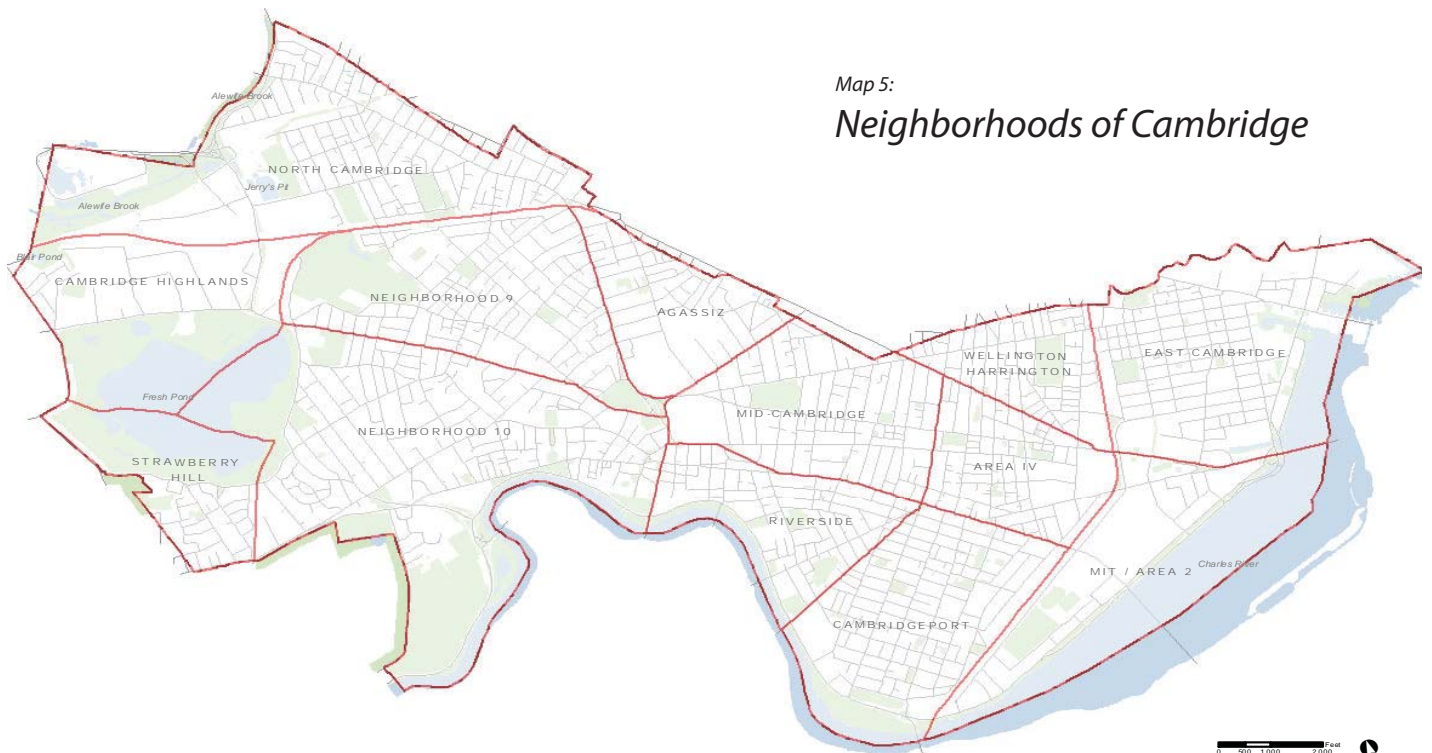
Neighborhood Analysis

The City of Cambridge is made up of thirteen neighborhoods, each of their own mix of building density, streetscapes, and zoning. The following section provides an introduction to the analysis of the street and park trees in each neighborhood, including the total number of trees and empty wells, species composition and tree size. The full analysis for individual neighborhoods is found in the *Appendix*.

The chart at the left shows the percent of city street trees in each neighborhood. Generally, the larger the neighborhood area, the more street trees it contains. However, this does not hold true for three neighborhoods: Area 2/MIT, Strawberry Hill or Cambridge Highlands.

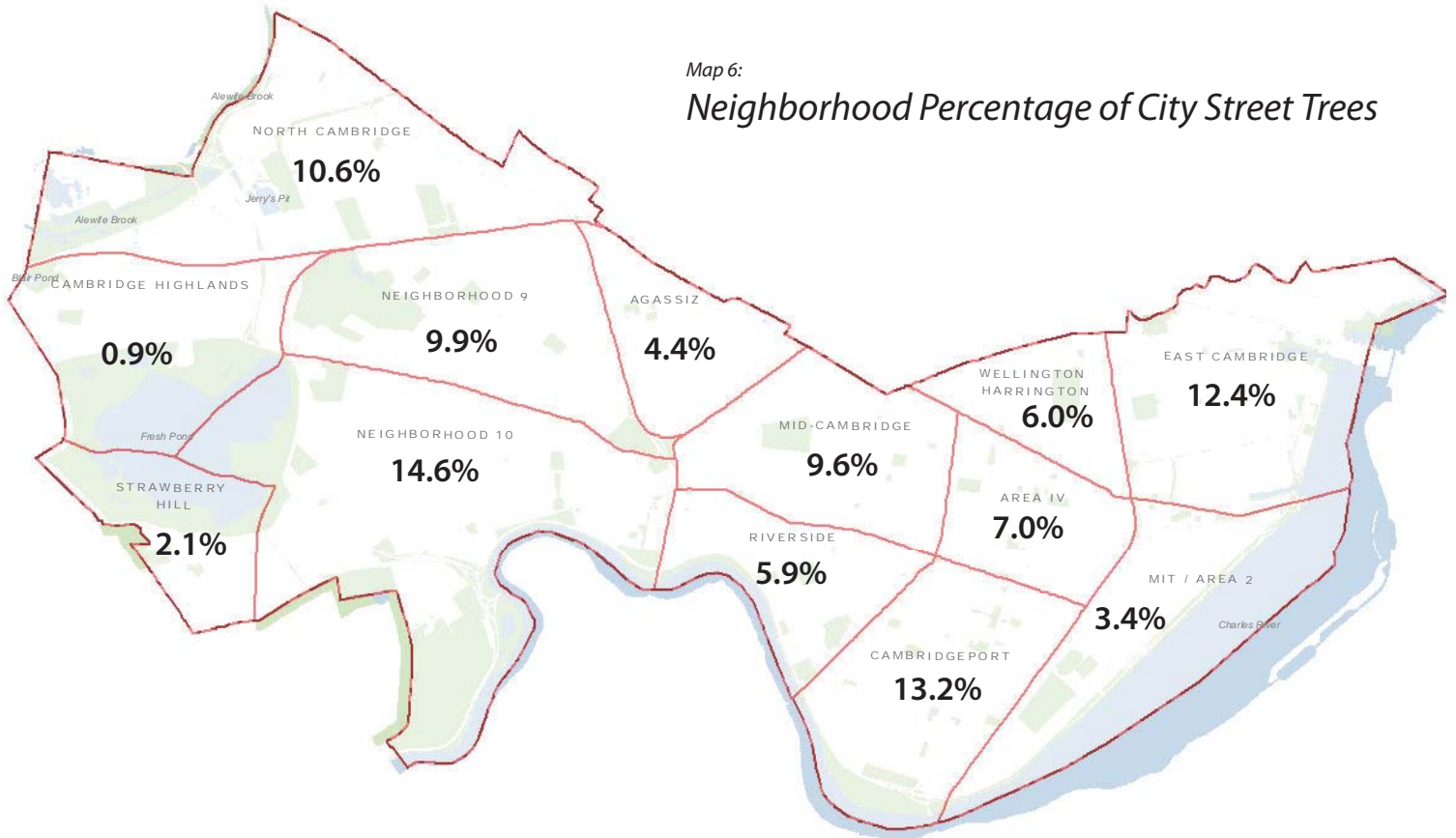
In order to more accurately compare the number of street trees between neighborhoods, and establish a “neighborhood street tree density,” the number of street trees in each neighborhood was compared to the total length of city streets in each neighborhood.⁶ This comparison normalizes each neighborhood, and establishes a ratio of percentage of street trees versus percentage of street length. A ratio of “1” conveys that the percent of neighborhood street trees equals the neighborhood’s percentage of city streets. If the ratio is great than 1, there are more trees in that neighborhood than streets; if the ratio is less than 1, there are fewer trees than streets. For example, East Cambridge has a ratio of 1.20 of City Street Trees to City Streets, meaning that it has more than trees than length of street. The following maps show how the ratio was established.

⁶Methodology: In each neighborhood, the number of street trees was compared to the total number of city street trees, creating a neighborhood “street tree” percentage. Likewise, the length of streets in each neighborhood was totaled and compared to the total length of all city streets to establish a neighborhood “street length” percentage. These two percentages were compared against each other, creating a ratio of percentage of street trees versus percentage of street length.

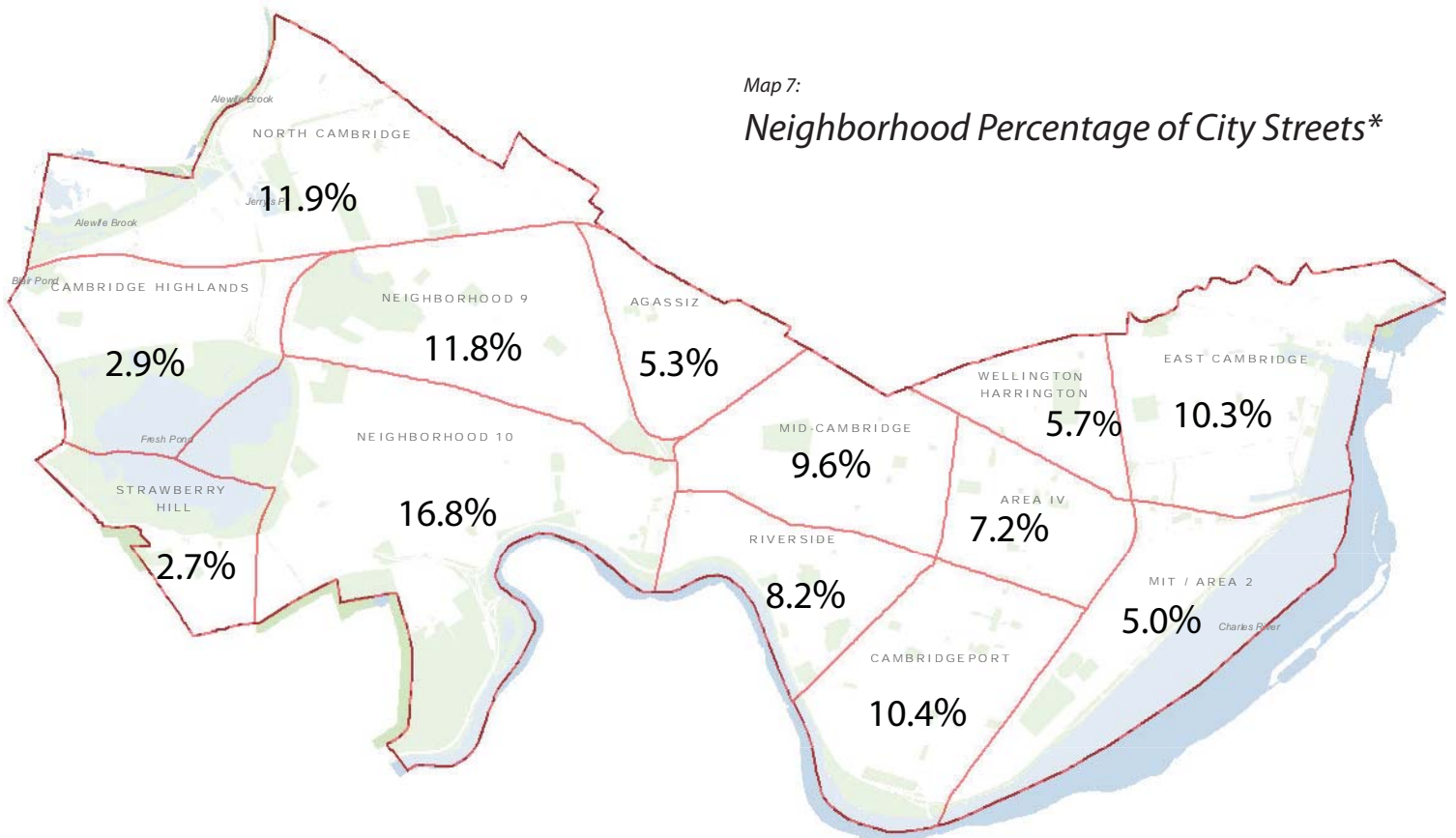


Map 5:
Neighborhoods of Cambridge

Map 6:
Neighborhood Percentage of City Street Trees



Map 7:
*Neighborhood Percentage of City Streets**



*total length of city streets in each neighborhood divided by the total length of all city streets

A note on Street Tree plantings: Narrow sidewalks, underground utilities, and private streets or lanes prevent city tree plantings. For a new tree to be planted, a city-owned sidewalk must be larger than 5'-6", as measured from the back of the curb to the back of the sidewalk, in accordance with the Americans with Disabilities Act (ADA). Below this width, the sidewalk is too narrow for accessible passage with a tree.

Where sidewalk conditions prevent street tree plantings, "back of sidewalk" trees can be requested for a tree planting on private property. The tree must be planted within 20 feet of the back of sidewalk. Visit the City's Urban Forestry website for more information: <http://www.cambridgema.gov/theworks/ourservices/urbanforestry/>

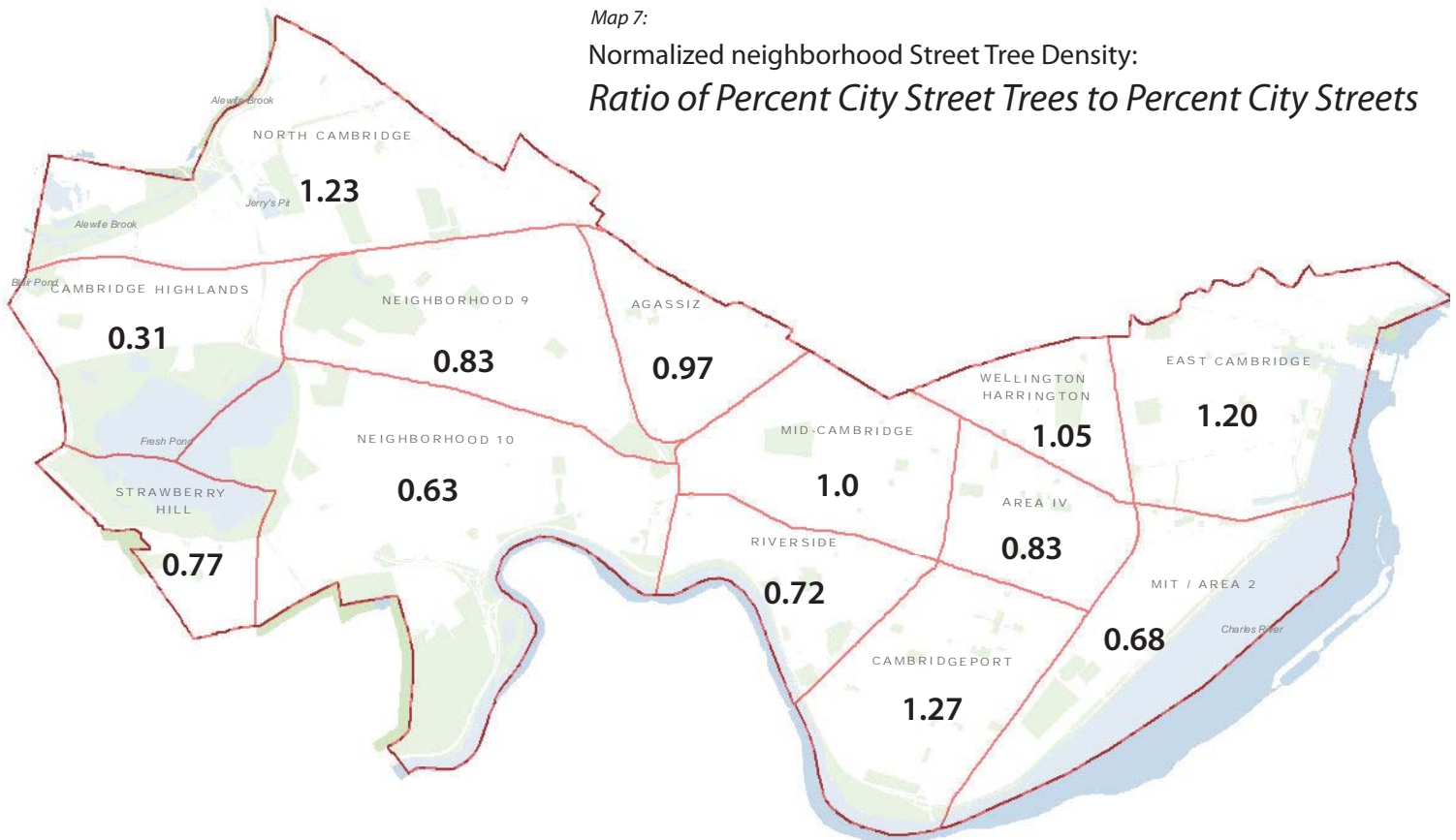
Neighborhood	% of City Street Trees	% of City Streets	Ratio
Cambridgeport	13.2	10.4	1.27
North Cambridge	14.6	11.9	1.23
East Cambridge	12.4	10.3	1.20
Wellington Harrington	6	5.7	1.05
Mid-Cambridge	9.6	9.6	1.00
Agassiz	7	7.2	0.97
Neighborhood 9	9.9	11.8	0.84
Area 4	4.4	5.3	0.83
Strawberry Hill	2.1	2.7	0.78
Riverside	5.9	8.2	0.72
MIT / Area 2	3.4	5	0.68
Neighborhood 10	10.6	16.8	0.63
Cambridge Highlands	0.9	2.9	0.31

Figure 13. Percent of City Streets Trees and Streets by Neighborhood, and ratio of Street Trees to Streets

Map 7:

Normalized neighborhood Street Tree Density:

Ratio of Percent City Street Trees to Percent City Streets



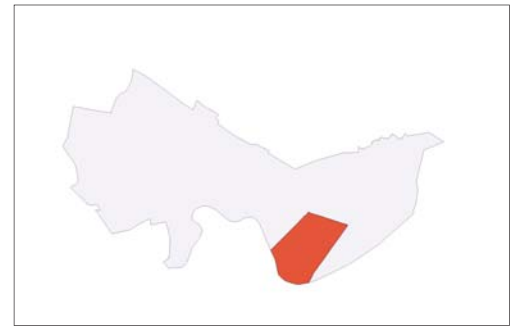
Neighborhood with Highest Street Trees to Street Ratio, 1.27: Cambridgeport



Map 8: City Street Trees, Park, Public School Trees, and DCR Trees in Cambridgeport



Map 9: Empty Street Tree Wells and Empty Wells within City Street Construction Areas in Cambridgeport



0.57 sq miles (9% of city area)
 10% of City Streets
 13.2% of City Street Trees
 52 Street Tree Species

	Cport Total	City Total	Percent of City
City Street Trees	1,701	12,934	13.2%
Empty Wells Total	82	752	10.9%
Empty Wells outside Proposed Street Construction	65	626	10.4%
Empty Wells within Construction Areas	12	126	9.5%
Retired Sites	3	148	2.0%
Parks, Public School and City Building Trees	251	3,658	6.9%
DCR Street Trees	83	563	14.7%
DCR Park Trees	12	859	1.4%

STREET + PARK TREES DBH

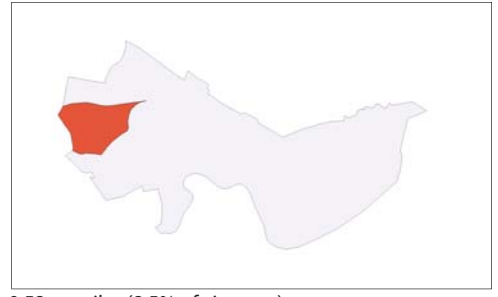
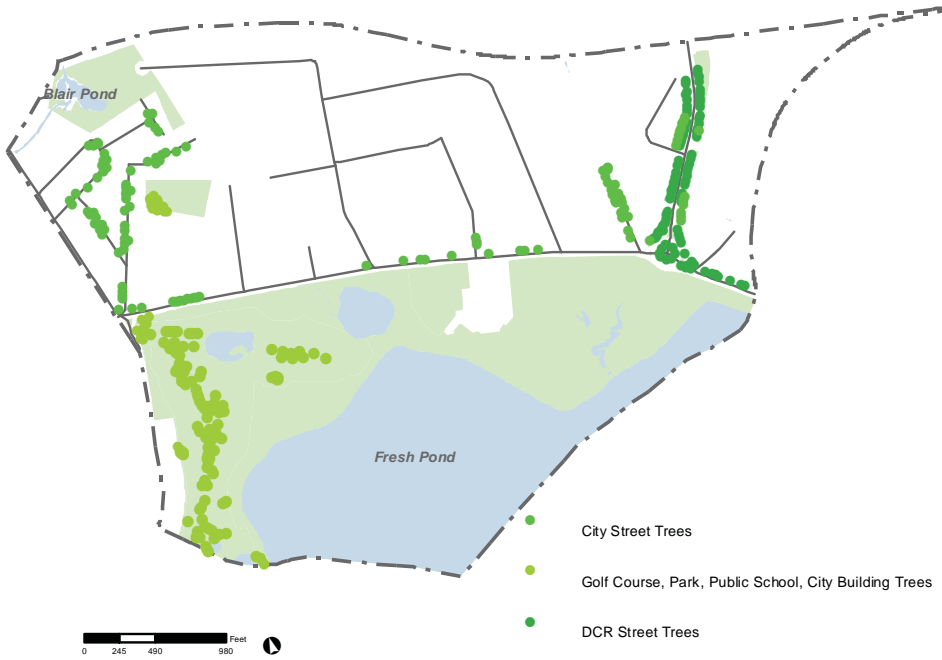
range	street	park	% of trees
1-6	948	104	54.3
7-12	443	69	26.5
13-18	168	33	10.4
19-24	84	17	5.2
25-30	38	11	2.5
31-36	8	3	0.6
37-42	4	0	0.2
43-53	0	0	0.0

STREET TREES : 12 MOST COMMON SPECIES

SPECIES	count	% of trees
maple, red	218	12.9
maple, norway	211	12.5
linden, littleleaf	193	11.4
honeylocust	188	11.1
pear spp	146	8.6
oak, pin	80	4.7
pear, Bradford	50	3.0
ash* (white, green, spp)	50	3.0
lilac, jap tree	40	2.4
zelkova, japanese	36	2.1
maple, hedge	34	2.0
planetree, london	32	1.9
sophora	32	1.9

Neighborhood with Lowest Street Trees to Street Ratio, 0.5: Cambridge Highlands

Map 10: City Street Trees, Golf Course, Park, Public School and DCR Trees in Cambridge Highlands



0.52 sq miles (8.5% of city area)

	CH Total	City Total	Percent of City
City Street Trees	118	12,934	0.9%
DCR Street Trees	92	563	16.3%
Empty Wells Total	64	752	8.5%
Empty Wells outside Proposed Street Construction	56	626	8.9%
Empty Wells within Construction Areas	8	126	6.3%
Retired Sites	0	148	0.0%
Parks, Public School, City Building Trees	29	3658	0.8%
Golf Course	106	247	42.9%

STREET + PARK TREES DBH			
range	street	park	% of trees
1-6	97	6	45.2
7-12	45	16	26.8
13-18	24	1	11.0
19-24	4	0	1.8
25-30	12	3	6.6
31-36	12	0	5.3
37-42	4	0	1.8
43-53	1	3	1.8

Map 11: Empty Street Tree Wells and City Construction Areas in Cambridge Highlands



STREET TREES: TOP 12 SPECIES		
SPECIES	count	% of trees
linden, littleleaf	55	27.6
oak, pin	50	25.1
oak, red	21	10.5
mapl, norway	20	10.1
ash, green	14	7.0
sycamore	6	3.0
mapl,nwy crmsn kg	4	2.0
honeylocust	3	1.5
mapl, columnar re	3	1.5
mapl, red	3	1.5
oak, swamp white	3	1.5
zelkova, japanese	3	1.5

Empty Street Tree Wells

One of the City's central Urban Forestry Benchmarks is number of empty tree wells on the city streets. An empty tree well is an existing planting site in the sidewalk that is either empty or contains a stump. The goal is to reduce and eventually eliminate the number of empty wells through new tree plantings every spring and fall.

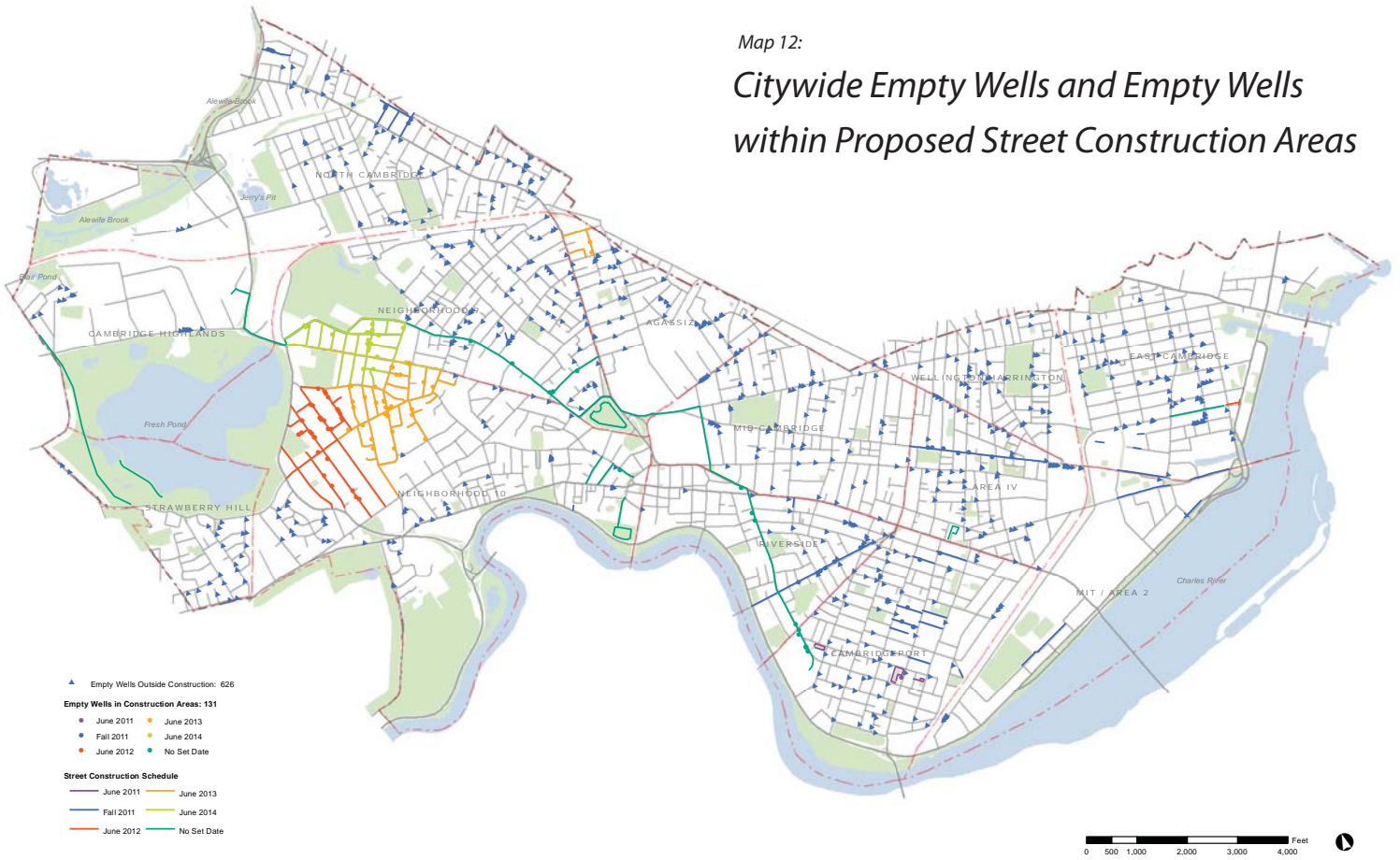
The 2011 street tree survey documented 752 empty wells on city streets. This information is conveyed in the map *Citywide Empty Tree Wells and Empty Wells in Proposed Construction Areas*. The empty wells data was overlaid with the City's Proposed Street Construction in the next five years. The empty wells in proposed construction areas will be filled at the end of the construction phase, when the street work has been completed.

The remaining empty wells outside construction areas will need to be filled through a larger management plan. The chart below shows which neighborhoods have the greatest percentage of citywide empty wells, outside proposed construction areas. Neighborhood 9 and East Cambridge have the greatest percentage of the city's empty wells, at 12.9 and 12.5 percent, respectively.

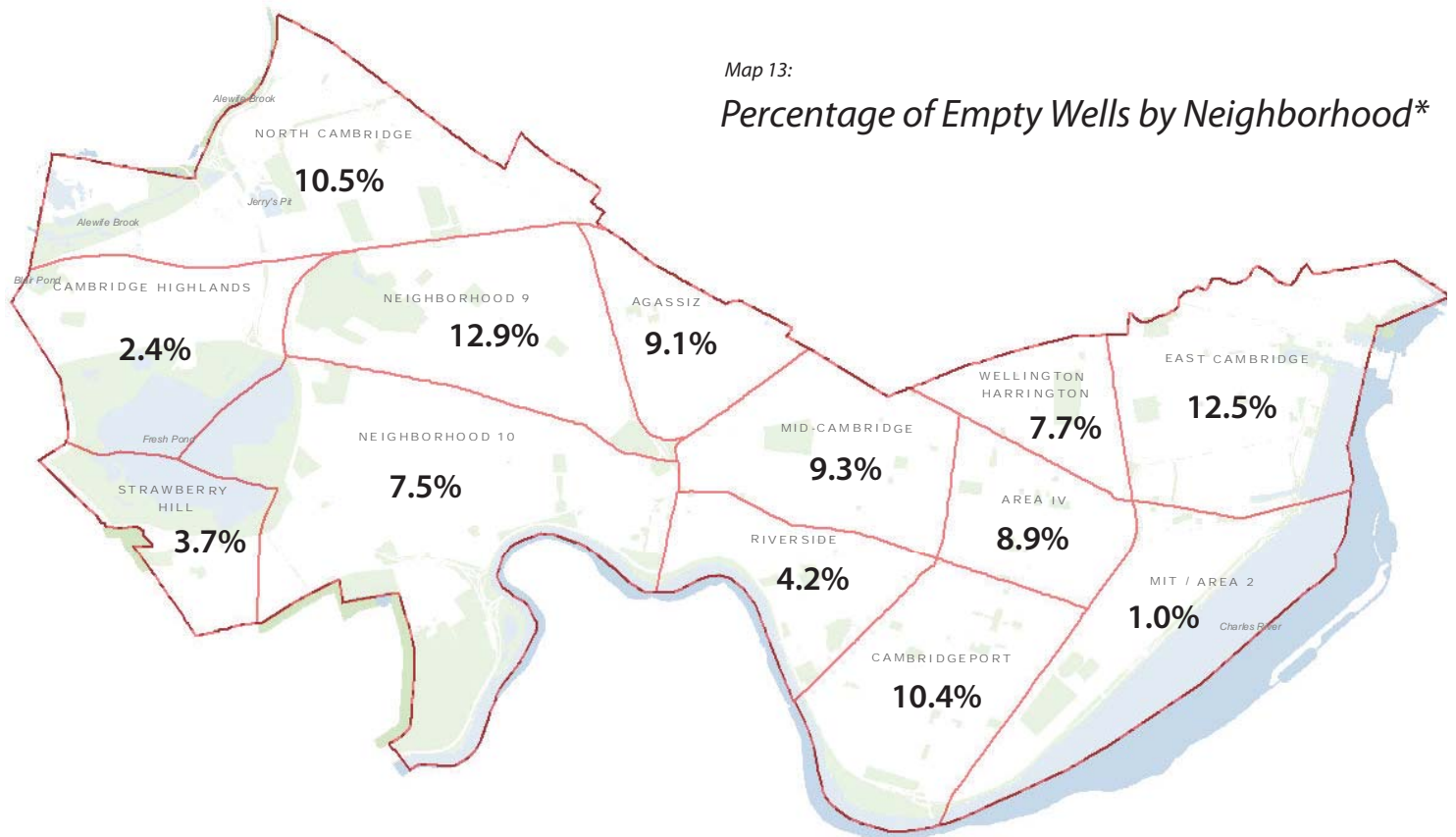
Figure 14. Empty Street Tree Wells in each neighborhood, Empty Wells within City Proposed Street Construction Areas, and Neighborhood percentage of City's empty tree wells

Neighborhood	Empty Wells Total	Empty Wells outside Proposed Street Construction	Empty Wells within Construction Areas	City Total Empty Wells (752 - 126)	Percent of City Total
Neighborhood 9	104	81	23	626	12.94%
East Cambridge	78	78	0	626	12.46%
North Cambridge	74	66	8	626	10.54%
Cambridgeport	77	65	12	626	10.38%
Mid Cambridge	58	58	0	626	9.27%
Agassiz	59	57	2	626	9.11%
Area IV	64	56	8	626	8.95%
Wellington Harrington	48	48	0	626	7.67%
Neighborhood 10	109	47	62	626	7.51%
Riverside	36	26	10	626	4.15%
Strawberry Hill	23	23	0	626	3.67%
Cambridge Highlands	15	15	0	626	2.40%
MIT Area 2	7	6	1	626	0.96%
TOTAL	752	626	126		100.00%

Map 12:
 Citywide Empty Wells and Empty Wells
 within Proposed Street Construction Areas



Map 13:
 Percentage of Empty Wells by Neighborhood*



*excludes empty wells in proposed construction areas, which will be filled with street construction

Tree Mortality

Since 2008, 1,500 new trees have been planted throughout the city. The City's tree inventory began in 2005 and presents a window of understanding on how young trees are faring in the urban environment. The average lifespan of a new tree planted in a downtown urban environment can range from 7 to 13 years.⁷ In contrast, the average lifespan of trees planted in residential areas is 37 years, and rural trees, 150 years.

Consistent annual evaluations of a new tree's condition is necessary to track tree mortality rates. Trees planted since 2008 can be queried from the tree inventory and visited by trained staff to evaluate the condition of the tree. Consistency across rating a trees' condition, as "Good", "Fair", or "Poor" needs to be developed further (see Part 3: Tree Inventory Methodology).

By understanding how young trees fare in certain locations and conditions, the City could possibly use this information to assess contractor plantings, and explore sidewalk modifications or more back-of-sidewalk plantings to improve a tree's survival rate.

The information below presents a preliminary assessment of young trees planted since 2008. Tree mortality rates are less than 5%, but its important to monitor those trees labeled "Fair" and "Poor".

Figure 15. Tree Mortality rates and condition of trees planted in 2008, 2009, and 2010, based on 2011 street tree survey

Trees planted in 2008

Condition	Total	Total Planted Trees	Percentage
Dead	5	237	2.11%
Fair	11	237	4.64%
Poor	7	237	2.95%

Note = 2008 Planted Trees now labeled "Planting Site" or "Stump" are considered "Dead"

Trees planted in 2009

Condition	Total	Total Planted Trees	Percentage
Dead	6	371	1.62%
Fair	28	371	7.55%
Poor	14	371	3.77%

Note = 2009 Planted Trees now labeled "Planting Site" or "Stump" are considered "Dead"

Trees planted in 2010

Condition	Total	Total Planted Trees	Percentage
Dead	10	232	4.31%
Fair	5	232	2.16%
Poor	11	232	4.74%

Note = 2010 Planted Trees now labeled "Planting Site" or "Stump" are considered "Dead"

⁷Skiera, B. and G. Moll. 1992. "The sad state of city trees". *American Forests*. March/April.

Part 2: Using the Inventory

The current purpose of the tree inventory is to have a record of the City owned trees to be able to better manage the city's urban forest. The inventory's purpose, however, could be expanded to allow for more detailed research and evaluation of the city's trees and trees within "pilot" streetscape interventions throughout the city, and further, to promote public stewardship of the trees through accessible information. The current and potential uses of the inventory are described below.

Management Tool

The tree inventory is currently a tool for maintaining the City's urban forest. The inventory is used to document new tree plantings, completed work orders, locate empty wells for new tree plantings, stumps in need of removal, identify hazardous conditions, and in the selection of new tree species for annual plantings. The inventory can also provide accurate data for the City's operational and capital budgeting, and contribute to more efficient maintenance and prioritized work orders.

Recommendations

Currently, the inventory is updated in the field using "Tough Books" laptops and Tree Viewer software connected to GIS. Forestry work orders are completed through paper documentation, which is later entered into GIS software. This two-step process causes a delay in recording closed work-orders, and creates a lag in accuracy of the tree inventory. With strong weather events such as Tropical Storm Irene, a large number of work orders may pile up before there is an opportunity to enter these changes in the inventory. The tree inventory therefore remains a relatively static source of information. A dynamic, real-time, inventory would increase its overall accuracy, and increase work order efficiency, and would require handheld devices for staff working in the field. An accurate and easily accessible tree inventory would be able to help to prioritize work orders, and increase work order efficiency. The City of Brookline, MA, uses handheld devices to access the inventory in the field. It would be worthwhile to explore precedents in other cities.

Research and Evaluation Tool

The updated inventory presents an opportunity for further research and evaluation of the City's urban forest. While this report has included an analysis of the trees' composition and size, and vulnerability to invasive insects, additional analysis could be used to evaluate the health of recent plantings, trees in streetscape improvements projects, or even the effects of salting routes.

With hundreds of new trees planted annually, it would helpful to understand how these new plantings fare over time. Based on the City's contract for fiscal year 2010 and 2011, each new tree costs the City \$320 for shade trees and \$344 for ornamental trees, which includes the purchase price, installation and a one-year warranty on the tree. Three hundred new trees planted over two planting seasons, spring and fall, can cost the city nearly \$100,000. This is



Figure 16. Young tree in early winter

an investment in a living product and future expectation. Meanwhile, the average lifespan of a new tree planted in a downtown urban environment can range from 7 to 13 years.⁸ Consistent yearly evaluation of new trees is important to understand tree mortality rates in Cambridge, and the City's return on investment. By understanding how young trees fare in certain locations and conditions, the City could possibly use this information to assess contractor plantings, and explore sidewalk or back of sidewalk modifications to improve a tree's survival rate.

The City has also led a number of streetscape improvement projects and explored different tree planting methods. The effect of these initiatives on new plantings could be tracked through the tree inventory. With a more structured research framework, and simple modification to the categories in tree inventory, tree health could be evaluated over time. Recent pilot programs include street trees planted with irrigation, structural soil, stormwater planters, and newly re-bricked sidewalks. Along with field evaluations of the trees' condition, location data of these pilot programs could be overlaid on the tree inventory, to see spatial patterns of tree health and compare against control sites. This research and evaluation could be conducted by the City, or also trained students from nearby universities.

Canopy coverage is another area of research that can be completed with the assistance of the tree inventory. High resolution orthogonal photos and LIDAR information is typically used to assess canopy coverage across a city. This coverage information could be referenced against the street and park tree inventory to determine actual trees against LIDAR data, and also to learn the contribution of city-owned trees to overall canopy coverage. Canopy coverage research across the city would require acquiring LIDAR data.

Recommendations

The updated inventory presents an opportunity to conduct further research on the City's urban trees, both to assess its current stock, new plantings and streetscape pilot programs. Specifically, this involves using the inventory more formally as an evaluation tool, and perhaps adjusting or streamlining some of the attribute categories in the database (See Part 3: Tree Inventory Methodology).

For example, those species identified as preferred hosts to the Asian Longhorned Beetle (ALB) and the Emerald Ash Borer (EAB) can now be flagged to be monitored and inspected. This "flag" could be simply adding a column to the tree inventory attribute table that notes ALB or EAB species as "Yes" or "No", which would enable a simple query search for these trees.

Young trees planted since 2008 can be evaluated annually to understand tree mortality rates, and help identify difficult sites that may need attention. The category for tree "Condition" should be updated annually, along with the more detailed evaluation of leaf and wood condition. While an initial evaluation of tree mortality on young trees since 2008 has been conducted, a longer time frame is necessary to understand how street trees fare overtime.

The inventory could also be more tightly linked to streetscape improvement projects. The evaluation of trees in new pilot streetscape programs, including stormwater planters, Silva cells, and structural soil, requires more coordination of data from different divisions at the Department of Public Works. This

⁸Skiera, B. and G. Moll. 1992. "The sad state of city trees". American Forests. March/April.

Street trees average lifespan 13 years, best city sites 60 years, residential trees 37 years, rural trees 150 years.



Figure 17. Original sandset brick sidewalk, uneven from root lift on Tremont Street in Area 4.



Figure 18. Re-bricked sidewalk on Franklin Street in Riverside, with brick set on sand over an asphalt base.

includes first identifying the location of these programs, new sidewalk work, and their installation date in GIS, and then overlaying or joining this information with the tree inventory. The selected trees could be flagged for annual inspection. This would establish a more structured tool for evaluating the health of trees in new planting initiatives, and comparing across other planting methods.

Existing trees within sidewalk improvement projects, such as newly re-bricked sidewalks, with sand-set brick over an asphalt base, could also be evaluated by similar measure. For example, uneven sidewalks in many parts of the City remain a problem due to the uplifting of the concrete and brick by tree roots. While old brick sidewalks set on sand allow water to infiltrate the ground and reach tree roots, overtime this brickwork becomes uneven (Figure 17). Newly re-bricked sidewalks set on an asphalt base alleviate the sidewalk unevenness, but also limit the amount of water able to infiltrate the ground and reach trees roots (Figure 18). The effect of this new sidewalk work on street trees could be monitored through the tree inventory. First, the location of new sidewalk work would need to be demarked in GIS, and then overlaid with the tree inventory database. These trees could be monitored over time, similar to a “conditions report” for tree mortality.

Using the inventory as an evaluation tool requires further refinement of the inventory categories, and also the consistency of yearly evaluations by trained staff. In addition, the establishment of a “control” is necessary for accurate comparison of trees planted under different conditions.

Public Interface

The tree inventory is also a potential educational tool for the public, neighborhood associations, and school groups. This spring, the inventory will be placed online as an overlay on Google maps, allowing the public to easily view and access information about trees. Cities such as San Francisco and Washington D.C. have already placed their inventories online with Google maps through private services. See the Casey Trees site for Washington D.C.: <http://www.caseytrees.org/geographic/maps-tools/tree-map/> and the Open Tree Map in San Francisco: <http://www.urbanforestmap.org/>



Figure 19. Online Tree Inventory for Washington D.C. by Casey Trees

In Cambridge, individuals, Neighborhood Associations, and community groups can use the online database to learn about trees in their neighborhood, and help locate and care for young trees. Young trees require regular watering to help their roots establish in the soil, and the first three years are particularly critical for their survival. The City needs help to water and care for young trees. The online inventory will enable individuals and “Friends of Trees” Groups to more easily locate and act as a steward for young trees. Furthermore, school groups will be able to use the inventory for tree identification tours, and as a tool to learn more about the urban forest. Elementary and middle schools can use the inventory as part of a tree curriculum, and to promote the “Junior Forester Program” among its students.

Recommendations

The completion of the online publication of the tree inventory on Google maps requires the assistance of the City’s IT Department. A work plan was developed in October 2011 for the site’s basic format and search query categories. A simple marker will define each street and park tree in the inventory. A selected tree will have an informational bubble that includes the trees’ common name and trunk diameter (DBH). The common name will link to a tree “Fact Sheet” from a university forestry program or cooperative extension, similar to the Casey Tree Map for D.C., which links to Fact Sheets from Virginia Tech.

Search features of the tree inventory should include individual address queries, a species search by common name, and potentially trees larger than 30” diameter, less than 4” in diameter, trees with fall color or spring flowers, and Junior Forester Trees. Large trees are of inherent interest to many people, but it could be worthwhile to distinguish where small trees are located, to more publicly advertise young trees that need care, such as watering. A selection of trees with seasonal interest will need to be defined through the inventory. Similarly, those trees cared for by Junior Foresters are not necessarily noted in the tree inventory database. Adding this information to the inventory could enable students and young people to locate other stewarded trees, and further publicize the program.

A notable search query for the Urban Forest Map in San Francisco is trees “Native to region”, which may be of interest to those new to plants and trees. This characteristic would need to be defined from the tree inventory. This definition may spark discussion on planting natives or non-native species in urban environments, which came up at a tree presentation to a local Neighborhood Association. Providing links to resources and publications on natives versus non-native plantings in urban settings could further inform interested persons on the subject, including the recent publication in the journal *Nature* in June, 2011: “Don’t judge species on their origins,” which is available as a PDF on the Arnold Arboretum website: <http://arboretum.harvard.edu/reassessment-of-non-native-species/>. Even if this category is not defined in the inventory, providing a link on the Urban Forestry page to information on natives versus non-natives trees in urban environments would help inform a curious public. Questions on native versus non-native tree species arose at one of Cambridge’s Neighborhood Association meeting on City tree plantings.

The online presence of an inventory also invites the opportunity for local neighborhood associations and friends groups to become more involved in the stewardship of trees in the city. For example, the Casey Tree Map for



Figure 20. Publication on Natives vs. Non-natives species in the journal *Nature*, as a potential link on the urban forestry website for a public curious about the species of trees planted in urban environments.

Washington D.C. links to "Neighborhood Tree Inventories," which is a partner program between Casey Trees and neighborhood groups to collect information on local trees, and identify potential spaces for new trees, including on private property. While this method of outreach may be beyond the scope of the City's capacities, it presents an opportunity to use the online inventory as a means to increase awareness of local trees and their effect on the urban environment. Providing information on the location of small trees within a neighborhood could help communities to care for young trees. As a complement to the online inventory, the Urban Forestry website will soon include three short films on tree care and maintenance, which will aid locals on tree care protocol.

In addition to the online inventory, publication of neighborhood maps and basic statistics on neighborhood trees on the Urban Forestry website would equip local groups to understand more about their urban environment. These publicized maps would be static as of December 2011, but a starting point and informative reference for stewardship initiatives. *See Appendix for Neighborhood Maps and statistics.*

Local stewardship of trees could extend to school programs and curriculum. The online inventory provides a teaching tool for identifying tree species, and a guide for tree walks. Similar to the CitySprouts program, which teaches students about growing food at schools in Cambridge, the Junior Forester program could grow into curriculum about urban trees, urban soils, site assessment, tree planting and care, and the benefits of trees to local environments. This curriculum could include field trips in Cambridge neighborhoods, and new DPW pilot programs for tree plantings techniques, such as stormwater planters, Silva cells and structural soil. This curriculum could extend from elementary schools to university programs, such as the Harvard Graduate School of Design, Landscape Architecture program and MIT's School of Architecture and Planning, and potentially tied to public tree plantings.

Part 3: Tree Inventory Methodology

The current tree inventory database includes forty-eight categories for documenting information on each tree, everything from growth space area and location, to the size of defective parts and percent deadwood. While many of these categories exist for a supplemental detailed conditions report, they are not frequently utilized and could potentially be aggregated. A reduction or simplification of categories would streamline tree assessment and help clarify which trees need routine maintenance or the immediate attention of a certified arborist.

The Cornell Horticulture Institute has developed a tree inventory methodology, which is utilized by forty communities in New York State. This methodology is published online:

<http://www.hort.cornell.edu/commfor/inventory/methodology.html>.

The inventory includes twelve categories, all of which are in the Cambridge database in some form. The Cornell Horticulture Institute categories include: 1. Tree Location; 2. GPS; 3. Location Site; 4. Species; 5. DBH; 6. Condition Wood; 7. Condition Leaves; 8. Percent Deadwood; 9. Maintenance recommendation; 10. Consult Needed; 11. Sidewalk damage; and 12. Overhead wires.

The difference between the Cambridge database and the Cornell protocol is that within each category, there is a rating system of 1-4 or 1-5. Three examples include:

1. "Location Site": 1= front yard or lawn; 2 = treelawn planting strip less than four feet wide; 3 = treelawn planting strip greater than four feet wide; 4 = sidewalk tree pit; 5 = street median;
2. Condition of Leaves: 1= Dead or Dying - extreme problems; 2 = Poor - major problems; 3 = Fair - minor problems; 4 = Good - no apparent problems;
3. Maintenance Recommendation: 1= None - no maintenance necessary; 2 = Train - routine maintenance for a young tree; 3 = Routine Prune - routine maintenance of a mature tree; 4 = High Priority Prune - a tree requiring immediate maintenance.

A review of the City's inventory methodology, and simplification of its categories would likely help streamline tree assessment and help flag trees in need of attention. The Cornell Horticulture Institute example offers one inventory methodology that could be referenced or modified to meet the City's needs.

Tree Condition Documentation

There remains a challenge to develop consistency across those who utilize the tree inventory and assess the trees. Determining the condition of the leaves of a tree as “Fair” or “Poor” is often an individual’s subjective judgment call. Developing an initial visual reference point for these categories would be helpful for those new to the City’s trees. A small photo collection of examples of “Good”, “Fair”, or “Poor” condition trees would help prime a diverse staff with various levels of experience, and offer a direct comparison when out in the field.

While inconsistent ratings of tree condition may not directly affect maintenance or fulfilling work orders, it becomes a concern when the tree inventory is used for evaluating the mortality of young trees, or trees planted in new streetscape designs or structural soils. If research and evaluation becomes a more robust component of the tree inventory, then the ratings of tree conditions will need more attention and may require a brief staff training. The current data in the inventory is not at a level of detail that could be utilized for robust evaluation; the tree inventory is utilized as an inventory, and not a “conditions report”.

Trees outside the City’s Jurisdiction



Photo of trees on Memorial Drive in late fall, managed by DCR

Within the City of Cambridge, the Department of Conservation and Recreation has jurisdiction over the land and trees over several major drives and parkways, which contribute 1,422 trees, or 7%, of the trees in the inventory. This count underscores the presence of DCR trees in Cambridge, because it does not include trees at Magazine Beach, nor along the lowlands of the Charles River on Memorial Drive. For the purposes of City maintenance, and the City’s Urban Forestry Benchmarks, these trees are not relevant to include in the inventory. For the purposes of having an accurate database of publicly owned trees, showing publicly managed trees to the public, or evaluating public canopy coverage, this information is worthwhile to include. If additional DCR trees are inventoried in the future, a more formal category to notate DCR trees should be created in the tree inventory attribute table. Currently, DCR trees in the inventory are labeled as “DCR tree” under the inventory’s “Notes” section, to distinguish them from City-owned trees.

Appendix

List of City Street Tree Species

arborvitae	2
ash spp	8
ash, black	9
ash, blue	4
ash, green	304
ash, white	158
beech, american	6
birch, am white	8
birch, eur white	4
birch, river	25
catalpa, northern	4
cedar, red	1
cherry spp	138
cherry, akebono	3
cherry, autumnali	6
cherry, black	1
cherry, kwansa	44
cherry, okame	29
cherry, pin	1
cherry, sargent	203
cherry, snowgoose	14
chestnut, american	6
chestnut, horse	15
corktree, amur	36
crabapple spp	117
dawn redwood	6
dogwood, flowering	4
dogwood, kousa	4
elm spp	269
elm, american	167
elm, lacebark	82
elm, siberian	30
ginkgo	337
golden raintree	69
hackberry	31
hawthorn spp	22
hickory spp	6
holly, american	2
honeylocust	1,525
hornbeam spp	27
katsuratree	28
kentucky coffeetree	38
larch, american	1
lilac, jap tree	326
linden, american	382
linden, littleleaf	870

linden, silver	59
locust, black	11
maackia	11
magnolia spp	16
maple spp	8
maple, columnar red	40
maple, hedge	174
maple, japanese	1
maple, norway	2,038
maple, paperbark	8
maple, red	1,178
maple, silver	188
maple, sugar	195
maple, sycamore	12
maple, trident	6
maple, nwy crmsn kg	151
mulberry	3
musclewood	3
oak spp	5
oak, black	10
oak, pin	781
oak, red	232
oak, swamp white	78
pear spp	905
pear, Bradford	114
pine, austrian	4
pine, red	8
pine, white	2
planetree, london	363
plum, american	13
redbud	20
serviceberry	65
sophora	239
sweetgum, american	148
sycamore	123
tree of heaven	6
tuliptree	39
tupelo, black	3
unknown	33
yellowwood	12
zelkova, japanese	257
TOTAL	12,934

List of City Park Tree Species

apple	4
arborvitae	73
ash spp	5
ash, black	26
ash, green	234
ash, white	63
beech, copper	1
beech, european	8
birch, eur white	2
birch, grey	7
birch, river	27
catalpa, northern	5
cedar, red	29
cherry spp	36
cherry, black	6
cherry, kwansa	11
cherry, okame	1
cherry, sargent	17
chestnut, american	1
chestnut, horse	15
common hoptree	1
corktree, amur	3
cottonwood	36
crabapple spp	162
dawn redwood	3
dogwood, flowering	26
dogwood, kousa	11
elm spp	14
elm, american	19
elm, lacebark	26
elm, siberian	3
fir, douglas	4
fir, white	3
ginkgo	9
golden raintree	11
hackberry	14
hawthorn spp	22
hemlock, eastern	31
honeylocust	352
hornbeam spp	16
katsuratree	12
kentucky coffeetree	9
larch	4
larch, american	1
lilac, jap tree	27
linden, american	55

linden, littleleaf	65
linden, silver	8
magnolia spp	48
maple spp	4
maple, columnar red	3
maple, norway	272
maple, paperbark	1
maple, red	275
maple, silver	11
maple, sugar	57
maple, sycamore	2
maple,nwy crmsn kg	8
mulberry	1
mulberry, red	3
mulberry, white	2
musclewood	1
oak spp	11
oak, black	30
oak, pin	195
oak, red	68
oak, swamp white	22
oak, white	3
paulowinia	1
pear spp	75
pear, Bradford	47
pine, austrian	69
pine, red	122
pine, white	257
planetree, london	90
poplar, lombardy	1
redbud	7
serviceberry	18
snowbell	1
sophora	29
spruce	3
spruce, blue	12
spruce, norway	2
spruce, white	3
sweetgum, american	42
sycamore	12
tree of heaven	18
tuliptree	18
tupelo, black	4
unknown	28
walnut, black	2

List of City Trees Species Vulnerable to Asian Longhorned Beetle (ALB)

apple	24
arborvitae	98
ash spp	13
ash, black	37
ash, blue	11
ash, green	558
ash, korean mount	1
ash, red	3
ash, white	232
aspen, bigtooth	1
beech, american	8
beech, copper	2
beech, european	14
birch, am white	8
birch, eur white	15
birch, grey	12
birch, river	63
catalpa, northern	12
cedar, red	30
cedar, white	10
cherry spp	246
cherry, akebono	4
cherry, autumnali	6
cherry, black	55
cherry, choke	4
cherry, fire	1
cherry, kwansa	66
cherry, okame	30
cherry, pin	2
cherry, sargent	224
cherry, snowgoose	14
chestnut, american	7
chestnut, horse	32
common hoptree	1
corktree, amur	39
cottonwood	37
crabapple spp	305
dawn redwood	9
dogwood, flowering	47
dogwood, kousa	23
elm spp	305
elm, american	196
elm, lacebark	109
elm, siberian	34
fir, douglas	7
fir, white	9
ginkgo	368
golden raintree	81
hackberry	46
hawthorn spp	53
hemlock, eastern	46
hickory spp	6
holly, american	6
holly, english	1
honeylocust	1,965
hornbeam spp	43
katsuratree	43
kentucky coffeetree	48
larch	4
larch, american	3
lilac, jap tree	363
linden, american	457
linden, littleleaf	941
linden, silver	68
locust, black	13
maackia	11
magnolia spp	70
maple spp	12
maple, black	4
maple, columnar red	43
maple, hedge	174
maple, japanese	2
maple, norway	2,482
maple, paperbark	9
maple, red	1,515
maple, silver	219
maple, sugar	345
maple, sycamore	28
maple, trident	8
maple,nwy crmsn kg	159
mulberry	5
mulberry, red	5
mulberry, white	4
musclewood	4
oak spp	16
oak, black	46
oak, overcup	2
oak, pin	1,065
oak, post	10
oak, red	339
oak, swamp white	128
oak, white	3
paulowinia	1
pear spp	999
pear, Bradford	161
pine, austrian	148
pine, red	133
pine, scotch	2
pine, white	299
planetree, london	478
plum, american	14
poplar, lombardy	1
red cedar	8
redbud	33
sassafras	1
serviceberry	95
smoketree	8
snowbell	1
sophora	293
spruce	4
spruce, black	1
spruce, blue	27
spruce, norway	27
spruce, white	11
sweetgum, american	204
sycamore	136
tree of heaven	35
tuliptree	63
tupelo, black	9
unknown	89
walnut, black	2
willow spp	1
willow, black	1
willow, coastal p	3
willow, weeping	19
witch hazel	2
yellowwood	24
yew	1
zelkova, japanese	343
Total City Trees	17,904
ALB Preferred Host Species	5,805
ALB Occasional to Rare Host Species	1,377
Non Host Species	10,722

List of City Trees Species Vulnerable to Emerald Ash Borer (EAB)

apple	24
arborvitae	98
ash spp	13
ash, black	37
ash, blue	11
ash, green	558
ash, korean mount	1
ash, red	3
ash, white	232
aspen, bigtooth	1
beech, american	8
beech, copper	2
beech, european	14
birch, am white	8
birch, eur white	15
birch, grey	12
birch, river	63
catalpa, northern	12
cedar, red	30
cedar, white	10
cherry spp	246
cherry, akebono	4
cherry, autumnali	6
cherry, black	55
cherry, choke	4
cherry, fire	1
cherry, kwansa	66
cherry, okame	30
cherry, pin	2
cherry, sargent	224
cherry, snowgoose	14
chestnut, american	7
chestnut, horse	32
common hoptree	1
corktree, amur	39
cottonwood	37
crabapple spp	305
dawn redwood	9
dogwood, flowering	47
dogwood, kousa	23
elm spp	305
elm, american	196
elm, lacebark	109
elm, siberian	34
fir, douglas	7
fir, white	9

ginkgo	368
golden raintree	81
hackberry	46
hawthorn spp	53
hemlock, eastern	46
hickory spp	6
holly, american	6
holly, english	1
honeylocust	1,965
hornbeam spp	43
katsuratree	43
kentucky coffeetree	48
larch	4
larch, american	3
lilac, jap tree	363
linden, american	457
linden, littleleaf	941
linden, silver	68
locust, black	13
maackia	11
magnolia spp	70
maple spp	12
maple, black	4
maple, columnar red	43
maple, hedge	174
maple, japanese	2
maple, norway	2,482
maple, paperbark	9
maple, red	1,515
maple, silver	219
maple, sugar	345
maple, sycamore	28
maple, trident	8
maple, nwy crmsn kg	159
mulberry	5
mulberry, red	5
mulberry, white	4
musclewood	4
oak spp	16
oak, black	46
oak, overcup	2
oak, pin	1,065
oak, post	10
oak, red	339
oak, swamp white	128
oak, white	3

paulownia	1
pear spp	999
pear, Bradford	161
pine, austrian	148
pine, red	133
pine, scotch	2
pine, white	299
planetree, london	478
plum, american	14
poplar, lombardy	1
red cedar	8
redbud	33
sassafras	1
serviceberry	95
smoketree	8
snowbell	1
sophora	293
spruce	4
spruce, black	1
spruce, blue	27
spruce, norway	27
spruce, white	11
sweetgum, american	204
sycamore	136
tree of heaven	35
tuliptree	63
tupelo, black	9
unknown	89
walnut, black	2
willow spp	1
willow, black	1
willow, coastal p	3
willow, weeping	19
witch hazel	2
yellowwood	24
yew	1
zelkova, japanese	343
TOTAL CITY TREES	17,904
EAB Host Species	855
Non Host Species	17,049

List of Recently Planted Trees (since 2008)

ash, green	7
ash, white	8
birch, river	28
cherry spp	35
cherry, akebono	4
cherry, autumnali	6
cherry, kwansa	30
cherry, okame	28
cherry, sargent	62
cherry, snowgoose	14
crabapple spp	24
dogwood, flowering	3
dogwood, kousa	1
elm spp	80
elm, american	61
elm, lacebark	11
ginkgo	50
golden raintree	40
hackberry	19
honeylocust	164
hornbeam spp	5
katsuratree	5
lilac, jap tree	32
linden, american	1
linden, littleleaf	58
linden, silver	19
maackia	11
magnolia spp	3
maple spp	2
maple, columnar red	12
maple, hedge	50
maple, red	141
maple, silver	4
maple, sugar	8
maple, trident	1
oak spp	1
oak, black	1
oak, pin	86
oak, red	31
oak, swamp white	65
pear spp	43
pine, white	2
planetree, london	69
redbud	6
serviceberry	32
sophora	13
sweetgum, american	32
tuliptree	6
tupelo, black	3
unknown	22
yellowwood	5
zolkova, japanese	56
TOTAL	1,500

List of Recently Planted Trees (since 2008), susceptible to ALB or EAB

ash, green*	7
ash, white*	8
birch, river	28
cherry spp	35
cherry, akebono	4
cherry, autumnali	6
cherry, kwansa	30
cherry, okame	28
cherry, sargent	62
cherry, snowgoose	14
crabapple spp	24
dogwood, flowering	3
dogwood, kousa	1
elm spp	80
elm, american	61
elm, lacebark	11
ginkgo	50
golden raintree	40
hackberry	19
honeylocust	164
hornbeam spp	5
katsuratree	5
lilac, jap tree	32
linden, american	1
linden, littleleaf	58
linden, silver	19
maackia	11
magnolia spp	3
maple spp	2
maple, columnar red	12
maple, hedge	50
maple, red	141
maple, silver	4
maple, sugar	8
maple, trident	1
oak spp	1
oak, black	1
oak, pin	86
oak, red	31
oak, swamp white	65
pear spp	43
pine, white	2
planetree, london	69
redbud	6
serviceberry	32
sophora	13
sweetgum, american	32
tuliptree	6
tupelo, black	3
unknown	22
yellowwood	5
zolkova, japanese	56
ALB Preferred Host Species	27%
ALB Occasional to Rare Host Species	6%
EAB Host Species*	1%

List of Recently Planted Trees (since 2008) Non-Host Species

cherry spp	35
cherry, akebono	4
cherry, autumnali	6
cherry, kwansa	30
cherry, okame	28
cherry, sargent	62
cherry, snowgoose	14
crabapple spp	24
dogwood, flowering	3
dogwood, kousa	1
ginkgo	50
golden raintree	40
hackberry	19
honeylocust	164
hornbeam spp	5
lilac, jap tree	32
linden, american	1
linden, littleleaf	58
linden, silver	19
maackia	11
magnolia spp	3
oak spp	1
oak, black	1
oak, pin	86
oak, red	31
oak, swamp white	65
pear spp	43
pine, white	2
redbud	6
serviceberry	32
sophora	13
sweetgum, american	32
tuliptree	6
tupelo, black	3
unknown	22
yellowwood	5
zolkova, japanese	56
TOTAL	1,013

Neighborhood Analysis

Area 4



- City Street Trees
- Park, Public School, City Building Trees



City Street Trees and Park, Public School, City Building Trees in Area 4

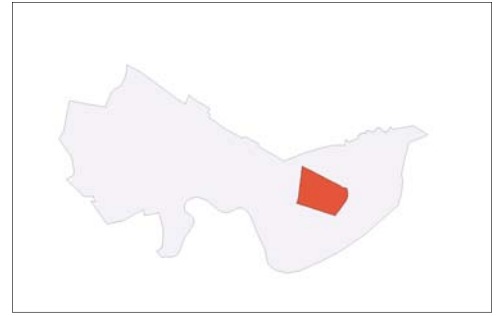


- ▲ Empty Wells
- Empty Wells in Construction Areas

Street Construction Fall 2011



Empty Street Tree Wells and Empty Wells within City Street Construction Areas in Area 4



0.3 sq miles (4.8% of city area)
 6.7% of City Streets
 7.0% of City Street Trees
 46 Street Tree Species

Area IV	Count	City Total	% of City
City Street Trees	902	12,934	7.0%
Empty Wells Total	64	752	8.5%
Empty Wells outside Proposed Construction Areas	56	626	8.9%
Empty Wells within Construction	8	126	6.3%
Retired Sites	11	148	7.4%
Parks, Public School, City Building Trees	85	3658	2.3%

STREET TREES DBH (Trunk Diameter in inches)		
range	count	% of trees
1-6	417	46.5
7-12	280	31.3
13-18	131	14.6
19-24	53	5.9
25-30	9	1.0
31-36	4	0.4
37-42	2	0.2
43-53	0	0.0

STREET TREE: 12 MOST COMMON SPECIES		
SPECIES	count	% of trees
honeylocust	187	17.6
maple, red	118	11.1
maple, norway	86	8.1
linden, littleleaf	71	6.7
oak, pin	59	5.6
pear spp	58	5.5
planetree, london	51	4.8
linden, american	37	3.5
ash, white	29	2.7
sophora	29	2.7
ginkgo	22	2.1
lilac, jap tree	22	2.1

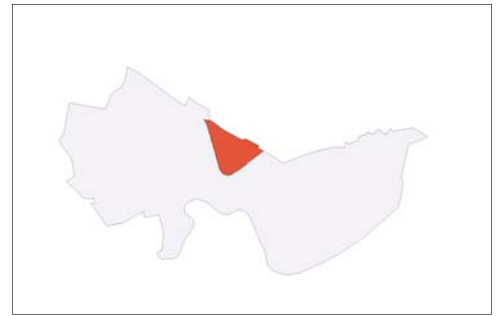
Agassiz



- City Street Trees
- Park, Public School, City Building Trees



City Street Trees and Park, Public School, City Building Trees in Agassiz



0.29 sq miles (4.7% of city area)
 5.3% of City Streets
 4.3% of City Street Trees
 42 Street Tree Species

	Agassiz Total	City Total	Percent of City
City Street Trees	565	12,934	4.4%
Empty Wells Total	59	752	7.8%
Empty Wells outside Proposed Street Construction	57	626	9.1%
Empty Wells within Construction	2	126	1.6%
Retired Sites	7	148	4.7%
Parks, Public School, City Building Trees	30	3658	0.8%

STREET TREES DBH (Diameter of Trunk)

range	count	% of trees
1-6	212	37.9
7-12	144	25.7
13-18	81	14.5
19-24	74	13.2
25-30	31	5.5
31-36	14	2.5
37-42	3	0.5
43-53	0	0.0

STREET TREES: 13 MOST COMMON SPECIES

SPECIES	count	% of trees
norway maple	111	19.9
honeylocust	73	13.1
red maple	58	10.4
pin oak	47	8.4
japanese lilac	24	4.3
littleleaf linden	24	4.3
pear	22	3.9
silver maple	17	3.0
sycamore	14	2.5
american linden	13	2.3
red oak	13	2.3
green ash	12	2.2
london planetree	12	2.2

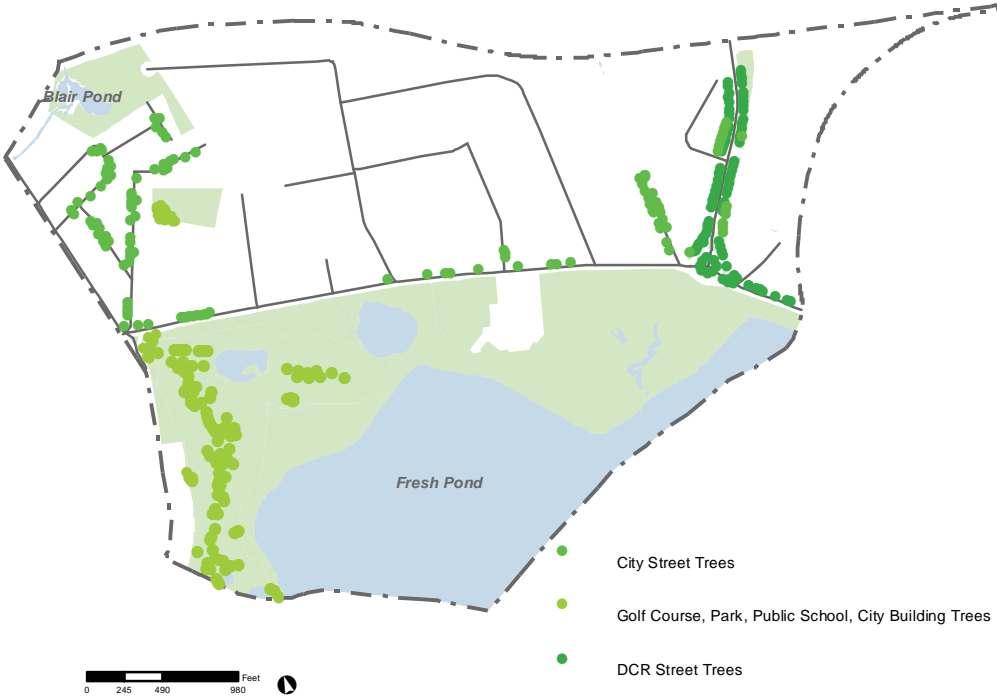
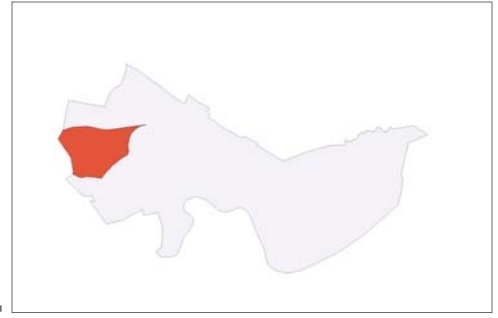


- Retired Sites
- ▲ Empty Wells
- Empty Wells in Construction Area
- Proposed Construction: June 2013
- Proposed Construction: No Set Date



Empty Street Tree Wells and Empty Wells within City Street Construction Areas in Agassiz

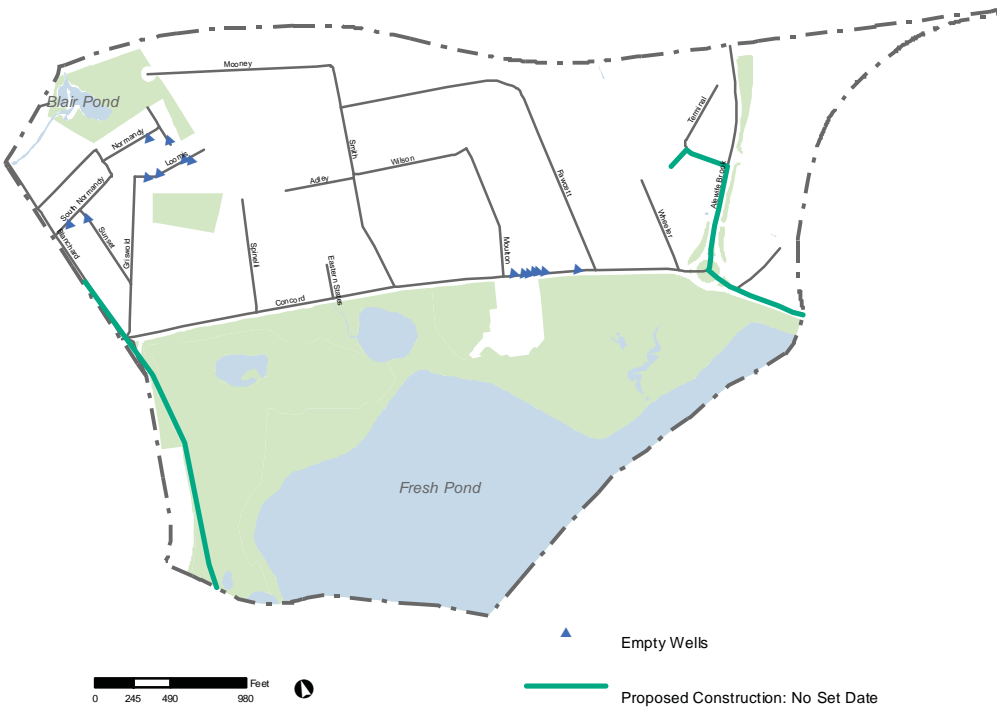
Cambridge Highlands



0.52 sq miles (8.5% of city area)
 2.9% of City Streets
 0.9% of City Street Trees
 23 Street Tree Species

	CH Total	City Total	Percent of City
City Street Trees	118	12,934	0.9%
DCR Street Trees	92	563	16.3%
Empty Wells Total	64	752	8.5%
Empty Wells outside Proposed Street Construction	56	626	8.9%
Empty Wells within Construction Areas	8	126	6.3%
Retired Sites	0	148	0.0%
Parks, Public School, City Building Trees	29	3658	0.8%
Golf Course	106	247	42.9%

City Street Trees and Golf Course, Park and Public School Trees and DCR Trees in Cambridge Highlands



STREET + PARK TREES DBH			
range	street	park	% of trees
1-6	97	6	45.2
7-12	45	16	26.8
13-18	24	1	11.0
19-24	4	0	1.8
25-30	12	3	6.6
31-36	12	0	5.3
37-42	4	0	1.8
43-53	1	3	1.8

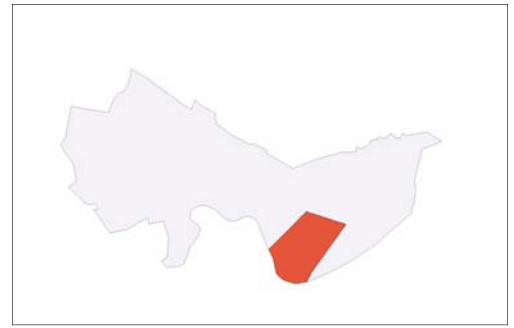
STREET TREES: TOP 12 SPECIES		
SPECIES	count	% of trees
linden, littleleaf	55	27.6
oak, pin	50	25.1
oak, red	21	10.5
mapl, norway	20	10.1
ash, green	14	7.0
sycamore	6	3.0
mapl, nwy crmsn kg	4	2.0
honeylocust	3	1.5
mapl, columnar re	3	1.5
mapl, red	3	1.5
oak, swamp white	3	1.5
zelkova, japanese	3	1.5

Empty Street Tree Wells and City Construction Areas in Cambridge Highlands

Cambridgeport



City Street Trees and Park, Public School, City Building Trees and DCR Trees in Cambridgeport



0.57 sq miles (9% of city area)
 10% of City Streets
 13.2% of City Street Trees
 52 Street Tree Species

	Cport Total	City Total	Percent of City
City Street Trees	1,701	12,934	13.2%
Empty Wells Total	82	752	10.9%
Empty Wells outside Proposed Street Construction	65	626	10.4%
Empty Wells within Construction Areas	12	126	9.5%
Retired Sites	3	148	2.0%
Parks, Public School and City Building Trees	251	3,658	6.9%
DCR Street Trees	83	563	14.7%
DCR Park Trees	12	859	1.4%



Empty Street Tree Wells and Empty Wells within City Street Construction Areas in Cambridgeport

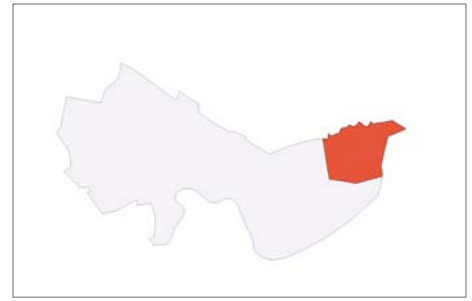
STREET + PARK TREES DBH

range	street	park	% of trees
1-6	948	104	54.3
7-12	443	69	26.5
13-18	168	33	10.4
19-24	84	17	5.2
25-30	38	11	2.5
31-36	8	3	0.6
37-42	4	0	0.2
43-53	0	0	0.0

STREET TREES : 12 MOST COMMON SPECIES

SPECIES	count	% of trees
maple, red	218	12.9
maple, norway	211	12.5
linden, littleleaf	193	11.4
honeylocust	188	11.1
pear spp	146	8.6
oak, pin	80	4.7
pear, Bradford	50	3.0
ash* (white, green, spp)	50	3.0
lilac, jap tree	40	2.4
zelkova, japanese	36	2.1
maple, hedge	34	2.0
planetree, london	32	1.9
sophora	32	1.9

East Cambridge



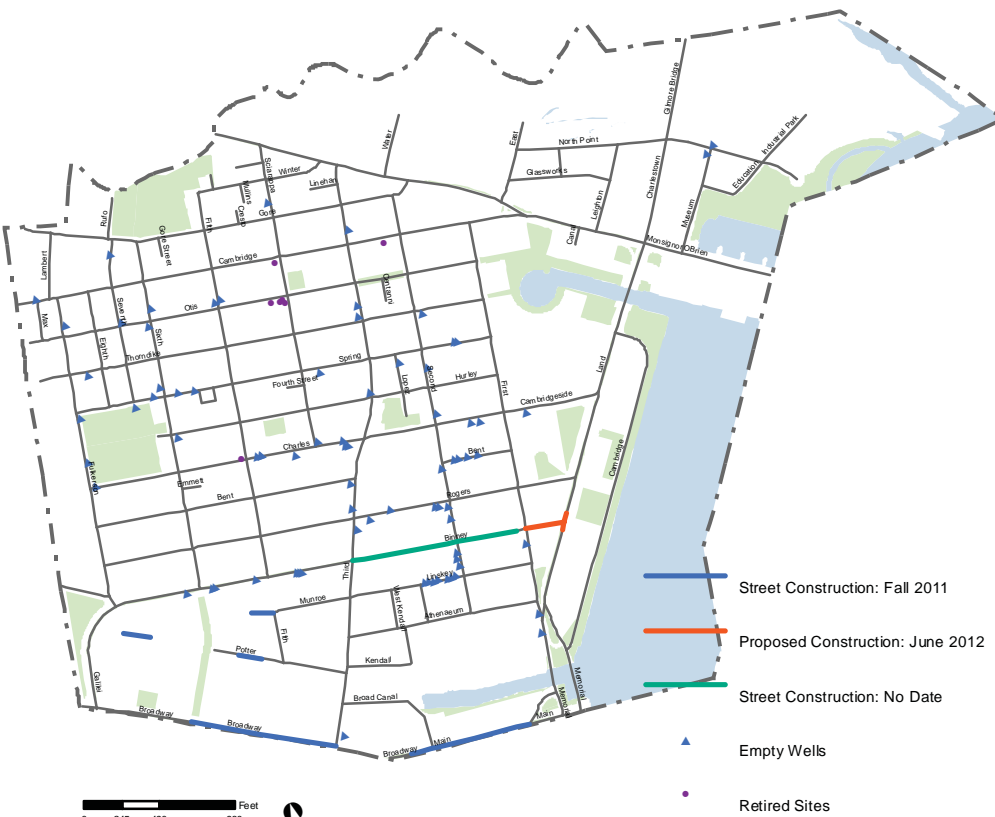
0.7 sq miles (11.4% of city area)
 10% of City Streets
 12.4% of City Street Trees
 44 Street Tree Species



City Street Trees and Park, Public School, City Building Trees and DCR Trees in East Cambridge

	EC Total	City Total	Percent of City
City Street Trees	1,598	12,934	12.4%
Empty Wells Total	78	752	10.4%
Empty Wells outside Proposed Street Construction	0	626	0.0%
Empty Wells in Construction Areas	0	126	0.0%
Retired Sites	7	148	4.7%
Parks, Public School, City Building Trees	437	3,658	11.9%
DCR Street Trees	77	563	13.7%
DCR Park Trees	124	859	14.4%

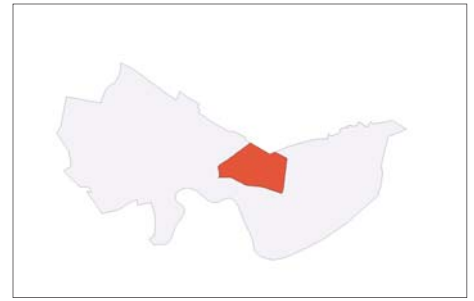
STREET + PARK TREES DBH			
range	street	park	% of trees
1-6	948	274	60.9
7-12	443	84	26.2
13-18	168	18	9.3
19-24	84	10	4.7
25-30	38	4	2.1
31-36	8	0	0.4
37-42	4	0	0.2
43-53	0	0	0.0



Empty Street Tree Wells and City Street Construction Areas in East Cambridge

STREET TREES – TOP 12 SPECIES		
SPECIES	count	% of trees
maple, norway	223	14.0
maple, red	145	9.1
pear spp	145	9.1
planetree, london	143	9.0
honeylocust	132	8.3
linden, american	99	6.2
oak, pin	99	6.2
zelkova, japanese	58	3.6
mapl, silver	49	3.1
linden, littleleaf	43	2.7
sophora	41	2.6
ash, white	39	2.4

Mid-Cambridge



0.46 sq miles (7.4% of city area)
 9.6% of City Streets
 9.6% of City Street Trees
 49 Street Tree Species

	MC Total	City Total	Percent of City
City Street Trees	1,241	12,934	9.6%
Empty Wells Total	58	752	7.7%
Empty Wells outside Proposed Street Construction Areas	0	626	0.0%
Empty Wells in Construction	0	126	0.0%
Retired Sites	13	148	8.8%
Parks, Public School, City Building Trees	188	3,658	5.1%

STREET + PARK TREES DBH

range	street	park	% of trees
1-6	499	81	42.2
7-12	327	45	27.0
13-18	194	18	15.4
19-24	123	10	9.7
25-30	43	7	3.6
31-36	19	1	1.5
37-42	6	0	0.4
43-53	0	3	0.2

STREET TREES: 12 MOST COMMON SPECIES

SPECIES	count	% of trees
maple, norway	227	18.74
honeylocust	180	14.86
maple, red	128	10.57
pear spp	68	5.62
linden, littleleaf	59	4.87
oak, pin	56	4.62
lilac, jap tree	42	3.47
sophora	39	3.22
planetree, london	33	2.73
zelkova, japanese	30	2.48
elm, american	27	2.23
ash, green	26	2.15



- City Street Trees
- Park, Public School, City Building Trees



City Street Trees and Park, Public School, City Building Trees in Mid-Cambridge



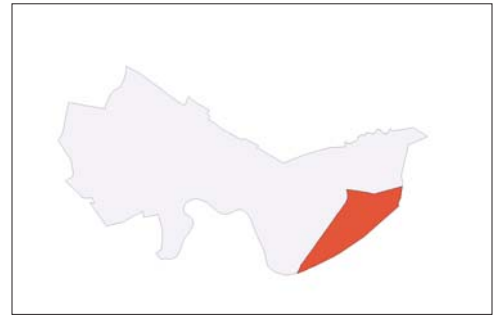
- ▲ Empty Wells
- Retired Sites



Empty Street Tree Wells and Retired Sites in Mid-Cambridge

MIT/ Area 2

	MIT/A2 Total	City Total	Percent of City
City Street Trees	445	12,934	3.4%
Empty Wells Total	6	752	0.8%
Empty Wells outside Proposed Street Construction Areas	0	626	0.0%
Empty Wells within Construction Areas	1	126	0.8%
Retired Sites	0	148	0.0%
Parks, Public School, City Building Trees	4	3658	0.1%
DCR Street Trees	40	563	7.1%
DCR Park Trees	421	859	49.0%



0.63 sq miles (11.4% of city area)
 5% of City Streets
 3.4% of City Street Trees
 22 Street Tree Species

City Street Trees and Park, Public School, City Building Trees and DCR Trees in MIT/Area 2



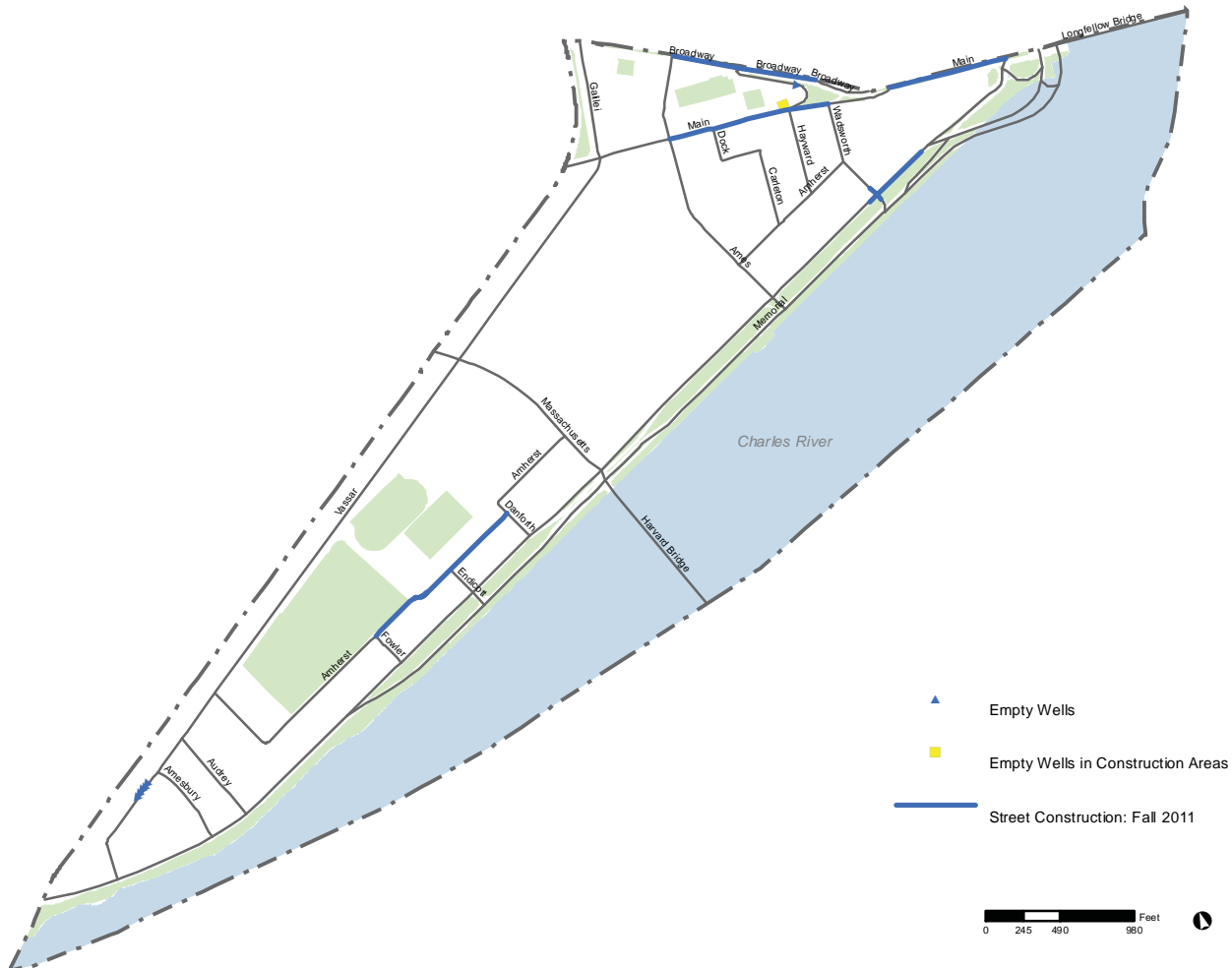
STREET + PARK TREES DBH

range	street	park	% of trees
1-6	313	3	70.4
7-12	94	0	20.9
13-18	37	1	8.5
19-24	1	0	0.2
25-30	0	0	0.0
31-36	0	0	0.0
37-42	0	0	0.0
43-53	0	0	0.0

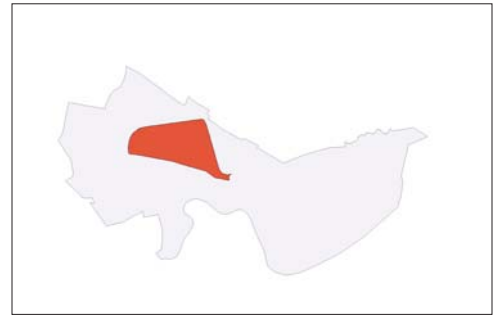
STREET TREES: 12 MOST COMMON SPECIES

SPECIES	count	% of trees
elm spp	107	24.0
linden, american	73	16.4
pear spp	63	14.2
ginkgo	59	13.3
honeylocust	39	8.8
oak, pin	22	4.9
birch, river	15	3.4
linden, littleleaf	14	3.2
cherry, kwansa	11	2.5
crabapple spp	10	2.3
hawthorn spp	8	1.8
lilac, jap tree	8	1.8

Empty Street Tree Wells and Empty Wells within City Street Construction Areas in MIT/Area 2



Neighborhood 9



0.63 sq miles (10.2% of city area)
 11.8% of City Streets
 9.9% of City Street Trees
 59 Street Tree Species

	N9 Total	City Total	Percent of City
City Street Trees	1,285	12,934	9.9%
Empty Wells Total	81	752	10.8%
Empty Wells outside Proposed Street Construction	81	626	12.9%
Empty Wells within Construction Areas	23	126	18.3%
Retired Sites	40	148	27.0%
Parks, Public School, City Building Trees	1,406	3,658	38.4%
DCR Street Trees	7	563	1.2%

City Street Trees and Park, Public School, City Building Trees and DCR Trees in Neighborhood 9



Neighborhood 9

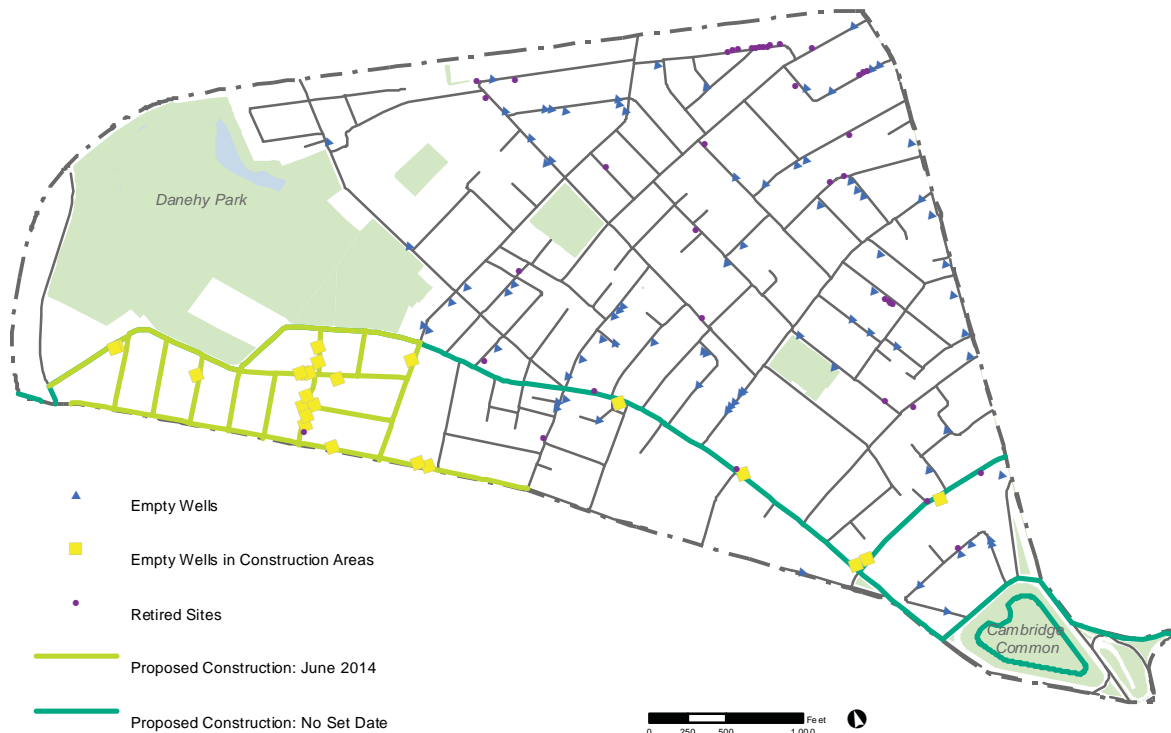
STREET + PARK TREES DBH

range	street	park	% of trees
1-6	529	716	46.7
7-12	318	518	31.3
13-18	196	92	10.8
19-24	139	39	6.7
25-30	62	24	3.2
31-36	27	6	1.2
37-42	4	0	0.2
43-53	3	1	0.2

STREET TREES: 12 MOST COMMON SPECIES

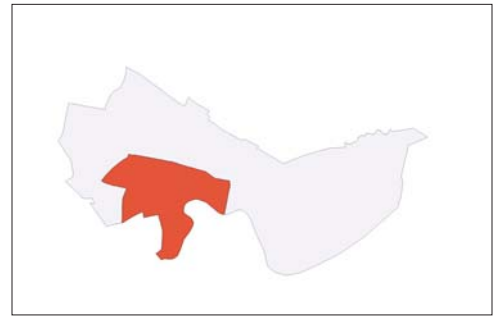
SPECIES	count	total trees	% of trees
maple, norway	246	1272	19.34
honeylocust	111	1272	8.73
mapl, red	106	1272	8.33
oak, pin	82	1272	6.45
pear spp	69	1272	5.42
linden, littleleaf	65	1272	5.11
lilac, jap tree	45	1272	3.54
mapl, silver	43	1272	3.38
mapl, sugar	37	1272	2.91
cherry, sargent	33	1272	2.59
sweetgum, american	31	1272	2.44
linden, american	28	1272	2.20

Empty Street Tree Wells and Empty Wells within City Street Construction Areas in Neighborhood 9



Neighborhood 10

	N10 Total	City Total	Percent of City
City Street Trees	1,893	12,934	14.6%
Empty Wells Total	109	752	14.5%
Empty Wells outside Proposed Street Construction Areas	47	626	7.5%
Empty Wells within Construction Areas	62	126	49.2%
Retired Sites	13	148	8.8%
Parks, Public School, City Building Trees	233	3,658	6.4%
Cemetery Trees	834	834	100.0%
DCR Park Trees	172	859	20.0%
DCR Street Trees	157	563	27.9%

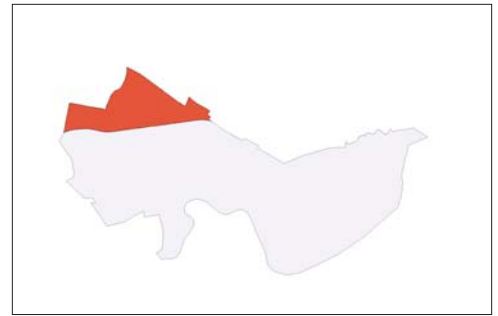


1.23 sq miles (19.7% of city area)
 16.8% of City Streets
 14.6% of City Street Trees
 62 Street Tree Species

City Street Trees and Park, Public School, City Building Trees and DCR Trees in Neighborhood 10



North Cambridge



0.88 sq miles (14.12% of city area)
 11.8% of City Streets
 10.6% of City Street Trees
 51 Street Tree Species

	NC Total	City Total	Percent of City
City Street Trees	1,368	12,934	10.6%
Empty Wells Total	74	752	9.8%
Empty Wells outside Proposed Street Construction Areas	66	626	10.5%
Empty Wells within Construction Areas	8	126	6.3%
Retired Sites	9	148	6.1%
Parks, Public School, City Building Trees	524	3,658	14.3%
DCR Street Trees	63	563	11.2%
DCR Park Trees	83	859	9.7%

City Street Trees and Park, Public School, City Building Trees and DCR Trees in North Cambridge



North Cambridge

STREET + PARK TREES DBH

range	street	park	% of trees
1-6	620	100	45.5
7-12	451	70	32.9
13-18	389	30	26.5
19-24	286	28	19.8
25-30	134	6	8.8
31-36	65	0	4.1
37-42	29	0	1.8
43-53	9	0	0.6

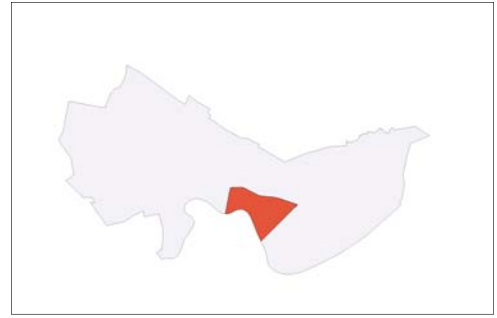
STREET TREES: 12 MOST COMMON SPECIES

SPECIES	count	% of trees
maple, norway	267	19.7
honeylocust	151	11.1
maple, red	130	9.6
oak, pin	120	8.9
linden, littleleaf	71	5.2
lilac, jap tree	49	3.6
maple,nwy crmsn kg	39	2.9
cherry, sargent	38	2.8
ash, green	38	2.8
pear spp	37	2.7
oak, red	37	2.7
maple, hedge	36	2.7

Empty Street Tree Wells and Empty Wells in City Street Construction Areas in North Cambridge



Riverside



0.34 sq miles (5.5% of city area)
 8.15% of City Streets
 5.9% of City Street Trees
 44 Street Tree Species



	RS Total	City Total	Percent of City
City Street Trees	761	12,934	5.9%
Empty Wells Total	36	752	4.8%
Empty Wells outside Proposed Street Construction	26	626	4.2%
Empty Wells within Construction Areas	10	126	7.9%
Retired Sites	13	148	8.8%
Parks, Public School, City Building Trees	296	3,658	8.1%
DCR Street Trees	48	563	8.5%
DCR Park Trees	53	859	6.2%

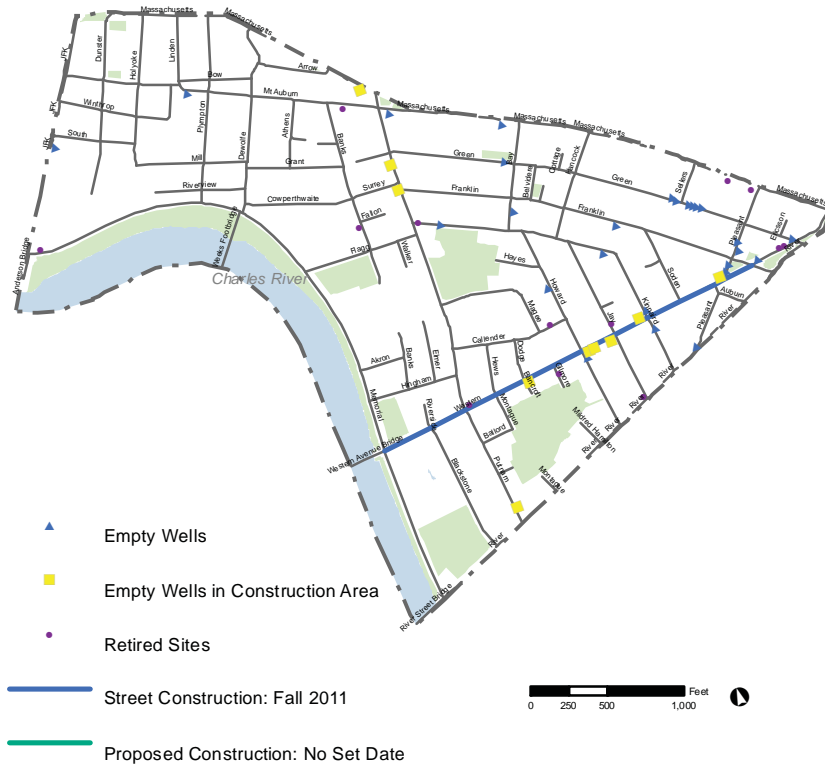
City Street Trees and Park, Public School, City Building Trees and DCR Trees in Riverside

STREET + PARK TREES DBH

range	street	park	% of trees
1-6	238	154	37.95
7-12	278	81	34.75
13-18	117	39	15.10
19-24	57	3	5.81
25-30	10	0	0.97
31-36	7	0	0.68
37-42	2	0	0.19
43-53	0	0	0.00

STREET TREES: 12 MOST COMMON SPECIES

SPECIES	count	% of trees
pear spp	112	14.91
honeylocust	104	13.85
linden, littleleaf	97	12.92
ash, green	68	9.05
maple, norway	64	8.52
mapl, red	48	6.39
zelkova, japanese	25	3.33
oak, pin	24	3.20
ginkgo	23	3.06
linden, american	21	2.80
sophora	15	2.00
maple, hedge	12	1.60

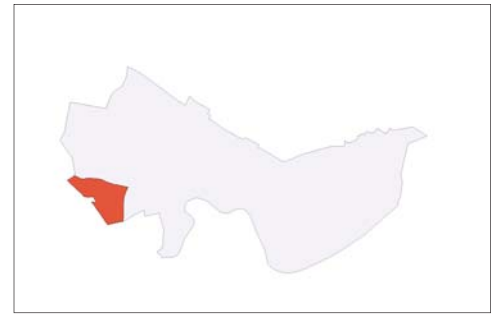


Empty Street Tree Wells and Empty Wells in City Street Construction Areas in Riverside

Strawberry Hill



City Street Trees and Golf Course, Park and Public School Trees in Strawberry Hill



0.29 sq miles (4.7% of city area)
2.7% of City Streets
2.1% of City Street Trees
29 Street Tree Species

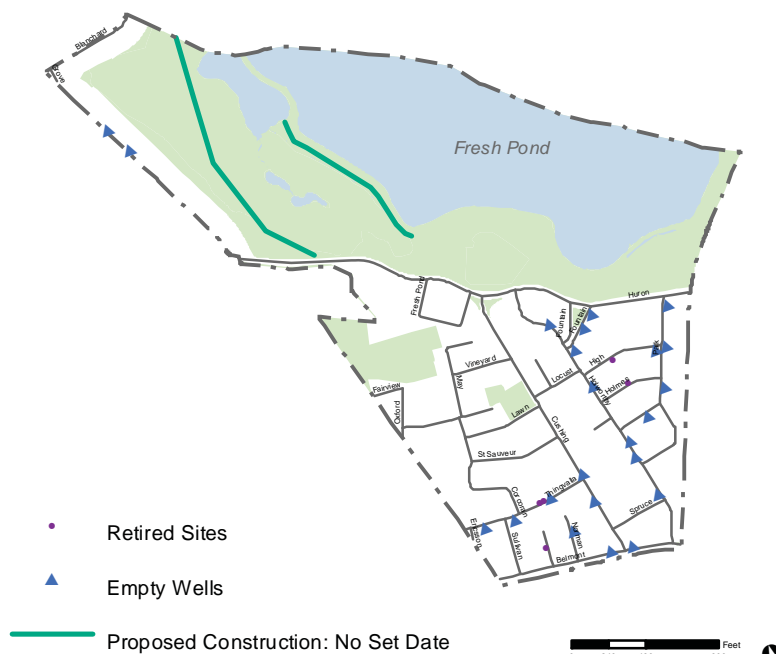
	SH Total	City Total	Percent of City
City Street Trees	269	12,934	2.1%
Empty Wells Total	23	752	3.1%
Empty Wells outside Proposed Street Construction	23	626	3.7%
Empty Wells within Construction Areas	0	126	0.0%
Parks, Public School, City Building Trees	61	3,658	1.7%
Golf Course Trees	143	247	57.9%

STREET + PARK TREES DBH

range	street	park	% of trees
1-6	105	30	42.1
7-12	70	11	25.2
13-18	42	5	14.6
19-24	26	1	8.4
25-30	12	4	5.0
31-36	11	1	3.7
37-42	2	0	0.6
43-53	0	0	0.0

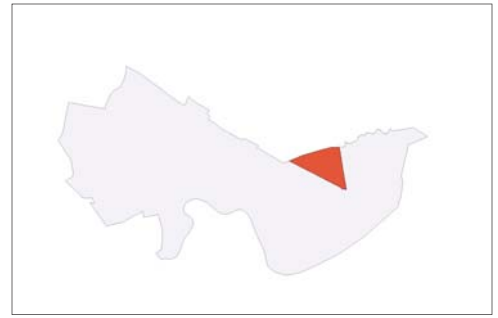
STREET TREES: 12 MOST COMMON SPECIES

SPECIES	count	% of trees
maple, norway	37	13.8
oak, pin	31	11.6
honeylocust	28	10.5
pear spp	26	9.7
maple, red	22	8.2
crabapple spp	21	7.8
lilac, jap tree	16	6.0
linden, littleleaf	11	4.1
maple, sugar	10	3.7
zelkova, japanese	8	3.0
elm, lacebark	8	3.0
cherry, sargent	8	3.0



Empty Street Tree Wells and City Construction Areas in Strawberry Hill

Wellington Harrington



0.24 sq miles (3.8% of city area)

6% of City Streets

6% of City Street Trees

44 Street Tree Species

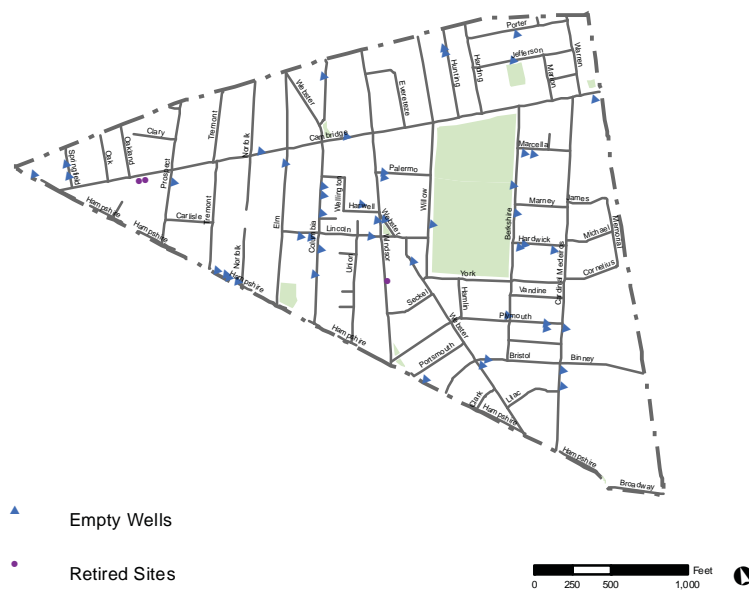


- City Street Trees
- Park, Public School and City Building Trees

City Street Trees and Park, Public School, City Building Trees in Wellington Harrington

	WH Total	City Total	Percent of City
City Street Trees	777	12,934	6.0%
Empty Wells Total	48	752	6.4%
Empty Wells outside Proposed Street Construction	56	626	8.9%
Empty Wells within Construction Areas	8	126	6.3%
Retired Sites	3	148	2.0%
Parks, Public School, City Building Trees	113	3658	3.1%

STREET + PARK TREES DBH	
range	% of trees
1-6	42.5
7-12	30.2
13-18	19.6
19-24	4.3
25-30	2.0
31-36	0.1
37-42	0.1
43-53	0.0



- ▲ Empty Wells
- Retired Sites

Empty Street Tree Wells and Retired Sites in Wellington Harrington

STREET TREES: 12 MOST COMMON SPECIES		
SPECIES	count	% of trees
maple, norway	150	19.4
honeylocust	135	17.4
linden, littleleaf	94	12.1
ginkgo	59	7.6
oak, pin	53	6.9
maple, red	42	5.4
pear spp	40	5.2
ash, black	21	2.7
linden, american	18	2.3
planetree, london	17	2.2
sophora	13	1.7
oak, red	9	1.2