



INTRODUCTION

IN OCTOBER 2023, the City of Worcester released a draft Urban Forest Master Plan (UFMP), issuing ten recommendations meant to guide the further preservation, management, and expansion of Worcester's urban forest—and in particular, Worcester's public "street trees." The UFMP is a vision, a first-step, intended to guide long-term budgets and inform other management plans going forward by the City's Forestry Operations, a unit of the Department of Public Works and Parks. The plan emphasizes a transformation from *reactive* to *proactive* management; not only engaging with resident concerns, but anticipating them. This marks a turn towards equity and the importance of climate resilience, while it stresses continued focus on prevention and protection against all manner of threats to the urban forest, whether pests (like the Asian Longhorned Beetle or the Spotted Lanternfly), disease, or other natural phenomena.

The phrase "urban forest" might simply evoke images of the trees that cover Newton Hill or Green Hill Park, but in reality the "urban forest" refers to all the trees (and other greenery) within the city limits. It covers the trees in the parks, certainly, but also street trees and residential trees. However, the Urban Forest Master Plan draft, while urging for a comprehensive tree canopy assessment,

focuses especially on Worcester's 23,137 street trees, and indicates a desire on the part of the City of Worcester to more proactively manage those street trees as a key part of that urban forest.

The release of the Urban Forest Master Plan follows a long history of urban forest management in the City, including 37 consecutive years as a Tree City USA recipient and 24 consecutive years as a Tree City USA Growth Award Recipient. The UFMP concept was first identified as part of the 2013 Open Space and Recreation Plan, and its development was further refined in the Green Worcester Plan released in 2020. Developing an Urban Forestry Plan was an integral aspect of the Green Worcester Plan's theme of Connected Green and Blue Spaces. Its authors called for an updated tree and canopy inventory, guidelines for tree removal and replacement, and to prioritize the expansion of trees of all kinds in the urban core. The planning process itself began in late 2021, with the first public meeting held on November 17, 2021, and was written with Davey Resource Group. The Urban Forest Master Planning process began just before the official start of the Urban Forestry Tree Commission. That Commission was first proposed at an August 10, 2021 meeting of the City Council, and began accepting applications for members on January 17, 2022.

WORCESTER'S TREES

Trees within urban communities provide a number of environmental, economic, and health benefits to residents of those communities. For example, the 2020 Massachusetts Forest Action Plan estimates that "every 1% increase in tree canopy above a minimum 10% canopy cover brings a 1.9% reduction in energy needs for cooling and up to a 1.1% reduction in energy for heating" (Forest Action Plan, 2020, 142). According to Worcester's draft UFMP, trees filter particulate matter from the air and absorb other airborne pollutants; improve water quality through stormwater filtering and help to control and prevent flooding; can help to cool and shade areas that would otherwise absorb heat (such as roofing and asphalt); provide homes to local wildlife; lower utility bills "for the average household by \$100 to \$250 per year"; and can increase property values (UFMP, 2023, 23-26). The US Department of Agriculture Forest Service developed a tool, "i-Tree," that quantifies some of those benefits. In addition, trees have been shown through hundreds of studies to positively affect physical and mental health (see the literature review of Wolf, et. al, 2020, which separates the health benefits of trees into three categories of research - reducing harm, restoring capacity, and building capacity. Additionally, Table 2 at the end of this brief summarizes some of their findings).

CURRENT CONDITIONS

According to a 2022 heat risk assessment conducted in Worcester, 37% of the city is covered by tree canopy, 36% by impervious surfaces, 24% by grass and other vegetation, and 3% is water (UFMP 2023, 29). That 37% of tree canopy is made up of 23,137 street trees (which are those trees only on public right-of-ways), numerous residential trees, and trees on other public and private lands within the city (a comprehensive tree canopy assessment has not, so far, been done by the City). Most of the City's street trees are in City Council District 1 (36%) and District 5 (27%), with the fewest in District 4 (6%).

One way to visualize the distribution of trees is through the "tree equity score" published by the organization "American Forests." Overall, Worcester's tree equity score is 89/100, but in some areas scores as low as 45. American Forests determines the equity score for a neighborhood through a combination factor of existing canopy cover, target canopy cover for a neighborhood, and then Census demographic, social, and economic data. A lower score indicates a higher priority for increasing tree canopy in a neighborhood. That map can be found below, or at treeequityscore.org, which explains their methodology in greater detail.



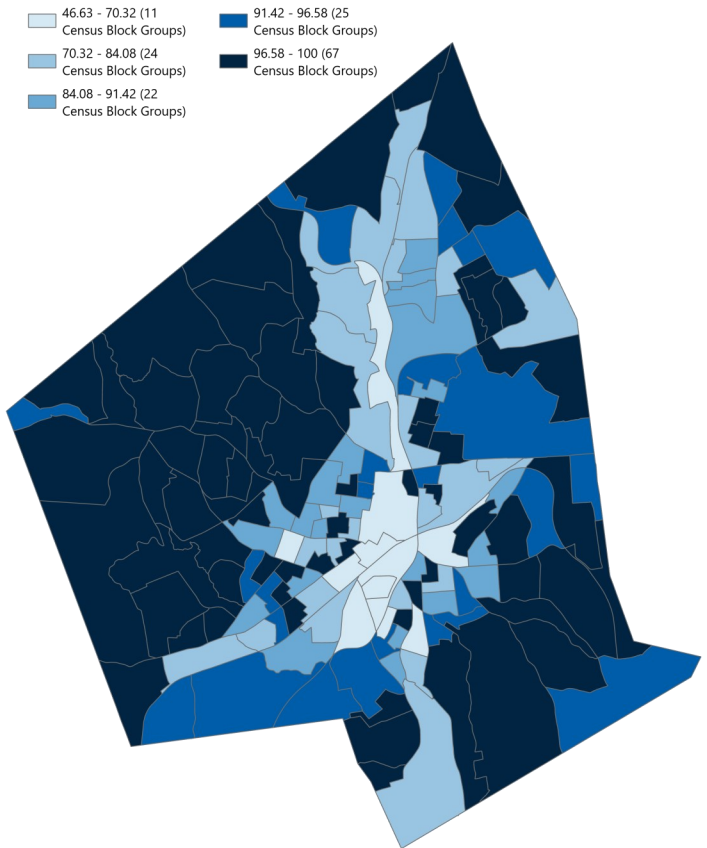
RECOMMENDATIONS AND COSTS

Ultimately, the draft UFMP makes ten recommendations to improve the City’s urban forest and to improve operations within the City’s Forestry Operations and the Department of Public Works and Parks:

1. Establish proactive public tree management.
2. Increase city resources in pursuit of the first goal, and to support urban forest planning, operations, and education.
3. Create and improve urban forestry processes to support advancements from customer service to information management.
4. Support urban forest growth and preservation through expanded regulations, best management practices, and other guidelines.
5. Ensure there is adequate space for trees to grow and thrive.
6. Conduct a comprehensive urban tree canopy assessment.
7. Plant and care for trees citywide but especially in areas that improve sustainability and further equity goals.
8. Work with community and regional partners.
9. Create an Urban Forestry Communication and Outreach Plan.
10. Proactively monitor and address environmental threats (including pests and disease).

Many, if not all, of these recommendations require some budget increases, especially if the City wishes to move towards proactive management of public trees, rather than reactive. For Fiscal Year 2024, the City has budgeted \$575,101 towards salaries for Forestry, and an additional \$135,000 for overtime. The number of salaried positions between FY23 and FY24 have remained the same. Other costs, including ordinary maintenance, are included within the overall budget for the Division of Parks, Recreation, and Hope Cemetery, and are not otherwise separated in the annual budget document. However, according to the UFMP, the total Forestry budget, including salaries and maintenance, for 2022 was

Tree Equity Score by Worcester Census Block Group



Source: American Forests’ Tree Equity Score, treeequityscore.org

\$1,692,593, and it has largely remained unchanged over the previous four years.

Many of the steps involved in achieving the recommendations will require additional funding, including expansion of the department’s staff (see UFMP 2023, 78-109 for more information about each of the waypoints to implementing the ten recommendations). Table 3 on the final page shows the action steps for which there is a known, estimated cost (other steps indicate costs but do not estimate what they will be). Significantly, the UFMP Draft visualizes spending at least \$80.77 per street tree, which would require at least an additional

Table 1: Budgeted Positions in Forestry, City of Worcester

Position (# of Positions in Category)	FY23 Approved	FY24 Approved
Supervisor of Forestry (1)	\$87,727	\$90,003
Forestry Foreman (1)	\$62,432	\$70,388
Working Foreman, Craftsman (2)	\$88,419	\$131,000
Arborist (6)	\$261,796	\$283,710
Total (10)	\$500,374	\$575,101

Source: City of Worcester, FY24 Budget



\$500,000. Many of these costs could potentially be defrayed by grant money; though, the City's recent application for \$23.5 million from the Inflation Reduction Act to plant up to 7,000 trees was not granted, with no public reason why (see Schwan, September 2023). Grants also exist from the Massachusetts Department of Conservation and Recreation, Urban and Community Forestry Program—the “Greening the Gateway Cities” initiative provides grants for municipalities planting trees in urban areas. The report also examines potential new sources of funding to support these programs (see UFMP 2023, 52).

These costs, and other recommendations, the UFMP argues, are necessary if the City wants to take care of its aging tree inventory, increase tree species diversity, plant more trees in areas that have very few, ensure common standards for trees in the way of utilities, and to head off pestilential or disease-based threats. For example, the Asian Longhorned Beetle (ALB), discovered in 2008 in Worcester but likely here several years earlier, led to the removal of more than 30,000 public and private trees across the city in just seven years. With a shift in focus to proactive management, the hope is that threats will be caught earlier before trees need to be removed and, replanted. Both young and aging tree stock across the city will require maintenance going forward as well. Regular maintenance across a tree's life-cycle increases its benefits, while likely lowering its overall costs (deferred maintenance may lead to unexpected costs later, which can be difficult to quantify). See especially the literature review by Vogt, et. al, 2015 about maintenance and Lovett, et. al, 2016 about pests and pathogens.

DOES THE PLAN DO WHAT IT PURPORTS TO DO?

Thanks to its nature as a long-term vision of Worcester's urban forest, while some of the UFMP's recommendations

could begin immediately with funding, others will take some time to complete. One, for example, is the comprehensive canopy assessment (to be done in regular intervals) that could then be used to prioritize tree planting areas across the city. Such an assessment is an integral part of the overall plan, and one that is necessary to get a true picture of Worcester's urban forest. However, the report points out that other studies have identified areas for planting that can begin while a full canopy assessment is underway. Some areas of the city, like Green Island, could use the trees today to mitigate heat and flood risks. Thanks to the 2022 street tree inventory conducted by Davey Tree Resources, the 2022 heat risk assessment conducted by Urban Climate Consulting LLC, and the Tree Equity Scores referenced earlier, many potential tree planting sites across the city are already known and the city could begin planting before the canopy assessment process is finished.

What the UFMP is *not* is a comprehensive plan and strategy for management of Worcester's urban forest. Rather, it is a set of recommendations to establish such plans and practices and to reorient city leaders and the community towards a more proactive view of tree care in the city.

CONCLUSION

The benefits of the urban forest are many, and the Urban Forest Master Plan draft released in October 2023 is the City's continued attempt to protect and manage it for years to come. The implementation of this plan will require that the City provide new and expanded resources to Forestry to ensure Worcester residents can continue to enjoy the benefits of its urban forest. Proactive, preventative, care of Worcester's urban forest, may require a number of upfront costs, but could be more cost-effective in the long run.

SOURCES

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Table 2: Researched Tree Benefits for Physical and Mental Health

Reducing Harm	Restoring Capacity	Building Capacity
Reduced Air Pollutants	Exposure to trees may promote cognitive and attention restoration	"Forest Walks" may promote immune system function
Reduce Air and Surface Temperatures	Exposure to trees, especially forested areas, reduces stress, depression, and anxiety	Street tree cover tends to correlate with higher levels of physical activity
Tree canopy is negatively correlated with heat-related ambulance calls	Exposure to trees, especially forested areas, may reduce cortisol levels	Street tree canopy associated with lower prevalence for overweight populations
There is some evidence that tree size, location, and health can reduce crime	Tree exposure may have positive effects on certain clinical populations	Street trees may promote social cohesion and trust in neighborhoods

Source: Wolf, et. al, 2020, *Urban Trees and Human Health: A Scoping Review*. These are just some of the studies reviewed in this sweeping literature review, and they note many of the potential effects of tree exposure on human health. As the authors note, more research needs to be done to better understand these correlations between trees and physical and mental health.

Table 3: Known Estimated Costs for Urban Forest Master Plan (Draft)

Action Step	Description	Estimated Cost-Range	Frequency	Notes
1.2	Use Street Tree Inventory to Develop Urban Forest Management Plan	\$25,000	One-Time	May be eligible for grant funding
1.2.1	Routine pruning schedule for established trees and the structural training of young trees	\$210,000-\$450,000	7 or 15 year Cycle	
1.4.1	Establish an Interim Funding Goal to exceed \$80.77 spent per street tree	\$500,000	Annual	
1.6 and 1.6.1	Assessments of Conservation Commission properties to identify species composition, threats, and opportunities	\$50,000	Annual	
2.1	Add and Hire New Arborist Position	\$150,000	Annual	
2.3	Contract with Partner Organizations	\$75,000	Annual	May be eligible for grant funding
2.5	Training Plans for Forestry Staff/ maintain certifications/ stay up to date on latest techniques	\$1,500	Annual	Estimated \$1,500 per employee; May be eligible for grant funding
2.6	Evaluate Establishment of an Urban Forestry Internship Program	\$30,000	Annual	May be eligible for grant funding
2.7	Implement goals of <i>Worcester Open Space and Recreation Plan Update 2021</i>	\$300,000	Annual	Includes new staff
3.5	Re-inventory and assess all trees and planting sites every 7-10 years	\$125,000-\$175,000	7 or 10 year Cycle	
4.7	Staff to enforce tree protection and preservation regulations on public property	\$150,000	Annual	Planning and Regulatory Services; Conservation Commission
6.1	Comprehensive UTC assessment without affecting operational resources	\$50,000-\$100,000	5 or 10 year Cycle	May be eligible for grant funding
7.3	Develop and Strengthen partnerships to support outreach efforts focused on increasing tree planting in low canopy areas	\$75,000	Annual	May be eligible for grant funding
9.2	Partner with New England Botanic Garden and Worcester Technical High School to create education and outreach materials	\$75,000	Annual	May be eligible for grant funding
10.4	Develop an Urban Tree Health Program to Scout and Monitor for Threats	\$75,000	Annual	May be eligible for grant funding

Source: City of Worcester, 2023 Urban Forest Master Plan Draft