Cambridge Urban Forest Master Plan

Task Force Meeting #8

January 31, 2019

CAMBRIDGE DEPARTMENT OF PUBLIC THE WORKS

KLEINFELDER Bright People. Right Solutions.

clf conservation law foundation

BARTLETT TREE EXPERTS SCIENTIFIC TREE CARE SINCE 1907

APPLIED ECOLOGICAL SERVICES

REED HILDERBRAND

F² VJ ASSOCIATES

PUBLIC SURVEY

POLICY

PRACTICES

PUBLIC SURVEY

POLICY

PRACTICES

1,643 total respondents over three month period (Sept. 5 - Dec. 6, 2018)

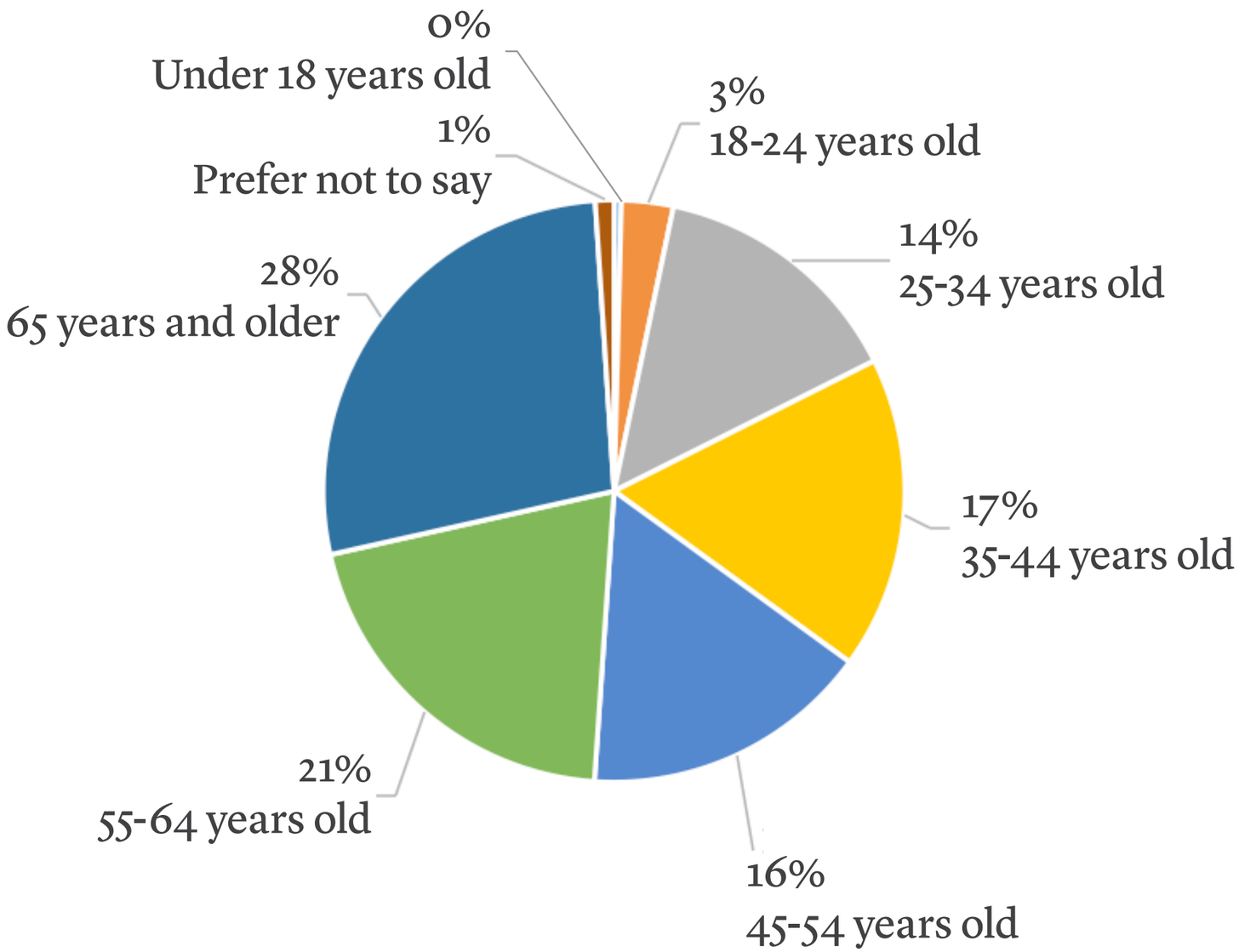
Based on self-selected, not random, sample

Survey offered in eight languages
(only six surveys completed in a language other than English)

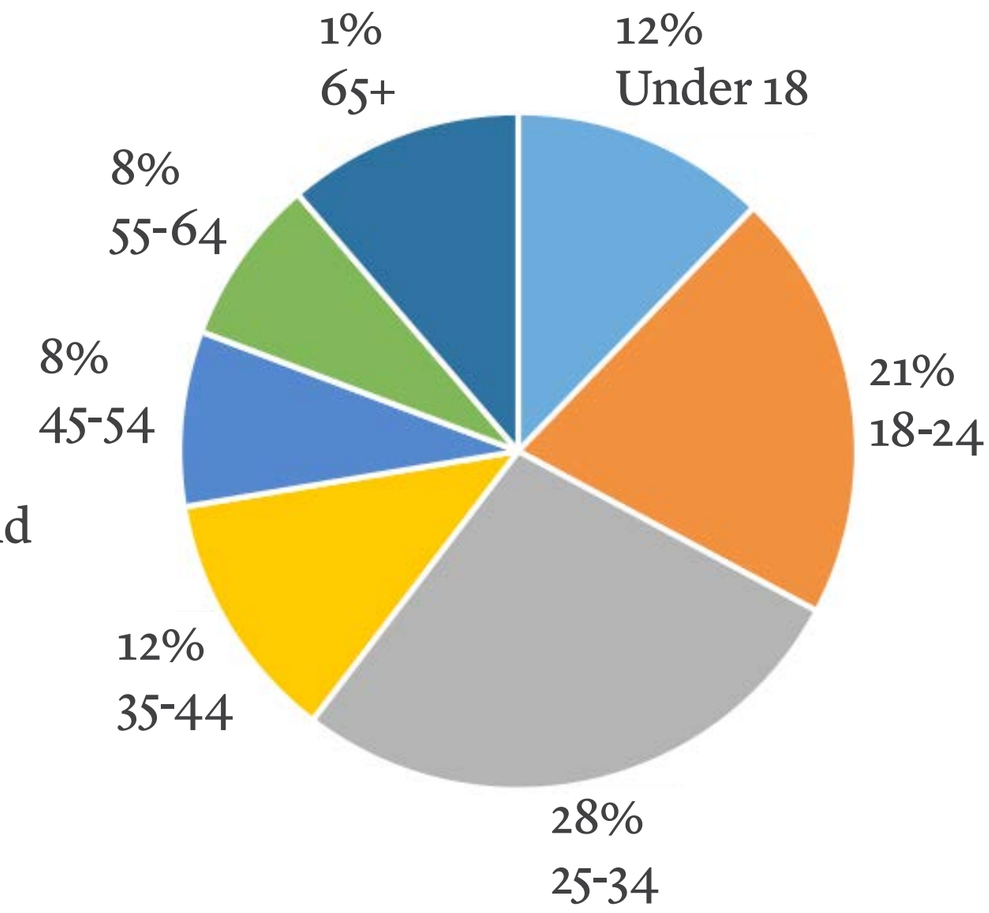
Question types:

- Perceptions of existing tree canopy and condition
- Awareness of existing programs and policies
- Attitudes toward tree preservation and growth

Repondents represent a broad cross section of ages

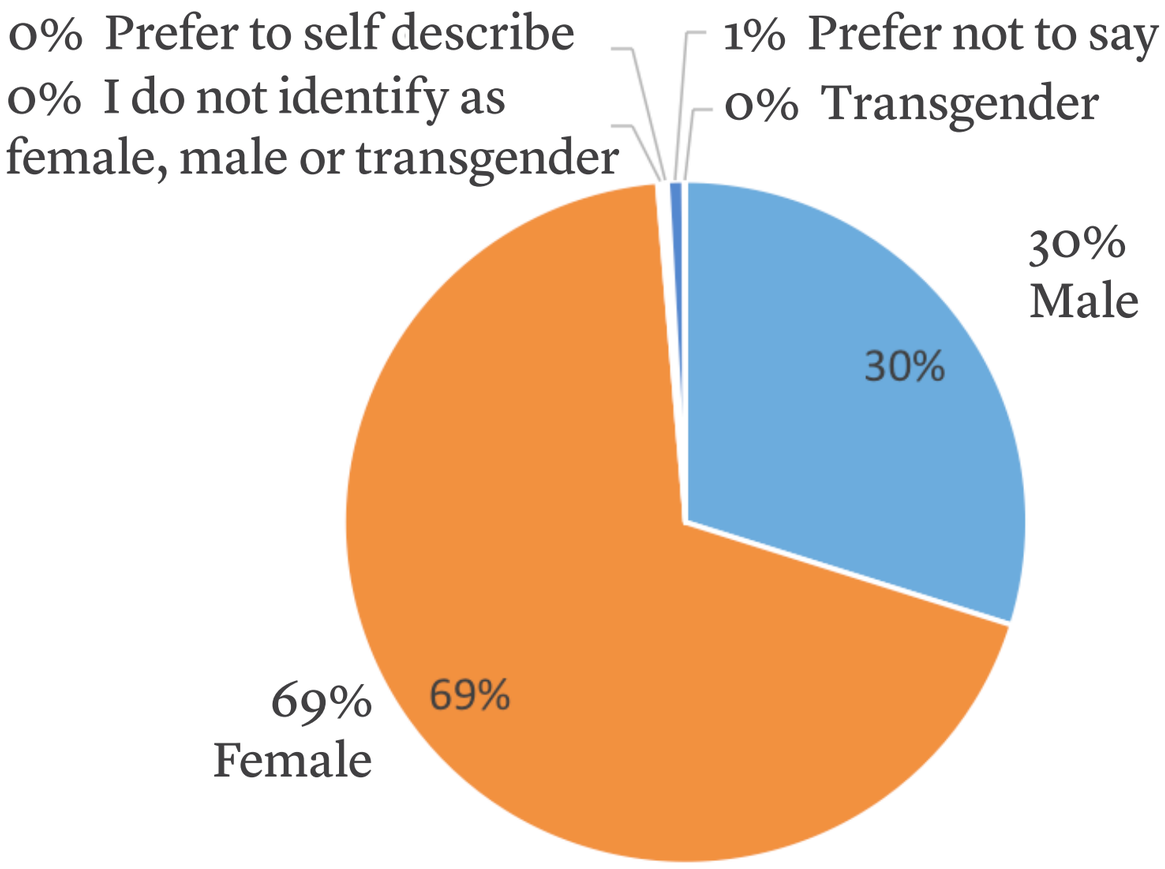


SURVEY DEMOGRAPHICS



CENSUS DEMOGRAPHICS

69% of respondents were women



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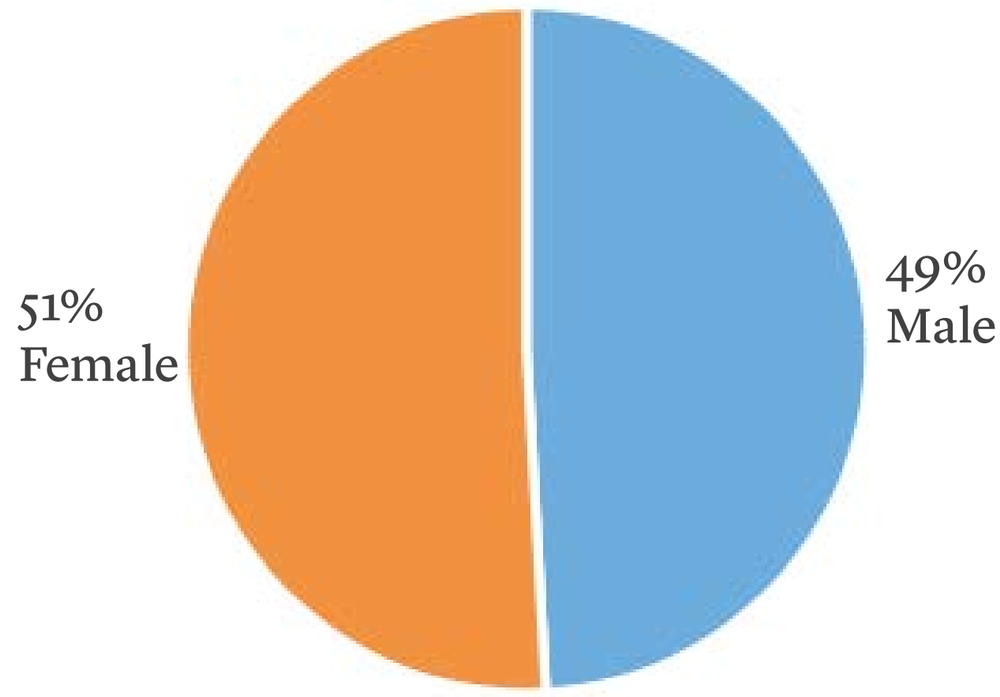
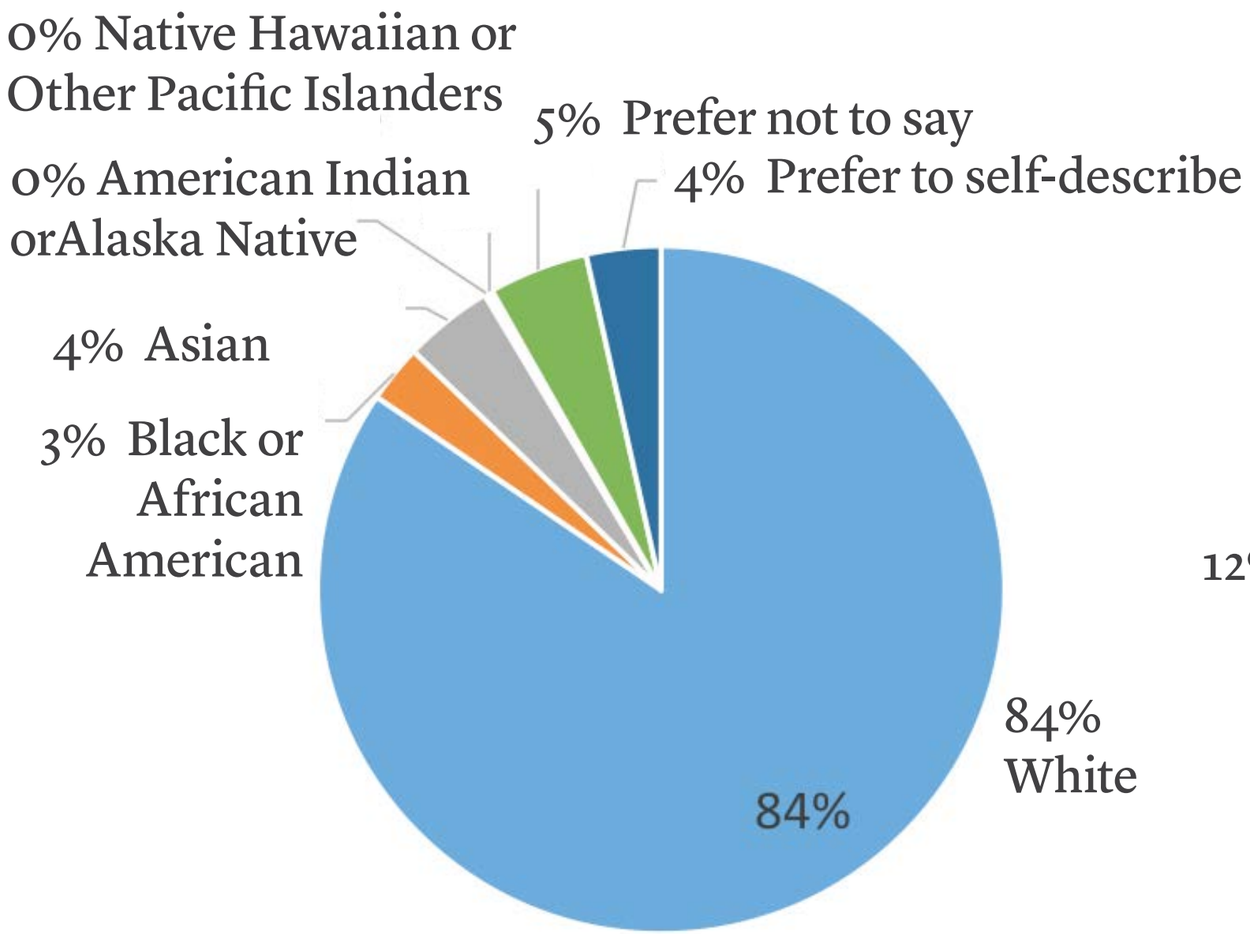


CENSUS DEMOGRAPHICS

85% of respondents were white



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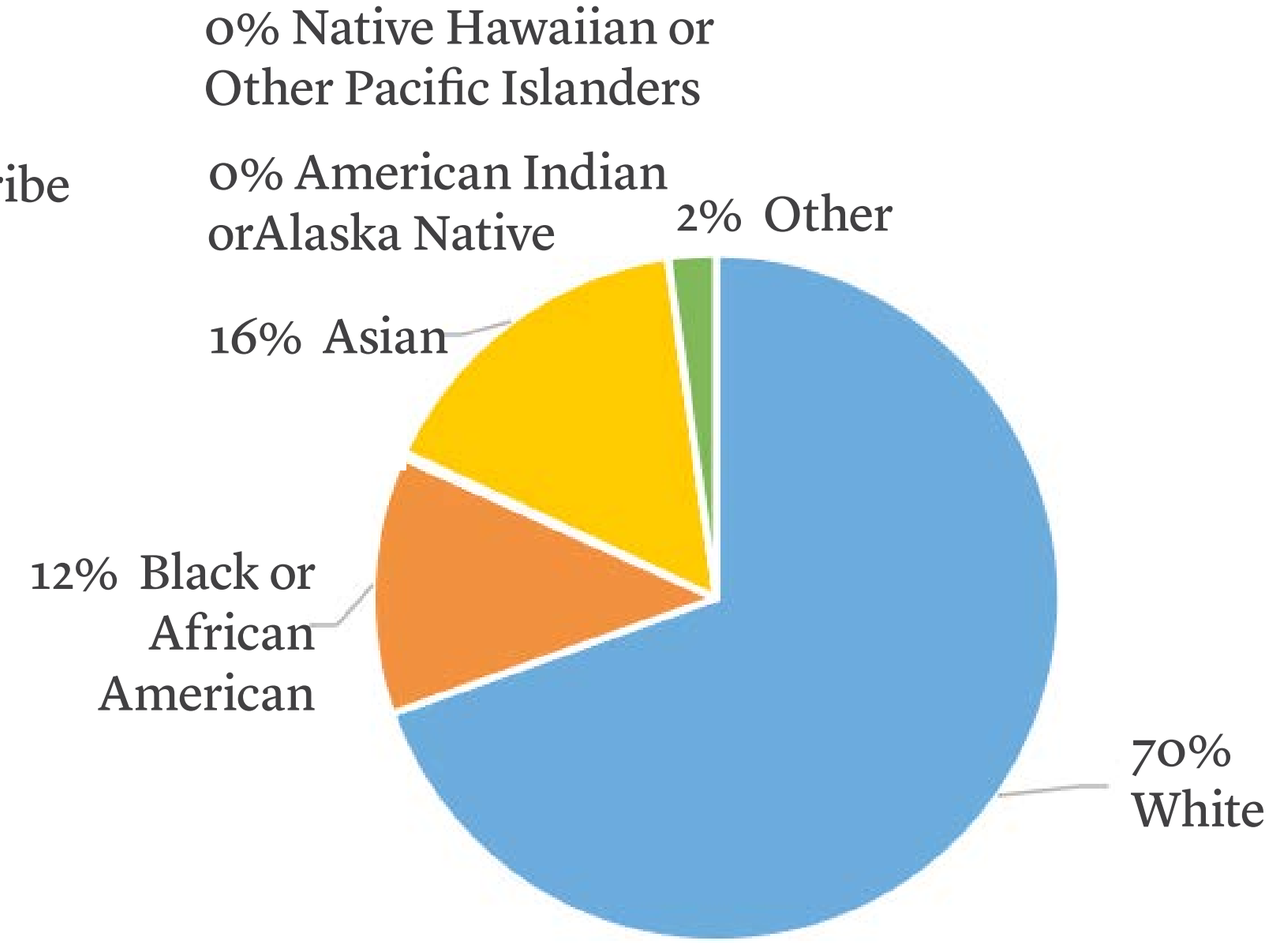
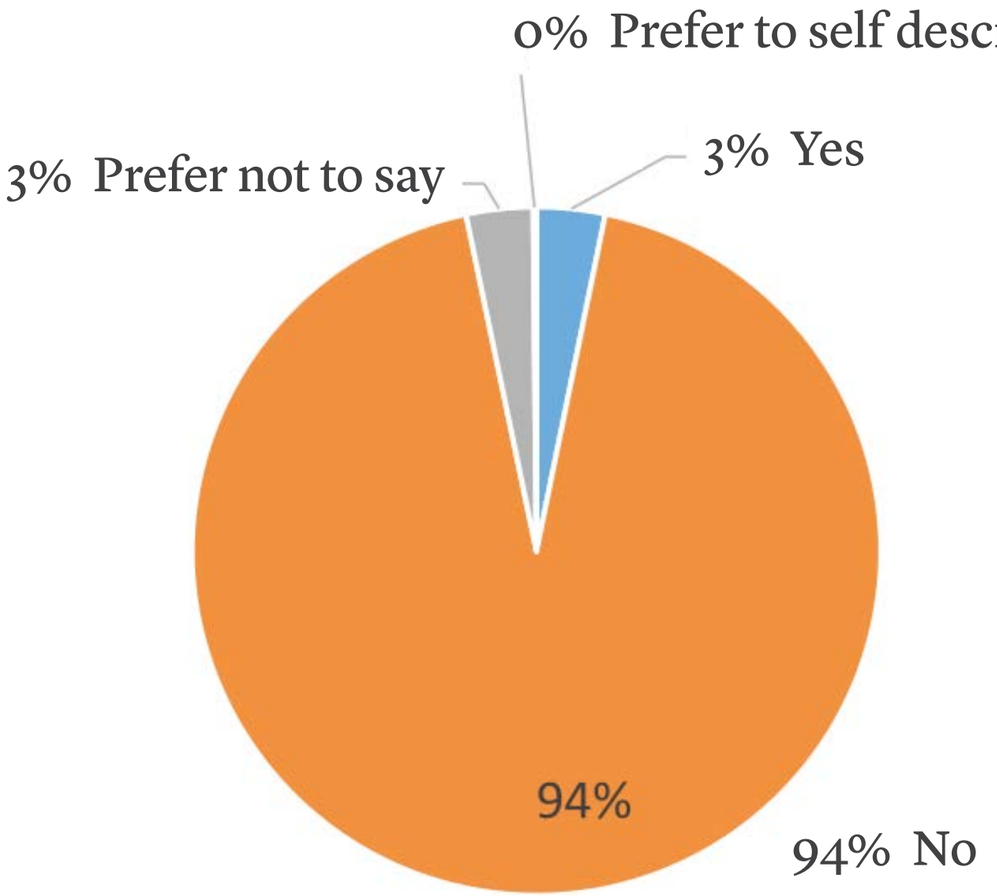


CENSUS DEMOGRAPHICS

3% of respondents identify as Hispanic



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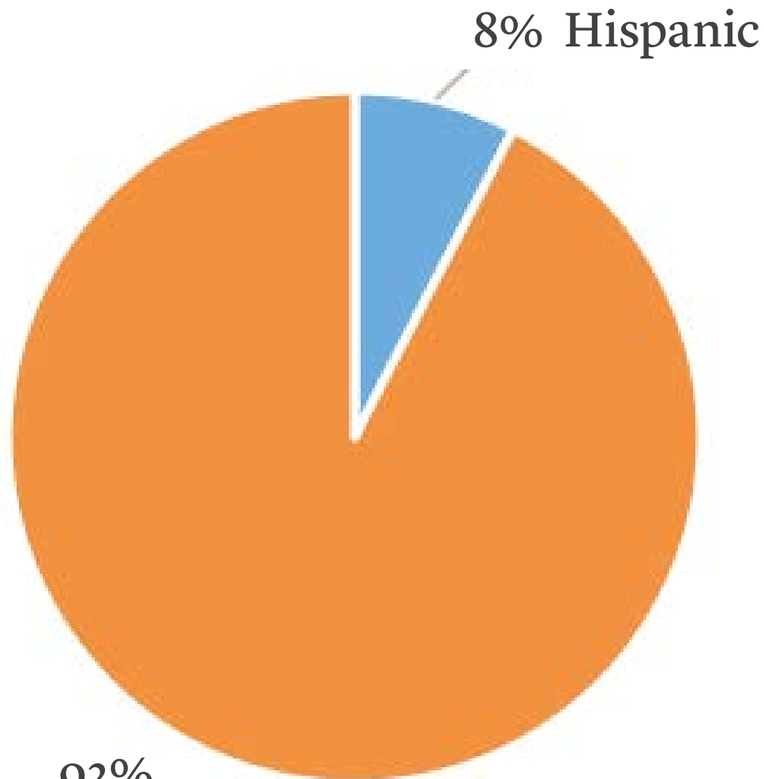
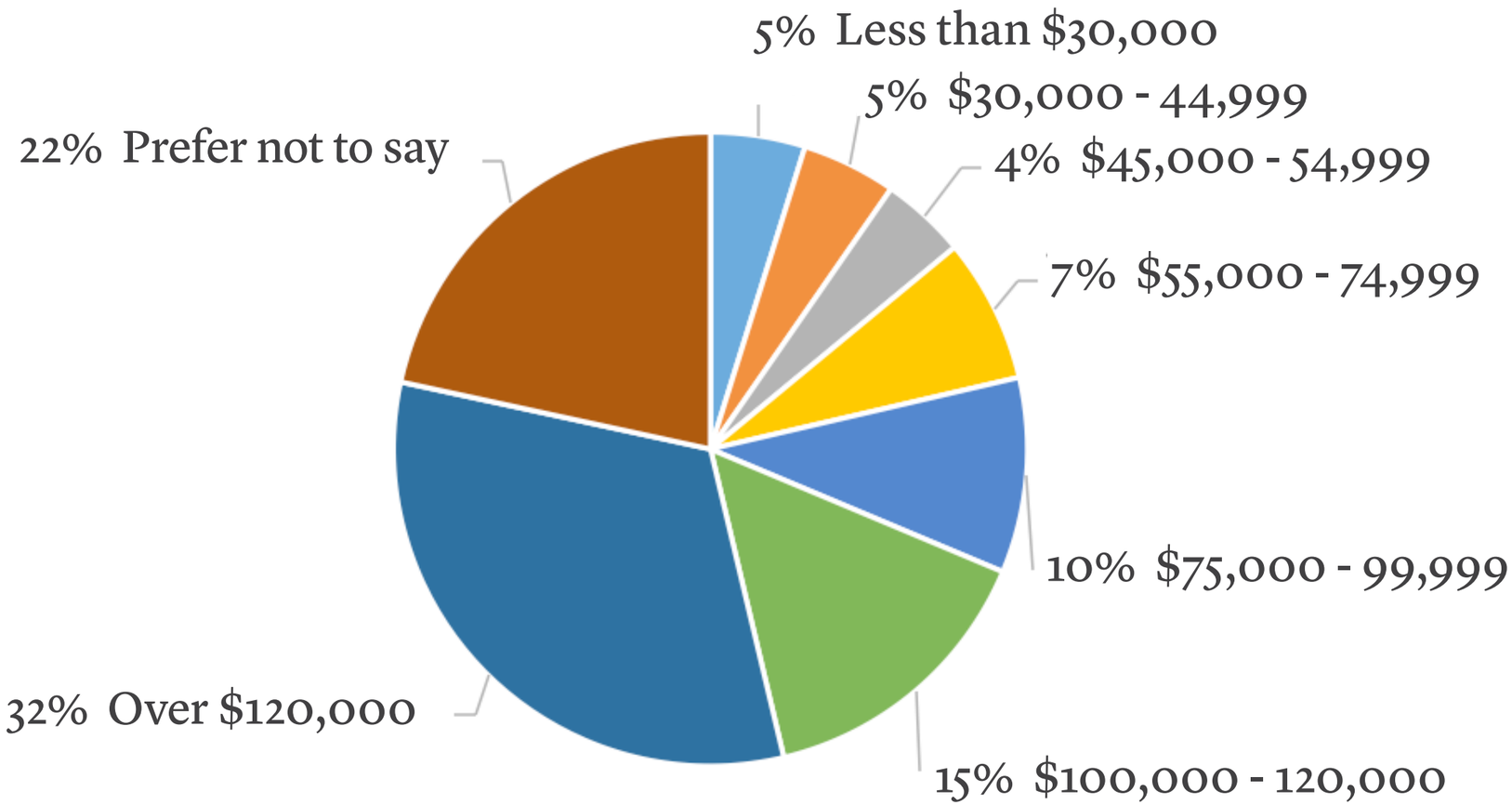


CENSUS DEMOGRAPHICS

47% of respondents earn more than $100,000
Median household income is $83,122



SURVEY DEMOGRAPHICS

Based on the findings of the Public Survey:

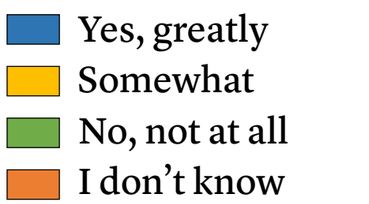
What are the **opportunities** or **constraints** around stemming the loss of existing trees or growing canopy by planting new trees?

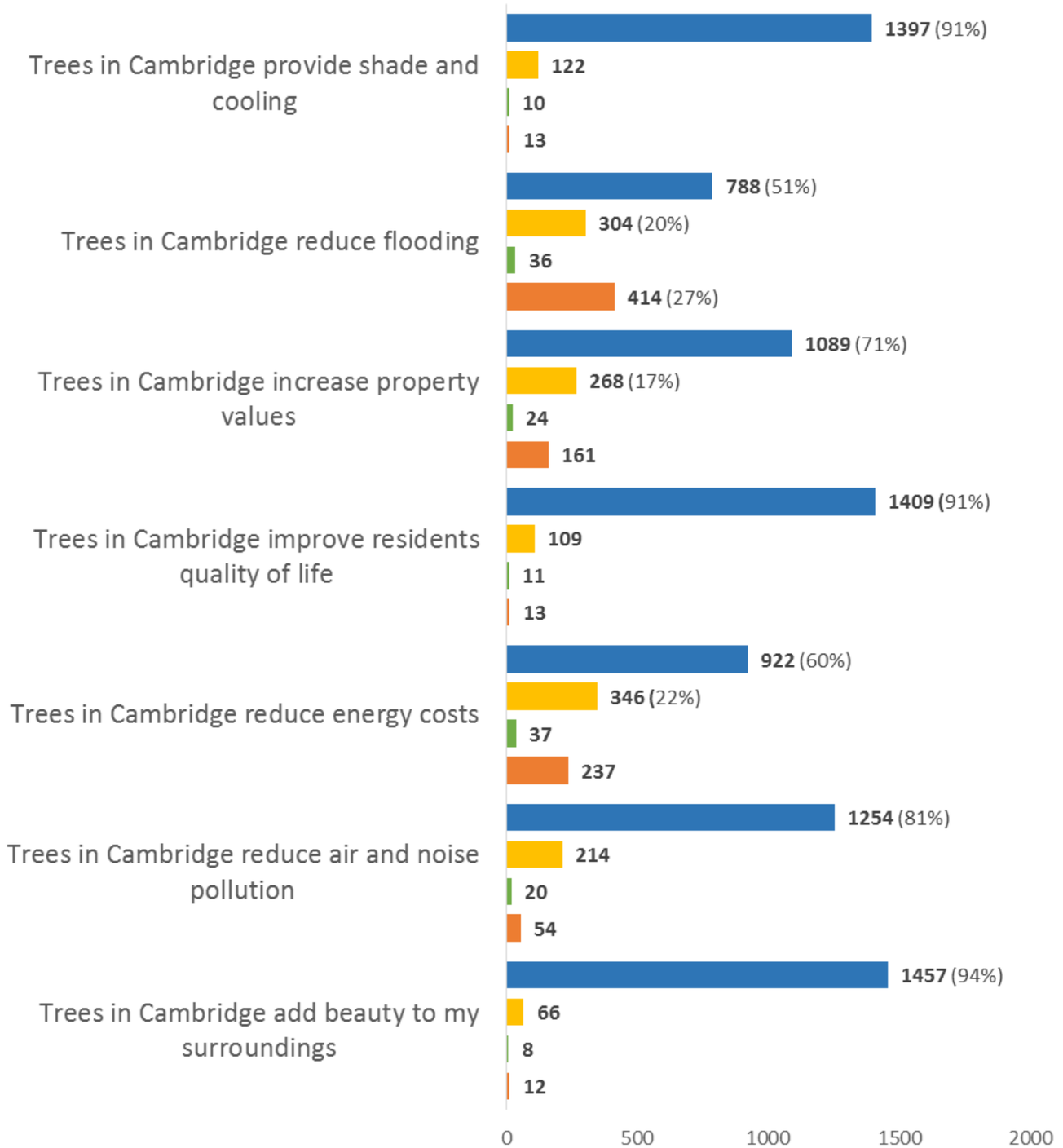
Respondents generally understand

the value of trees in the urban environment.

Benefits of Trees

"In your opinion, how do Cambridge's trees contribute to the following items?"



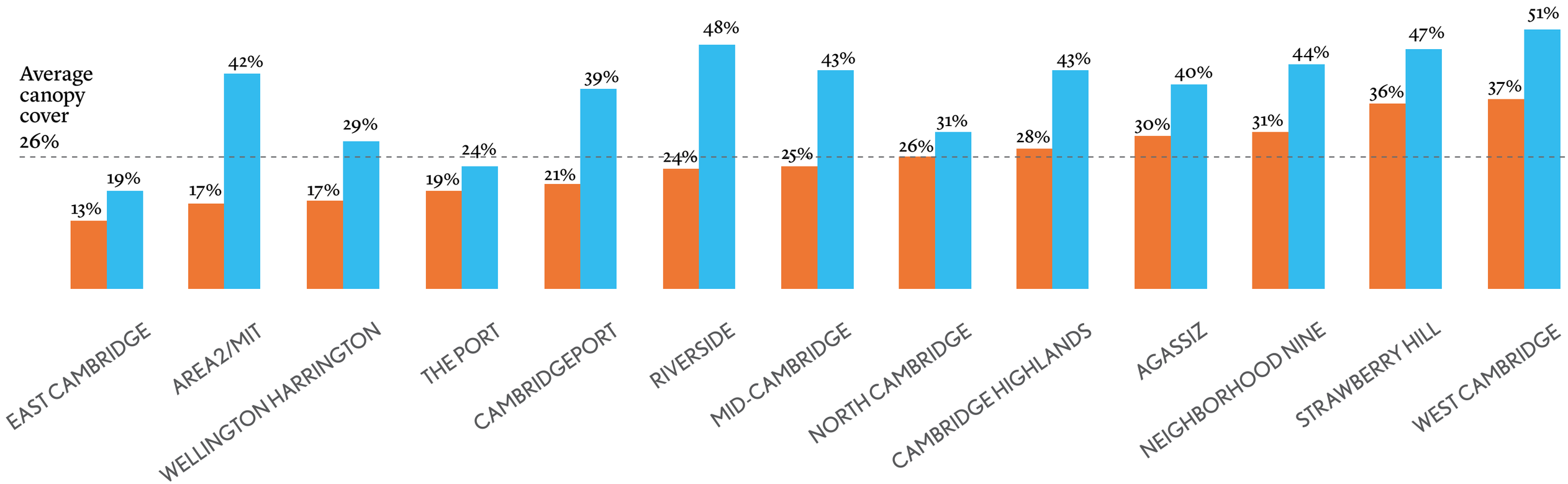


Respondents generally believe there are

not enough trees in the city,

especially in neighborhoods with less than average canopy cover.

SURVEY RESULTS | CANOPY PERCEPTION



Analysis — 2018 canopy cover percentage by neighborhood

Perception — Percent responding “Enough trees” in their neighbrohood

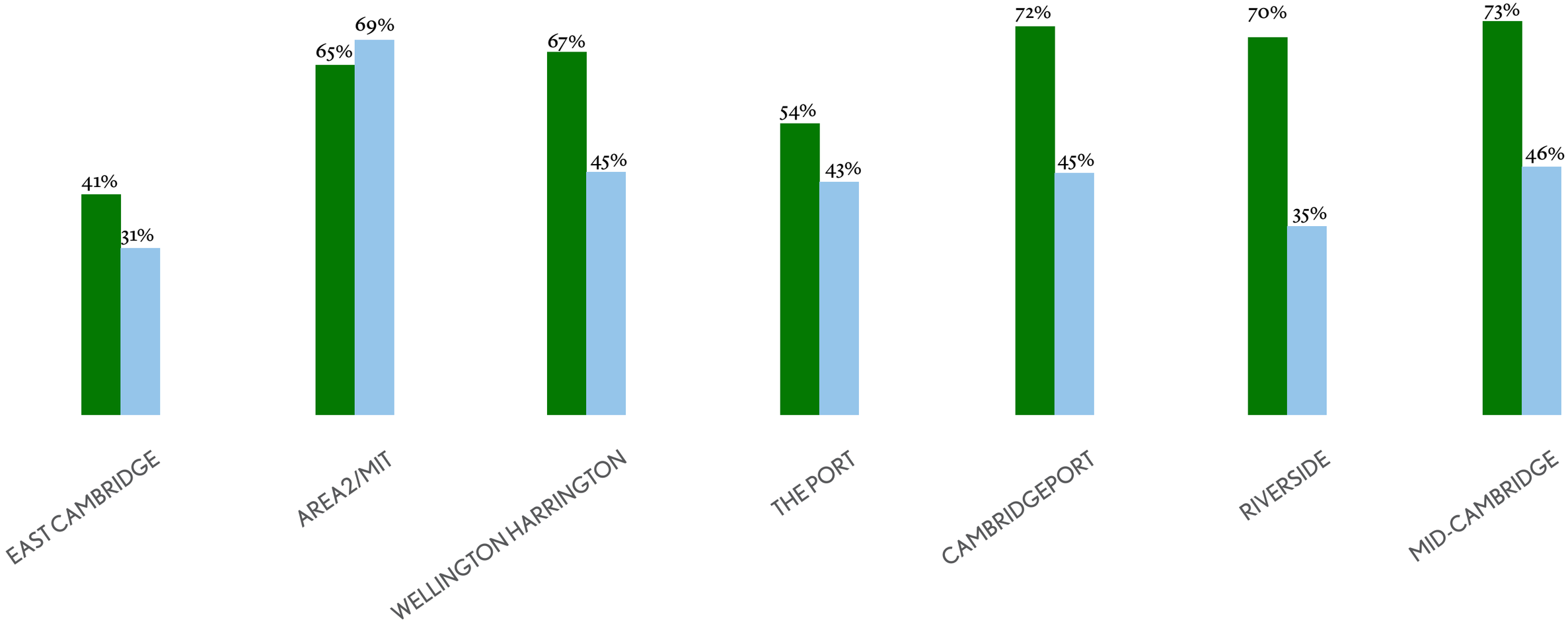
Respondents generally believe city trees

are **not as healthy** as they should be,

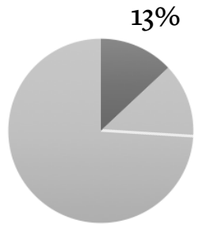
especially in neighborhoods with less than average

canopy cover.

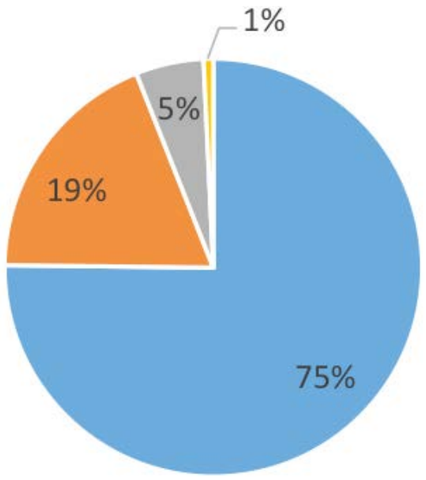
SURVEY RESULTS | HEALTH



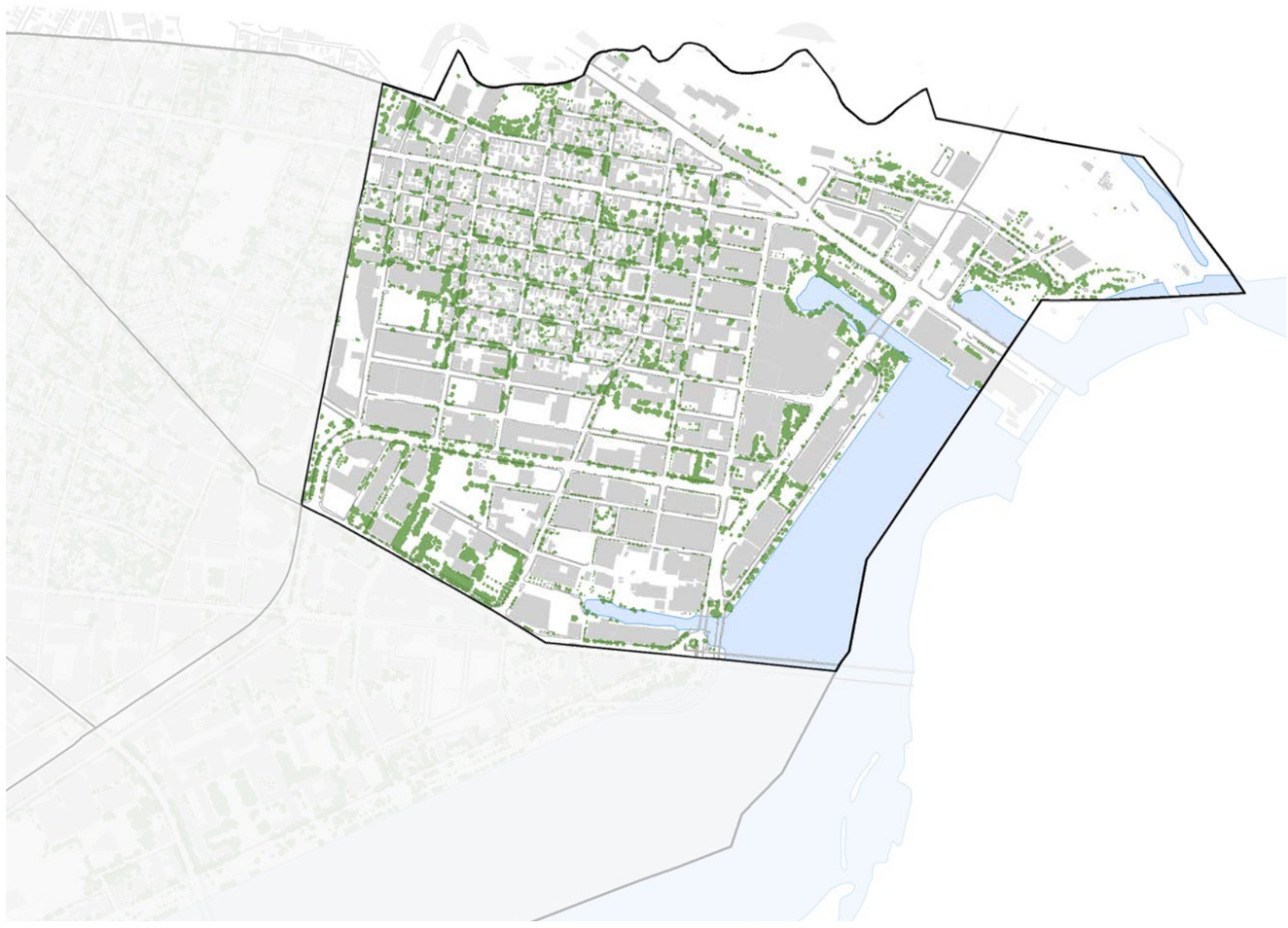
East Cambridge — 13% Coverage



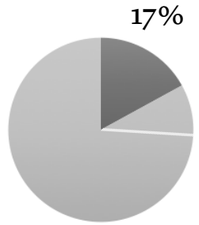
"In your opinion, which best describes the amount of trees in your neighborhood?"



- Too few trees
- Enough trees
- Too many trees
- I don't know



Area 2 / MIT — 17% Coverage



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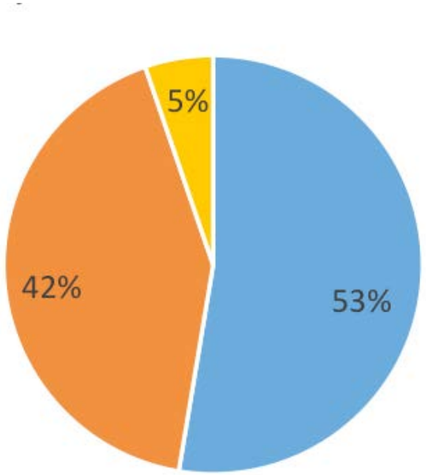
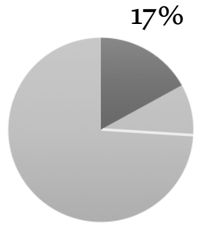


Wellington-Harrington — 17% Coverage



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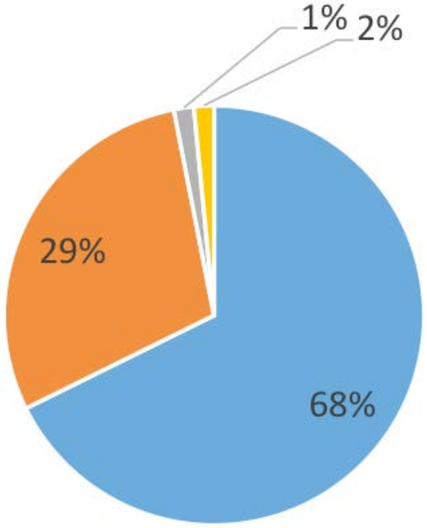
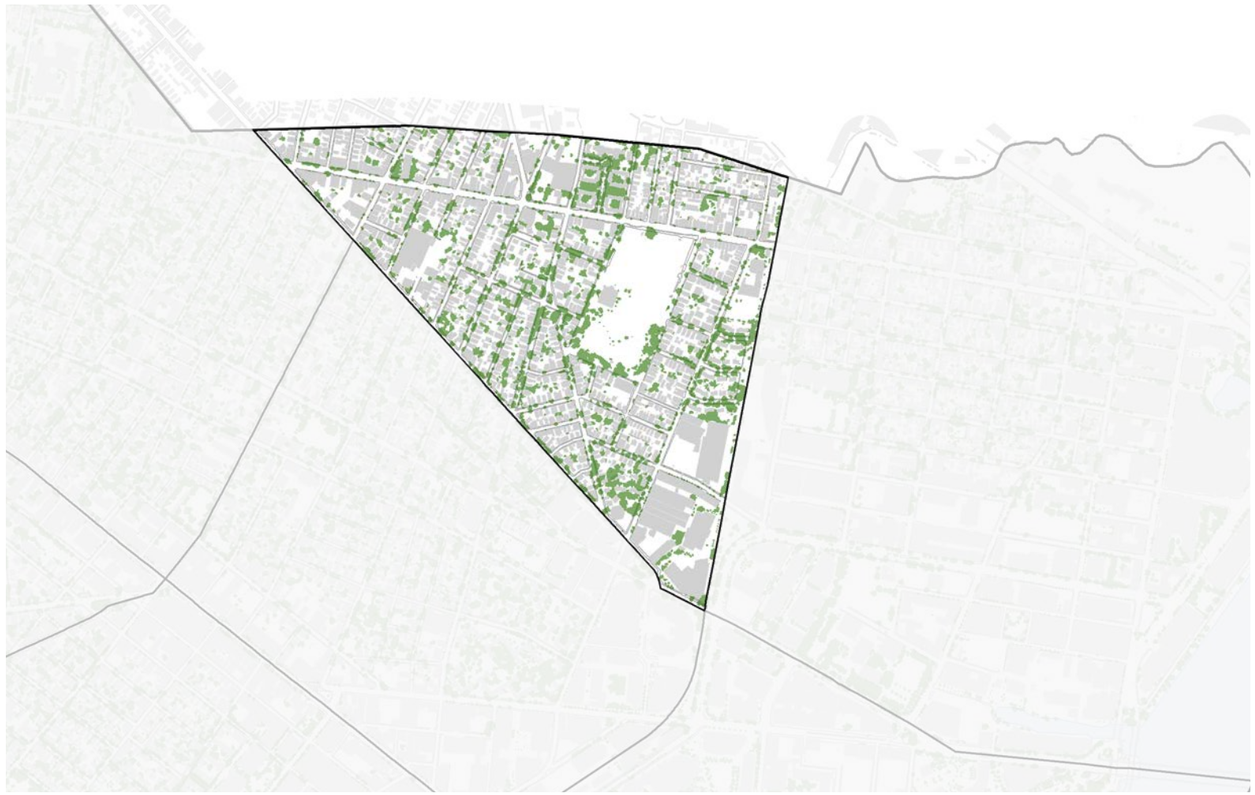
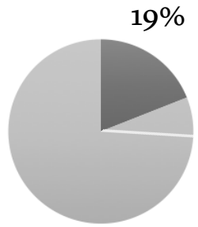




The Port — 19% Coverage



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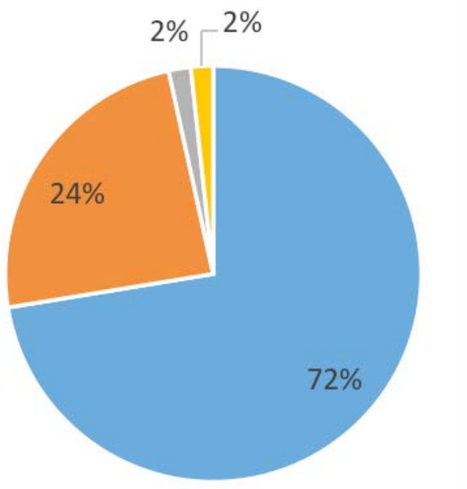
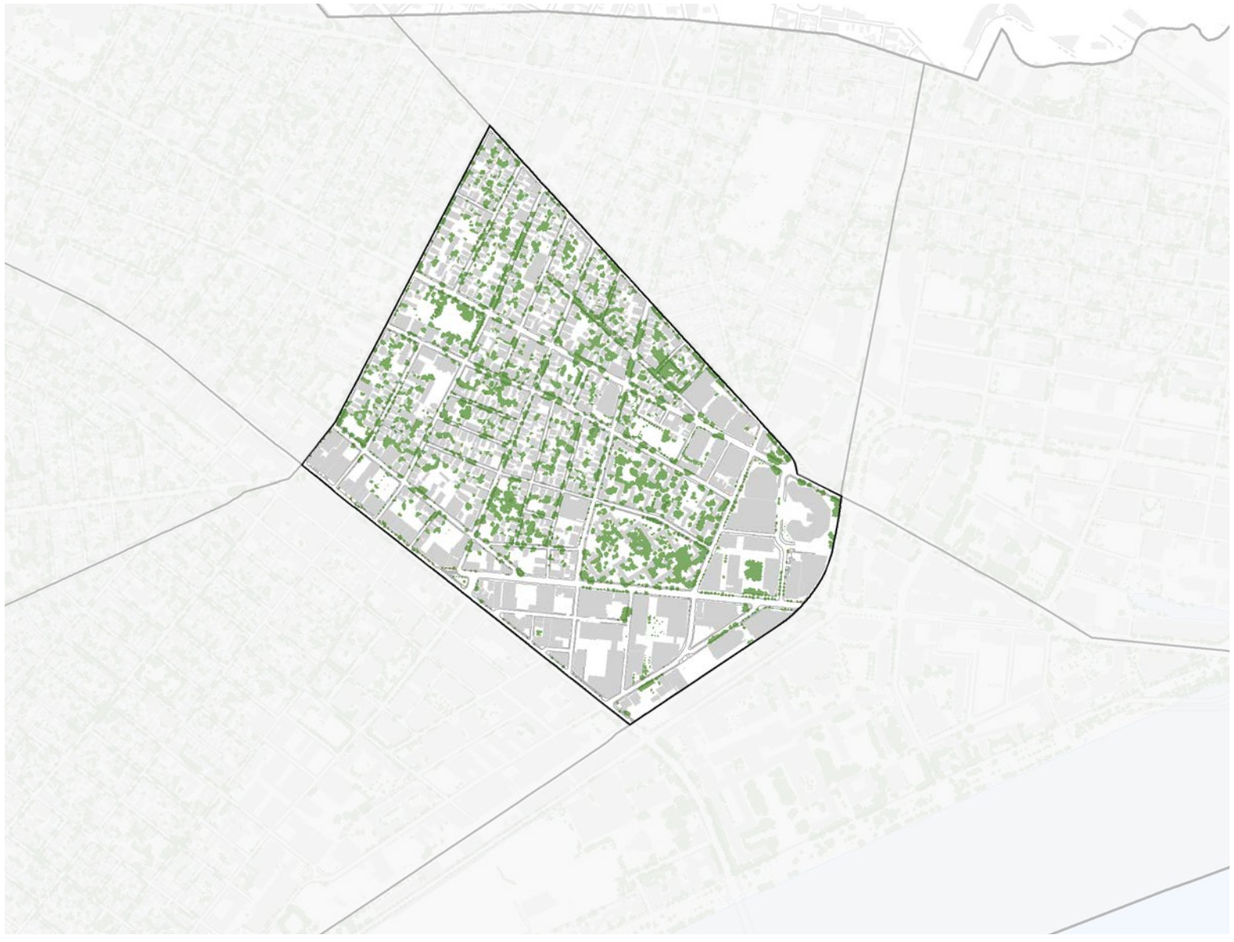
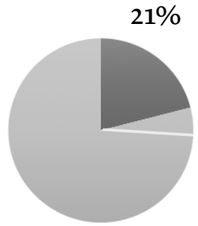




Cambridgeport — 21% Coverage



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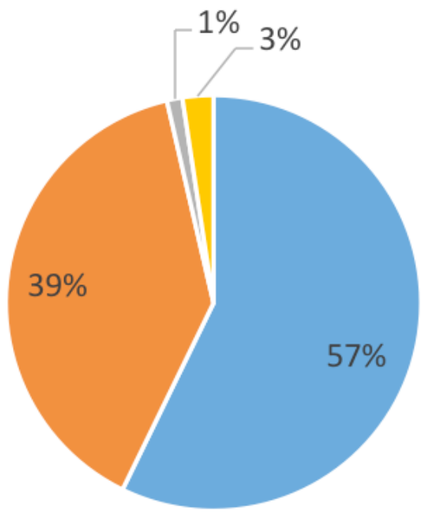
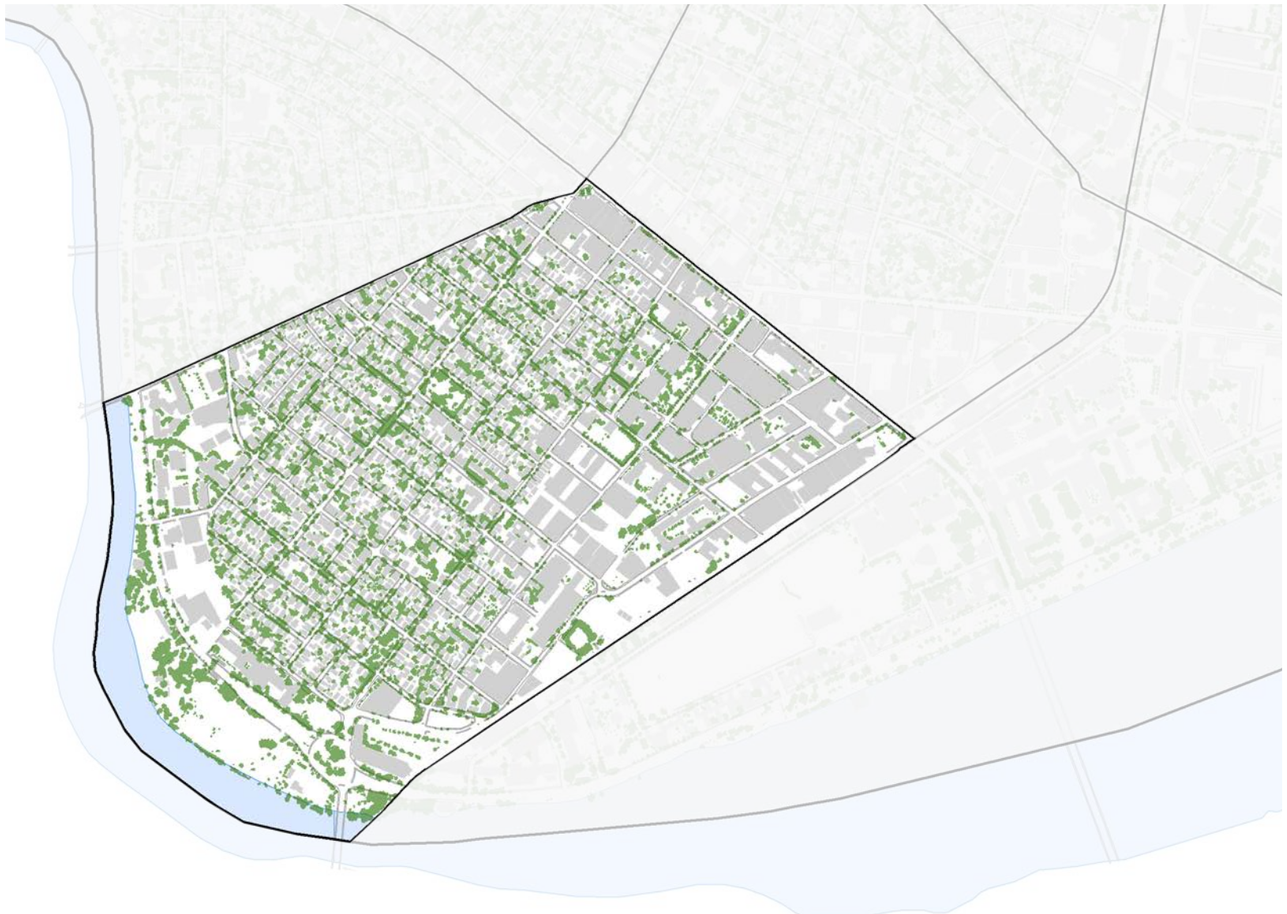
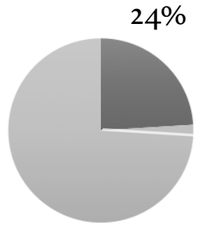




Riverside — 24% Coverage



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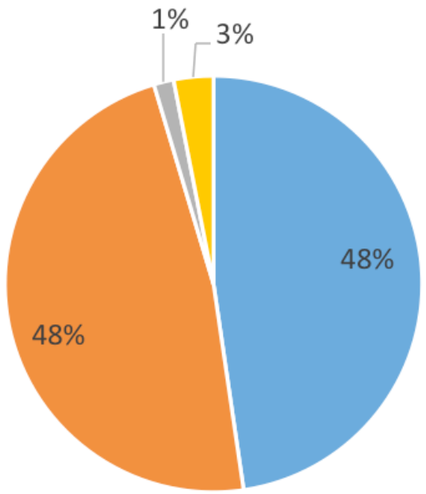
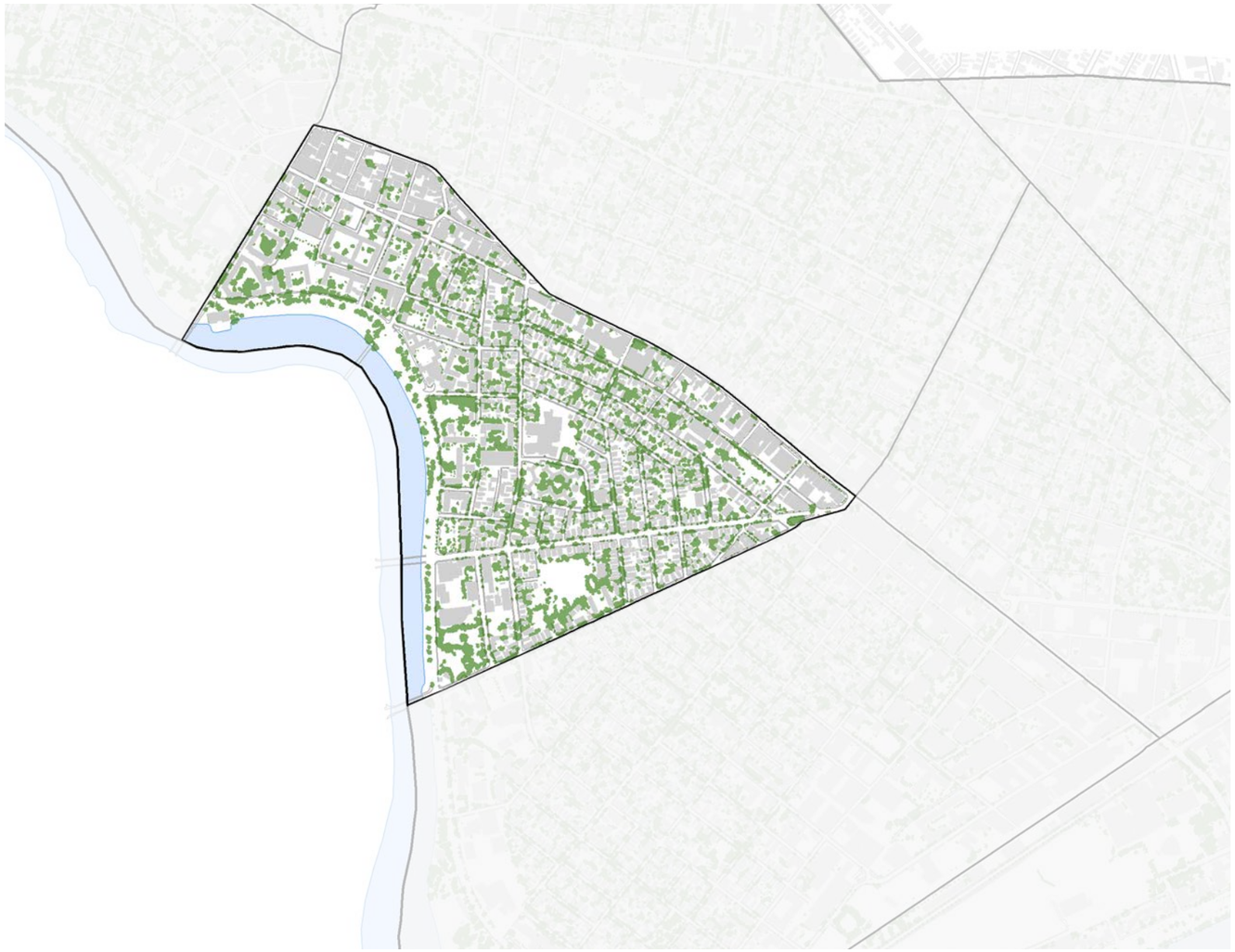
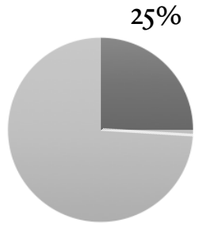




Mid-Cambridge — 25% Coverage



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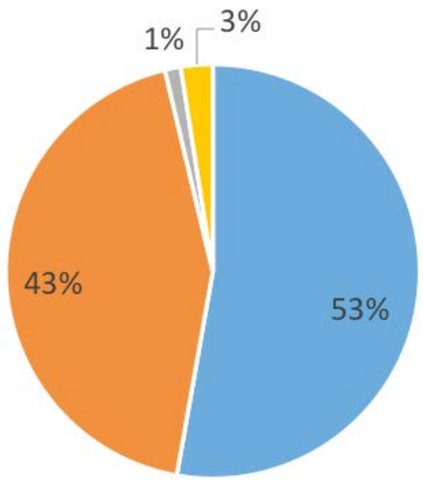
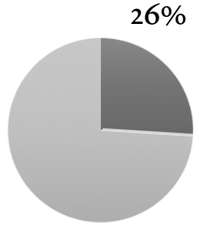


North Cambridge — 26% Coverage



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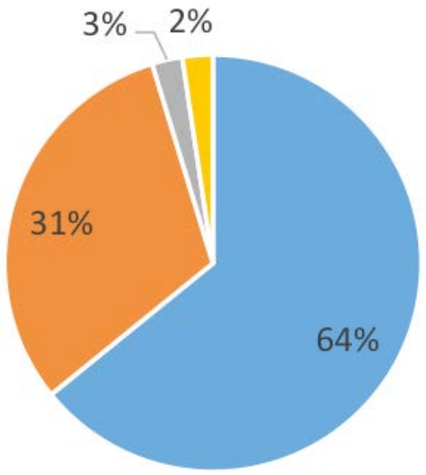
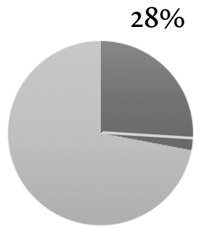


Cambridge Highlands — 28% Coverage



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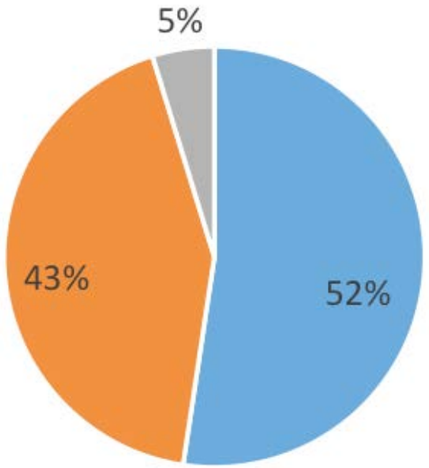
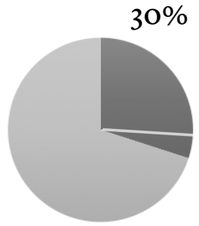


Agassiz — 30% Coverage



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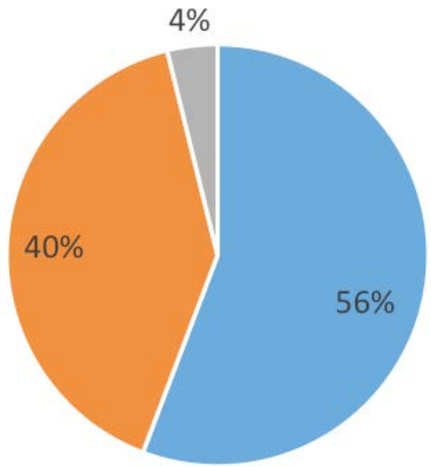
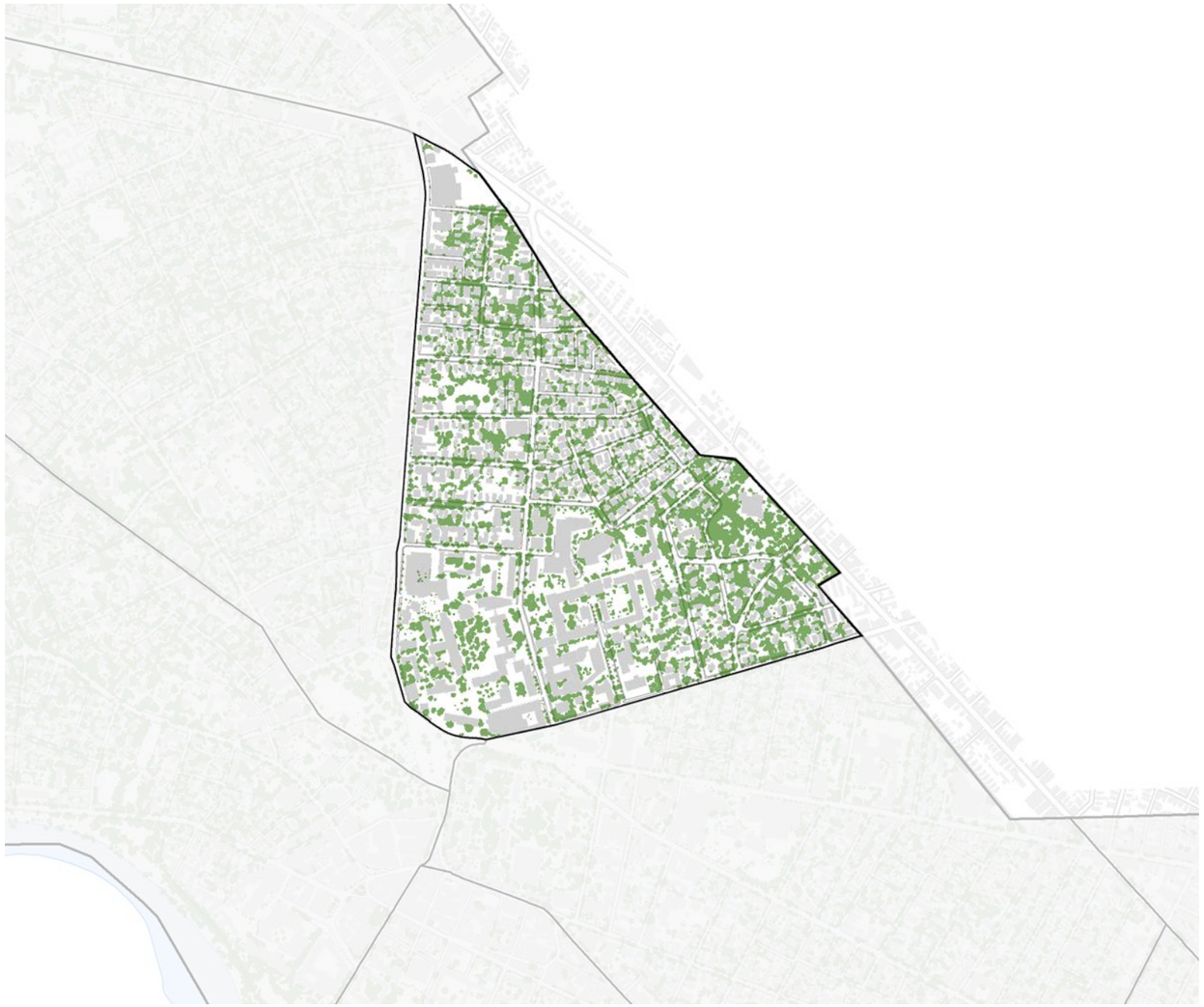
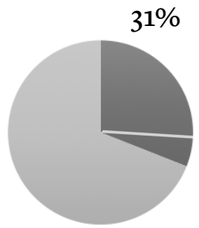




SURVEY RESULTS | CANOPY COVER
Neighborhood Nine — 31% Coverage



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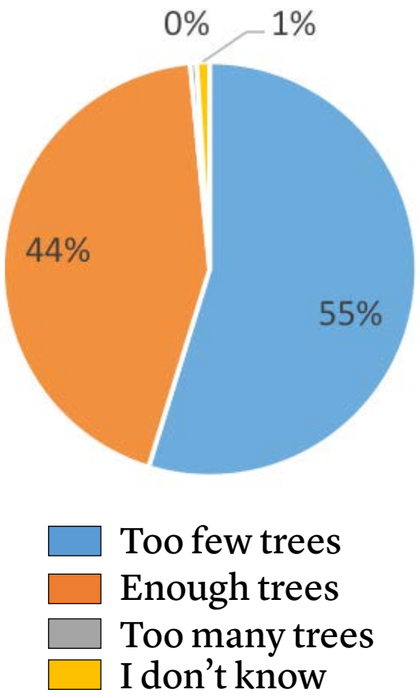
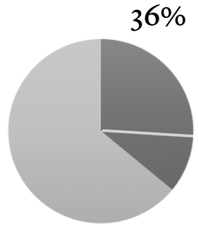


Strawberry Hill — 36% Coverage



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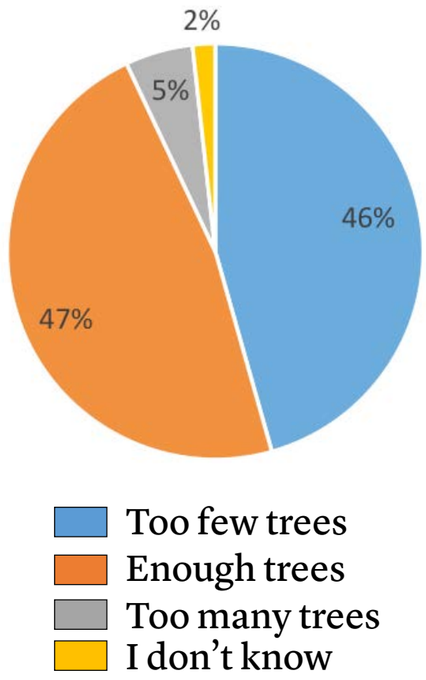
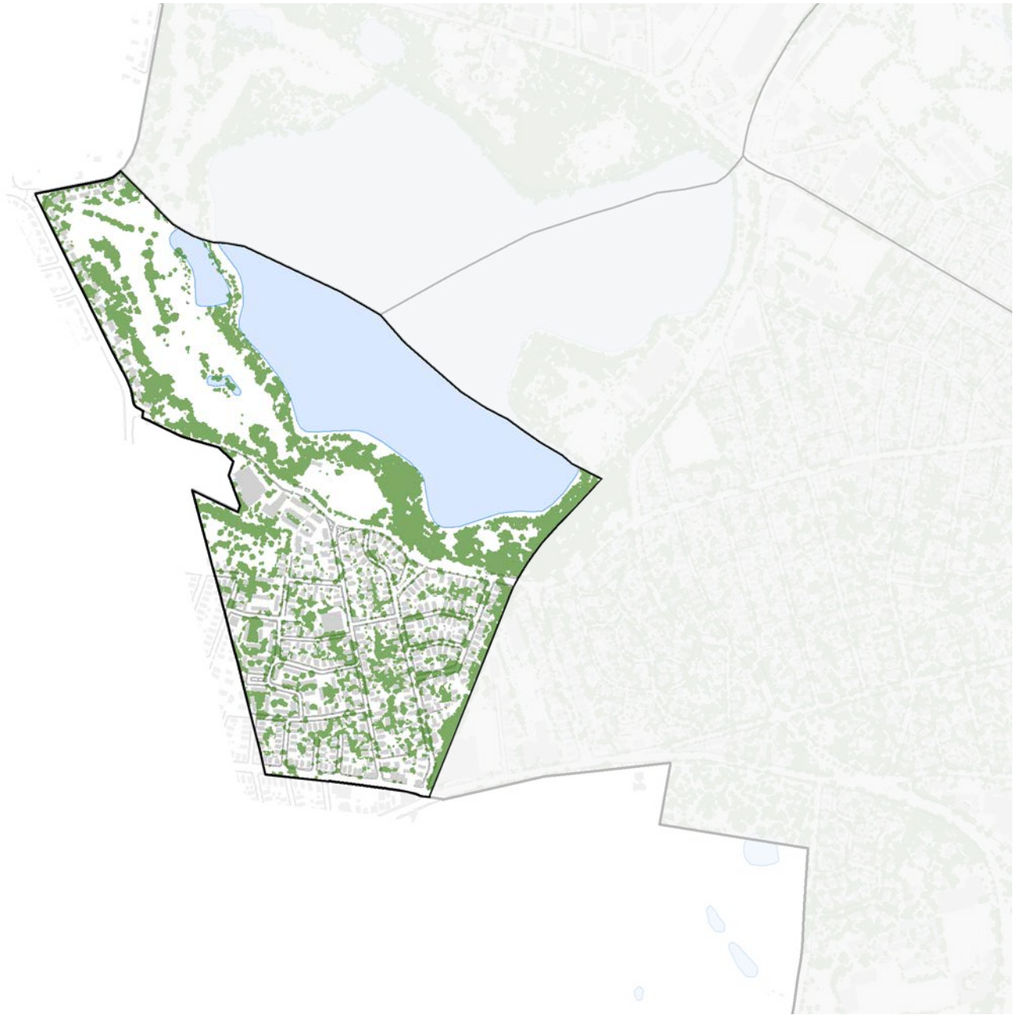
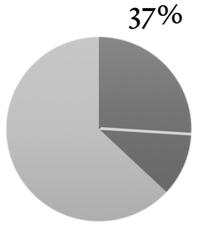




West Cambridge — 37% Coverage



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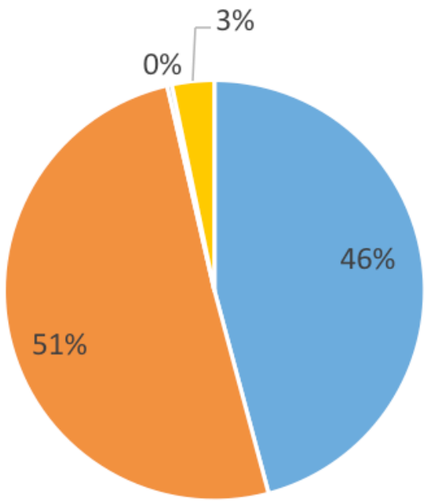
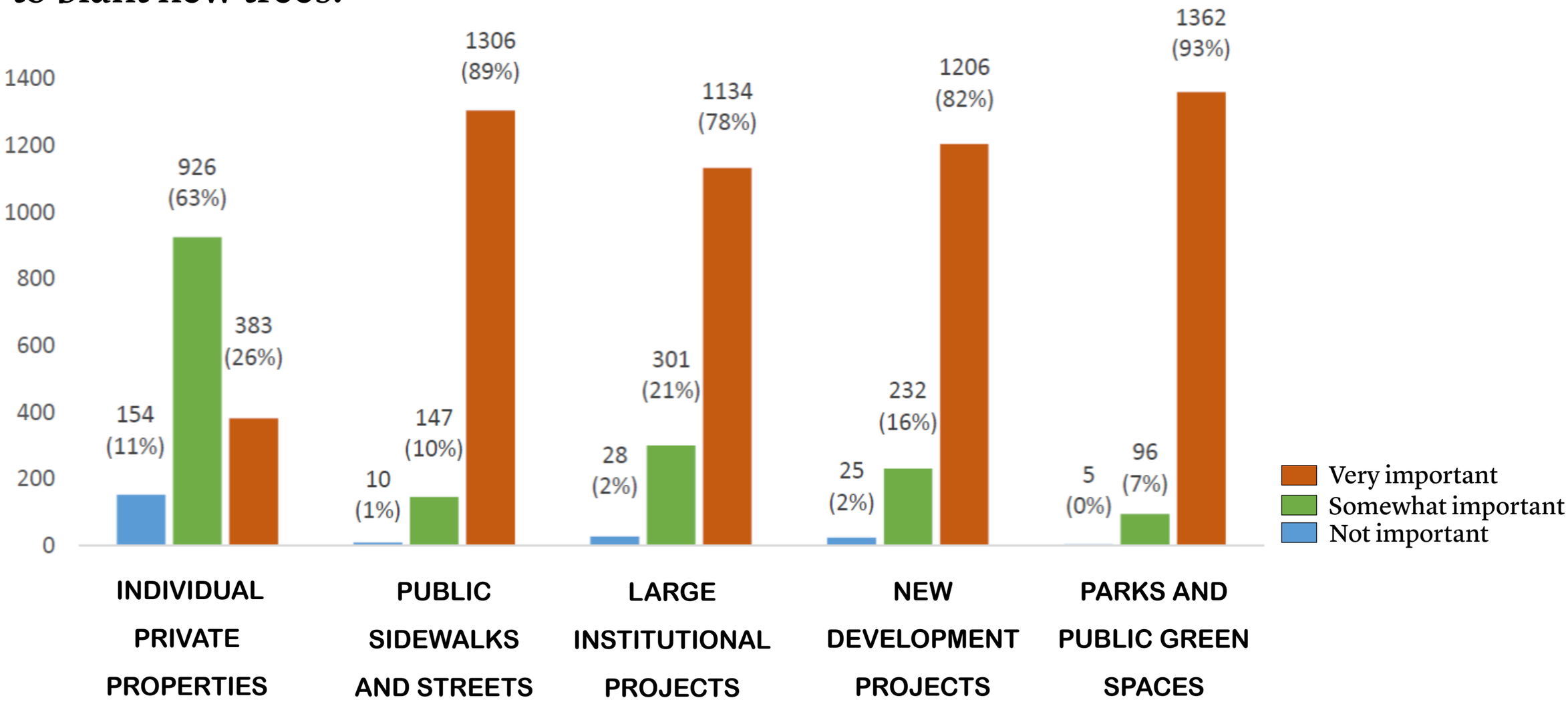
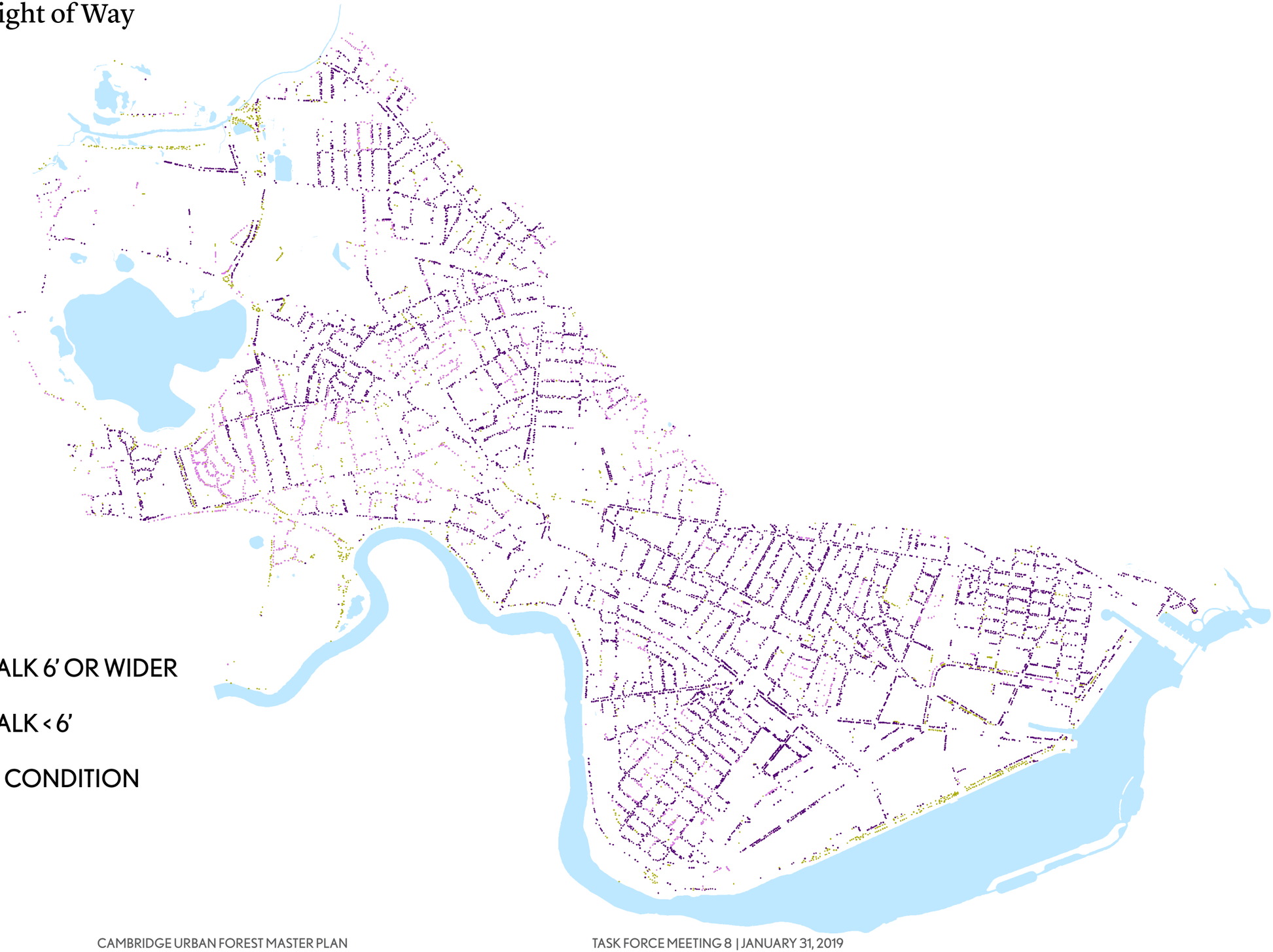


A majority (55%) stated that **public sidewalks and streets** were the **single most important** location to plant new trees when asked a follow up question about the single most important location to plant new trees.



ANALYSIS | PUBLIC REALM CANOPY COVER

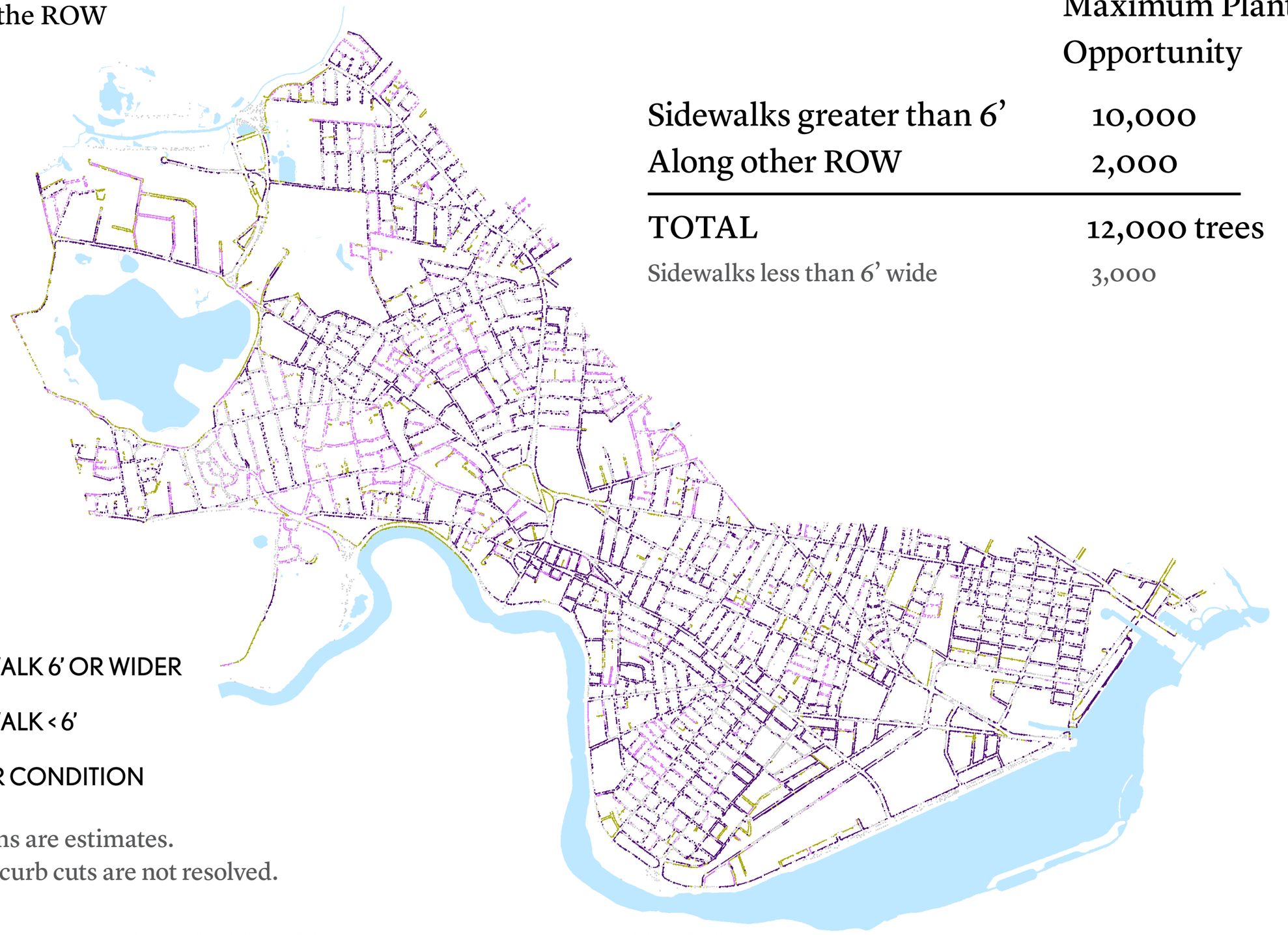
Current trees in the Right of Way



- STREET TREE ON SIDEWALK 6’ OR WIDER
- STREET TREE ON SIDEWALK < 6’
- ROW TREE IN ANOTHER CONDITION

ANALYSIS | PUBLIC REALM CANOPY COVER

Potential Planting in the ROW



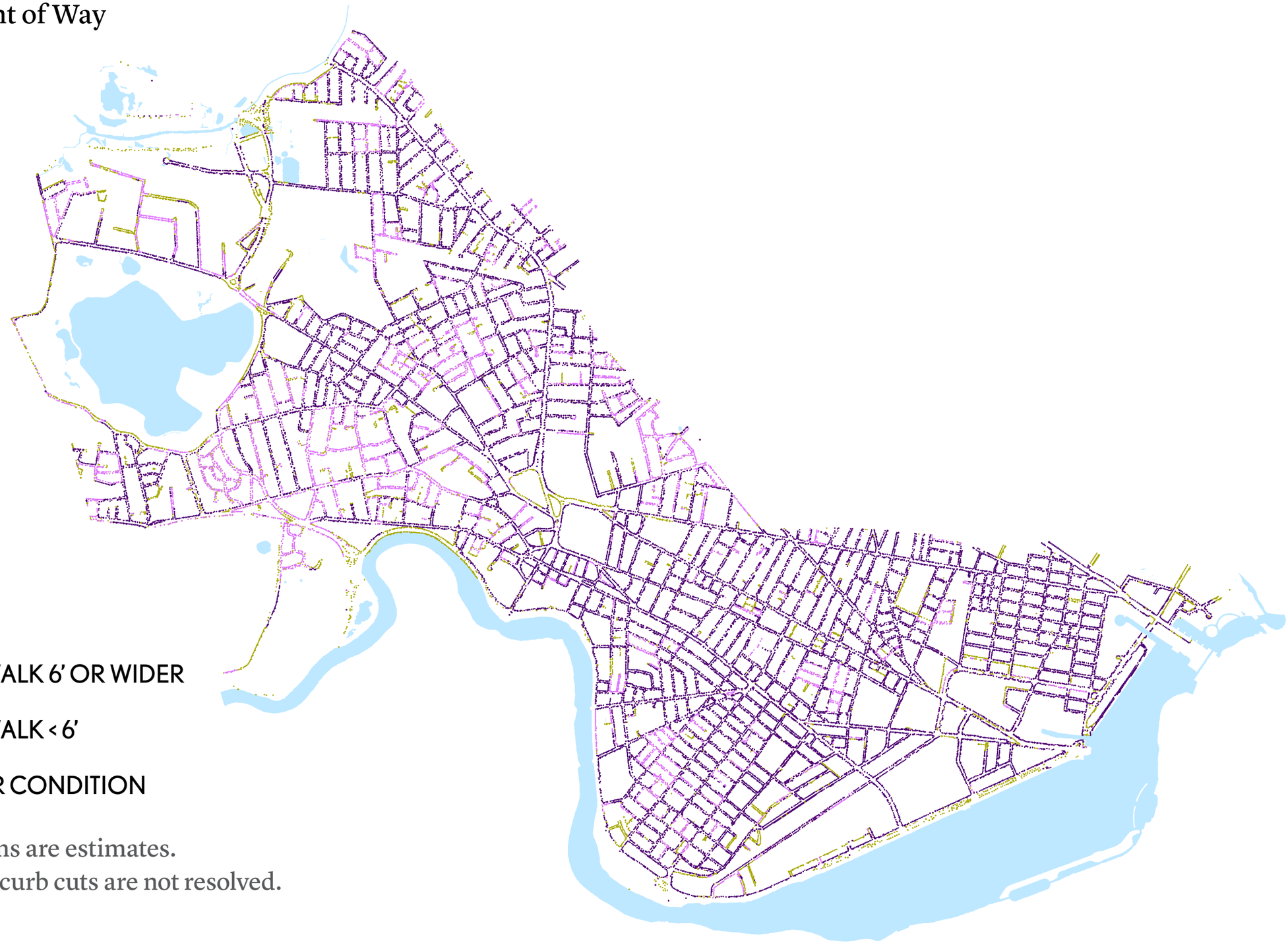
	Maximum Planting Opportunity
Sidewalks greater than 6’	10,000
Along other ROW	2,000
TOTAL	12,000 trees
Sidewalks less than 6’ wide	3,000

- STREET TREE ON SIDEWALK 6’ OR WIDER
- STREET TREE ON SIDEWALK < 6’
- ROW TREE IN ANOTHER CONDITION

Note: Potential tree locations are estimates.
Conflicts with utilities and curb cuts are not resolved.

ANALYSIS | PUBLIC REALM CANOPY COVER

Full Build Out of Right of Way



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Note: Potential tree locations are estimates.
Conflicts with utilities and curb cuts are not resolved.

ANALYSIS | PUBLIC REALM CANOPY COVER

Maximizing planting in ROW could increase canopy cover by 3.7% citywide

	2019	2030	2050
No. of Trees	Approx. 13,000	Plant 1,200 trees at 2” cal. per year for 10 years	Approx. 25,000
Canopy area (acres)	229	+10	+37
% Canopy citywide	26.0%	26.3%	26.9%
% Canopy cover in ROW (812 total acres)	28.2%	29.2%	31.7%

Assumptions:

9.5” dia canopy growth per year up to year 20 and 4.25” dia growth after that.

3% mortality rate for new plantings

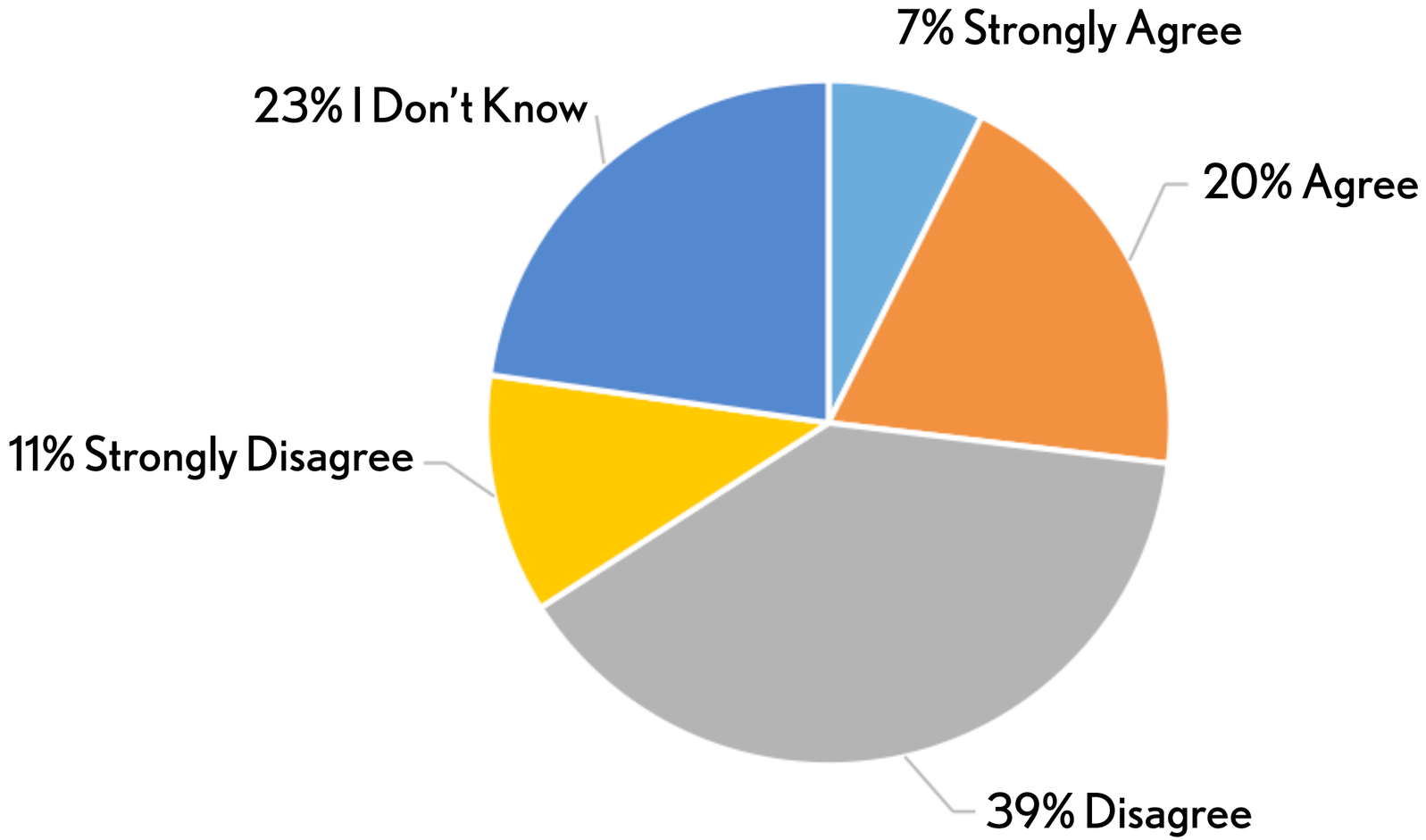
93% agree that the city should have laws to protect large, healthy trees **on public property.** (70% strongly agree, 23% agree)

and

58% agree that the city should have laws to protect large, healthy trees **on private property.** (27% strongly agree, 31% agree)

50% disagree (11% strongly disagree, 39% disagree) with the statement:

"private property owners should make decisions about trees on their property without input from the city."



86% agree that the city should **regulate removal** of trees during construction.

and

88% agree that the city should **require planting of new trees** on site if existing trees cannot be preserved.

81% agree that the city should use more resources to maintain and protect existing trees. (46% strongly agree, 35% agree)

but

43% said "I don't know" when asked whether the city should prioritize resources for other services over tree planting and maintenance.

67% agree that the city should **incentivize, not require**, tree planting and maintenance on private property.

and

77% agree that the city should **provide resources to residents** to plant trees on private property.

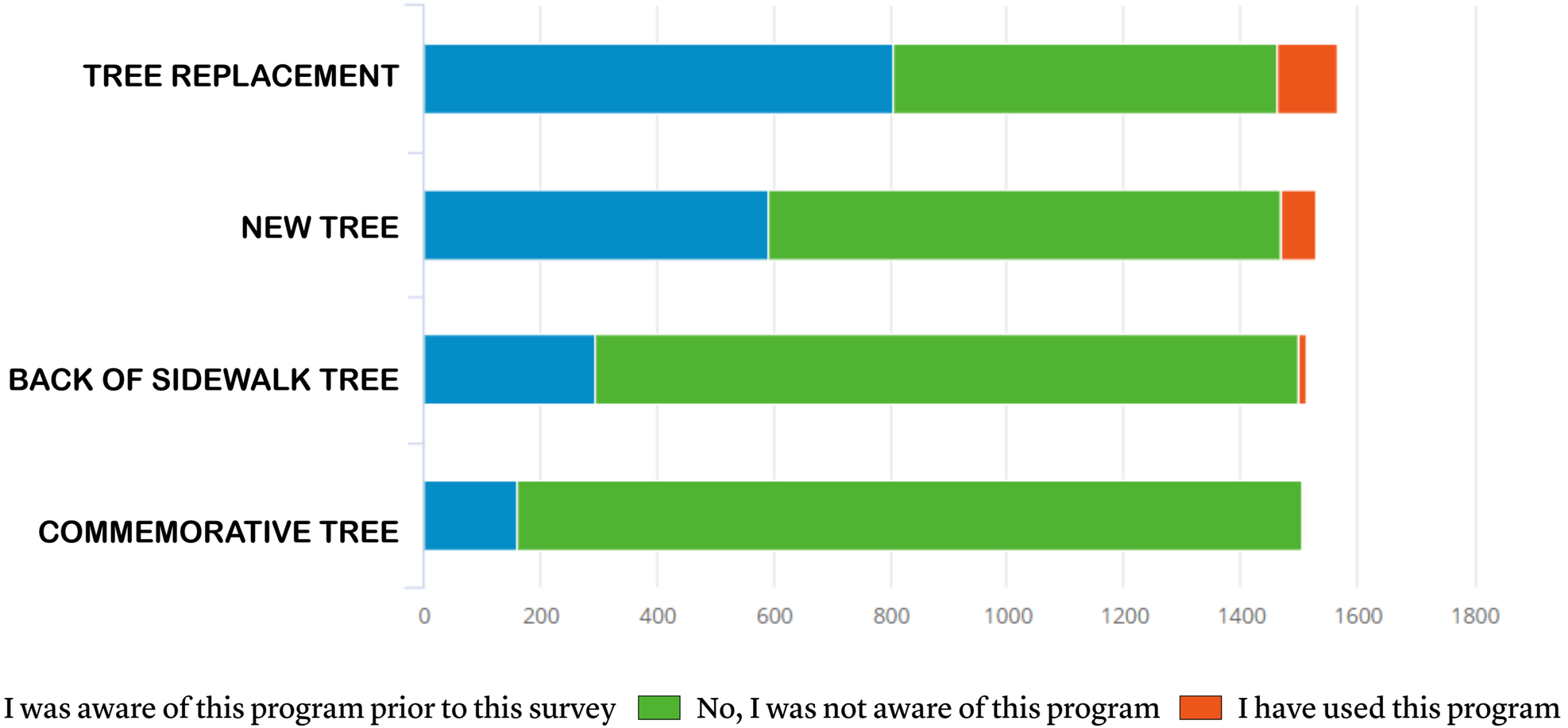
Respondents are broadly

unaware of city tree-related programs,

and in cases where they were aware,

use of the programs is very limited.

"Please tell us whether you are aware of each program and whether you have participated in them."



SURVEY RESULTS | PLANTING PROGRAMS

The New York Times

Free Trees? Many Detroit Residents Say No Thanks

It's not that residents don't like trees, a recent study found. They just don't quite trust the city to take care of them.

Members of The Greening of Detroit, a nonprofit group, planting a tree in the city's Osborn neighborhood in 2016. Carlos Osorio/Associated Press

By Steph Yin

Jan. 7, 2019 29

Deborah Westbrook, a lifelong resident of Detroit, would love a tree in front of her home.

"With a green tree in front of my house," she said, "and me looking at the green leaves, knowing that the tree and sun were mixing together to give off the oxygen we breathe? I would be proud. A tree in front of my house would not only help with the air, but it would help with me."

Nonetheless, when representatives from a local nonprofit came to plant trees on her block five years ago, Ms. Westbrook said no. So did more than 1,800 Detroiters — a quarter of all eligible residents — between 2011 and

CITYLAB

DESIGN / TRANSPORTATION / ENVIRONMENT / EQUITY / LIFE

John Kost, left, and Barry Johnson, citizen foresters for the nonprofit group The Greening of Detroit, plant a tree in the Osborn neighborhood in Detroit in 2016. // Carlos Osorio/AP

Why Detroit Residents Pushed Back Against Tree-Planting

BRENTIN MOCK JAN 11, 2019

Detroiters were refusing city-sponsored "free trees." A researcher found out the problem: She was the first person to ask them if they wanted them.

SHARE TWEET ...

A landmark report conducted by University of Michigan environmental sociologist Dorceta Taylor in 2014 warned of the "arrogance" of white environmentalists when they introduce green initiatives to black and brown communities. One black environmental professional Taylor interviewed for the report, Elliot Payne, described experiences where green groups "presumed to

Distrust of city and nonprofit planting group led to failure of planting program in Detroit.

PUBLIC SURVEY

POLICY

PRACTICES

POLICY STRATEGIES

STRATEGIES

		Policy			Planning/Design					Practices				Outreach/Other		
		Enhance Current Tree Protection Ordinance	Formalize City Practices	Clarify Planning and Zoning	Leverage Envision Cambridge and CCPR planning studies	Restrict Street Tree Planting to Only Suitable Areas	Create New Typologies for Street Tree Planting	Implement City-Wide Planting Plan to Focus Efforts	Site New Parks/Open Spaces Strategically	Improve City Planting Practices	Improve City Maintenance and Care Practices	Implement Soils Management Program	Monitor Tree Canopy and Adapt	Invest in Educational Programs	Build Community Partnerships	Seek Alternative Green Strategies
ACTION	**in response to …**	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Curb loss	Mature canopy decline	●													●	
	Land conversion	●		●	●							●			●	
	Residential removals	●		●										●	●	
	Poor tree condition	●	●	●		●				●	●	●		●	●	
	Narrow sidewalks			●		●										●
	Inadequate soil volume			●		●				●		●				
	Understanding the value of trees													●	●	
	Equity in distribution of canopy cover	●	●	●	●		●	●	●	●	●	●	●	●	●	

POLICY STRATEGY 1

Change the definition of "Significant Trees"

SUMMARY
For projects requiring a special permit from the Planning Board or development projects subject to large project review (25,000 sq. ft. or more), the city's tree protection ordinance provides certain protections. These protections only apply to "Significant Trees," which are defined as trees greater than 8" diameter at breast height (DBH).

ANALYSIS
It is unclear how the city determined the DBH threshold for significant trees but other cities and towns locally and across the country offer protections for trees with a lower DBH. In particular, protections for trees with 6" DBH or greater is common. Bartlett's inventory of Cambridge's tree canopy found that of 4,118 trees inventoried, 41 percent measured greater than 8 inch DBH versus 60 percent which measured 6" DBH or greater. If the city were to redefine Significant Trees as 6" DBH or greater, this would increase the number of trees captured under the ordinance for the purposes of new or redevelopment by about 49 percent.

PROS
Increases the number of trees protected by the provisions of the ordinance

Primary burden placed on developers rather than individual residents or the city

CONS
Would apply to more proposed development projects and thus require additional city resources to review and approve associated tree studies, mitigation, and protection plans

May require more city resources for enforcement because of the increased number of sites

PRECEDENTS
National
Atlanta, Georgia
Seattle, Washington
Oakland, Florida
Miami, Florida
Anna, Texas

Local
Concord, Massachusetts
Lexington, Massachusetts
Brookline, Massachusetts

POLICY STRATEGY 5

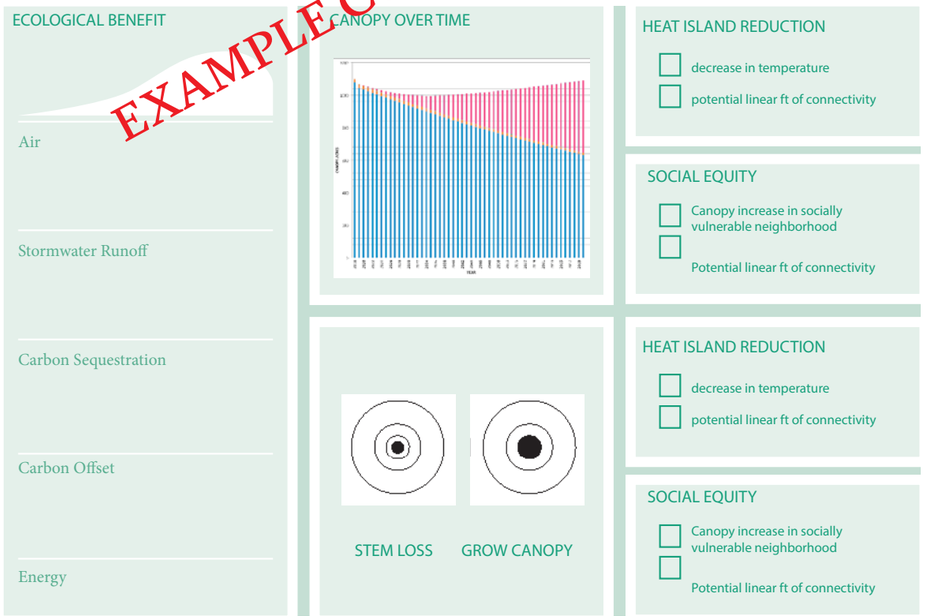
Change mitigation requirements under tree protection ordinance

DESCRIPTION
Under the current Tree Protection Ordinance, a developer proposing to remove a Significant Tree must either replace the tree on site or pay into the Tree Replacement Fund. The current formula for payments into the Tree Replacement Fund is based on the average cost of a 2-inch caliper tree multiplied by a factor of 4 for installation, maintenance, and potential replacement over a five-year period (about $1,000/tree) plus additional maintenance costs associated with watering and pruning (about $300/tree).

BENEFIT
As an example, a developer would have to mitigate with $284,000 instead of the current $71,000 for 110 total diameter at breast height (DBH) removals. This increase would allow the city to plant an additional 500 trees.

COST
$X

IMPACT AREAS



1. Enhance Tree Protection Ordinance
    a. Change the definition of Significant Trees
    b. Create an “Exceptional Tree” category
    c. Change mitigation requirements
2. Enhance the role of the Committee on Public Planting
3. Expand tree protections to private property
4. Earmark Tree Replacement Fund dollars for community grants
5. Align planting protocols with City’s commitment to equity
6. Increase oversight to ensure compliance
7. Strengthen zoning ordinance requirements
    a. Establish canopy coverage requirements
    b. Increase ratios for trees to parking spaces and/or dwelling units
    c. Increase setback and open space requirements in priority areas
    d. Establish flexible landscape mandate like Green Factor or Green Area Ratio

1. a. Change the definition of Significant Trees

Today, only trees greater than 8” dbh require mitigation and only when part of new development projects.*

Many cities regulate trees 6” dbh and greater.

* applies to certain multifamily, townhouse and other projects requiring a special permit from the Planning Board or development projects of 25,000 square feet or more.

POLICY STRATEGIES | ENHANCE CURRENT TREE PROTECTION ORDINANCE

Special Permits 2009-2018

207 acres (148 projects)

20.1 acres of canopy in 2009

12.9 acres (1484 trees*)removed

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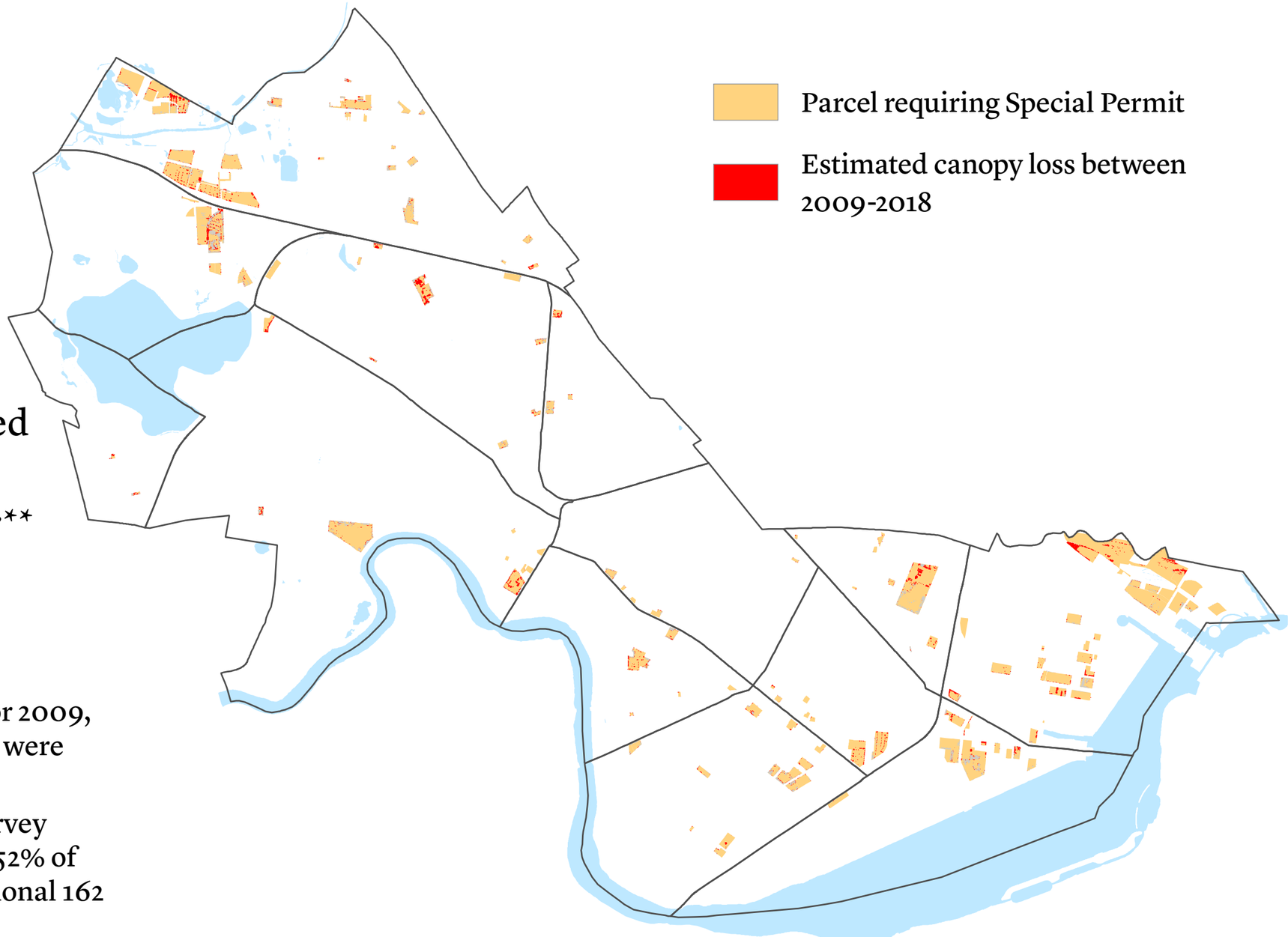
162 additional trees are estimated to be covered by the ordinance if it pertained to 6” dbh or greater**



Assumptions:

*Use the 2018 ratio of canopy acres to trees for 2009, (115 trees/acre), then we can infer 1,484 trees were loss in the special permits area.

**Based on age class distribution per 2018 survey (41% of the forest is greater than 8”dbh, and 52% of the forest is 6” dbh or greater), then an additional 162 trees would be protected.

Compensation to the tree fund

162 trees at 7” dbh = 1134” dbh to be mitigated

567 total trees at 2” caliper x $1,700 = $963,900 to tree fund*

*2009-2018 timeframe

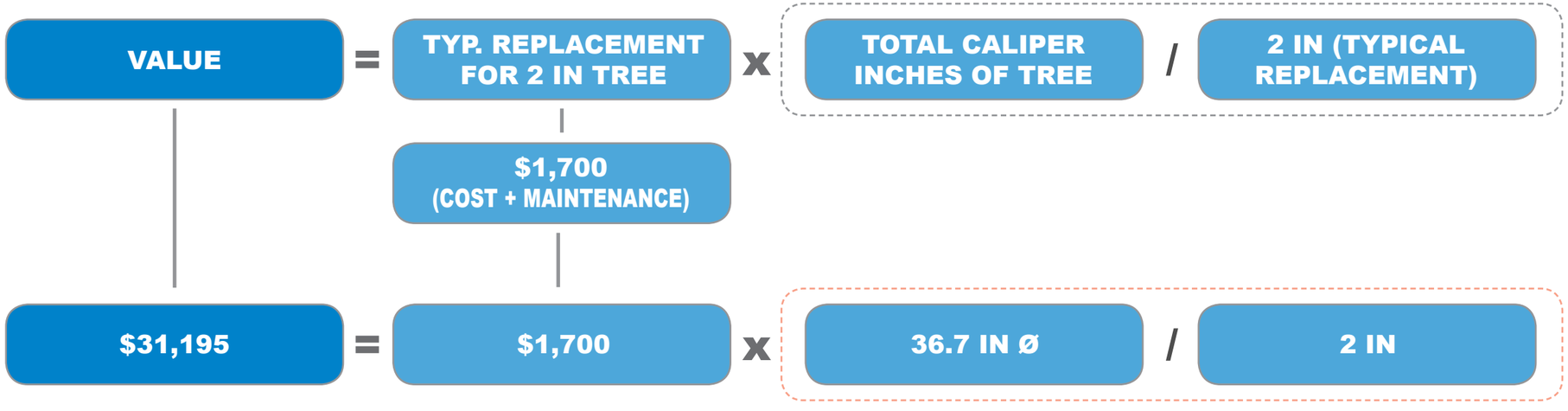
1. b. Create an “Exceptional Tree” category

The addition of an “Exceptional Tree” category in the City’s Tree Protection Ordinance would allow for a more stringent set of protections than those currently applied to Significant Trees in order to protect the city’s most valuable trees.

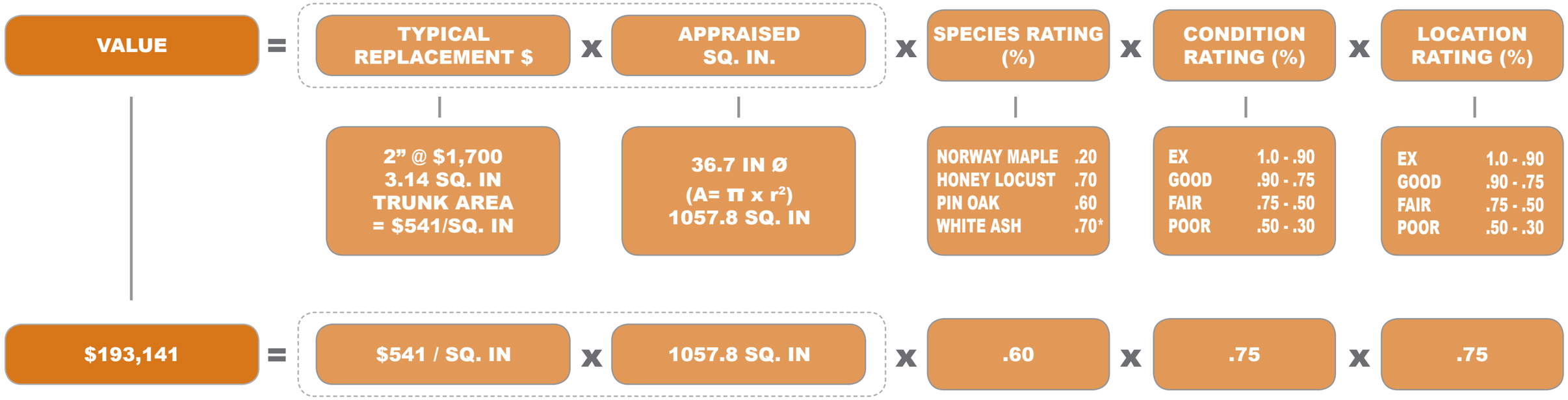
POLICY STRATEGIES | ENHANCE CURRENT TREE PROTECTION ORDINANCE

1.c. Increase mitigation costs to reflect lost value

TYPICAL CALIPER REPLACEMENT VALUE



WEIGHTED TRUNK AREA REPLACEMENT VALUE



1.c. Increase mitigation costs to reflect lost value

Special permits example:
162 trees at 7” dbh*

	153.95 sq. in
x	$541/sq. in
x	162 trees
x	0.7 (species rating)
x	0.8 (condition)
x	0.75 (location)
=	$5,666,844

*2009-2018 timeframe, assuming honey locust in good condition/location

2. Enhance role of Committee on Public Planting

Provide the Public Planting Committee with resources to extend the discussion of subjects raised by the UFMP, including

— interpreting recommendations
— updating analysis based on current research
— reviewing pilot projects
— reviewing progress toward targets

3. Expand tree protections to private property

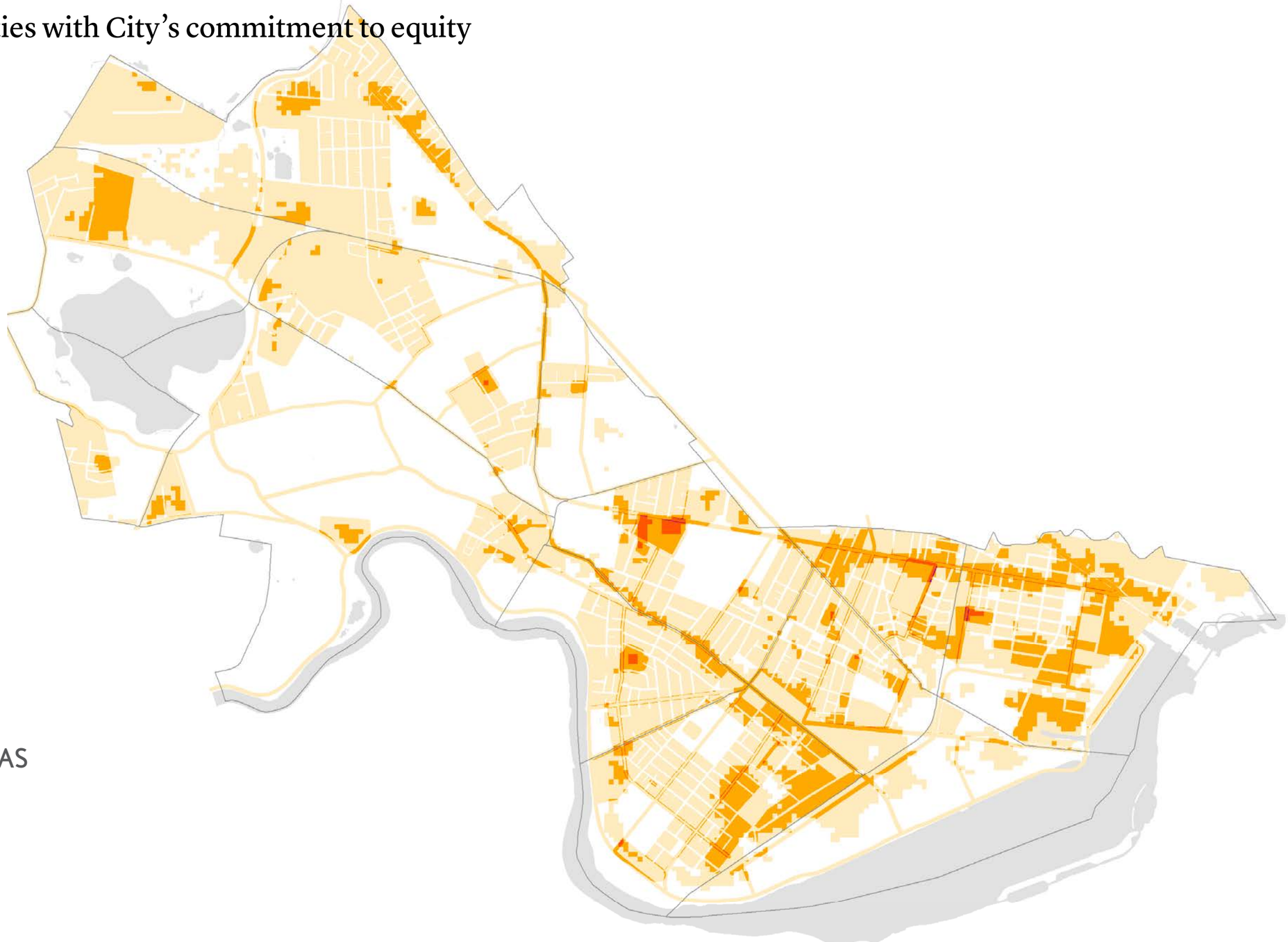
Many cities locally and across the country have expanded the jurisdiction of local governments through tree protection ordinances by r**equiring a removal permit for all trees**, regardless of whether they are **on public or private property**.

Circumstances under which the city approves a tree removal permit vary in stringency but could range from approving every request to prohibiting removal of any healthy tree. However, the success of this approach has not been well established.

4. Earmark Tree Replacement Fund dollars for community grants

The city could earmark some of the funds in the Tree Replacement Fund for **community-based grant making** that could help fund operations to encourage planting on private property.

5. Align planting priorities with City's commitment to equity



PLANTING PRIORITY AREAS

- Highest Priority
- High Priority
- Medium Priority

6. Increase oversight to ensure compliance

Currently, there is limited City oversight to ensure compliance.

The Tree Protection Ordinance does not currently define standards for tree protection during construction.

6. Increase oversight to ensure compliance

Require increased offset from tree dripline to protect tree roots

Require periodic review per an order of conditions to improve tree protection measures (fencing, watering) during construction

Require city arborist/city engineer inspection prior to obtaining Certificate of Occupancy

7. Broaden and align zoning requirements

a. Establish canopy coverage requirements

b. Increase ratios for trees to parking spaces and/or dwelling units

c. Increase setback and open space requirements in priority areas

d. Establish flexible landscape mandate like Green Factor
or Green Area Ratio

Integrate canopy goals and resilience zoning

Climate Resilience Zoning

Climate Resilience Zoning Task Force

The City Manager has appointed a Climate Resilience Zoning Task Force representing a variety of community stakeholders and perspectives to work through resiliency elements raised during the Envision process and through the Douglas Brown, et al., with the input of the appropriate City agencies and departments. This task force is being created to build upon the City's 2017 Climate Change Vulnerability Assessment (CCVA) and ongoing Climate Change Preparedness and Resilience (CCPR) planning efforts and to advise on development standards that can be incorporated into the Zoning Ordinance that would result in new development that is more resilient to climate change risks. Specifically, this group will focus on zoning recommendations that address the climate change impacts identified in the CCVA:

- Anticipated flooding due to sea level rise, storm surge, and precipitation.
- Anticipated rise in temperatures exacerbated by the urban heat island effect.

The Latest | Schedule | Resources | **Members** | Documents

Residents

1. Doug Brown (Co Chair) - West Cambridge
2. Conrad Crawford - East Cambridge/Cambridge Redevelopment Authority
3. Ted Cohen - North Cambridge/Planning Board
4. Mike Nakagawa - North Cambridge

Union/Trades Rep

5. Louis Bacci Jr - Laborers Local 151/East Cambridge/Planning Board

Institutional/Non-Profit Representatives

6. Brian Goldberg - MIT Office of Sustainability
7. Tom Lucey - Harvard University
8. Margaret Moran - Cambridge Housing Authority
9. Deborah Ruhe - Just-a-Start

Business Representatives/Property Owners

10. Jason Alves - East Cambridge Business Assoc.
11. Nancy Donahue - Cambridge Chamber of Commerce
12. Joe Maguire - Alexandria
13. Tom Sullivan - Divco West
14. Mike Owu - MITIMCo

Subject Matter Experts

15. Tom Chase - Energy & Resilience Consultant, New Ecology
16. Lauren Miller - Climate Consultant, CDM Smith
17. Jim Newman - Resilience Consultant, Linnaean Solutions

I'd like to learn more about…
Select a Topic

Neighborhood or Square
Select One

Current Projects…
Select One

Click the Map to Explore Cambridge

A 5-STAR Community and National Leader in Sustainability

STAR COMMUNITY RATING®

Google translate

Community Development

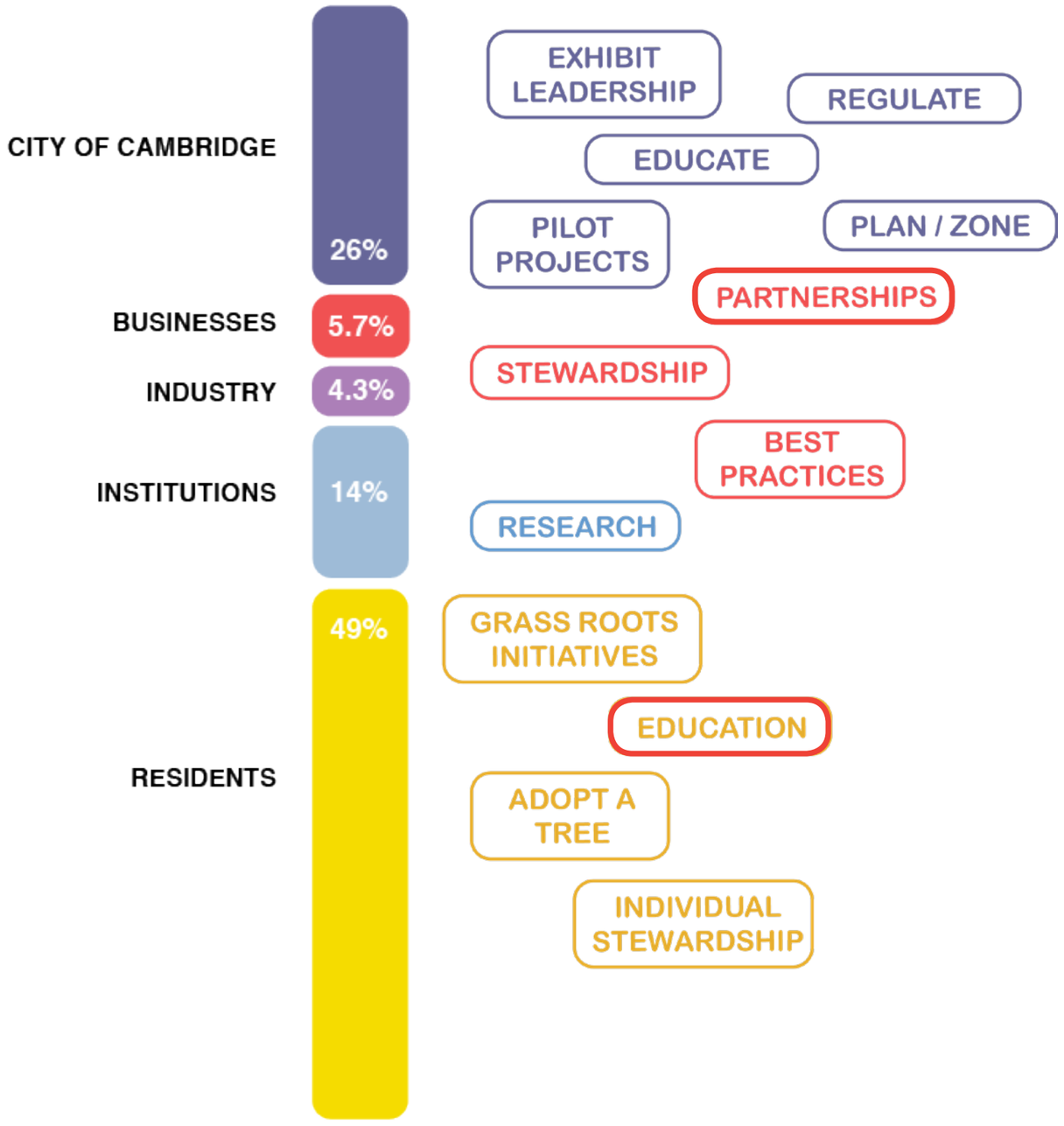
Iram Farooq
Assistant City Manager for Community

Did we miss any strategies?

Any clarification required?

Where are gaps?

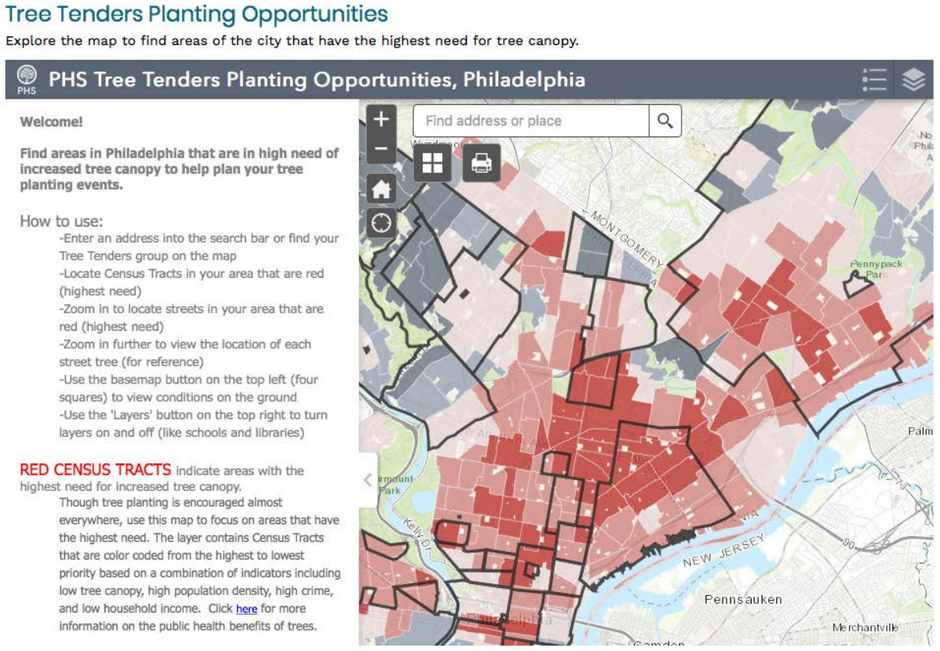
Among strategies proposed, policy is least effective at growing canopy on private property.



Empower existing NGOs to plant and maintain more trees, including on private property.

TREE TENDERS (PENNSYLVANIA HORITCULTURAL SOCIETY)

- Hands-on tree care training, covering biology, identification, planting and proper care
- Tree Planting Opportunities Map for tree planting events
- Tree Tenders Book Club
- Video Library



Support community employment and involvement in tree planting and constructing bioswales.

YALE URBAN RESOURCES INITIATIVE

Community Greenspace provides material supplies, technical advice, and clasroom-based and hands-on training to support resident-driven community greening projects.

GreenSkills is a local green jobs program that employs high school students and adults with employment barriers through the planting of trees.

Green Infrastructure, a partnership with the City of New Haven to construct bioswales.

Build capacity of existing NGOs through partnerships with national organizations.

ABROR DAY FOUNDATION – ALLIANCE FOR COMMUNITY NETWORK

- Nonprofit organizations, urban forest councils, municipalities and individuals can join the alliance.
- Arbor Day offers education & training to its members and provides online tree planting and care resources.

A Strong Network Focused on Trees

With more than 90% of Americans living and working in towns and metropolitan areas, the need for informed action on a local level is greater than ever.

The Arbor Day Foundation's Alliance for Community Trees network is composed of community-based organizations dedicated to planting and caring for trees. These passionate nonprofits are the boots on the ground — the purest and best definition of grass roots. Their hands are in the dirt; their impact is undeniable. And as a unified force, they are changing towns and cities across the country.

Tree Health Guide

Find immediate access to a network of professionals with this online tree care guide.

Pruning Guide

Make a difference in your tree's health and longevity with proper pruning.

Planting Your Trees

- Bare root trees.
- Potted trees.
- Balled/burlapped trees.

Your 10 Free Trees

Identify the trees sent to you in the mail by their painted color.

Storm Recovery Kit

Save damaged trees in your yard and in your community.

Tree Care Video Library

Learn the best practices in tree care through these tutorials.

Educate city staff, institutions, and other grounds managers on the value of trees and how to be stewards of them.

DAVEY TREE

- Employee education programs
- Davey Tree Fund supports arboriculture and urban forestry education

ENGAGED EMPLOYEES

Share

Continuing Education at Davey

The Davey Institute provides employees opportunities to earn Continuing Education Units (CEUs) to maintain their International Society of Arboriculture (ISA) Certified Arborist® accreditation through online courses. The Davey Institute website for education and training allows employees to access a variety of extension lessons on subjects such as tree care and lawn care. All tree-related lessons have been approved for ISA re-certification credits, and many states have approved Davey's courses for state pesticide applicator CEU credits. Providing continuing education opportunities and resources to our employees is just one way we foster personal and professional development and create pathways for growth and career advancement at Davey.

ENGAGED EMPLOYEES

Share

Davey Establishes Educational Endowment for TREE Fund

The Davey Tree Expert Company proudly pledged a $250,000 educational endowment fund through TREE Fund. The Davey Fund supports community-based arboricultural education in the United States. Davey Tree has a history of supporting TREE Fund's dedication to furthering scientific discovery and research in the field of arboriculture and has given more than $500,000 in donations and in-kind gifts over the last 15 years. TREE Fund is a 501(c)3 nonprofit dedicated to supporting scientific discovery and dissemination of new knowledge in the fields of arboriculture and urban forestry. Its primary public outreach and fundraising event is the green industry renowned Tour des Trees, an annual weeklong, 500+ mile cycling adventure. Since 1992 Tour riders have cycled through communities in the U.S., Canada and the U.K., planting trees, educating children and shining a light on the work done by arboriculture professionals and the importance of science-based tree care. Davey's pledge of

Educate the public on the value of trees and how to be stewards of them.

PENNSYLVANIA HORITCULTURAL SOCIETY

Green City Teachers
a training program that enables educators to start school gardens

Garden Tenders
a training program for starting community gardens on vacant lots, in parks, around schools and churches etc.

City Harvest
thousands of seedlings are started at neighborhood-based greenhouses by nonprofit partners as well as by inmates of the Philadelphia Prison System at a prison greenhouse through a training program.

POLICY STRATEGIES | POTENTIAL PARTNERS

Green Cambridge
Charles River Watershed Association
Mystic River Watershed Association
Charles River Conservancy
The Cambridge Community Gardens
A Better Cambridge
Cambridge Residents Alliance
Agassiz Baldwin Community
East Cambridge Planning Team
East End House
Neighborhood Association of East Cambridge
Mid-Cambridge Neighborhood Association
Cambridgeport Neighborhood Association
Cambridge Residents Alliance
Wellington-Harrington Neighborhood Association
Area Four Neighborhood Coalition
Essex Street Neighbors
Margaret Fuller House
Cambridge Community Center
Riverside Neighborhood Association
Taylor Square Neighborhood Association
Fresh Pond Residents Alliance
North Cambridge Stabilization Committee
Cambridge Highlands Neighborhood Association
Harvard Square Neighborhood Association
Inman Square Neighborhood Association
Porter Square Neighbors Association
Central Square Business Association

PUBLIC SURVEY

POLICY

PRACTICES

The City of Cambridge forest management practices are generally aligned with best industry standards.

To stem loss and increase gain
enhanced practices fall into four categories:

improve monitoring and responsiveness
remediate causes of decline
improve planting and soils details
expand routine maintenance

ENHANCE PRACTICES | OVERVIEW

Cambridge Urban Forest
Strategy Matrix

ACTION	in response to …	1 Enhance Current Tree Protection Ordinance (Policy)	2 Formalize City Practices (Policy)	3 Clarify Planning and Zoning (Policy)	4 Leverage Envision Cambridge and CCPR planning studies (Planning/Design)	5 Restrict Street Tree Planting to Only Suitable Areas (Planning/Design)	6 Create New Typologies for Street Tree Planting (Planning/Design)	7 Implement City-Wide Planting Plan to Focus Efforts (Planning/Design)	8 Site New Parks/Open Spaces Strategically (Planning/Design)	9 Improve City Planting Practices (Practices)	10 Improve City Maintenance and Care Practices (Practices)	11 Implement Soils Management Program (Practices)	12 Monitor Tree Canopy and Adapt (Practices)	13 Invest in Educational Programs (Outreach/Other)	14 Build Community Partnerships (Outreach/Other)	15 Seek Alternative Green Strategies (Outreach/Other)
	Mature canopy decline	•													•	
	Land conversion	•		•	•							•			•	
	Residential removals	•		•										•	•	
Curb loss	Poor tree condition	•	•	•		•				•	•	•		•	•	
	Narrow sidewalks			•		•										•
	Inadequate soil volume			•		•				•		•				
	Understanding the value of trees													•	•	
Grow canopy	Equity in distribution of canopy cover	•	•	•	•		•	•	•	•	•	•	•	•	•	
	Shading and cooling / pedestrian thermal comfort	•	•	•	•		•	•	•	•	•	•	•		•	
	Environmental quality / wellbeing and public health	•	•	•	•		•	•	•	•	•	•	•		•	•
	Ecological connectivity	•		•	•		•	•	•	•	•	•	•			•
	Diversity of forest composition						•	•		•			•			
	Disaster response preparedness				•			•		•			•	•	•	•

MONITOR

—Enhance tree assessments
—Expand pest monitoring
—Expand Cartegraph tracking to monitor success of practices

REMEDIATE

—Manage soils
    —Liquid biological amendments
    —Decompaction/Aeration
—Treat private trees during severe pest outbreaks (EAB)

PLANT

—Enhance soil specs
—Ensure proper drainage
— Plant bare root trees
—Revise tree species list
—Prune and water more frequently and longer

MAINTAIN

—Formalize a City-wide management plan
—Manage soils
    —Mulching
    —Liquid biological amendments
—Expand irrigation program

Increase frequency of city-wide tree assessments.

BENEFITS

allows identification of stressed trees for remediation practices

SCOPE

High: Survey trees on a 3 year cycle

Low: Survey trees on a 5 year cycle

Expand pest/disease monitoring.

BENEFITS

Allows treatment at start of outbreak

SCOPE OF APPLICATION

Monitor specifically for pests/diseases that are systemic city-wide threat

SCOPE OF WORK

High: Traps and tree assessments

Low: Traps

Track all treatments (ie., soil management) in Cartegraph (City inventory software).

BENEFITS

Ability to assess success of treatments

SCOPE OF APPLICATION

All trees when pruned by contractors
All trees treated with liquid biological amendments and decompaction measures

SCOPE OF WORK

Record treatment in Cartegraph through mobile device at time of treatment

Treat private trees during city-wide pest/disease outbreaks.

BENEFITS

In the case of Emerald Ash Borer (EAB) the City is currently treating 883 City trees, approx. 2% of City canopy

LiDAR survey indicates there are 1,536 Ash in the City, approx. 4% of the City canopy

Expanding EAB treatment to private trees could save additional 2% of canopy

SCOPE

Treat approx. 650 private trees with TreeAzin injections per City spec

650 trees x $142/tree = $92,300 / year

Treat underperforming trees with liquid biological amendments.

BENEFITS

Improve nutrient availability
Reduce compaction

SCOPE OF APPLICATION

High: all publicly owned trees
Medium: all publicly-owned trees under 20 years of age
Low: all trees showing signs of fair-poor cond. (per city-wide tree assessment)

SCOPE OF WORK

Soil injections of 10 gallon liquid (compost tea) @ 4 points per tree
Approximately 10 minutes per tree

FREQUENCY

High: yearly, half of the trees in spring and half in fall
Low: 1/3 of trees each year, 3 year cycle of treatment

Treat compacted soil through mechanical decompaction.

BENEFITS

Reduce compaction
Enhance moisture retention

SCOPE OF APPLICATION

High: All publicly owned non-street trees
Low: Park trees in areas of high use

SCOPE OF WORK

Airspade zones within dripline of each tree or group of trees
Incorporate high-quality compost with airspade
Approximately 60 minutes per tree

FREQUENCY

High: each tree every year, half of the trees in spring and half in fall
Medium: each tree every two years, a quarter of the trees in spring and quarter in fall
Low: once, half the trees in the spring, half in the fall

Incorporate drainage measures in new plantings.

BENEFITS

Prevent roots from potentially sitting in water and dying

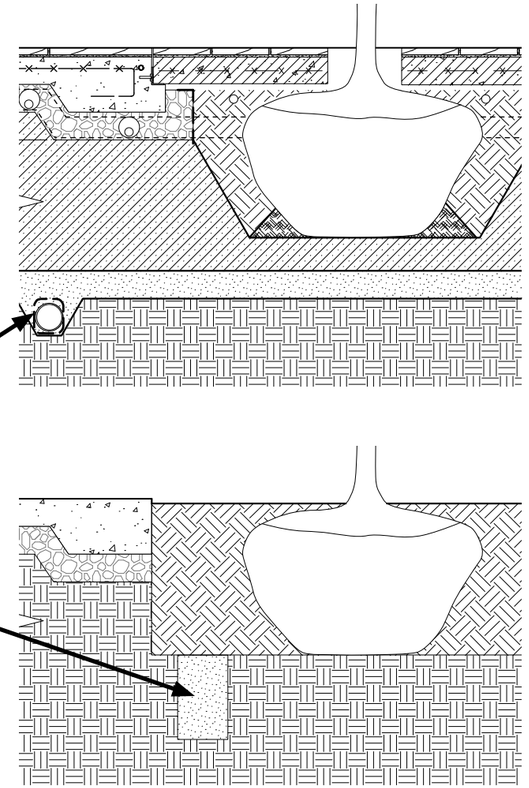
SCOPE OF APPLICATION

Test all new plantings, remediate where needed

SCOPE OF WORK

High: Underdrains at bottom of pits for new trees associated with large projects

Low: Augur sand wicks at bottom of pit for tree pits with poor drainage



Enhance soil specifications.

BENEFITS

A) Improve tree health and root capacity
B) Improve survival rates and growth rates

SCOPE OF APPLICATION

A) High: All publicly planted trees
B) Low: All publicly planted street trees

SCOPE OF WORK

A) Develop multiple soils blends to respond to specific conditions
    i. Structural soils
    ii. Suspended pavements
    iii. Parkland Turf
    iv. Beds and mixed planting
    v. Wetland
B) Incorporate biological guidelines into soil specification
C) Incorporate biochar within soils
D) Measure compaction by standard proctor
E) Require compliance testing by contractor

Increase frequency of structural pruning for young trees.

BENEFITS

Improve vitality and life span of young trees

SCOPE OF APPLICATION

High: All new City plantings + Require structural pruning of new trees planted under Special Permits for 5 yrs

Low: All new City plantings

SCOPE OF WORK

Selectively prune branches and stems larger than about half the diameter of the trunk.

FREQUENCY

High: Prune young trees on 3 year pruning cycle for 12 years of tree's life (Fourfold increase over current frequency)

Low: Prune young trees on 3 year pruning cycle for 6 years of tree's life (Twofold increase over current frequency)

Revise recommended tree species

Evaluation Criteria:

— Climate Resiliency Score

pest/disease susceptibility + drought + flood*

— Relative Urban Stress Tolerance (RUST) Score

pH, hardiness, sun, insect/diseases, physiological/environmental, moisture, salt, texture, compaction

— Size

— Location

— Sun Exposure

— Flooding tolerance

*flooding is weighted x0.5

ENHANCE PRACTICES | NEW PLANTINGS

Revise recommended tree species

NAME			CLIMATE RESILIENCY SCORE					ORIGIN		SIZE				TYPOLOGIES	
Genus	Species	Comm_Name	Flood score	Drought Score	Pest Score	Total score	RUST (Relative Urban Stress Tolerance)	Native	Non-native	Typical Range of Mature Crown Width	Small (Mature height less than 35 ft tall)	Medium (Mature height greater than 35 ft but less than 50 ft tall)	Large (Mature height greater than 50 ft tall)	CANOPY STREET TREES	UNDERWIRE STREET TREES
Abies	concolor	Fir-White	1	2	2	5.5			Yes	15-20'		X			
Acer	negundo	Boxelder	3	3	1	4.5	1.40	Yes		40-50'		X		X	
Acer	ginnala	Maple-Amur	1	2	1	6.5			Yes	15-25'	X				
Acer	nigrum	Maple-Black	1	2	1	6.5			Yes	40-50'			X		
Acer	platanoides	Maple-Crimson King Nc	1	3	1	5.5			Yes	30-45'			X		
Acer	x freemanii	Maple-Freeman	2	2	1	6			Yes	35-40'			X		
Acer	campestre	Maple-Hedge	1	3	1	5.5	4.14		Yes	25-35'	X				X
Acer	palmatum	Maple-Japanese	1	2	1	6.5			Yes	10-25'	X				
Acer	griseum	Maple-Paperbark	1	2	1	6.5			Yes	15-25'	X				
Acer	rubrum	Maple-Red	3	1	1	6.5	1.4	Yes		20-35'			X	X	
Acer	saccharinum	Maple-Silver	3	2	1	5.5	1.73	Yes		40-60'			X	X	
Acer	saccharum	Maple-Sugar	2	1	1	7	-0.72	Yes		30-50'			X		
Acer	tataricum	Maple-Tatarian	1	3	1	5.5			Yes	15-20'	X				
Acer	buergeranum	Maple-Trident	1	2	1	6.5	2.18		Yes	20-30'	X				X
Aesculus	glabra	Buckeye-Ohio	2	1	1	7	1.68		Yes	40-50'			X	X	
Aesculus	hippocastanum	Horsechestnut	2	2	1	6			Yes	40-50'			X		
Aesculus	x carnea	Horsechestnut-Red	2	2	1	6	0		Yes	30-40'		X			
Albizia	julibrissin	Mimosa	1	2	1	6.5			Yes	25-35'		X			
Alnus	glutinosa	Alder-Common	2	2	2	5	1.21		Yes	15-20'			X	X	
Amelanchier	x grandiflora	Serviceberry-Apple	2	2	3	4			Yes	15-25'	X				
Amelanchier	arborea	Serviceberry-Downy	2	1	3	5	0.72	Yes		10-20'	X				
Betula	pendula	Birch-European White	1	1	1	7.5			Yes	15-30'		X			
Betula	populifolia	Birch-Gray	1	1	1	7.5	1.43	Yes		10-20'		X		X	
Betula	papyrifera	Birch-Paper	2	1	1	7	2.95	Yes		25-50'			X	X	
Betula	nigra	Birch-River	2	2	1	6	3.03	Yes		40-60'			X	X	
Carpinus	caroliniana	Hornbeam-American	2	1	1	7	1.82	Yes		15-30'		X		X	
Carpinus	betulus	Hornbeam-European	2	3	3	3	0.12		Yes	35-40'		X			
Carya	tomentosa	Hickory-Mockernut	1	3	2	4.5	1.72	Yes		50-75'			X	X	
Carya	ovata	Hickory-Shagbark	1	2	2	5.5	4.11	Yes		50-75'			X	X	
Castanea	dentata	Chestnut-American	1	2	1	6.5			Yes	50-75'			X		
Cedrus	libani	Cedar of Lebanon	1	3	3	3.5			Yes	40-60'			X		

Plant bare root trees and manage a gravel bed nursery.

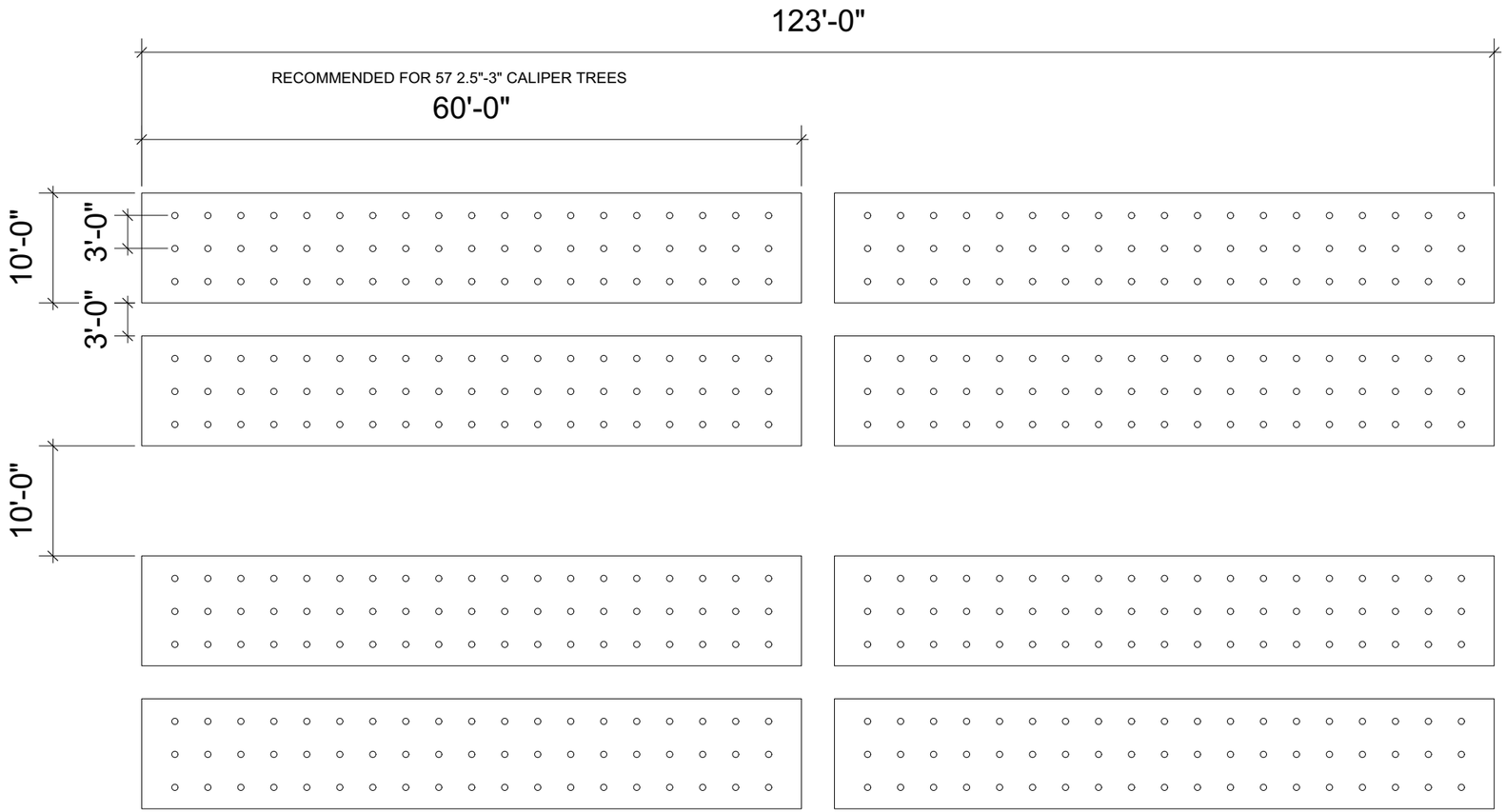
BENEFITS

Increase survival rates
Increase species selection
Lower installation costs
Expand season for planting

SCOPE OF WORK

Manage a gravel bed nursery
on city-owned land

Plant bare root trees and manage a gravel bed nursery.



Stem loss and enhance growth

Create City-wide Management Plan

BENEFITS: Codify management goals and delineate clear steps to achieve outcomes

Expanded mulching

BENEFITS: Improve soils and suppress weeds

Liquid biological amendments

BENEFITS: Improve soils and reduce compaction

Expanded irrigation program

BENEFITS: Improve tree survival rates and enhance growth

MONITOR

—Enhance tree assessments
—Expand pest monitoring
—Expand Cartegraph tracking to monitor success of practices

REMEDIATE

—Manage soils
    —Liquid biological amendments
    —Decompaction/Aeration
—Treat private trees during severe pest outbreaks (EAB)

PLANT

—Enhance soil specs
—Ensure proper drainage
— Plant bare root trees
—Revise tree species list
—Prune and water more frequently and longer

MAINTAIN

—Formalize a City-wide management plan
—Manage soils
    —Mulching
    —Liquid biological amendments
—Expand irrigation program

PUBLIC COMMENT

www.cambridgema.gov/ufmp

TASK FORCE MEETING SCHEDULE

JUNE 12	Introduction
JUNE 28	RESEARCH: Regulation and Management
JULY 26	RESEARCH: Goal Setting
AUGUST 30	RESEARCH: Ongoing Analysis + Climate Modeling
SEPTEMBER 27	RESEARCH: Summary of Findings
OCTOBER 25	Cancelled
NOVEMBER 29	TESTING: Baseline Change Model
DECEMBER 20	PROPOSAL DEVELOPMENT
JANUARY 31	PROPOSAL DEVELOPMENT
FEBRUARY 28	PROPOSAL DEVELOPMENT
MARCH 28	DRAFT DOCUMENTATION
APRIL 25	DRAFT DOCUMENTATION

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