

**Healthy
Forest**



**Healthy
City**

**A healthy forest
is a vital part of a
healthy city.**

**We all share a
responsibility
to care for our
urban forest.**



The City of Cambridge, Massachusetts

A vision for a healthy forest

CHARLES RIVER

CAMBRIDGE COMMON

Engaged Homeowners

Homeowners take advantage of the Back-of-Sidewalk program, planting front-yard trees that provide shade on sidewalks too narrow for street trees.

Collective Action

Private property owners plant and care for trees, collectively contribute to a resilient urban forest.

Habitat Connectivity

Birds, insects and small mammals find homes and food in the robust urban forest.

Reduced Heat

Increasing canopy cover to 30% citywide would lead to significant cooling of 38% of the city land area.

Energy Efficiency

Trees help reduce energy costs related to heating and cooling throughout the year.

Cool Corridors

People walk, bike and run to work because the streets are shaded and comfortable.

Shaded Storefronts

People chat on the streets and shop longer at their local businesses.

PORTER SQUARE

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Cleaner Air and Water
Trees reduce air pollution, mitigate pollutant in the stormwater and store carbon, creating a healthier city for the whole community.

A Resilient Forest
Diverse tree plantings make the forest more resilient to pests and diseases.

Reduced Heat
Underutilized areas, like traffic islands, alleys and rail corridors become resources for cooling and habitat.

CAMBRIGESIDE GALLERIA

Community Well-being
People gather and play at parks with robust canopy around the edges, providing refuge during the summer heat.

Equitable Canopy Distribution
More tree planting has reduced the heat impact caused by large areas of asphalt.

Shaded Transit Corridors
Transit shelters are shaded and people regularly use the bus system.

LECHMERE MBTA STATION

Redesigned Streets
Redesigned streets allow more space for soils and trees through innovative road and sidewalk design.

What is Cambridge's urban forest?

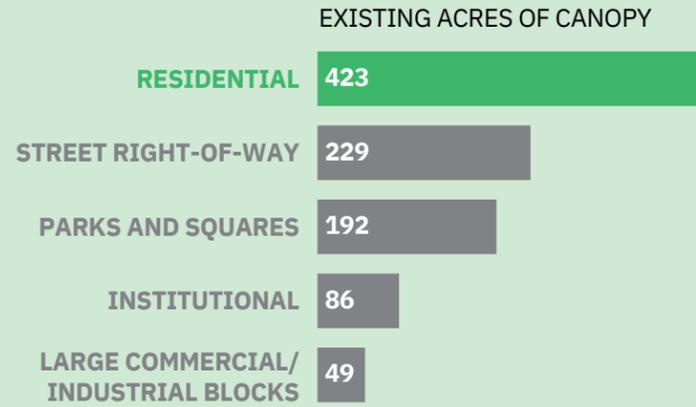
The urban forest is all of the trees in Cambridge — trees on streets and in parks, on private properties and campuses. This network of trees creates shade around our homes and shapes civic spaces where we gather together as a community. Trees make our city cooler in summer and clean the air we breathe. They also support a living ecosystem, benefiting water quality and providing food and habitat for mammals, birds, and insects.

More trees mean more shade and more habitat. More trees and healthier trees mean a healthier city.

The forest is diverse and in good health.

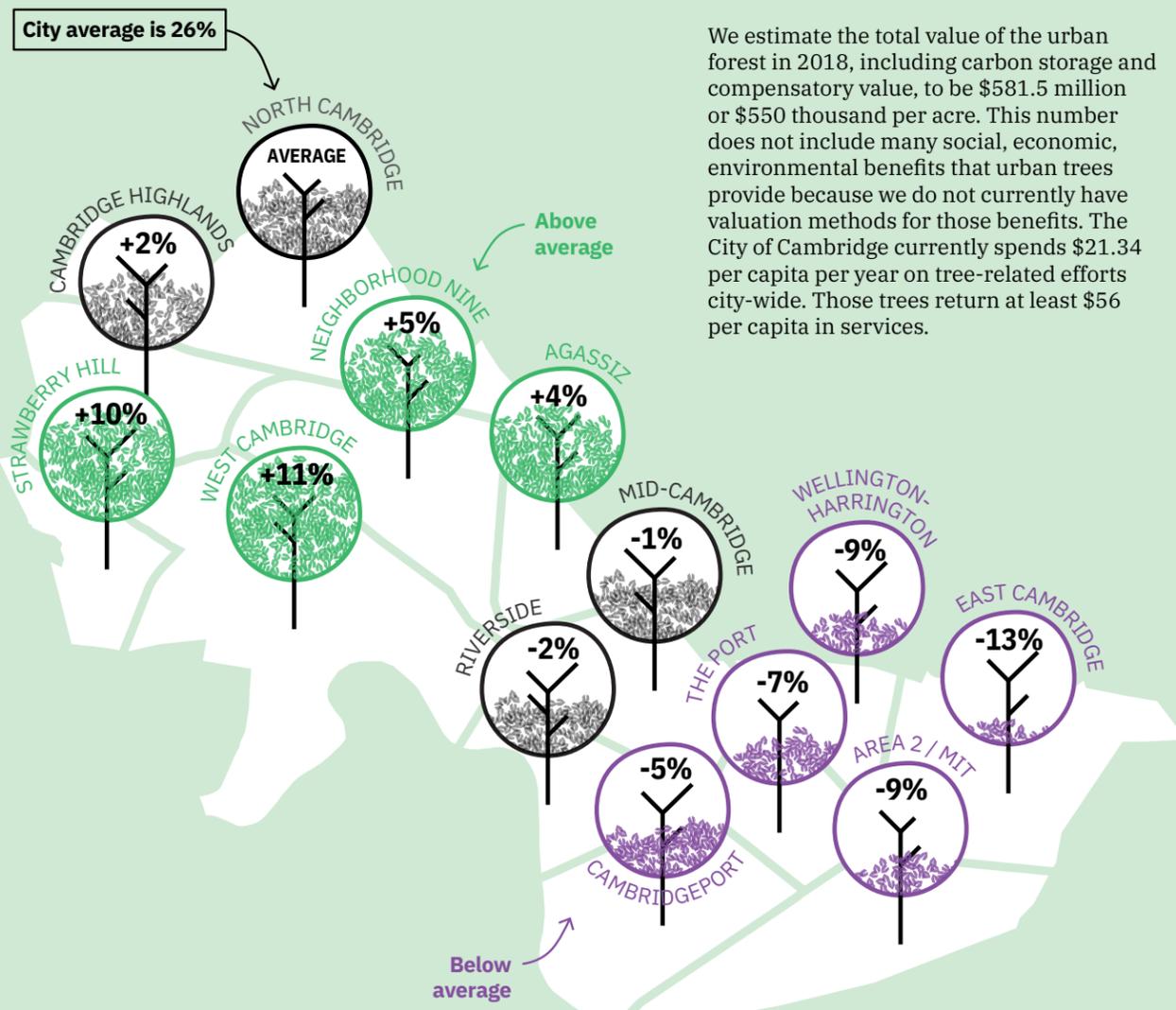
The vast majority of the City's trees are in good (62%) or fair condition (28%). That's pretty good in comparison to other cities our size.

Ten species make up roughly 64% of the urban forest. Norway Maple, Pin Oak and Honey locust are the highest in number, and comprise about 30% of the forest. This distribution is slightly less diverse than ideal for habitat and resilience. We need to be watchful not to plant too many of any one species, and to expand the range of species we do plant.



The forest has measurable value.

We estimate the total value of the urban forest in 2018, including carbon storage and compensatory value, to be \$581.5 million or \$550 thousand per acre. This number does not include many social, economic, environmental benefits that urban trees provide because we do not currently have valuation methods for those benefits. The City of Cambridge currently spends \$21.34 per capita per year on tree-related efforts city-wide. Those trees return at least \$56 per capita in services.



Tree canopy is not evenly distributed.

Trees are not evenly distributed throughout the City's neighborhoods. Canopy cover ranges from 13% to 39% depending on where you live or work. Areas of the City with more closely spaced buildings, more paved areas, less green space and fewer trees are more likely to suffer from heat extremes. Many of these neighborhoods also have a higher than average number of people most vulnerable to heat stress – those with lower incomes, minorities, the elderly, and non-native English speakers.

Planting trees cools the City.

Trees noticeably cool the air and surfaces in the city. Trees along streets and sidewalks can create continuous corridors of shade, and create cool corridors for walking and biking. Planting more trees in neighborhoods with low canopy cover can reduce heat stress for the people who live and work there. Existing low canopy areas tend to be the most densely populated and more challenging to plant. In some cases, making space for new trees will require rethinking our street and sidewalk design.

The most tree canopy and the most loss occurs on residential land.

A significant portion of the City's tree canopy – the leafy area of the tree as measured from above – shades our sidewalks and public open spaces, but the largest area of tree canopy lies on residential properties. The greatest rate of canopy loss is also happening on residential properties.

Narrow sidewalks and limited setbacks create difficult conditions for street trees.

Street trees are in better condition where adjacent buildings are set back from the sidewalk than where there is no setback. 39% of trees along sidewalks with no setback to buildings – even sidewalks greater than 8 feet wide – are in poor condition, higher than the city average. Because shade is so important to cooling our public realm – the shared spaces where our community gathers and the corridors along which people move throughout the city – it is critical that we design our sidewalks to support the growth of large canopy trees.

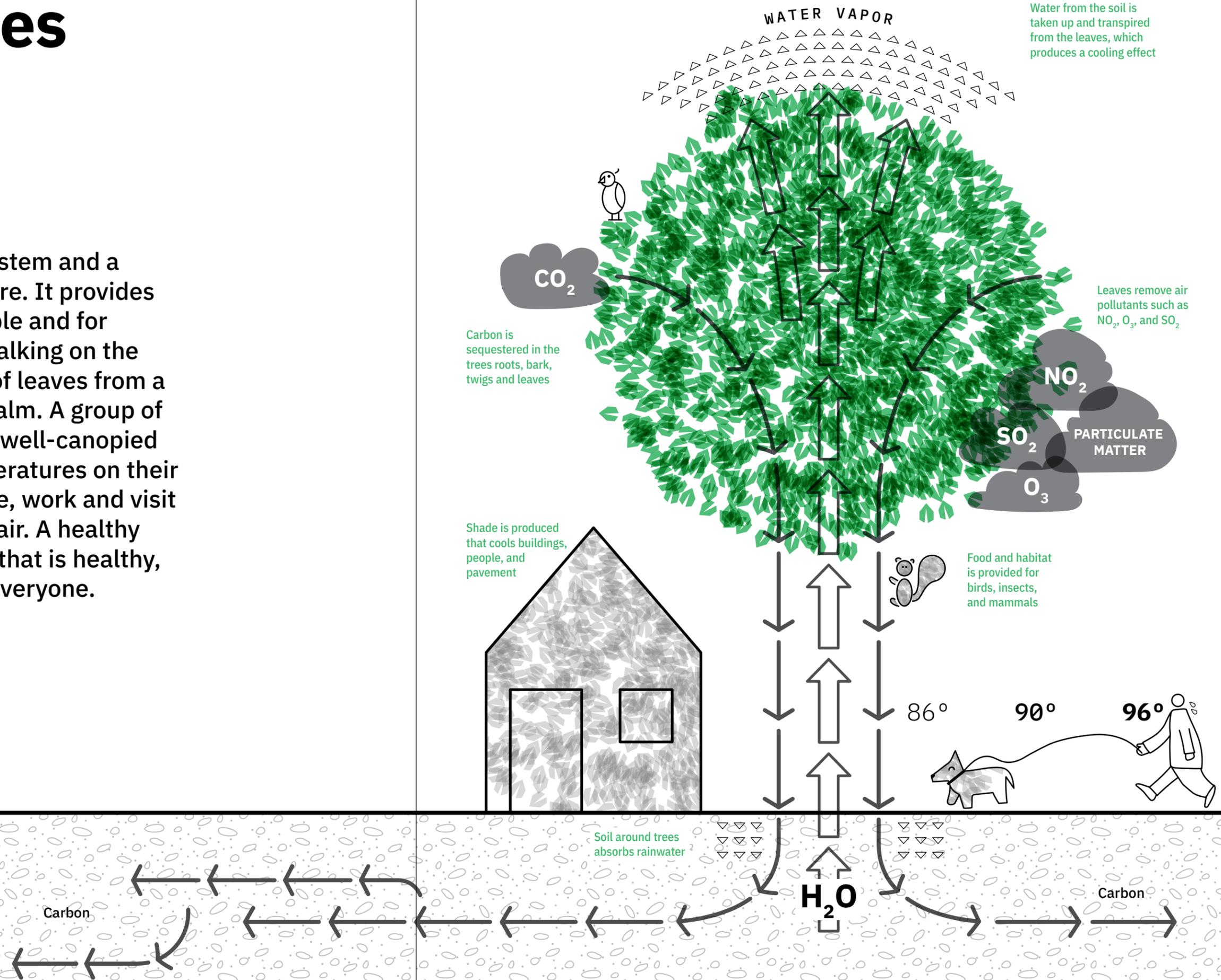
Trees are removed for a variety of reasons.

No one condition or pressure accounts for the majority of tree loss. Many factors lead to the decision to remove a tree, including new construction, renovation and site improvements, miscellaneous decisions by individual property owners, and natural mortality from age. Because it takes so long for trees to grow and provide shade, curbing loss of canopy by maintaining and protecting our existing trees is critical. We need to prioritize reducing voluntary removals of trees, and when trees cannot be preserved, we need to do our part by replanting trees.

Why do trees matter?

The urban forest is a living system and a part of our urban infrastructure. It provides measurable benefits for people and for our environment. A person walking on the sidewalk, hearing the rustle of leaves from a single tree, feels a sense of calm. A group of residents living adjacent to a well-canopied park experience cooler temperatures on their streets. And all those who live, work and visit the city benefit from cleaner air. A healthy city relies on an urban forest that is healthy, connected, and available to everyone.

City of Cambridge Healthy Forest → Healthy City



How do we sustain the urban forest?

It takes a long time to grow a forest. A tree may need 30 years or more to develop significant canopy. As time goes on, trees also ultimately decline and die. As stewards of this living system, it is our common responsibility to plant trees every year – on public and private property – to sustain our forest. If we plant more trees today, we'll have a more robust forest in the future.

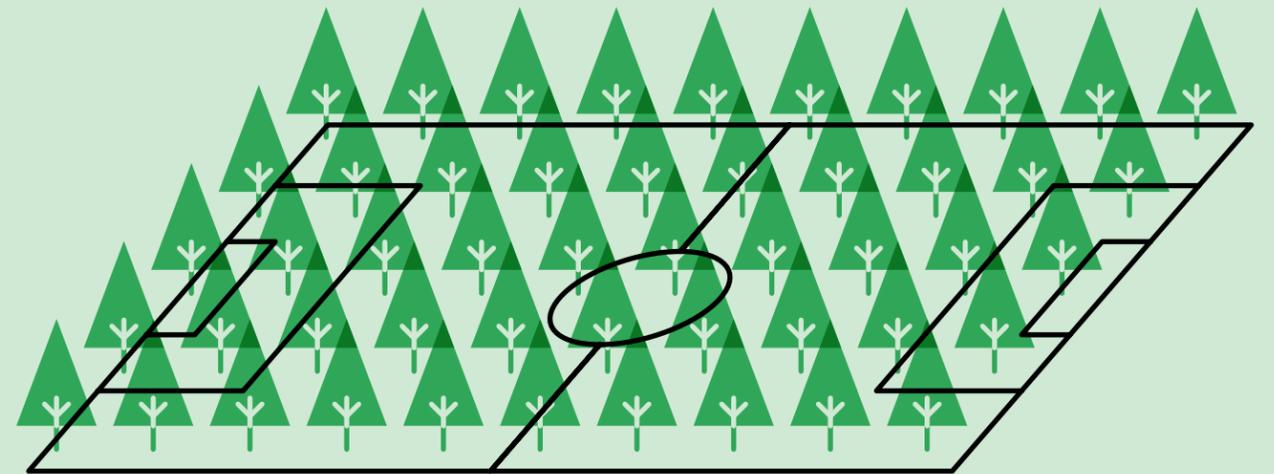
Existing trees decline and die over time.



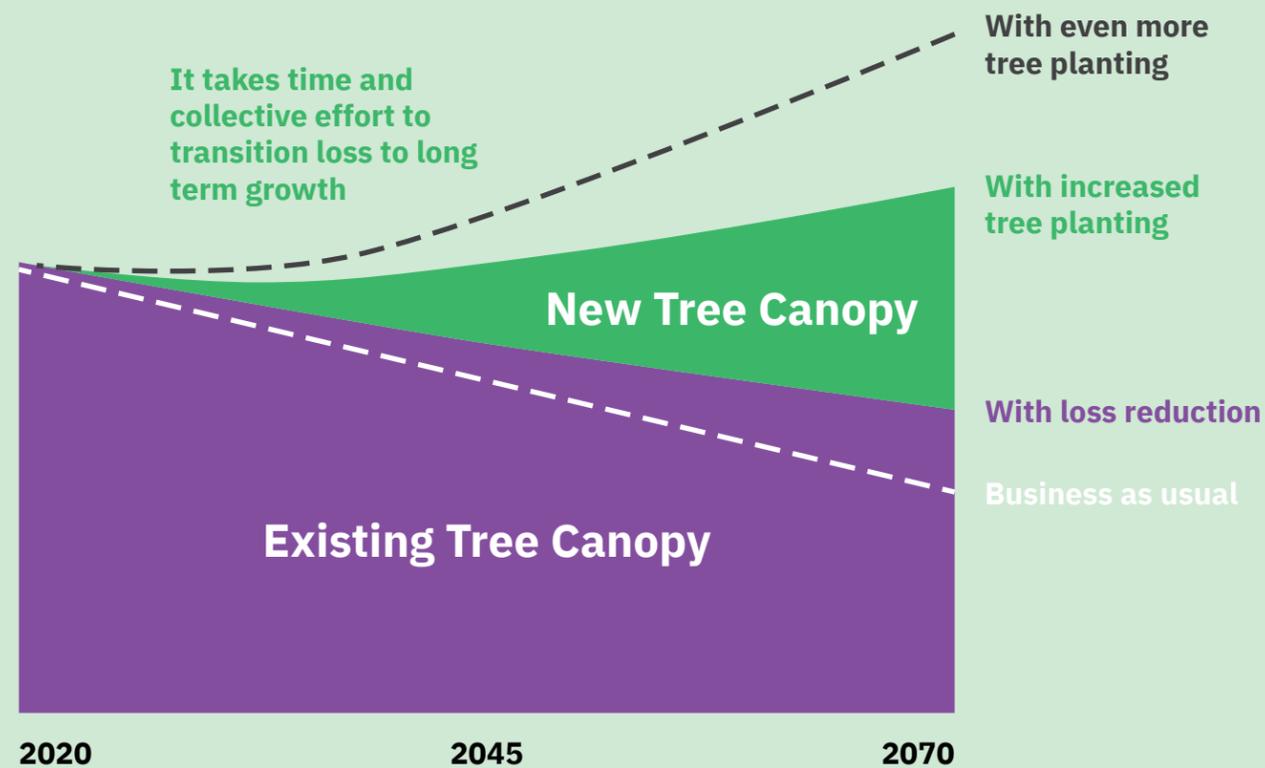
New trees need time to develop.

Multiple small trees cannot immediately replace the canopy of one large tree.

Since 2009 Cambridge has lost the equivalent of **86 soccer fields** (150 acres) of tree canopy from the total of 692 fields. If this trend continues, an additional **107 fields** will be gone by 2030. By caring for our forest today, we can reverse this trend.



It will take time to reverse the trend from loss to gain. It is important to both **curb loss of existing trees** and to **plant new trees** to create the next generation of canopy.



Because it takes so long for trees to grow and provide shade, every removal of a healthy tree creates a hole in the canopy that takes decades to repair. And the longer a tree lives, the larger its canopy grows. With this in mind, our first priority must be to **remove fewer trees** unnecessarily and to extend the lives of our trees through improved management practices. The fewer trees we remove, the faster we can increase our citywide canopy.

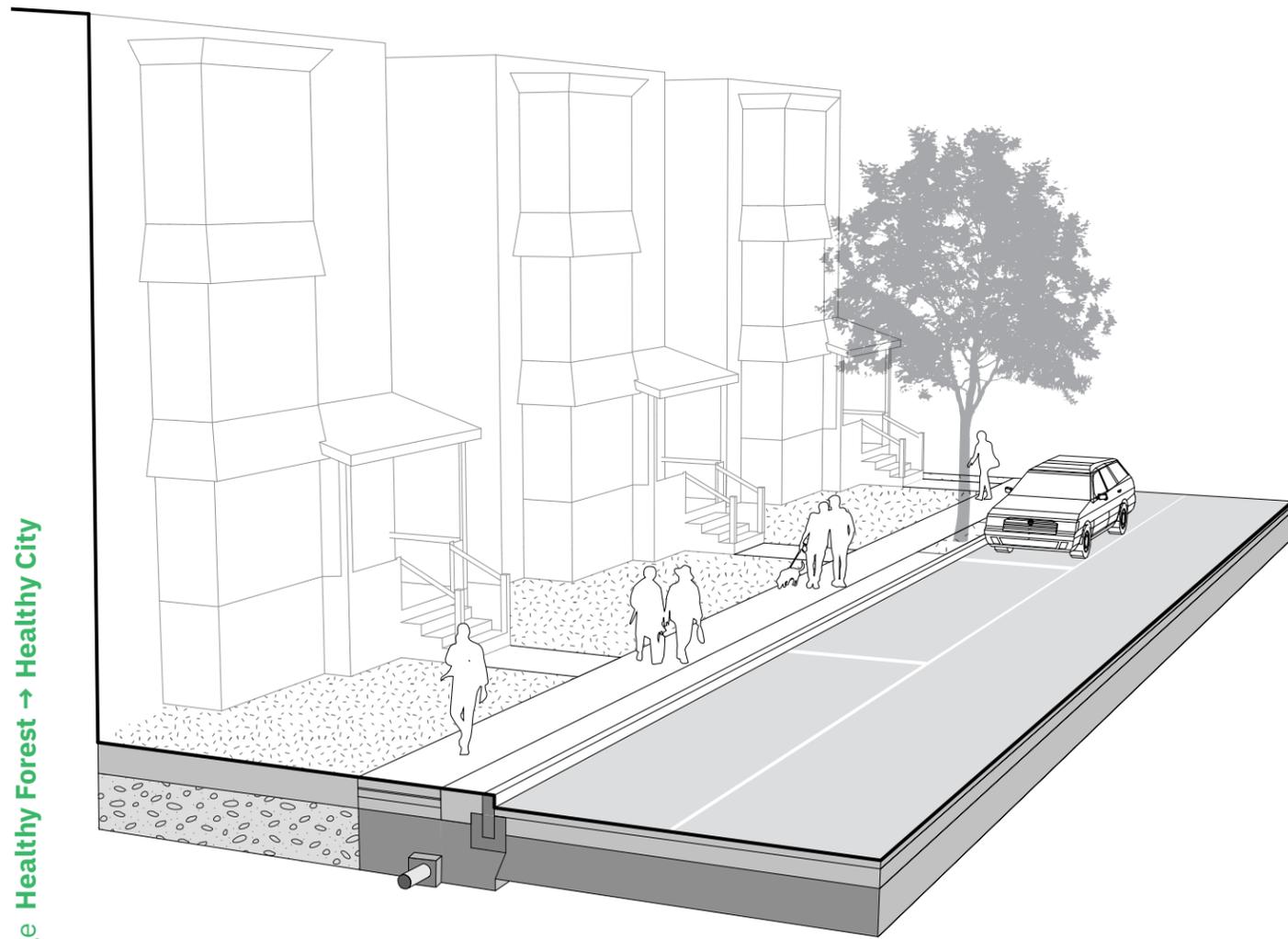
Maintaining a healthy urban forest requires that we **respond to new challenges** related to climate change. Some species will not be able to survive the warmer temperatures. And warmer temperatures will likely bring a new suite of pests and diseases to our area. Increased intensity and duration of drought will greatly stress many species, making them more susceptible to other pests and diseases. And higher winds or more frequent ice storm events may cause large limbs to fall or even uplift entire trees. With these many threats related to climate change and no action in response, Cambridge's urban forest could be cut by almost a third by 2030 and by more than a half by 2050.

To be resilient in the face of future threats, we must work even harder to maintain our urban forest and we need to **plant well-adapted trees** today to the conditions of tomorrow.

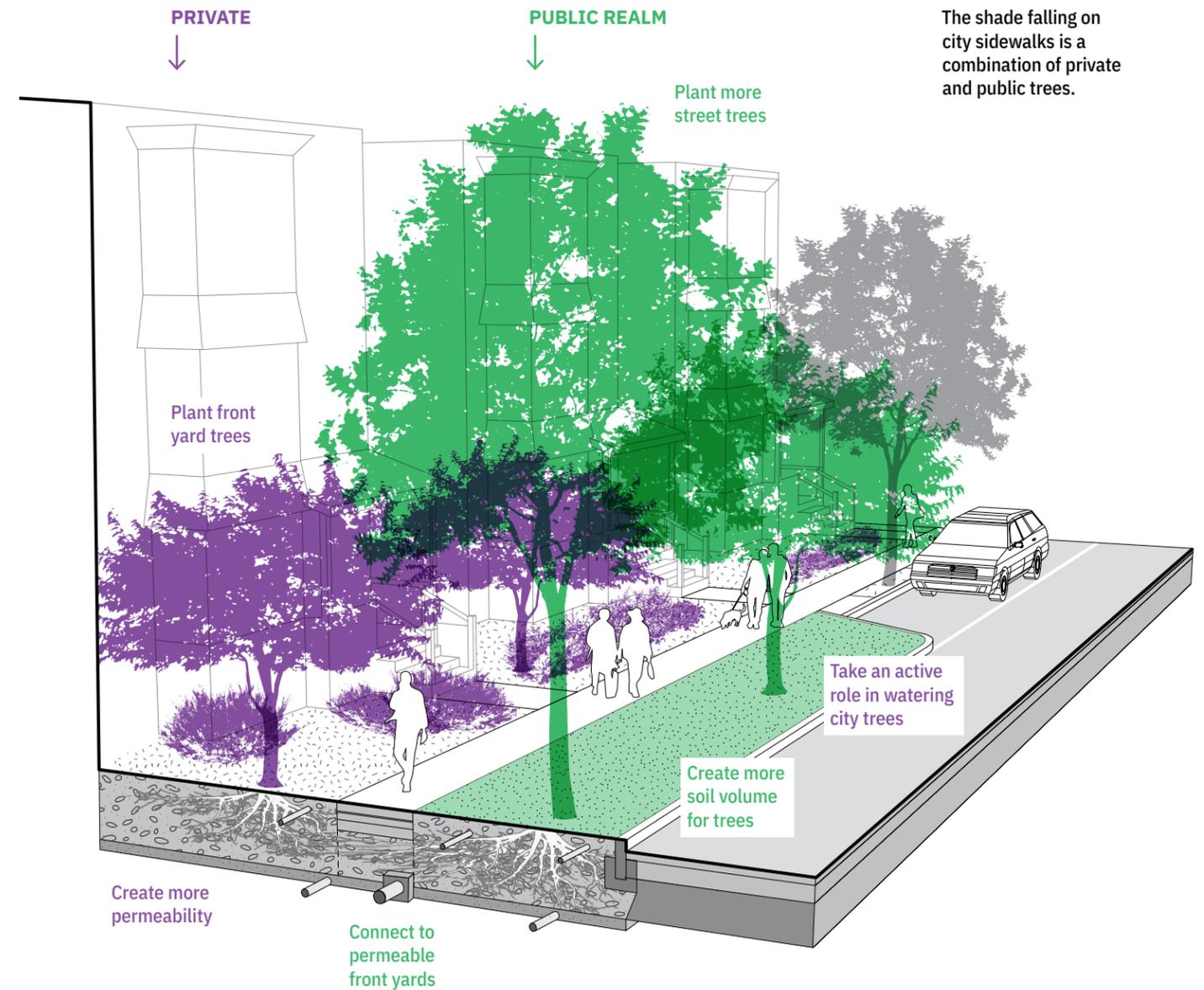
How do we build a healthy forest for a healthy city?

City of Cambridge Healthy Forest → Healthy City

Members of the community and the City share in the responsibility of building and maintaining a healthy urban forest. For instance, a **COMMUNITY MEMBER** can plant front yard trees, create additional planting areas, and take an active role in watering City trees. By reallocating roadway space, **THE CITY** can plant more street trees and provide better growing conditions by designing sidewalks that allow for greater soil volume for trees and allow roots to access more permeable front yards.



Existing



Proposed

The shade falling on city sidewalks is a combination of private and public trees.

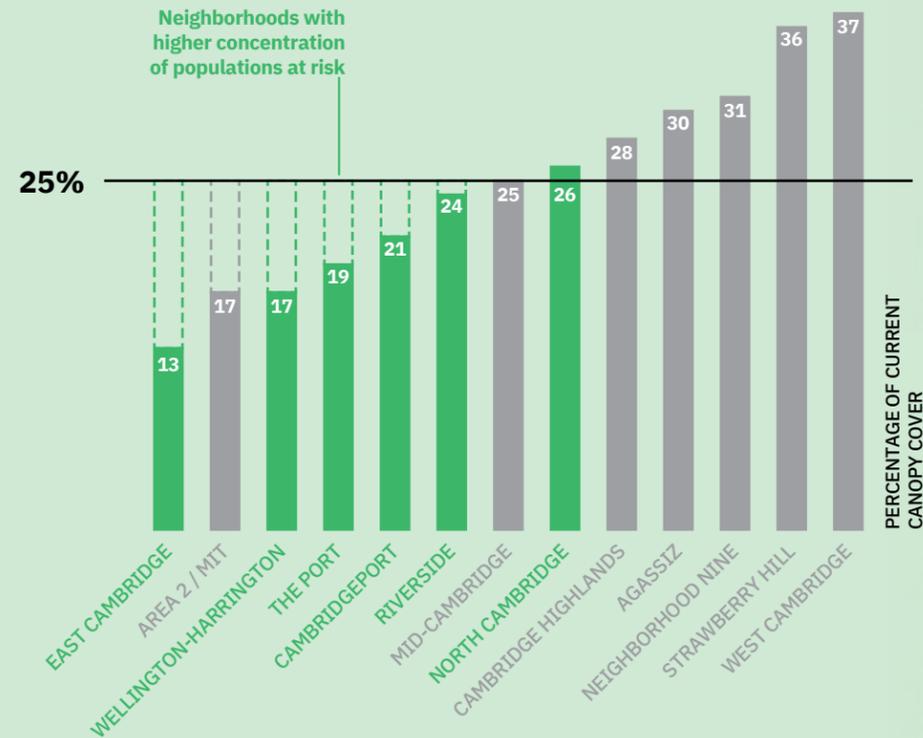
**An equitable, resilient
urban forest requires
everyone to lend a
hand in its care.**

Equity

An equitable city contains an urban canopy that provides benefits to all of its citizens.

GOAL Increase canopy cover where it is currently lacking, particularly in areas with high concentrations of minorities, the elderly, non-English speakers, and those with low incomes

→ 25% minimum canopy cover for every neighborhood



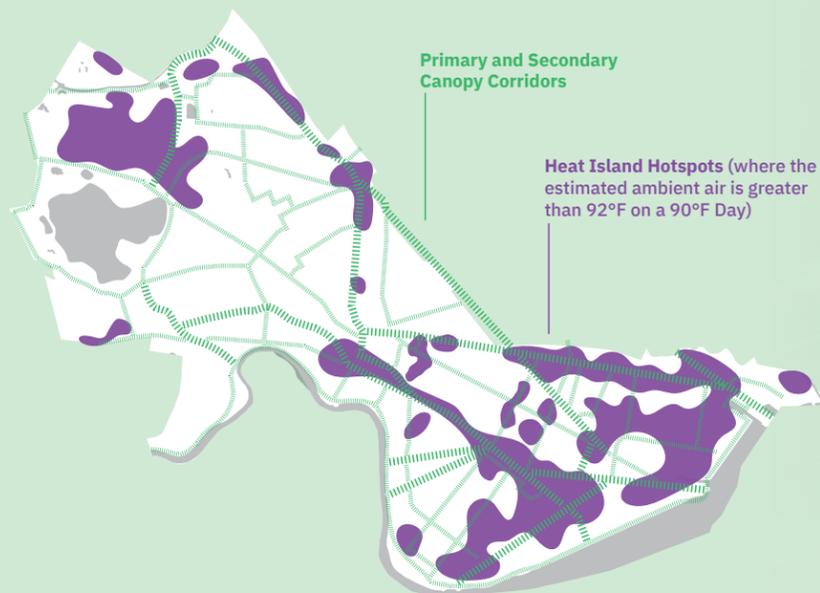
Resiliency

A resilient city contains a robust urban forest that benefits human health and well being.

GOALS

Enhance canopy cover in the public realm to create “cool corridors” that reduce heat island where people are impacted the most

- 60% canopy cover over sidewalks
- 50% reduction of heat island hotspots
- Species diversity: No more than 10% of a single species, 20% of a genus, and 30% of a family



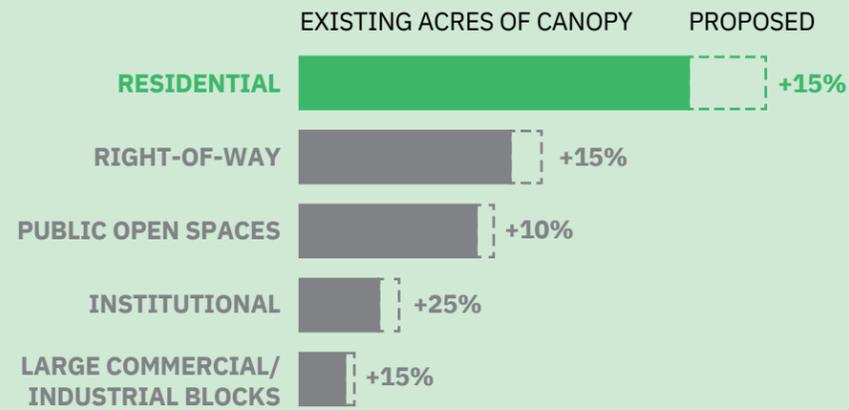
Shared Responsibility

A healthy city benefits from knowledgeable and engaged citizens who contribute to the care of the urban forest.

GOALS

Incentivize each landowner to increase canopy cover — a thriving forest requires mutual care by many parties

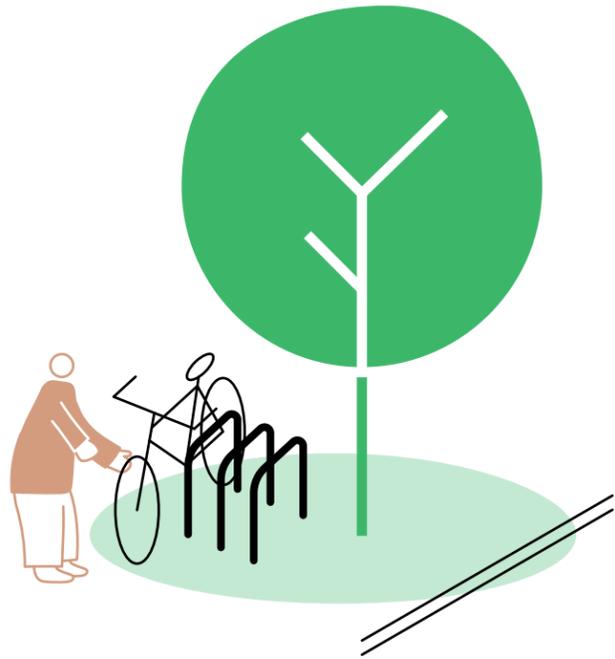
→ Increase canopy cover by 10 to 25% across landowner types



**No one member of
the community can
do this alone.**

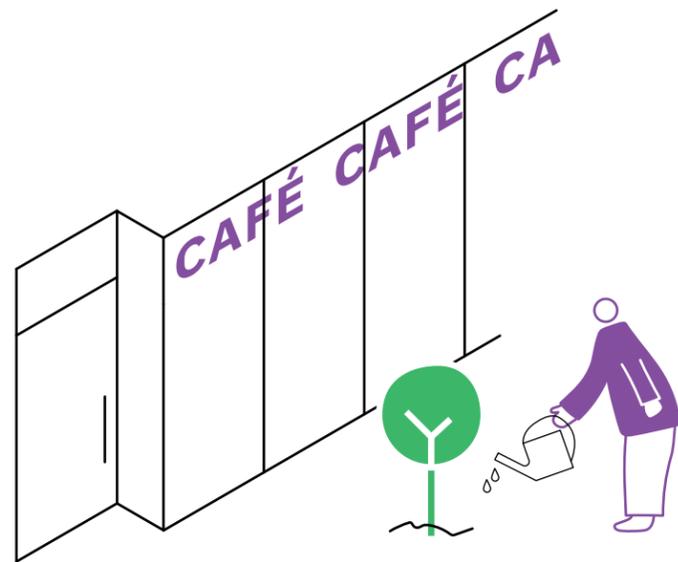
**There are things each
of us can do to help.**

Everyone contributes to and benefits from a healthy forest.

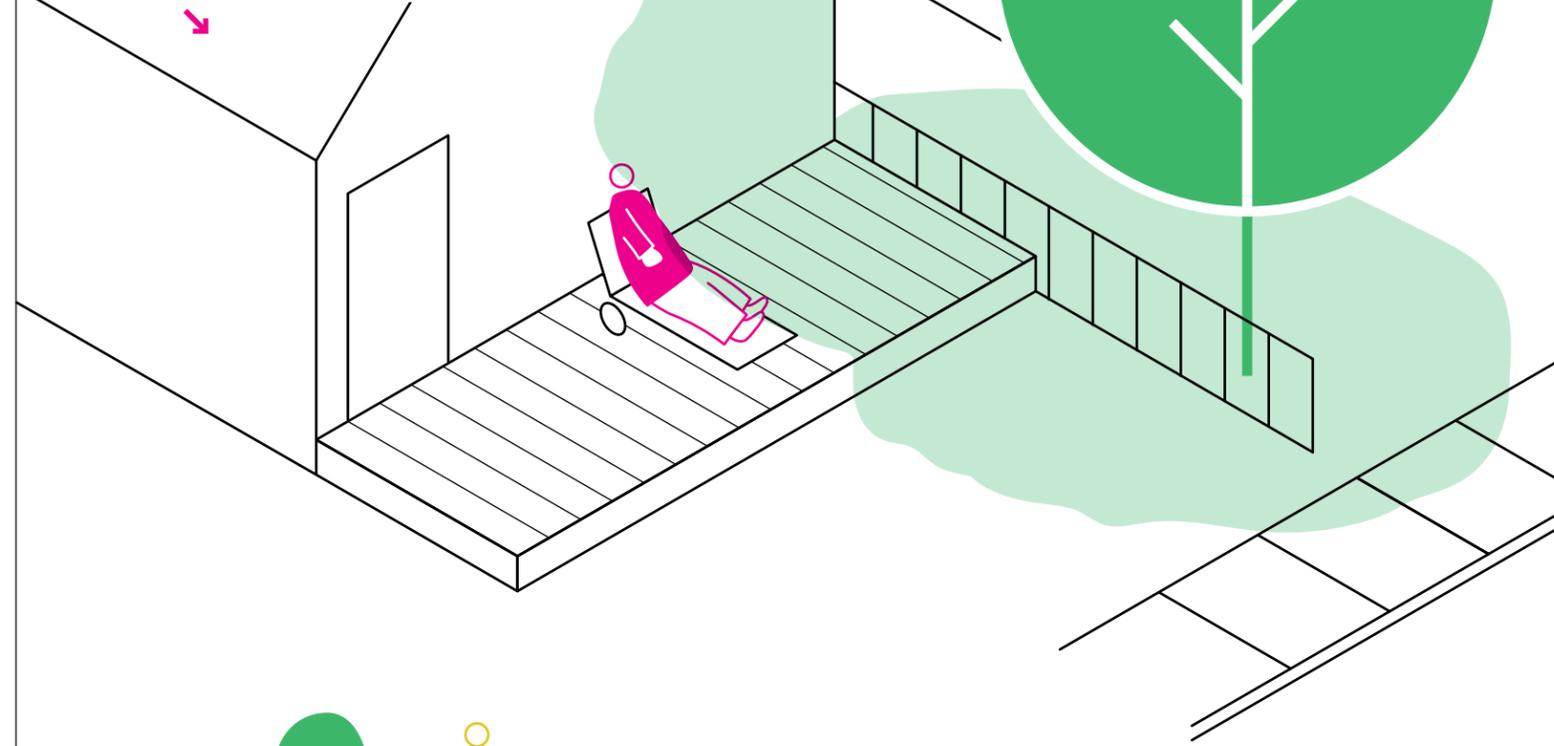


✔ **CYCLISTS** lock their bike to a rack rather than a tree trunk to protect sensitive bark and extend the lifespan of our trees.

→ **BUSINESS OWNERS** care for the trees on and in front of their property because they know shade and lush greenery attract shoppers and diners.



HOMEOWNERS preserve and nurture their trees, which benefits everyone by providing shaded sidewalks and backyards and even lowering energy costs.



← **VOLUNTEERS** participate in company-sponsored tree plantings for public spaces in neighborhoods where canopy is needed most.



TEACHERS help children learn about the importance of the urban forest so they grow into the next generation of planters and stewards.

EVERYONE uses the Commonwealth Connect app (cambridgema.gov/311), helping the City know when trees need attention.



**The City of Cambridge
is committed to
curbing loss and
growing canopy.**

**The following
Action Plan guides
City agencies in
concerted action.**

UFMP ACTION PLAN

● EQUITY ● RESILIENCE ● SHARED RESPONSIBILITY



CURB LOSS



GROW CANOPY

PUBLIC REALM STREET TREES

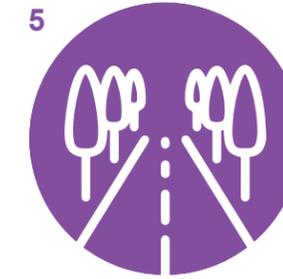


1 Prepare and implement a SOILS MANAGEMENT PLAN

Expand DATA COLLECTION on tree health and use an annual report to TRACK PROGRESS



4 PLANT 1,000 STREET TREES per year, focusing on priority areas and streets



5 MAKE SPACE FOR MORE TREES by prioritizing better growing conditions in street redesign



6 Maximize tree planting in existing PARKS, focusing on canopy deficient neighborhoods

CITYWIDE



2 GALVANIZE THE COMMUNITY through an outreach and engagement plan

Publicize the BACK OF SIDEWALK program



3 Update the TREE PROTECTION ORDINANCE



7 Establish a TREE TRUST to support planting on private property



8 REFORM ZONING tools and revise Article 19 to encourage more trees in new projects

Leverage planning review to encourage new public open spaces



9 INSTITUTIONALIZE TREE PLANTING PRIORITIES in City Departments by forming an interagency resiliency group



UFMP Action Plan 2020 – 2025

In order for the City of Cambridge to have an equitable, resilient urban forest, all stakeholders must be invested in and participate in its care.

This action plan — to be implemented over the next five years — guides City agencies, working together, toward reaching the strategic goals set out in the 2019 Urban Forest Master Plan Technical Report (UFMP). It also defines approaches to engage and activate non-City stakeholders toward achieving specific targets that we all must meet to find overall success.

While the following actions must be considered and evaluated among the City's many initiatives, most of the efforts described here are aligned with and support existing City-wide initiatives related to resiliency, equity, public health, transportation and smart development.

Some of these actions will take significant effort and investments by multiple City agencies. Others (indicated in green) may be implemented more easily and immediately.

Programs in green represent efforts that can be most easily and quickly implemented by individual agencies.
→

ALL CITY DEPARTMENTS

Coordinate action among City agencies.

Educate all City agencies and departments about the findings and recommendations of the UFMP. Ask each department how they can contribute to advancing the goals of the UFMP, and develop or task an existing cross-departmental group to carry on regular discussions about how the City is making progress toward these goals and targets. Find opportunities to integrate with efforts stemming from Envision Cambridge and the Climate Change Preparedness and Resiliency Plan.

Galvanize the community to take action.

Develop and implement an outreach and engagement plan that articulates broad community-wide themes and develops specific tactics to activate the many diverse populations of Cambridge. Assess all modes for engagement, including events, popups, publications, and partnerships.

Integrate urban forest principles into street and sidewalk reconstruction projects.

In order to more quickly reach the goal of providing a minimum 25% canopy cover in each neighborhood, identify city-wide construction efforts including utility projects and street and sidewalk rebuilding efforts particularly in priority areas identified within the UFMP. Incorporating the conditions to strengthen and grow the urban forest should be integral to these infrastructure projects.

CITY COUNCIL

Update the Tree Protection Ordinance.

Enhance and expand the Tree Protection Ordinance by redefining “Significant Trees” to include more trees, creating an “Exceptional Tree” category to protect the largest and oldest trees, increasing mitigation requirements to reduce the rate of removal, requiring replacement tree planting be included as a mitigation option and including mitigation for tree removals to all private property, where the largest proportion of trees are in Cambridge. Emphasize tree preservation on construction sites and mitigation for injuring roots or canopy that may cause decline or mortality of existing trees during construction.

Amend zoning code to encourage preserving and planting trees.

Implement recommendations of the Resilient Zoning Task Force including a “Cool Factor” that creates a weighted scoring system to encourage keeping existing trees, planting of new trees, and a reduction in impervious surfaces in the city. Changes to Article 19 should also be considered that prioritize the value of urban trees in urban design.

Expand the ways the Tree Fund can be used.

Take action to allow for flexibility in how the existing City Tree Fund is dispersed. Explicitly allow for funding of outreach and education programs and for planting trees outside of City property.

Establish a Tree Trust.

Establish a Tree Trust where funds can be gathered and then distributed to support planting on private property. Clarify that funds may be received outside of those required by mitigation as required in the Tree Protection Ordinance. Establish a Board of Trustees to oversee the administration of the fund.

DEPARTMENT OF PUBLIC WORKS

Plant in parks.

Maximize canopy by planting all available areas within parks in neighborhoods that have below average canopy cover. For parks with active recreational programs, plant a thick buffer. (Potential Sites: Cambridge Common, Dana Park, Danehy Park, Flagstaff Park, Fort Washington Park, Front Park, Greene Rose Heritage Park, Joan Lorentz Park, Longfellow Park, Mary Conlan Park, New Riverside Neighborhood Park, Riverside Press Park, Sennott Park.)

Redesign streets and sidewalks to make room for more trees.

When rebuilding streets and sidewalks, implement innovative design alternatives that accommodate space for trees with adequate soil volume. Include the priorities of UFMP when revising the City’s 5 Year Sidewalk and Street Reconstruction Plan and 10 year Sewer and Drain Infrastructure Plan. UFMP priority neighborhoods include: East Cambridge, The Port, Wellington-Harrington.

Plant 1,000 street trees each year.

Focus planting in priority areas and along priority streets (Massachusetts Avenue, Cambridge Street, River Street, Beacon Street, Main Street, etc). Follow best practices for soils and planting details. Water and provide appropriate establishment support.

Plant diverse and resilient species.

Plant well-adapted species with a high climate resiliency score (Refer to Appendix N). Track species planted city-wide to meet the overall diversity targets (no more than 10% of any one species, 20% per genus, 30% per family).

Update recommended species list.

Update the recommended street tree species list on the City’s website to include more diverse species and reduce dependence on overplanted species. Add a searchable database of recommendations for private property trees based on size, location, type, and habit. (Refer to page 154 in the UFMP Technical Report)

DEPARTMENT OF PUBLIC WORKS

Track progress annually and conduct a tree census every five years.

Publish annual reports to document initiatives, garner support, and track progress toward goals (Precedent: Annual Net Zero Action Plan progress report). Every five years, undertake a detailed city-wide tree census and evaluate progress and adjust strategies.

Specifically: Survey neighborhood associations, business associations, and other groups that may be able to estimate the tree numbers planted each year on private property. Review tree removal permit applications yearly to evaluate the potential effectiveness and impact of the Ordinance. Conduct LIDAR studies every 5 years to evaluate overall canopy cover change. Engage an expert advisory committee to advise the City on current science on climate and horticultural practices, as well as, reviews annual progress on efforts to reduce rate of canopy loss.

Expand data collection to enhance tree health.

Expand the use of Cartegraph to include additional data on each tree, including soil design, soils management practices, paving condition, pruning schedule, etc., to allow the City to target maintenance efforts most efficiently and to assess the effectiveness of pilot projects and experimental treatments.

Increase tree assessments to improve resiliency.

Conduct a windshield assessment for all City trees once a year and after large storms. Increase pruning frequency so every City tree in the City is assessed and cared for on a more frequent basis. As part of the pruning work, or as a separate assessment, monitor trees for potential pests and diseases.

Manage urban soils to grow healthier trees.

Implement recommendations from a Soils Management Plan, which the City is currently undertaking. The plan will provide targeted recommendations to enhance the health and performance of urban soils based on specific planting conditions and situations within the city.

Prune proactively.

Undertake structural pruning for young shade and ornamental trees. Identify trees planted within the last 4 to 8 years. Contract to prune for form and structure to reduce potential future damage during ice and wind storms. Pruning now can reduce risks and costs later in a tree's life.

DEPARTMENT OF PUBLIC WORKS

Require City Arborist inspection prior to occupancy.

For special permit projects, the City Arborist should confirm that tree plantings conform to project planting plans and details before granting a final Certificate of Occupancy.

Promote existing City programs.

Promote existing programs that encourage tree planting and stewardship such as the Back of Sidewalk program, Adopt a Tree, and Junior Forester. Communicate opportunities directly to stakeholders and through community organizations, neighborhood associations, events, and cultural events.

Educate local businesses about the dangers of pest outbreaks.

Pests that have devastated some of our most prevalent trees have been introduced in industrial packaging materials. Send fliers to business about the importance of confirming materials meet international standards (ISPM 15) for imported wood packaging.

Engage all stakeholders.

Implement recommendations from the Outreach and Engagement Plan, which the City is currently undertaking. Broaden the community of people interested in improving the urban forest. And undertake efforts to engage people in concerted action, including preserving and planting trees.

COMMUNITY DEVELOPMENT

Add landscape architects to City staff to advocate for trees.

Add more landscape architects to City staff and encourage representation of holistic landscape and urban forestry issues on official boards like Planning and Zoning.

Develop a public realm design manual.

Develop a public realm design manual that supports tree plantings while balancing the need to provide amenities, connections, and green infrastructure necessary to maintain and enhance the city's livability. The manual will document goals for the beauty, functionality, safety, and environmental performance of the City's public realm.

Amend zoning code to encourage preserving and planting trees.

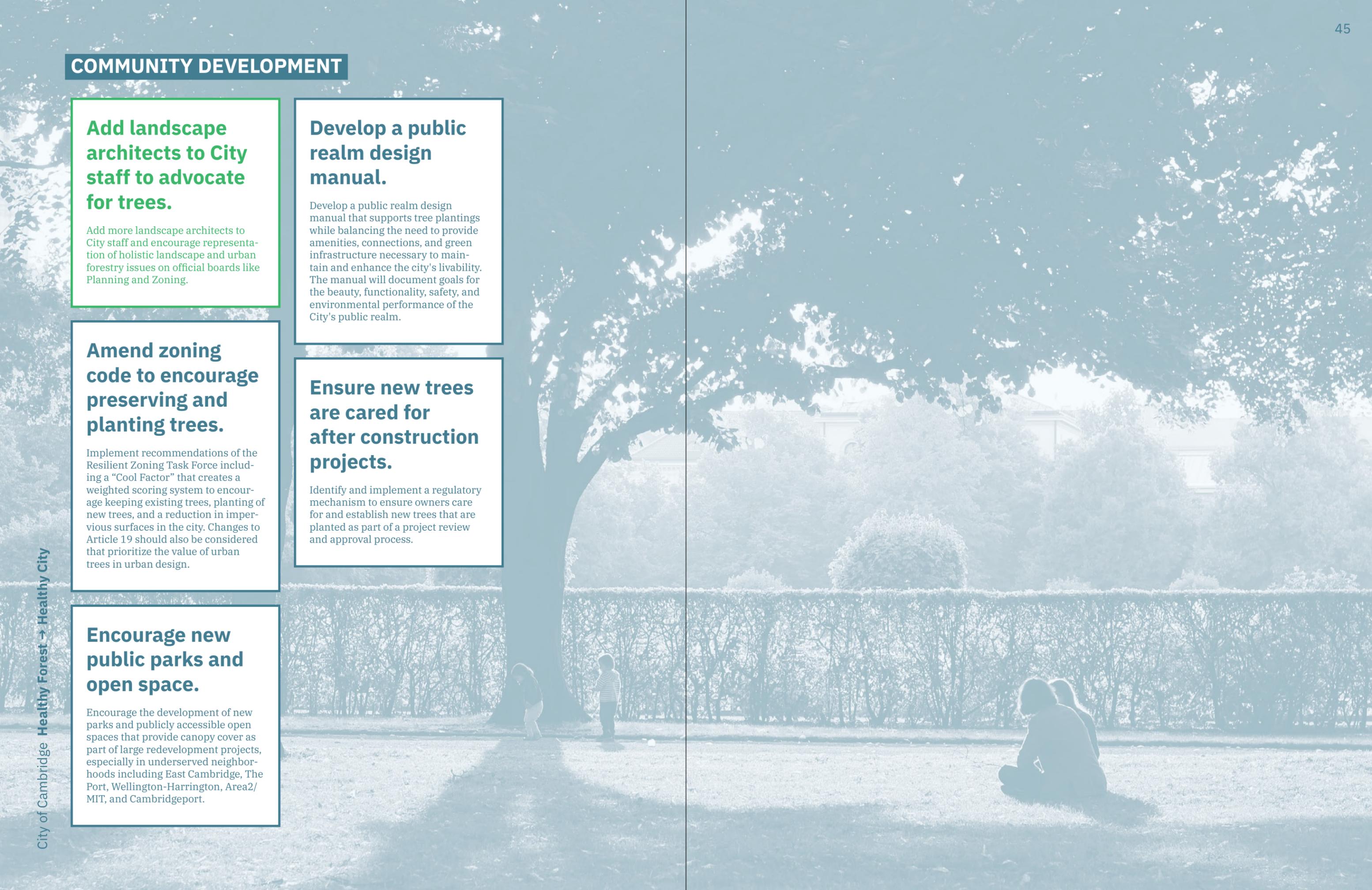
Implement recommendations of the Resilient Zoning Task Force including a "Cool Factor" that creates a weighted scoring system to encourage keeping existing trees, planting of new trees, and a reduction in impervious surfaces in the city. Changes to Article 19 should also be considered that prioritize the value of urban trees in urban design.

Ensure new trees are cared for after construction projects.

Identify and implement a regulatory mechanism to ensure owners care for and establish new trees that are planted as part of a project review and approval process.

Encourage new public parks and open space.

Encourage the development of new parks and publicly accessible open spaces that provide canopy cover as part of large redevelopment projects, especially in underserved neighborhoods including East Cambridge, The Port, Wellington-Harrington, Area2/MIT, and Cambridgeport.



The following chart provides a snapshot of Cambridge's urban forest in 2018, and related City metrics from 2019.

Every five years, when the City undertakes a detailed city-wide tree census, this chart can be updated to evaluate progress towards neighborhood canopy goals.

Cambridge Urban Forest Snapshot 2018



Source: CDD Neighborhood Statistical Profile, 2019 & CUFMP GIS 2018 data

The City of Cambridge Urban Forest Report
Healthy Forest → Healthy City

View the entire CUFMP Technical Report at
www.cambridgema.gov/UFMP



Reed Hilderbrand
OverUnder
Kleinfelder
Conservation Law Foundation
Applied Ecological Services
Bartlett Tree Experts
F² Environmental
Ellana

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