PART 3
APPENDICES

Part 3

City of Pleasanton UFMP Appendices

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Appendix A

Pleasanton UFMP Wildfire Section

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Acronyms and Abbreviations

Acronym/Abbreviation	Definition
CAL FIRE	California Department of Forestry and Fire Protection
CAL TRANS	California Department of Transportation
City	City of Pleasanton
County	Alameda County
FHSZ	Fire Hazard Severity Zone
I-580	Interstate 580
I-680	Interstate 680
ISA	International Society of Arboriculture
LPFD	Livermore-Pleasanton Fire Department
NWS/NOAA	National Weather Service/ National Oceanic and Atmospheric Administration
PG&E	Pacific Gas and Electric Company
ROW	Right of Way
UFMP	Urban Forest Management Plan
WUI	Wildland Urban Interface

Introduction

The City of Pleasanton (City) enjoys a varied character of urban, suburban and rural neighborhoods. This offers residents a diverse lifestyle and beautiful scenery. For the low-density suburban areas of the city on the slopes of the Pleasanton Ridge and in the hills along the south side of the City, this diversity of lifestyle and beautiful scenery is represented in low-density residential development intermixed with undeveloped open space and natural vegetation. The same attributes that make these areas so attractive to residents to live in also present some challenges. Namely, the residents and development in these areas are at greater risk of being impacted by a destructive wildfire due to the presence of vegetation and terrain near development. These areas require additional planning, resources, and maintenance from the city and residents, which are not required in the more built-up areas of the city in order to protect life and property from wildfire.

The City and the Livermore Pleasanton Fire Department (LPFD) understand that there are areas of elevated wildfire risk in the city. They are taking action to reduce the risk that a destructive wildfire, one that results in loss of buildings, infrastructure, and lives, occurs within the city limits. One of the planning efforts undertaken by the City is the inclusion of a wildfire section in the UFMP. The LPFD has an existing defensible space and vegetation management program for the areas of the city at the highest risk for wildfire. Both the city and fire department recognize that this wildfire section in the UFMP can complement their existing wildfire prevention programs by providing recommendations for tree management on both public and private trees that emphasize fire department defensible space recommendations and sound tree care practices.

This Wildfire Section to the Pleasanton UFMP is intended to provide relevant information about the fire environment within the City and provide guidance to City urban forest managers as well as property owners on how to manage their trees to minimize the risk that it could contribute to the spread or intensity of a wildfire. This section of the UFMP summarizes the urban forest-related wildfire hazard presented by the combination of terrain, vegetation cover, and land use. This UFMP section describes the relevant state and local regulations that set the vegetation management requirements within areas designated as high risk for wildfire. This UFMP section provides specific recommendations for tree maintenance practices, including tree spacing, removal and replacement strategies for fire-prone tree species, and pruning standards for both private and public trees that will reduce the risk to the City's urban forest, contributing to the spread of a wildfire. Finally, this UFMP section discusses economic considerations for implementing the recommended tree maintenance practices, opportunities to fund fire prevention work beyond the existing tree maintenance programs, and property insurance considerations.

The Wildland Urban Interface in Pleasanton

Location and Extent of the WUI

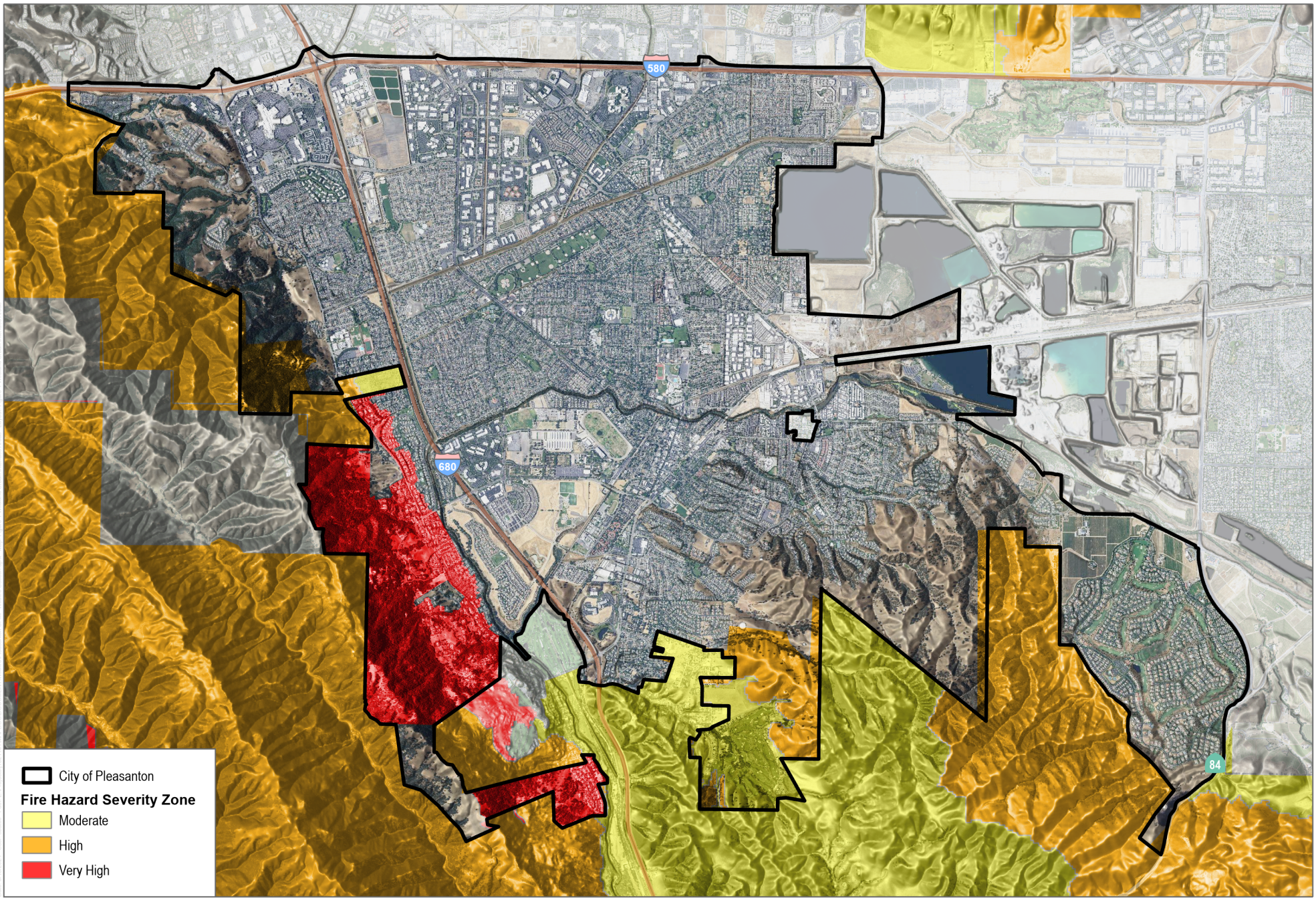
The Wildland Urban Interface (WUI) is the geographical area where structures and other developments meet or intermix with wildlands or areas of unmanned vegetative fuels (ICC, 2021).

Within the City of Pleasanton, there are two WUI areas. First are the hillside areas on the west side of the city below Pleasanton Ridge. This area extends along the entire west side of the City, covering the entire hillside west of Foothill Road to the city limits near the ridgeline. The second area is on the hillside along the City's south side, extending from I-680 east to State Route 84. Both areas are characterized by low-density development abutting or intermixing with large areas of continuous, unmanaged natural vegetation. Both areas contain hilly terrain. However, the first area along the Pleasanton Ridge is characterized by a steep, generally east-facing large slope from the valley bottom to the ridgeline. In contrast, the second area along the city's south side is characterized by numerous hills and small ridgelines. The State (CAL FIRE) has created Fire Hazard Severity Zone Maps (FHSZ) that designate and identify areas where there is a higher wildfire hazard. The city has adopted the state's recommendations for the FHSZ boundaries within the city limits. For the purposes of this wildfire section, the WUI areas in the city have the same boundaries as the CAL FIRE FHSZ's in the city.

Wildfire knows no boundaries, and this is true for the lands surrounding the City. The WUI areas within the City boundaries are not isolated islands surrounded by urban areas. Rather, they are continuations of large WUI and wildland areas that extend further west into Pleasanton Ridge Park and south into hills surrounding the San Antonio Reservoir.

Figure 1 shows the CAL FIRE Fire Hazard Severity Zone maps for the City and the surrounding area. The areas colored in yellow, orange, and red are the FHSZs and WUI areas. As shown on the map, the State has different designations for portions of the FHSZ and WUI areas. First, the FHSZ classifies areas as either State Responsibility Areas (SRA) or Local Responsibility Areas (LRA). These classifications refer to who has the primary responsibility for the suppression of wildfire; on SRA lands, the state is responsible (e.g., CAL FIRE), and on LRA lands, the local agency is responsible (e.g., LPFD). Next, the FHSZ classifies SRA areas as having Moderate, High, or Very High fire hazard severity, while LRA areas are only classified as having Very High fire hazard severity. For the purposes of this wildfire section, the specific classifications is not important. Instead, it is more important to identify the areas that are within a FHSZ and WUI area.

Figure 1 CAL FIRE Fire Hazard Severity Zone Maps for the City and Surrounding Areas



SOURCE: CalFire 2024; USGS 2022

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0 0.5 1 Miles

FIGURE 1

Wildland Urban Interface Areas

Pleasanton UFMP Wildfire Section

The Fire Environment

Wildfire behavior is governed by terrain, vegetation (fuels), and weather. Within the WUI areas in the city, the fire environment can be broadly summarized into two types: the WUI on the west side and the WUI on the south side. A different make-up of terrain and vegetation characterizes each area. Both areas experience similar weather conditions regarding temperature and relative humidity, but each area has unique wind patterns.

Terrain

Terrain influences wildfire in two ways. First, fires burning uphill on a slope have higher rates of spread and higher intensities because the slope brings the flames closer to vegetation above it, preheating them and allowing them to ignite more readily. Second, the aspect influences how much sun exposure is received. South and west aspects receive the greatest exposure, which makes them the hottest and driest slopes and, therefore, the most readily available to burn.

A singular, long east-facing slope from Foothill Road to Pleasanton Ridge characterizes the WUI areas' terrain along the City's west side. There is some minor variation in the slope aspect where the hillside contains numerous drainages. There is an approximately 1,200-foot difference in elevation between Foothill Road and the ridge. Slopes average between 25% and 65% along the upper 1/3rd of the slope (Google Earth, 2024).

Numerous hills characterize the terrain in the WUI areas along the city's south side. These hillsides are generally composed of north-south running ridgelines (closer to I-680) or east-west running ridgelines (closer to State Route 84), representing all aspects in this WUI area. These hills are considerably shorter than the Pleasanton Ridge, with only a 200 to 300-foot difference between the ridgeline and the adjacent valley. Slopes are similar, averaging about 25% with a maximum of 65% (Google Earth, 2024).

Weather

The City of Pleasanton's fire season occurs when vegetation and weather conditions are conducive to the spread of a wildfire. Fire season typically begins in May when grasses and annual plants have cured and ends in October with the arrival of significant precipitation. The actual beginning and end of fire season can vary from year to year. The beginning of the fire season is dependent on how much precipitation occurs during the winter and spring and when the last wetting rain occurs. The end of the fire season is dependent on when the first wetting rains of the fall arrive. Precipitation is generally absent during fire season. The hottest and driest conditions occur July through September with a mean maximum temperature over 80°F and mean minimum relative humidities below 10%. Winds are predominantly out of the west and west-northwest (WRCC 2024). Wind speeds vary depending on the location in the City. The WUI areas on the City's west and south sides experience pronounced diurnal winds during the fire season. On the city's west side, particularly in the hillsides below Pleasanton Ridge, a significant increase in wind speeds can occur in the late afternoon and persist until after sunset. On the south side of the city, winds are primarily from the southwest, and there is typically an increase in wind speeds in the early afternoon that persists until after sunset (Altamont and Las Trampas RAWS, 2024.)

Vegetation

Overview of Vegetation Within the WUI

Vegetation is the fuel of the wildfire. Three vegetation factors influence fire behavior. First is the volume of vegetation; volume influences how much fuel is available for the wildfire, influencing the maximum intensity and duration of the burn. Second is the arrangement of vegetation; the arrangement of the vegetation influences fire intensity as well since taller vegetation can produce greater flame lengths and a higher intensity. The arrangement

of vegetation also influences what type of fire can occur, as continuous vegetation from the surface to the tree canopy can provide pathways for fire to move into the tree crowns, causing torching small groups of trees or crown fires. Finally, the surface area to volume ratio influences how readily vegetation ignites and burns and how long it burns. 'Lighter' vegetation, like grass, has a low surface area to volume ratio and readily ignites when fully cured or dried out, and the grass blades are entirely yellow This low surface area to volume ratio also results in fire quickly consuming the grass, and there is little residual fire after the main front of the fire has passed. 'Heavier' fuels like logs have a higher surface area to volume ratio and take longer to ignite and burn, but once ignited, they burn longer.

The vegetation in the WUI areas along the city's west side is characterized by a generally continuous band of Oak forest and woodlands. On the lower slopes, the tree canopy tends to be more open, consisting of individual trees or clusters of trees separated by openings in the tree canopy. Closed-canopy forests and woodlands primarily characterize the middle and upper slopes. Surface vegetation on the lower slopes is a mix of grasslands with areas covered with shrublands. Beneath the areas covered by tree canopy, small trees are also present. Understory vegetation on the middle and upper slopes comprises a dense layer of shrubs and small trees. On the upper portions of the slope, there is little to no separation between the surface vegetation and the tree canopies. How far up the slope development on the west side of the site reaches varies. There are no large developed areas west of Foothill Road that are anticipated to be a barrier to fire spread because there is little or flammable vegetation or offer an area of relative safety because a wildfire is not expected to burn actively there. Generally, the development consists of low-density (more than 100 feet between homes) single-family home communities separated by undeveloped areas. Landscaping within these communities combines frequently maintained ornamentals (e.g., irrigated lawns, flower beds, etc.) and managed oak woodlands. There is sufficient vegetation within these communities to sustain the spread of a fire, though not at the same intensity as the adjacent natural areas due to lower fuel volumes and better separation between tree crowns and surface vegetation.

Open-canopy oak woodlands and grasslands characterize the vegetation in the WUI areas along the city's south side. Areas of continuous grassland are common throughout this WUI area. Tree cover is varied, with most areas only having scattered trees within the grasslands. Sheltered areas like drainage bottoms and north-facing slopes generally have denser tree cover. Development in this WUI area is composed of larger planned residential communities with a higher density (less than 30 feet between homes) than the communities along Foothill Road. Vegetation within these communities is predominantly maintained ornamental landscaping. Natural vegetation is limited to isolated strips of vegetation along drainage bottoms or small sections of hillside. The exception to this are the homes along the southern limit of development. These areas have more in common with the communities along Foothill Road and contain ornamental landscaping near the homes and natural areas around the perimeter of the landscaped areas.

Tree-Related Fire Hazards

Public Trees

Public trees within the WUI areas of the City are comprised of trees located along roadways, trees in open space areas, and park trees. Most of the public trees in WUI areas in Pleasanton are located within the more than 700 acres of open space in the City. These trees are further than 100 feet from a structure or 20 feet from a road and are outside of the defensible space area in the LPFD's vegetation management standard so the City does not regularly maintain them. City-maintained trees within the WUI areas are predominantly located along roadways, with a minor component in City parks. Many native and ornamental tree species present along roadways in the WUI areas are broadleaf trees that do not have characteristics identified by state or local fire agencies as highly flammable. Native Oak (e.g., Coast Live Oak and Valley Oak) and common landscape tree species (e.g., Ornamental Pear and Sweetgum) are identified as 'fire resistant' or have a 'favorable fire rating' according to state and local wildfire preparedness guides. SubAppendix A contains a list of references for fire-resistant species and fire-wise landscaping.

Dead trees are a fire hazard. While live trees often contain a large amount of water in their tissues, dead tree tissues, particularly the leaves and small branches, have moisture levels that are generally in equilibrium with the moisture in the air. As a result, they are readily ignited and can burn under conditions where green vegetation would not. Most significantly concerning are recently dead trees with a full crown of dead leaves or needles since these dead leaves readily ignite, spreading fire into the tree crown and producing many embers. Dead public trees are a transitory phenomenon because these trees are likely to fall into a public right of way or park; the City makes removing these trees a priority. For this reason, the number of dead trees in the city changes annually, but they are always a minor component of the city's trees. At the time of the inventory, dead trees comprised 0.5% of City trees.

Maintenance of individual trees and groups of trees is as important as species or species characteristics. Well-maintained trees, with minimal deadwood or leaf litter accumulation and adequate clearance between the crown and surface vegetation, are less likely to ignite and burn. The City regularly maintains public trees for safety and clearance above roadways and sidewalks (pers comms G. Damonte July 2023), so public trees are generally maintained in a condition that reduces the risk of fire spreading into the tree crowns.

Private Trees

Pleasanton's privately owned trees are dispersed throughout private lots and along privately maintained streets throughout the WUI area. Whereas the public trees primarily occur as single rows of individual trees along roadways, trees on private properties form a more uniform, although rarely dense, canopy. Tree densities vary significantly from property to property, with some lots devoid of trees and others heavily populated. Private property is assumed to contain more trees than public property because there is a greater area of private property than public property in the WUI areas. Most urbanized landscapes are more fire-resistant than native landscapes since they are maintained and irrigated to some degree, although they do not always focus on minimizing wildfire risk. Ornamental irrigated landscapes that receive maintenance (removal of dead and dying plants, trimming, thinning) are generally less receptive fuel beds than an unmaintained native landscape.

No inventory was made of trees on private property, and the exact composition of tree species on private property in the WUI areas is unknown. However, based on observations made during the inventory of city trees and field visits with City staff, the variety of tree species on private property in the WUI area is similar to that on city property. A large portion of the urban forest canopy on private property in the WUI areas is composed of trees that do not have undesirable fire characteristics, including native trees such as oaks and ornamentals such as fruit trees and broadleaf shade trees. Trees with undesirable fire characteristics are more prevalent on private properties than public properties in the WUI areas.

Dead trees on private property have the same fire potential as those on public property. However, where public trees are generally removed from buildings (more than 30 feet of separation) dead trees on private property can be much closer to a building. Therefore they can be considered a greater fire hazard, particularly when they are within 10 feet of a structure because of the risk of a fire transitioning from the tree to the building. Like dead public trees, dead trees on private property are a transitory phenomenon because property owners remove them as they are unsightly and are at risk of falling onto a home or improvement.

The maintenance of trees on private property varies. However, most of the properties observed during the field visits for the preparation of this section were maintained to some degree, though not always with an emphasis on fire safety. Because private trees are more likely than public trees to be close to a building, it is much more common to see private trees with inadequate clearance from a building, which is less than 10 feet of space between tree branches and a chimney.

County and Local Regulations in the Wildland Urban Interface

Several local and state regulations govern the care of trees within the WUI areas of the City. These regulations fall into three categories: those that protect certain trees from unnecessary damage or removal, those that set standards for maintaining vegetation on a property to prevent the spread of a wildfire, and those that govern tree maintenance around utilities. This section contains an overview of the relevant regulations and their relationship to the management of trees within the WUI areas of the City.

Tree Protection Regulations

City of Pleasanton Municipal Code

Chapter 17.16 Tree Preservation

The City's Tree Preservation chapter emphasizes the importance of preserving heritage trees to enhance natural beauty, increase property values, maintain ecology, moderate temperatures, prevent erosion, and improve air quality. This chapter defines which trees in the City on private property are protected by this chapter in the code. This chapter also defines when a permit is required to remove or maintain a tree protected by the city code, when a permit is not required, and the permit process. Chapter 17.16 also defines the removal and protection of trees on property related to the development of property.

Vegetation Maintenance Requirements

City of Pleasanton Municipal Code

Chapter 9.28 Property Maintenance

The City's property maintenance code, specifically **Section 9.28.020, Unlawful property nuisances, defines unlawful property conditions**. This section includes two items related to vegetation on a property: (B) defines unlawful conditions related to overgrown vegetation visible from a public street that can harbor pests or block the public right-of-way, and **(C).** defines vegetation, including trees that are visible from the street and are dangerous to public safety.

Chapter 20.65.100 Weeds

This section of the City's property maintenance code requires all premises and exterior property to be maintained free from weeds or uncontrolled plant growth in excess of 20 inches in height. Weeds are defined as all grasses, annual plants, and vegetation other than trees or shrubs.

Chapter 20.24 Fire Code

The City of Pleasanton has adopted the California Fire Code with some local amendments as their fire code. One amendment, **Section 20.24.187,** amends the definition of the Wildland Urban Interface to the area defined by CAL FIRE fire hazard severity zone maps.

California Code of Regulations

Title 24 California Fire Code

The California Fire Code establishes minimum requirements consistent with nationally recognized good practices to safeguard the public health, safety, and general welfare from the hazards of fire, explosions, or dangerous conditions in new and existing buildings, structures, and premises and to provide safety and assistance to firefighters and emergency responders during emergency operations. Chapter 5 of the fire code describes fire service features for buildings, structures, and premises that contain the requirements for access roads for fire department apparatus. These requirements include horizontal and vertical clearance requirements for roadside vegetation. Chapter 49 of the fire code provides minimum standards to reduce the likelihood of life and property loss due to wildfire. It includes prescriptive requirements for the installation and maintenance of vegetation near buildings. Chapter 49 also includes the requirement that new developments or projects in the identified WUI area prepare a fire prevention plan, known as a Wildland Fire Management Plan to the LPFD, that describes the measures taken to minimize and mitigate the wildfire risk on the project property.

Government Code

Sections 51175 through 51189 of the government code define the areas of the state where a local agency is responsible for fire protection and where a very high fire hazard exists. These sections also define the responsibility of property owners to maintain the buildings and vegetation on their property within 100 feet of a structure in a condition that minimizes the risk of building ignition. **Section 51182** provides specific criteria for maintaining vegetation within 100 feet of a building, including trees that overhang a building.

These sections form the core regulations that define the vegetation management standards enforced by the fire department.

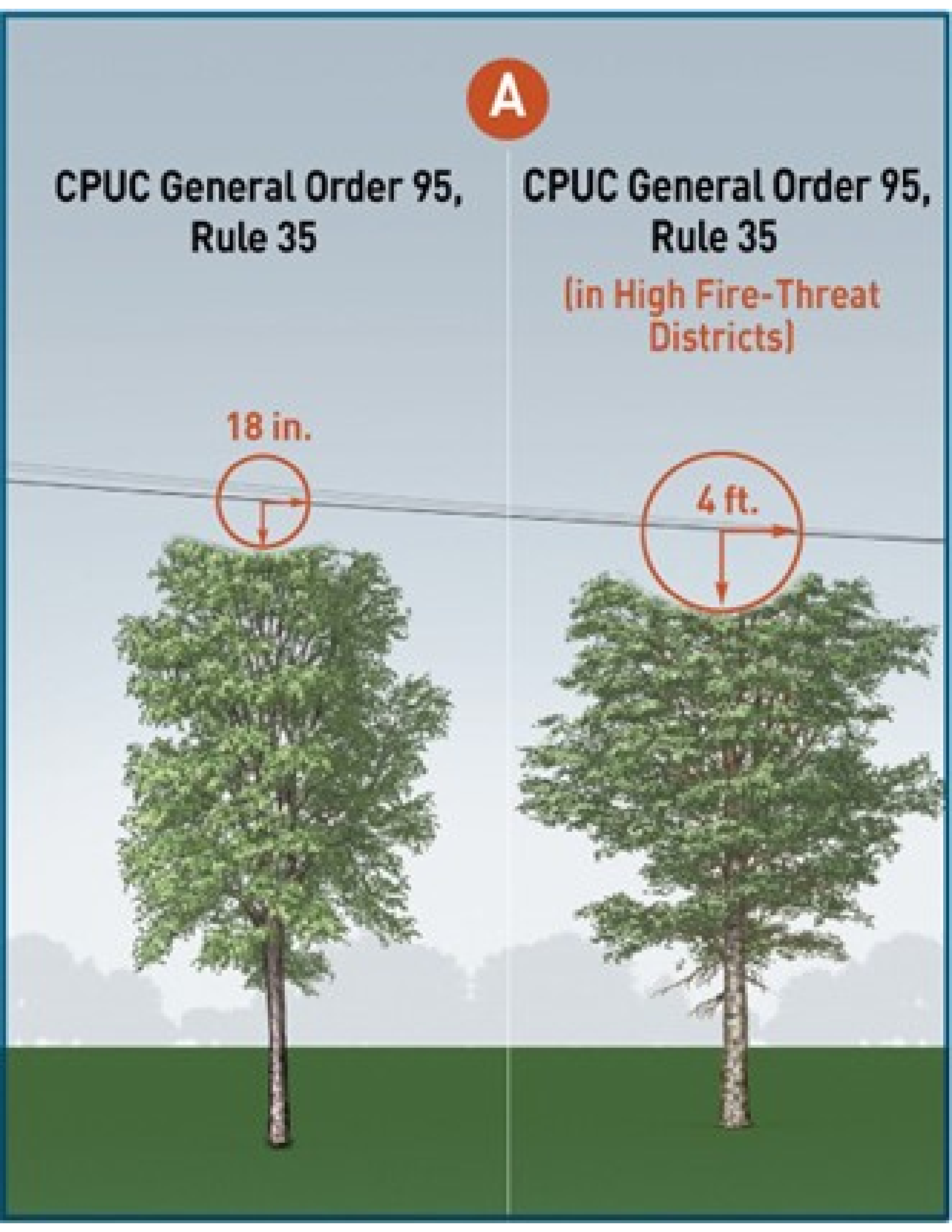
Utility Clearance Requirements

Public Utility Code

General Order 95

General Order 95, Rule 37, Table 1 defines the above-ground clearances of conductors and the clearances between conductors and other structures/vegetation. These rules include the maintenance of trees near electrical equipment and special provisions for clearances in WUI or areas designated as high fire hazard severity zones.

Figure 2 PUC Clearance Requirements for High Voltage Electrical Lines


A
CPUC General Order 95, Rule 35
CPUC General Order 95, Rule 35
(in High Fire-Threat Districts)
18 in.
4 ft.

Tree Management in the Wildland Urban Interface Area

The behavior of a wildfire in the City's WUI areas, as described in Chapter 2 of this section, is influenced by several factors, including the arrangement and volume of vegetation present. The maintenance of this vegetation can significantly impact the spread and intensity of a wildfire. This includes the maintenance of trees on private and public property. Proper tree care in the WUI areas can reduce the risk of extreme fire behavior, including torching or crown fires.

The Role of Tree Maintenance in Managing Wildfire Risk

Wildfire spread and intensity are dictated by the surface vegetation volume and arrangement. Trees and the tree canopy influence the fire's capacity to transition into and sustain torching or crown fires. Continuous vegetation from the surface to the tree canopy creates a path for fire to spread into the tree canopy. Tree litter indirectly contributes to the spread of wildfire on the surface by adding to the fuel volume on the ground. Therefore, the main fire prevention role of tree maintenance in Pleasanton's WUI areas is minimizing the risk that a wildfire on the surface can spread into the tree canopy. A secondary role would be reducing surface fuel volumes by maintaining leaf litter.

Tree maintenance recommendations intended to reduce the risk of a wildfire spreading into the tree crowns focus on separating the lighter, more readily ignited leaves and small branches in the tree crown from the surface vegetation that can sustain a wildfire. Vertical separation is created by reducing surface vegetation and raising the height of the lowest branches in the tree crown, which creates space to prevent direct flame contact and allows radiant and convective heat to dissipate.[1]Creating horizontal space between tree crowns also reduces the risk of a fire transitioning into them by allowing heat and hot gases to vent into the atmosphere and by reducing the risk that flames from one tree torching can come into contact with another tree crown. Tree maintenance recommendations for reducing tree litter's contribution to the surface fuel load focus on maintaining the level of accumulated litter at a minimum so that leaf litter cannot contribute to the spread or intensity of a fire. In areas with minimal surface vegetation, particularly areas that serve as a barrier to fire spread(e.g., roads), the focus is on removing any accumulations of litter.

Tree Maintenance Standards

Trees in the WUI area require maintenance practices to increase horizontal spacing between retained trees to reduc the potential for crown fire spread. These practices remove ladder fuels (i.e., fuel that can facilitate fire spread fro ground fuels into tree crowns) by increasing the vertical spacing between surface fuels (shrubs, grasses) and tree crown to reduce the potential for surface-to-crown fire transition. Creating more fire-resilient trees involves a three-part proces 1) reducing surface fuels, 2) reducing ladder fuels, and 3) reducing tree crown density through crown thinning (USF 2013). For the majority of wildfires, the fire behavior, that is, the intensity and rate of spread, is determined by the volum and arrangement of vegetation on the surface. Surface and ladder fuels should be the highest priority for managemen in order to reduce fire intensity, rate of spread, and crown fire potential. Active crown fires are initiated with individu tree crowns igniting but are ultimately sustained by the density of the overstory crowns. Reduction in potential surfac fire behavior plus an increase in canopy base height minimizes torching potential (Agee & Skinner, 2005).

The tree maintenance standards presented in this section are intended to reduce fire hazards by rearranging and maintaining the fuels' spatial distribution. All vegetation, including trees, will burn, given the right conditions (Reinhardt

[1]. The trunks on live, healthy trees take much longer to ignite than the leaves and small branches in the crown. Most wildfires don't burn in an area long enough to ignite the trunk.

et al., 2008). Therefore, the goal of fuel treatment is not to remove all trees or vegetation but to minimize the potential for ignitions, crown fires, and extreme fire behavior by reducing fuel loads and altering the retained vegetation structure, composition, and spacing (horizontal and vertical). These recommendations should be conducted for all trees within 100 feet of the structure, and those that overhang are within 20 feet of a road or driveway. The Livermore-Pleasanton Fire Department has published a vegetation management standard that details how to properly maintain other types of vegetation, such as grass, brush, and other types of vegetation (LPFD 2021). SubAppendix B contains the LPFD's Vegetation Management Standard.

Tree maintenance recommendations and vegetation management to meet defensible space requirements and reduce wildfire risk generally do not change depending on who performs the work or where the tree is located. In the WUI areas of the City, trees within 100 feet of a building are recommended to be maintained to meet the recommendations in section 1.3 and appendices D, E, and F of the UFMP and the guidelines published by the Livermore-Pleasanton Fire Department. The two exceptions to this rule are 1.) trees along public roads should be maintained so that vehicles can travel unobstructed, and 2.) vegetation clearance around high-voltage electrical equipment is generally the responsibility of the electric utility, which is PG&E in the City.

Tree Arrangement

Fire spreads horizontally (from shrub to shrub or treetop to treetop) and vertically (from understory vegetation to tree). A more significant fire hazard exists where the spacing between trees and between shrubs and lower branches is close enough for the fire to preheat vegetation and ignite across the gap, either horizontally or vertically. If a ground fire transitions into a tree canopy fire, it will quickly spread from one tree to closely adjacent trees. The primary goal of tree arrangement is to break up the continuity of the flammable materials in the tree canopy through proper tree spacing. To accomplish this, the following recommendations are provided in the LPFD vegetation management standard (Livermore-Pleasanton Fire Department, 2021):

- For slopes less than 20 percent, trim or space trees to provide 10 feet of space between the tips of tree limbs. Trees should be limited to groupings of 2-3 trees, with each grouping separated horizontally as described herein.
- Increase spacing to 20 feet for slopes that are 20 to 40 percent.
- For steep slopes over 40 percent, 30 feet of spacing is needed. When planting individual or small groupings of trees, allow for future growth by spacing them 20 to 30 feet apart.

In addition, other ladder fuels, such as shrubs, should be removed around the base of trees.

Pruning Practices

Lack of attention to tree crowns of any species can result in trees accumulating dead twigs, leaves, and branches, regardless of whether they are categorized as "fire resistant." This buildup of dead fuels in the canopy can easily result in trees becoming very flammable. Tree pruning recommendations focus on preventing fire from spreading into a tree canopy. To reduce the fire-spreading potential of trees taller than 18 feet, prune the lower limbs to a minimum height of 6 feet. If the tree is shorter than 18 feet, all branches and foliage should be removed from the lowest 1/3 of the tree. Trees near homes or buildings should receive additional attention, and branches that overhang the roof or come within 10 feet of the chimney should be trimmed or removed (Livermore-Pleasanton Fire Department, 2021). Additional attention should be given to trees that overhang public and private roads by trimming trees to provide 14 feet of vertical clearance above the roadway for emergency vehicle access (CFC, 2022).

Special Pruning Standards for Palms – Palm trees are significantly different from broadleaf and conifer trees in their pruning requirements. Palm trees lack branches or leaves originating from buds on the trunk; instead, new fronds grow from a central point at the top of the tree (the heart). All palm tree species produce new fronds annually,

and certain genera of palms, such as Mexican fan palms (*Washingtonia robusta*), can accumulate large collars of dead and highly flammable fronds. As a result, palms cannot be pruned using the same standards as broadleaf and conifer trees. Pruning practices should emphasize removing dead fronds and skinning the trunk to minimize the accumulation of dead material. Pruning to maintain clearance is generally not necessary[2] unless the tree is near a roof or chimney.

Special Pruning Standards for Species that Produce Large Amounts of Flammable Debris –The pruning practices described above address the requirements for trimming and removing flammable branches to create adequate vertical and horizontal spacing. However, some tree species with growth characteristics produce flammable or dead material that is not addressed by pruning branches. Some species of eucalyptus trees (primarily *Eucalyptus degulpta* and *Eucalyptus globulus*) shed their bark in heavy quantities, which produces high volumes of dry and flammable debris at the base of the tree. This pile of bark can readily ignite and spread fire quickly. All dead wood and flammable debris should be removed from the tree before each fire season.

An International Society of Arboriculture-Certified Arborist is recommended to complete tree pruning per American National Standards Institute A300 specifications (ANSI, 2017). This will ensure tree pruning complies with wildfire hazard area maintenance recommendations and supports tree longevity. The City of Pleasanton does not require a permit to prune trees; however, pruning should be done in accordance with International Society of Arboriculture pruning guidelines. Topping is not an approved pruning practice as it creates a hazardous canopy with weakly attached limbs prone to failure.

Tree Pruning for Utility Clearance

Vegetation contact with aboveground electrical equipment is a common cause of fires ignited by electrical utilities. In 2023, contact with vegetation was the cause of 19% of fires ignited by PG&E equipment (CPUC 2024). Maintaining adequate clearance between high-voltage electrical equipment and nearby vegetation is the responsibility of the electric utility, which is PG&E within Pleasanton city limits. Within the WUI areas of the City, PG&E is responsible for maintaining at least four feet of clearance between its high-voltage equipment and nearby vegetation for wires carrying 22.5 kV or less, 6 feet of clearance for wires carrying from 22.5 to 72 kV, and 10 feet of clearance for lines carrying more than 110 kV. The utility is also responsible for removing branches likely to fall onto their equipment regardless of distance. Healthy, stable trunks and major branches are exempt from this requirement since they do not readily ignite. Electrical utilities are not required to maintain specific vegetation clearances around low-voltage wires and service drops. However, they are required to maintain vegetation near their electrical lines, including low voltage lines, if the vegetation is abrading or damaging the line.

[2] Because live fronds do not readily ignite and removing or damaging the fronds near the heart of the palm can kill the tree.

Inspections

Public and private trees within the City's WUI areas should be inspected annually for conditions or defects that will make the trees more likely to ignite, pose a high risk to public safety, or obstruct public and private roads. Annual inspections should be performed before the beginning of the fire season in May, ideally sufficiently early that there is adequate time before the fire season begins to complete any needed tree maintenance work. Annual inspections should be focused on identifying the following conditions or defects:

- Large dead areas of the tree crown, large broken branches that are hanging within 10 feet of the surface, and significant accumulations of leaf litter in the crown.
- Dead trees or dying trees with no hope of recovery.
- Branches in contact with high-voltage electrical equipment.
- Branches overhanging the roadway less than 14 feet above the road surface obstructing vehicle traffic on public and private roads.
- Trees near buildings and roadways with root or trunk defects that are a high risk for whole tree failure and are likely to strike the building[3] or land in the roadway.
- New branch growth on trees within 10 feet of buildings,

These above conditions and defects are generally readily detected by a short visual inspection. These annual inspections are expected to be incorporated into the routine inspections performed by property managers and by tree maintenance crews while performing routine tree trimming or removals.

Tree Removal & Replacement Standards

Tree Removals

All trees in both urban and natural areas have a lifespan within the landscape that is partially dependent on the care and maintenance they receive. When a tree's related costs (maintenance, watering, pruning, or hazard level) outweigh its benefits (aesthetics, energy conservation, air quality, etc.), tree removal should be considered with a replanting plan. Dead, declining, or diseased trees should be removed from the urban forest before they present a hazard. However, tree removals should be justified based on a condition assessment, a cost-benefit analysis, a hazard evaluation, or other fact-based methods that justify removal as the best approach. Removing large trees results in losing valuable environmental and economic benefits that are not easily or quickly replaced. For trees removed in the wildfire hazard area, replacement trees should be carefully selected to provide maximum benefits with minimum drawbacks.

Tree Removal Priorities:

1. Trees with structural defects or conditions that make them an imminent risk to public safety and no less drastic means are available to reduce risk.
2. Dead trees
3. Trees with structural deficiencies or poor health where no less drastic means are available to reduce risk.
4. Fast-growing tree species growing beneath high-voltage power lines that have been repeatedly topped.

[3] Including critical facilities such as water tanks, pump houses

5. Trees near buildings (less than 10 feet away) that require drastic pruning to meet fire department vegetation spacing requirements.

Tree Replacement

When a tree is removed from a property in a WUI area of the City, a proposed replacement should be a tree species appropriate for the conditions on the property. Appropriate species for the WUI areas in the City have the following fire-resistant characteristics (UCANR 2021):

- Tree species with leaves that retain moisture. Trees with leaves that retain a greater moisture content are less likely to ignite during a fire.
- Open growth structure. Trees with an open growth structure have widely separated branches and limbs that are not likely to accumulate dead leaves or catch embers from a fire.
- Raised crown structure. Tree species that naturally prune or shed branches in the lower crown are less likely to retain dead branches in the lower crown and less likely to be ignited by surface fires.
- Low litter production. It is normal for all tree species to shed leaves and small branches. However, some species produce low volumes of litter, and those with leaf drop occur during the fall and winter after the fire season has ended.
- Drought tolerant. Seasonal and extended droughts are a common occurrence in California. Species adapted to regional weather conditions are less likely to produce excessive leaf litter or dieback when the region experiences persistent hot and dry weather.
- Thick Bark. Thick bark trees, particularly tree species native to the region, are more resistant to damage from fire. Thick, persistent bark (e.g., not shedding or peeling) does not readily ignite or spread fire.

Other considerations:

- Trees planted near electrical lines should be species that do not exceed 30 feet in height when mature. Large shade tree species should not be planted within 50 feet of high-voltage electrical equipment (PG&E 2024).
- Identify underground utilities before planting, and do not plant trees within 10 feet of a utility line.
- Size at maturity, including the average maximum height and crown spread.

Tree replacement in WUI areas should consider the concept of "right tree, right place, right reason" for each site. Right tree, right place emphasizes planting tree species compatible with the region they are growing in and having adequate space to develop without creating hazardous conditions. Trees that are incompatible with the site they are planted in are more likely to be in poor health, have greater maintenance costs, and require early removal (Arbor Day Foundation 2024). In the WUI areas of the city, the "right tree, right place, right reason" includes adequate spacing between newly planted trees and existing vegetation. As noted in the Livermore Pleasanton Fire Department's vegetation management guidelines, there should be 10 to 40 feet of space between tree crowns, depending on the slope. Planting replacement trees should not only consider whether the species is appropriate for the property but also if the tree will have adequate space between nearby vegetation to minimize the risk of fire transitioning into the tree crown. SubAppendix C contains a list of tree species appropriate for WUI areas in the City of Pleasanton.

As a final note, it is not appropriate to replace every tree removed with a new tree in the same location. Poor replanting sites include locations within 10 feet of a structure, within 5 feet of an underground utility line, within 25 feet of an overhead electrical line, and in locations with inadequate spacing between the crowns of the existing mature trees. Replacement trees should be relocated to a more appropriate site in these situations.

Watering

When establishing new trees, deep, infrequent (weekly) watering ensures water slowly percolates into 12 inches of soil, allowing roots to establish into the landscape. Once a tree is established in approximately the first three years after planting, supplemental watering is only necessary during extreme heat or prolonged drought periods. Deep watering during the establishment period encourages root growth beyond the surface, which would occur if shallow or broadcast irrigation was used to establish the tree. Deep watering is a best practice to establish the root system of newly planted trees into the landscape, helping to reduce the likelihood of future storm- or wind-related failure.

When extreme heat or drought is experienced, mature trees may benefit from supplemental watering once per month around the dripline.

During predicted high heat events, dry periods, and drought, trees with shallow roots struggle to intake enough water from the top of the soil, which dries out first (Davey Research, 2016). Deep watering stimulates trees to produce broad and deep root systems, resulting in trees that are better able to survive drought, are more solidly anchored, and can withstand significant winds. This technique also uses less water, which provides greater security so that the tree can survive through extended drought conditions where water restrictions might be in place. Keeping trees in the wildfire hazard area sufficiently irrigated decreases the risk of ignitions and/or extreme fire behavior.

Staffing

The City's existing urban forest management program consists of 38 staff members with tree-related job functions. Tree maintenance is not the only responsibility for these staff members who are also employed to park maintenance duties. City staff are being utilized across a range of urban forest tasks, including planting, establishment care, pruning, removals, and tree debris cleanup. The tree maintenance contractor accomplishes the majority of the public street tree pruning and tree removal.

Accomplishing the tree maintenance standards above requires adequate staffing to perform the recommended tree maintenance activities. Some of the recommended maintenance activities are already being done as part of the city's routine tree maintenance. The tree maintenance contractor already trims street trees overhanging public streets to create 14 feet of clearance above the roadway, and City staff identifies and schedules the removal of dead trees in a timely manner. Some of the recommended maintenance activities can be incorporated into the existing tree maintenance programs but will require modifying the standards used by City staff and the tree maintenance contractor. The contract with the tree maintenance contractor can be revised when the contract is renewed or re-bid to include a requirement to maintain trees in the WUI areas to the standards recommended in this section of the UFMP. Finally, several recommended maintenance activities cannot be accomplished with the current staffing levels or tree maintenance contract, and the City will need to consider hiring additional staff or a new contractor to perform the recommended work. Annual defensible space and vegetation inspections in the WUI areas would require additional staffing to complete the inspections and follow up with property owners before the peak of the fire season (August-October). One to two full-time staff members would be required to complete the annual inspection program, which includes public outreach, property inspections (private and public), and the required follow-up (notification letters, scheduling work, etc.). It is recommended that these additional staff be assigned to the Fire Prevention section of LPFD so that the inspectors can perform a variety of wildfire preparedness duties and allow the fire department to enforce its vegetation management standards fully.

Prepared for Wildfire

The tree maintenance and removal standards described above are part of a larger and more comprehensive program to prepare properties for a wildfire that includes vegetation management, home hardening, address and water supply identification, and access. Implementing all of the parts of this comprehensive wildfire preparedness program is the key to minimizing the risk of destructive wildfire spreading across a property. It is essential to recognize that this comprehensive program is more than the sum of its parts. Overemphasizing one part of this

program does not compensate for not performing another part. For example, a home with a combustible roof and exterior is still at risk of ignition during a wildfire, even if the property owner removes every tree within 100 feet of the home.

Public and private property owners should consider all the wildfire vulnerabilities and all the preparedness steps they can take to protect their properties, including tree maintenance and removal. The LPFD can provide property owners with information and guidance on how to reduce the risk of wildfire for their properties.

Tree Maintenance Responsibility

Ownership and responsibility for the maintenance of trees within the WUI areas of the City is complex. There are a variety of different property types, both private and public, with different maintenance responsibilities depending on the property types or the improvements built upon them. It is important to recognize that in the WUI areas of the City, the tree maintenance standards do not change depending on who owns the property or who is responsible for tree maintenance. Responsibility for tree maintenance can be organized into the following groups:

- **Private Property Owner-Single Family Use.** This refers to a property designated for the use of a single family, typically a stand-alone structure built on its parcel of land.
- **Private Property Owner-Single Family Residential-Planned Development Tract, Common Area, Use.** This term refers to common areas (e.g., parks, pools, playgrounds, golf courses, etc.) in a housing development owned by the Homeowner's Association (HOA). Common areas in some Planned Unit Development PUDs can include roads and open spaces.
- **Public Property-Open Space:** Refers to areas owned by the City, county, or other public agency and open and accessible to the general public. In the WUI areas of the City, open space is predominantly natural areas but can include city parks.
- **Public Agency.** Refers to parcels owned by the City, County, or other public agency that contain publicly owned facilities, including water tanks, pump houses, substations, etc.
- **Public Right of Way.** This refers to lands reserved for public use, including streets, sidewalks, and utilities. The right of way is distinct from the above categories in that the public agency does not own the land the right of way passes through, and the responsibility for tree maintenance may not be the public agency's responsibility unless there is a mandate to do so.

It is difficult to generalize who is responsible for tree maintenance based on where a tree is located because of the variety of ownership. If there is a doubt about land ownership and responsibility, contact the City of Pleasanton for more information before conducting any tree work.

Economic Considerations

The City recognizes that maintaining trees in the WUI areas of the City to meet the Livermore-Pleasanton Fire Department vegetation management guidelines and the recommendations in this section can require more effort and expense than elsewhere in the City. This can include additional or more frequent tree trimming to ensure that the trees retained on the property have crowns with adequate clearance from the ground, buildings, chimneys, and roads. It can also include managing the number of trees on the property to maintain an ideal spacing of at least 20 feet between tree crowns and removing dead trees as soon as possible.

This section summarizes the costs associated with the additional tree work and, as a comparison, the costs associated with the suppression of a large wildfire. It also includes opportunities for funding vegetation management work, including tree care, that is available for the public and agencies and discusses tree maintenance practices and property insurance.

Costs Associated with Tree Maintenance

Completing the tree maintenance recommendations in this section incurs a cost in both dollars and effort. It is highly recommended that an ISA-certified and experienced tree service perform tree maintenance activities on all but the smallest trees or simplest maintenance activities due to the risk to personal safety and the effort involved in disposing of a large volume of cut woody debris. Costs to perform the recommended tree maintenance activities vary based on the tree(s) size and location.

Funding Opportunities

Funding is available to local government agencies and non-profit organizations to perform wildfire risk reduction work in the WUI area, including tree trimming and removal, mainly through grants. There are fewer opportunities for individual property owners and HOAs. However, individual property owners and HOAs can find opportunities for funding and assistance through their local firewise community or fire safe council. Diablo Fire Safe Council represents the Pleasanton area and has a cost-share program, which is described below.

CAL FIRE Wildfire Prevention Grants:

CAL FIRE's Wildfire Prevention (WP) Grants Program provides funding for wildfire prevention projects and activities in and near wildfire-threatened communities that focus on increasing the protection of people, structures, and communities. Funded activities include Hazardous Fuels Reduction, Wildfire Prevention Planning, and Wildfire Prevention Education, emphasizing improving public health and safety while reducing greenhouse gas emissions. The WP Grants Program funds three types of activities: Hazardous Fuels Reduction, Wildfire Prevention Planning, and Wildfire Prevention Education (CAL FIRE, 2023). Hazardous fuel reduction is the most relevant to the UFMP of these three activities. Hazardous fuel reduction grant funds can be used for the following activities.

- Creation or maintenance of fuel breaks in strategic locations, as identified in CAL FIRE Unit Fire Plans, a Community Wildfire Protection Plan, or similar strategic planning document
- Removal of ladder fuels to reduce the risk of crown fires
- Creation of community-level wildfire prevention programs, such as community chipping days, roadside chipping, and green waste bin programs
- Selective tree removal (thinning) to improve forest health to withstand wildfire
- Modification of vegetation adjacent to roads to improve public safety for egress of evacuating residents and ingress of responding emergency personnel
- Reduction of fuel loading around critical infrastructure to maintain continuity of government and other critical services
- Purchase of fuel modification equipment not to exceed a cumulative total of $750,000. Equipment is an item of $5,000 or more per unit cost and has a tangible useful life of more than one year
- Supplies include items under $5,000 per unit cost. Chainsaws are an example of a supply item and are not considered equipment
- Projects to improve compliance with defensible space requirements as required by Public Resources Code Section 4291 (Projects eligible for CCI funds are low-income, disabled, or elderly households per CA requirements)

- Seasonal and temporary prescribed grazing consistent with increasing the protection of people, structures, and communities

CAL FIRE WP grants are available to local agencies, including the City, County, Fire Protection Districts, Community Services Districts, Fire Safe Councils, and other qualified non-profit organizations with a 501 (c)(3) designation. Individual property owners and HOAs are not eligible to apply for these grants, but the funds can be used for private property.

FEMA Building Resilient Infrastructure and Communities

Building Resilient Infrastructure and Communities (BRIC) supports states, local governments, tribes, and territories as they work to reduce their hazard risk. Eligible states, territories, and federally recognized tribal governments can submit applications for BRIC funding. Homeowners, business operators, and nonprofit organizations cannot apply directly to FEMA. However, they can be included in a grant funded hazardous fuel reduction or vegetation management program.

The following activities are eligible for FEMA hazardous fuel reduction funds:

- Pruning - Removing the lower (live and dead) limbs of a tree reduces ladder fuels. This is frequently done alongside roads, thus increasing the effectiveness of the road as an existing fuel- break.

- Utility Vegetation management: Using herbicides to kill unwanted vegetation, brush removal around powerlines, and directional pruning. This method considers both structural integrity and the health of the tree. It guides tree branches away from powerlines and reduces internal decay.

- Removal of Understory – Removing shrubs and plants growing beneath the main canopy of a forest.

- Biomass Removal—This Includes clearing straw, removing dead or dry vegetation, thinning, and removing blown-down timber from wind throw, ice, or a combination of these.

- Felling of Hazardous Trees – Including removal of standing burned trees

- Mechanical Treatments—including disking, mulching, mowing, chopping, and removal of such material; material left onsite must meet appropriate depth practices in accordance with applicable codes and best practices.

Hazardous fuel reduction projects are eligible for FEMA funds if they are within two miles of homes and other structures that meet or exceed applicable fire-related codes and standards and demonstrate a risk reduction for the target community or buildings (FEMA, 2021).

USDA Forest Service Community Wildfire Defense Grant

The Community Wildfire Defense Program assists at-risk communities, including Tribal communities, with planning for and lowering wildfire risks on tribal, state, and privately managed land. Grant funding is available for communities to implement fuel reduction and defensible space programs; however, only fuel reduction and defensible space projects described in a Community Wildfire Protection Plan are eligible for the grant (USDA Forest Service 2024).

Diablo Firesafe Council:

Diablo Firesafe Council's (DFSC) Partners in Wildfire Prevention fuel reduction grant. Defensible space fuel-reduction projects are eligible for cost-share assistance of up to $5,000 per project. Funds are available to

organizations or groups of individuals to hire contractors to reduce fuel loads and create defensible space. DFSC may assist Alameda County or Contra Costa County property owners with vegetation management projects that will lead to compliance with their local fire department's defensible space requirements in areas designated as Priority Hazard Zones. Eligible projects include:

- Chipping or green waste removal of homeowner-cut material,
- Mowing or "weed whacking" (as a part of a larger project)
- Tree thinning (cutting of small trees) or "limbing-up" or removal of small dead trees
- Brush cutting (including juniper removal or use of mechanical equipment)
- Grazing

DFSC was not currently accepting new grant applications when this report was written, but this is a temporary closure, and the grant applications may open in the future (DFSC 2024). It is worth noting that this grant is available to individual property owners and HOAs.

The above funding sources are intended to help communities reduce the risk of wildfire by managing vegetation near buildings and critical infrastructure, including tree maintenance. Tree planting is typically not an eligible activity in these funding programs.

Wildfire Costs

Wildfires of all sizes incur costs that include damages to property, economic disruption, impacts on public health, and the cost to contain or suppress the fire. Preventing catastrophic wildfires, wildfires that cause substantial undesired losses to society and the environment (CCST 2020), is the intent of the Livermore-Pleasanton Fire Department's defensible space standards and this wildfire section. Catastrophic wildfires have costs that well exceed the tree maintenance costs recommended in this section, which are intended to prevent or reduce the likelihood of catastrophic wildfires in the WUI areas of the city. As an example, the 2020 SCU Complex, probably the closest catastrophic wildfire to the City, had a total acreage of 396,824 and burned from August 16 to October 1, 2020. The fire destroyed 225 structures and damaged 26 additional structures. The SCU complex cost approximately 68 million dollars to contain (NIFC 2020). Estimates of the costs related to the destroyed buildings are not available, but using the median price of homes sold in the County in 2020 ($1,027,860.00)(CA EDD, 2024) multiplied by the total number of structures destroyed (225) comes to more than 231 million dollars. Wildfire prevention, including tree maintenance, is overwhelmingly worth the investment compared to the cost of damages from the fire. As a final example, the Lick Observatory, which the 2020 SCU Complex threatened, was valued at the time of the fire at approximately $77 million. The observatory spent approximately $864,000.00 on vegetation management work in 2007 and 2017. CAL FIRE spent approximately $360,000.00 to suppress the fire at the observatory, and the observatory ultimately experienced $3.7 million in damages. Wildfire prevention measures resulted in a $73 million avoided loss (CAL OES, 2023).

Property Insurance Considerations

Property insurance companies can place demands on property owners to perform vegetation management work on their property in order to maintain coverage or prevent their policy premiums from increasing. While these demands do not carry the same legal authority as fire department requirements, losing coverage or paying significantly more in policy premiums can be just as impactful to property owners as a notice of violation from the City. Vegetation management work can include removing trees from the property. This can include trees that can be considered a foreseeable risk, such as dead or seriously damaged trees, but can also include healthy trees that are near a

building or overhang the roof in WUI areas. Insurance companies have their internal processes for evaluating and determining risk and may not consider the tree condition, maintenance history, City tree permit criteria, or fire department vegetation management standards. State regulations (PRC 4291 and GC 51182) permit insurance companies to require fuel modification, including tree trimming or removal, that is greater than what is required by the fire department.

Property owners receiving a requirement to remove a tree on their property from their insurance companies can be in a situation that ultimately does not benefit anyone. For the property owner, acquiescing to the insurance companies can incur tree removal costs that can be several thousand dollars for large trees or face the loss of property insurance coverage. For the City, the insurance company demands that removing a tree can pit property owners against City staff who have to enforce the City's Tree Preservation Ordinance. These demands can force property owners to spend money and effort on removing a tree that the fire department standards do not require and take away from vegetation management efforts that would minimize the risk of wildfire spread on the property. Finally, these demands from the insurance company do not consider the environmental services and benefits contributed by the tree that hold real economic value for the City.

Conclusion

Reducing wildfire risk in the WUI areas of the city can be accomplished through a combination of vegetation management around buildings and along roads, ignition-resistant construction, and early detection and response to new ignitions. Tree maintenance plays an important role in the vegetation management category by reducing the risk of extreme fire behavior, including crown fires. The Livermore-Pleasanton Fire Department has published vegetation management standards that guide property owners on how to maintain the vegetation on their property to reduce the risk it ignites nearby buildings and provide space for firefighters to work safely. The City of Pleasanton prioritizes urban forest management, including conserving healthy, low-risk trees that provide a variety of benefits to property owners and the community. To ensure the health of the City's urban forest, the Public Works Department performs routine maintenance on public trees. It enforces the City's tree preservation ordinance on trees on private property.

This UFMP section intends to provide the City with information to strike a balance between the fire department's objective of minimizing wildfire risk in the WUI areas and the public works goal of improving the urban forest. Both the fire department and public works' goals can be accomplished through regular tree maintenance that includes ensuring adequate clearance between trees and the surrounding vegetation, nearby buildings, and roads. Thoughtful planting of new trees can help improve the urban forest and ensure that the new generation trees do not contribute to overall wildfire risk in the WUI areas.

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SubAppendix A

References for Fire-Resistant Species and Firewise Landscaping

References for Fire Resistant Species and Firewise Landscaping

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[1] Not all trees in this guide are suitable for the East Bay Area, consult with a landscape professional before planting.

SubAppendix B

Livermore Pleasanton Fire Department Vegetation Management Standard

VEGETATION MANAGEMENT STANDARDS

Undeveloped Properties Within Wildland-Urban Interface Areas (WUI)

The following minimum standards apply to undeveloped/non-landscaped areas of unimproved and developed parcels within the wildland-urban interface. This standard does not apply to agricultural parcels – see separate handout. Property owners are required to maintain their property free of hazards, including any hazard created by the presence of weeds, grass, brush, debris, growth, or other matter, which may support fire spread during firefighting activities. This standard applies year-round. Multiple abatement efforts may be required due to regrowth. Special property conditions may require additional or modified abatement.

The wildland-urban interface areas are those areas that **have been designated** by the State of California as being within a Very High Fire Hazard Severity Zone. Further information about Fire Hazard Severity Zones can be found at https://gis.data.ca.gov/datasets/789d5286736248f69c4515c04f58f414.

Removal of weeds, dead vegetation including leaves, brush, tree limbs, and combustible material such as trash and debris, plus management of live trees, bushes, and brush is required as specified below.

Modifications to last year's requirements are highlighted.

STANDARDS FOR ABATEMENT AND MAINTENANCE

General Weed Abatement for Undeveloped Parcels

- Parcels five acres or less in size: Weeds and grasses must be disced or mowed; with material mulched, or raked and bagged and removed from the property, or rototilled. This applies to the entire area, including along streets and around the perimeters near fences, and around structures
- Parcels in-between five and ten acres: Disc or mow a 20' perimeter around the area. No cross breaks are required.
- Parcels ten acres or more: Disc or mow a 20' perimeter around the area. Disc 20' wide perimeter breaks as well as 20' wide cross breaks in 5-acre grids. Fence lines may require hand-mowing/weed-eating to ensure completion of fuel break. When terrain is too steep or rugged for a tractor, a hand mowed fuel break may be required.
- Within the areas of weed abatement:

  - Remove dead trees and shrubs
  - Remove dead leaves, shed bark, etc.
  - Limb smaller trees from the ground to one-third the height of the tree
  - Limb larger trees at least six feet up from the ground
  - Maintain at least six feet between the top of shrubs and tree limbs
  - Mulched material may remain at a depth not exceeding 4 inches

Defensible Space

In addition to General Weed Abatement, the following areas shall be maintained as defensible space:

- Within 20 feet of end of pavement of roads/sidewalks, and
- Within 100 feet of any structure (structures on the subject property or on neighboring properties), and
- 10 feet on either side of formal foot trails
- 10 feet on either side of a combustible fence

General: 0 - 100 feet from structures

- Cut or mow annual grass down to a maximum height of four inches. An increase is allowed when required control erosion on steep slopes – contact the Fire Department for details.
- Spacing
  - Create horizontal space between shrubs and trees. (See attached diagram #3)
  - Create vertical space between grass, shrubs, and trees. (See attached diagram #2)
  - Alternative for areas 30 feet or more from structures: use Continuous Canopy Option (See attached diagram #4)
- Remove fallen leaves, needles, twigs, bark, cones, and small branches. However, they may be permitted to a depth of four inches.
- Remove dead and dying trees, bushes, and brush.

Structures: 0 - 30 feet from structures

- Remove all dead plants, grasses, and weeds
- Remove dead or dry leaves and pine needles on the ground
- Remove/trim branches that overhang the roof or come within 10 feet of a chimney (See attached diagram # 1)
- Ensure wood piles are at least 30 feet from structures

STANDARDS for SPECIFIC ABATEMENT METHODS/SITUATIONS

Weeds and Grasses: Weeds and grasses must be disced, mowed, rototilled, bladed, or grazed. Cut vegetation must be raked, collected, and removed from the property or mulched in an approved manner. Depth of mulched vegetation (i.e. cut into small pieces) shall not exceed three inches when dry.

- Weeds, grasses, and similar vegetation shall be maintained at a height of no more than 4 inches from the ground
- Mow or graze in areas where discing, rototilling or blade work would undermine a roadbed or disturb a slope.
- All discing work to remove weeds, grass, crops or other vegetation or organic material which could be expected to burn, shall be substantially turned over so there is insufficient fuel to sustain or allow the spread of fire
- Handwork, including mowing, weed eating or hoeing, may be required where access by larger equipment is not possible. Handwork may also include the use of remote-controlled equipment.

- Blading and dozing must expose 75% minimum of clean dirt. Care shall be taken not to disrupt the existing grade. Sloughed off dirt and grass shall be spread out and not bermed up. Any piles of combustible material not mulched and spread in an approved manner shall be hauled away.

Slopes: Property with slopes up to 75 degrees are expected to mitigate their vegetation and debris hazards. Equipment is available to mow these types of slope grades. Owners with slopes greater than 75 degrees shall contact the Fire Prevention Bureau at 925-454-2361 to determine appropriate management standards.

Combustible storage: Combustible trash, rubbish and/or litter shall be removed from the property. Storage of combustible materials such as lumber, cord wood, hay or straw shall be neatly stacked, provided all weeds and vegetation is removed within 10 feet of the pile/stack.

Dead trees, bushes, downed branches and twigs, piles of leaves, and similar materials: These materials shall be removed. Exception: mulched materials scattered to a depth not exceeding four inches.

Living Trees and bushes:

- Consult with an arborist prior to trimming trees, especially oak trees to promote healthy trees and reduce tree damage.
- Consult with the city prior to removing trees to determine whether a permit is required.
- Multiple plants of the same type can be considered a single plant when the diameter of the group does not exceed 10 feet.

ENFORCEMENT

Routine vegetation management inspections will be conducted **during the first two weeks of June.** **Failure to comply with these standards could result in abatement by the City with abatement, administrative and legal costs charged to the property owner.**

Exception: Individual property owners with landlocked lots may contact the Fire Prevention Bureau regarding appropriate abatement requirements prior to the compliance date. Landlocked is defined as a parcel of real property which has no access or egress (entry or exit) to a public or private street and cannot be reached except by crossing another's property

Contact us
Phone: 925-454-2361
Fax: 925-454-2367
Email:
preventhazards@lpfire.org

Spacing Standards for Vegetation Management

See the **Vegetation Management Standard** for the locations where these spacing standards are applicable.

Diagram 1
House to Tree Spacing

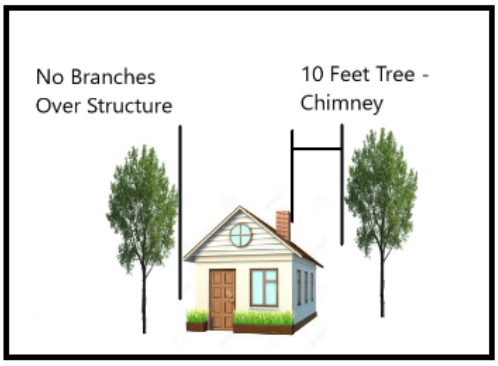
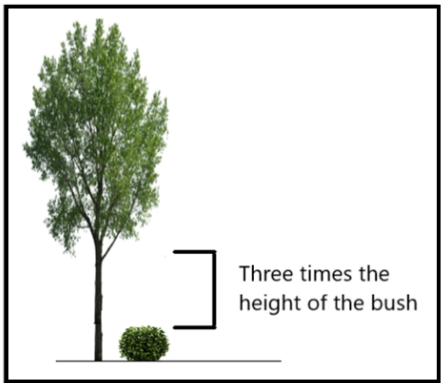


Diagram 2
Vertical Spacing



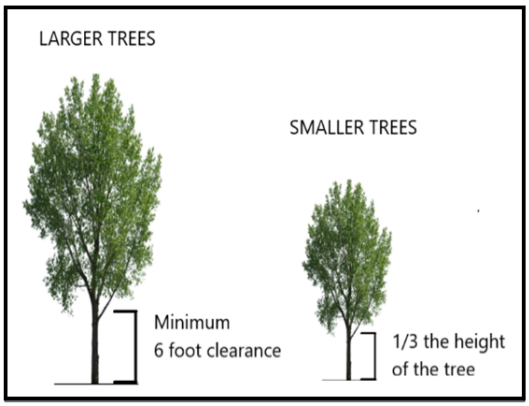
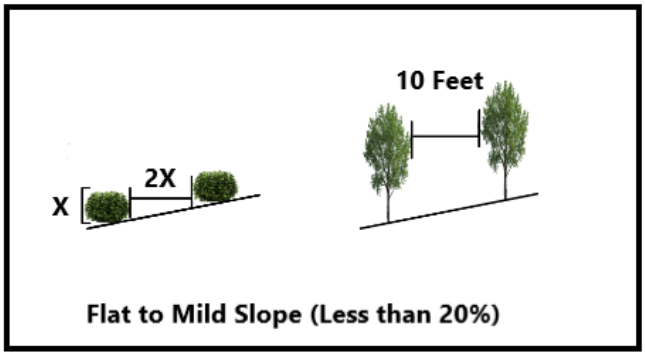
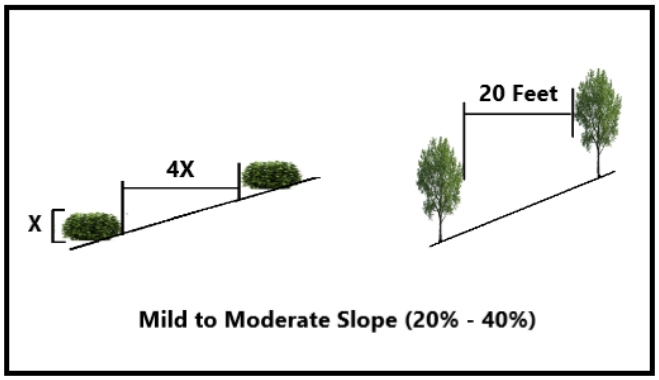


Diagram 3
Horizontal Spacing





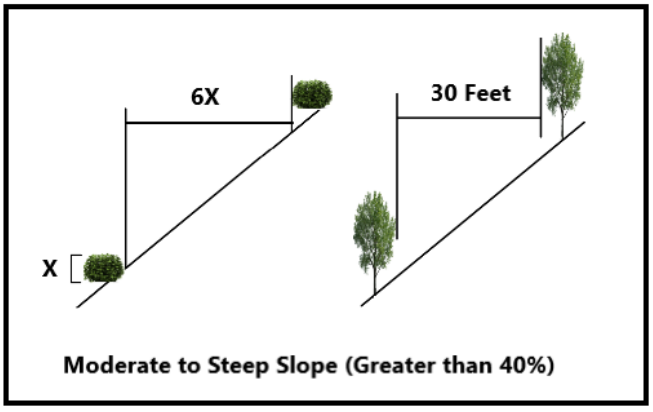
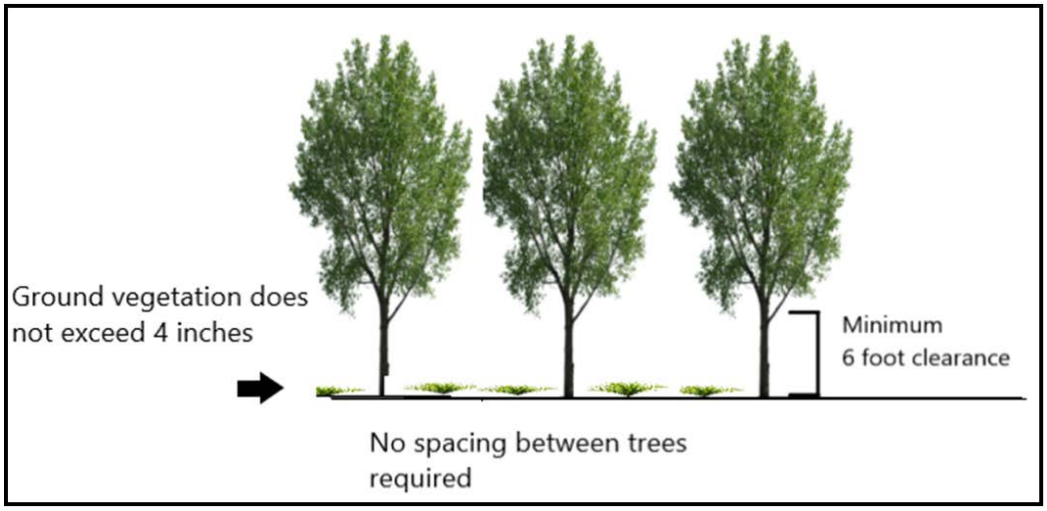


Diagram 4

Alternative Spacing Design

Continuous Canopy Option

for Trees at Least 30 Feet from Structures



SubAppendix C

List of Tree Species Appropriate for WUI Areas in the City of Pleasanton

Large Trees

Common Name	Scientific Name	Source
Coast Live Oak	*Quercus agrifolia*	FireSafeMarin Fire Resistant Plants Common to Marin County, Firescapeing with Native Plants San Mateo Fire Safe Counci, Calflora Illustrated Plant List, Fire Performance of Common Plants Diablo Firesafe Council, Living With Fire Santa Clara County Fire Safe Council
Valley Oak	*Quercus lobata*	FireSafeMarin Fire Resistant Plants Common to Marin County, Firescapeing with Native Plants San Mateo Fire Safe Counci
Western Sycamore	*Platanus racemosa*	FireSafeMarin Fire Resistant Plants Common to Marin County, Firescapeing with Native Plants San Mateo Fire Safe Council, Calflora Illustrated Plant List
Ash	*Fraxinus spp.*	FireSafeMarin Fire Resistant Plants Common to Marin County, Calflora Illustrated Plant List, Fire Performance of Common Plants Diablo Firesafe Council, CNPS Fire Resistant Plant List
Fremont Cottonwood	*Populus fremontii*	Calflora Illustrated Plant List
Coast Redwood	*Sequoia Sempervirens*	FireSafeMarin Fire Resistant Plants Common to Marin County, Calflora Illustrated Plant List

Medium Trees

Common Name	Scientific Name	Source
Strawberry Tree	*Arbutus unedo*	FireSafeMarin Fire Resistant Plants Common to Marin County, Calflora Illustrated Plant List, Fire Performance of Common Plants Diablo Firesafe Council, CNPS Fire Resistant Plant List
African Sumac	*Rhus lancea*	FireSafeMarin Fire Resistant Plants Common to Marin County, Calflora Illustrated Plant List, Fire Performance of Common Plants Diablo Firesafe Council, CNPS Fire Resistant Plant List
Chinese Pistache	*Pistacia chinensis*	Calflora Illustrated Plant List, CNPS Fire Resistant Plant List
California Buckeye	*Aesculus californica*	Calflora Illustrated Plant List, Fire Performance of Common Plants Diablo Firesafe Council
White Alder	*Alnus rhombifolia*	Calflora Illustrated Plant List, Fire Performance of Common Plants Diablo Firesafe Council

Small Trees

Common Name	Scientific Name	Source
Pineapple Guava	*Feijoa sellowiana*	FireSafeMarin Fire Resistant Plants Common to Marin County, Calflora Illustrated Plant List, Fire Performance of Common Plants Diablo Firesafe Council, CNPS Fire Resistant Plant List
Western Redbud	*Cercis occidentalis*	FireSafeMarin Fire Resistant Plants Common to Marin County, Calflora Illustrated Plant List, t, Fire Performance of Common Plants Diablo Firesafe Council, Living With Fire Santa Clara County Fire Safe Council
Citrus	*Citrus spp*	FireSafeMarin Fire Resistant Plants Common to Marin County, Calflora Illustrated Plant List, Fire Performance of Common Plants Diablo Firesafe Council, CNPS Fire Resistant Plant List
Crape Myrtle	*Lagerstroemia indica*	Calflora Illustrated Plant List
Holly Leaf Cherry	*Prunus ilicifolia*	Calflora Illustrated Plant List
Catalina Cherry	*Prunus lyonii*	Calflora Illustrated Plant List, Living With Fire Santa Clara County Fire Safe Council
Pomegranate	*Punica granatum*	Calflora Illustrated Plant List, CNPS Fire Resistant Plant List

Appendix B

Frequently Asked Questions

Frequently Asked Questions Regarding Pleasanton's Trees

Q1: Who is responsible for planting, watering, pruning, and removing City-owned trees?

The City Parks Division is responsible for planting, watering newly planted trees for the first year, pruning, and removing City-owned trees. The City puts out a request for bids every five years and selects the lowest bidder for its annual pruning contract. West Coast Arborists, Inc. is the city's current contractor to prune trees growing in city rights of way. Parks staff are responsible for pruning the majority of trees in City parks, with contractors supporting park tree pruning when extra assistance is needed. Other contractors may also be hired by the City for emergency post-storm tree cleanup, larger tree removal/clearance projects, or capital improvement projects.

Q2: Why doesn't the City remove trees due to leaf drop or other messy litter?

Leaf and litter drop is part of the natural process that all trees go through, especially deciduous trees during fall months, and is not considered an acceptable reason for removal of a tree. The Tree Preservation Ordinance (Ch 17.16) states that trees cannot be removed because of normal maintenance. Living with trees and the benefits they provide, also means accepting that there will be some regular upkeep that's needed to maintain the areas around trees in an urban environment. Trees truly benefit the entire community and are a valuable city asset.

Q3: How are our trees in open space maintained?

Due to their wildlife habitat value, dead and dying trees located in City-owned open space or natural areas will not be removed unless they pose an immediate hazard, or other reasons that warrant their removal.

Q4: Why doesn't the City spray trees for pests and diseases?

The City maintains a large tree inventory of over 20,000 trees. There are many pests and diseases which can affect the City's trees. Some common pests such as aphids do not kill our trees but can cause problems for residents and passersby such as sticky concrete or cars beneath the dripline of the trees. Pests are species dependent and vary in severity from season to season, so it is very difficult for the Parks Division to determine where to effectively implement its resources for treatment. Treatments are often preventative and do not work once the pest has already been identified as causing a problem, so it takes a skilled arborist familiar with trees, pests which affect them, and pest lifecycles and treatment options to adequately identify and diagnose and treat our city trees. For some common pests, homeowners can help the City by identifying City trees which are affected. Depending on the pest and the time of year, often times power-washing the leaves of the tree can be effective. It should be noted that Pleasanton has a bee ordinance and prioritizes protection of pollinators so chemical treatments should always be the last line of defense against very serious pests which can severely weaken or kill high value trees.

Q5: Will the City fix my sewer line that was damaged or destroyed by a City tree?

The sewer line from the street to the home (lateral) is the responsibility of the homeowner who benefits from the service. Many factors affect whether the city is liable for damage to a sewer line and each case is reviewed independently.

Q6: Will the City fix the sidewalk that has been uplifted or damaged by a City tree?

Per state law, the sidewalk is the responsibility of the resident. Notwithstanding, the City will review each case independently and make a determination as to whether a repair or replacement is warranted to address a potential tripping hazard.

Q7: Are certain trees protected in the City? Do I need a permit to remove a tree on my property?

Yes, the City of Pleasanton's Tree Preservation Ordinance (Municipal Code Chapter 17.16) protects native trees at 37" in circumference and larger and protects non-native trees at 55" in circumference and larger.

The following tree species are considered native to Pleasanton:

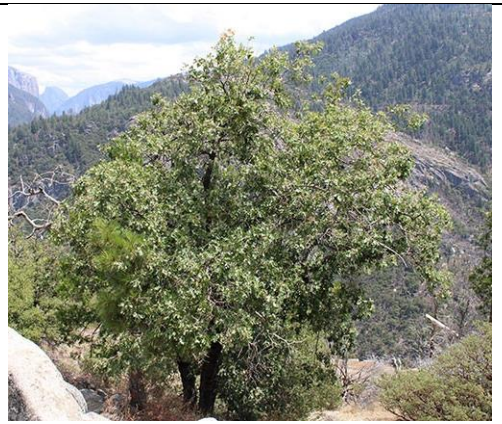
- Big Leaf Maple (*Acer macrophyllum)*
- Box Elder (*Acer negundo*)
- California Buckeye (*Aesculus californica)*
- California Sycamore (*Platanus racemosa)*
- Coast Live Oak (*Quercus agrifolia)*
- Canyon Oak (*Quercus chrysolepis*)
- Blue Oak (*Quercus douglassii)*
- California Black Oak (*Quercus kelloggii)*
- Valley Oak (*Quercus lobata)*
- Interior Live Oak (*Quercus wislizenii)*
- California Bay Laurel (*Umbellularia californica)*
- California Black Walnut (*Juglans hindsii*)
- Tan Oak (*Notholithocarpus densiflorus)*

See Table 1 on the following pages for photos and a link to the SelecTree website page for each native species.

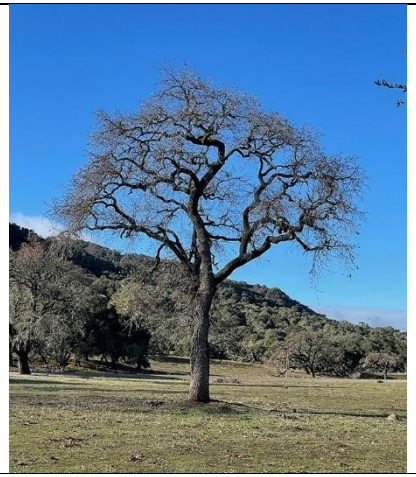
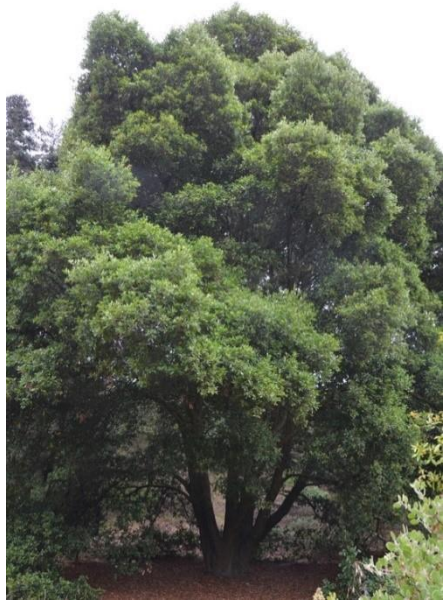
Table 1: List of protected native trees in the City of Pleasanton with photos to aid in species identification.

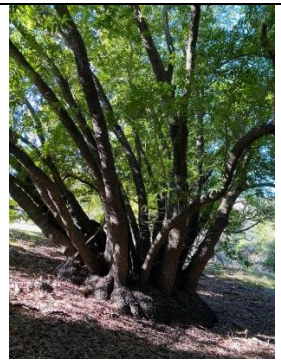
Scientific Name	Common Name	Leaf	Tree	Selectree Link
Acer macrophyllum	Big leaf maple			SelecTree: Bigleaf maple
Acer negundo	Box elder			SelecTree: Box elder

Aesculus californica	California buckeye			SelecTree: California buckeye
Platanus racemosa	California sycamore			SelecTree: California sycamore

Quercus agrifolia	Coast live oak			SelecTree: Coast live oak
Quercus chrysolepis	Canyon live oak			SelecTree: Canyon live oak

Quercus douglassii	Blue oak			SelecTree: Blue oak
Quercus kelloggii	California black oak			SelecTree: California black oak

Quercus lobata	Valley oak			SelecTree: Valley oak
Quercus wislizenii	Interior live oak			SelecTree: Interior live oak

Umbellularia californica	California bay			SelecTree: California bay
Juglans hindsii	California Black Walnut			SelecTree: Black walnut
Notholithocarpus densiflorus	Tan oak			SelecTree: Tan oak

Refer to the most recent version of the Tree Preservation Ordinance and City website found here to determine if you need a tree removal permit: https://ecode360.com/43030780#43030780

Q8: How do I request the removal of a dead City tree? How long will it take for the tree to be removed after the request is submitted?

Please contact the Parks Division within the Public Works Department. Call 925-931-5500 or visit the service request website to fill out a request form: https://www.cityofpleasantonca.gov/how-do-i/report-a-concern/. The timeframe will depend on various factors, but the Parks Supervisor can provide specifics once the request has been filed.

Q9: What species of trees should I plant on my property? Are there any species that the City prohibits from planting on private property?

An approved tree species list is available on our website at: https://www.cityofpleasantonca.gov/assets/our-government/public-works/engineering/landscape-ordinance/Approved-Heritage-Tree-Replacement-List.pdf. This list also contains the tree species that should not be planted anywhere in the City due to their status with the California Invasive Plant Council (CAL-IPC) or other reasons.

Q10: Are there informational resources available on tree planting and tree care?

Yes, the City has information for tree planting and tree care on our website. https://www.cityofpleasantonca.gov/our-government/public-works/landscape-architecture/. Resources can also be found in the other Appendices of the Technical Assessment.

Q11: If there is a drought, do I have to water my tree?

The city recognizes the difficult position that homeowners face during severe drought years regarding care for their landscape. We recommend prioritizing mature trees on the property over lower value landscape such as lawn and shrubs (which can be easily replaced within a couple of growing seasons versus a tree which may take fifty or more years to grow). The City doesn't assess penalties for dead trees which suffered during the drought and were not watered but highly discourages neglecting mature trees for financial reasons as tree removal, stump grinding and planting a replacement tree can easily exceed the cost to water the tree. The city has a water conservation division which can help homeowners dial in irrigation and save money on water. https://www.cityofpleasantonca.gov/our-government/public-works/water-conservation/

Q12: Does the City provide trees to property owners or volunteer groups?

The city looks for opportunities to provide education and materials for tree planting to the public. Each year, the city celebrates Arbor Day and provides planting education and information. Sometimes, the city even gives a tree to attendees. More information about this event and whether a tree giveaway is included will be advertised in the Pleasanton Activity Guide under Arbor Day Celebration.

Q13: Does the City have the right to remove parkway strips, concrete, pavement, and/or cobble to plant new trees?

The city has the authority to remove any existing improvements in the public rights of way where city trees are planted to ensure that the tree has adequate room to grow. The City discourages improvements to this area which can restrict the trees ability to thrive. Concrete, decorative pavers, plantings and cobble are commonly installed by homeowners which may inadvertently affect city tree health. In such cases, these additions may be removed. The City is not responsible for repairing improvements made by the property owner in the parkway strip. The City can also remove existing improvements (concrete, gravel/cobbles, pavers, plants) in the parkway strip to plant a new tree. It is recommended to contact the city parks division before making any improvements in the right of way.

City Contact Information

Tree Preservation Ordinance and "Protected Trees":
Sarah Hosterman
Landscape Architect Assistant
925-931-5514

City-Owned Trees:
Parks Maintenance Division
925-931-5500

Trees Required by Conditions of Approval or Planned Unit Development (PUD):
Planning Division
925-931-5600
Monday* - Friday, 8:00 a.m. - 5:00 p.m.
*Planners are not available on Mondays from 9:30 a.m. to 11:00 a.m.

E-mail: http://www.cityofpleasantonca.gov/contact/services/contact

Appendix C

Recommended Tree Species List

How to Read the Tree Species Selection Guide

This Appendix is a matrix detailing the tree species that are suitable for public spaces in Pleasanton. The matrix contains 9 attributes for over 200 tree species. The Tree Species Selection Guide table below contains explanations for some attributes found in this appendix.

Table G-1. Tree Species Selection Guide

Attribute		Explanation
Tree size	Height at maturity	These attributes should be the primary factors considered when finding the right species for a planting location. Before planting a tree, one should consider how large it will grow in the coming decades and choose a species that fits the available space at maturity.
	Canopy spread at maturity	
	Trunk Diameter	
	Planting Area requirement	
Water Use Rating		As California and the City of Pleasanton continue to cycle through extended periods of drought and extreme heat, tree species that require low amounts of water are likely to be suitable for the City's environmental conditions.
Hardscape Damage Potential		The hardscape damage potential is a metric for a species' known ability to cause damage to sidewalks, streets, curbs, and gutters.
Pest and Disease Vulnerability		There are an array of arboreal pests and diseases that affect tree health. Certain pests and diseases can have detrimental affects on certain species trees. Notes about pest and disease susceptibility are included for each species in the tree list.

Species Recommendations

Selecting the appropriate tree species for their designated planting locations can drastically simplify the task of maintaining a sustainable urban forest. Proper attention should be given to making the right species choice because decisions made at this stage have lasting impacts on the health and resiliency of a city's urban forest. Pleasanton aims to follow the principles of "right tree, right place" when choosing which type of tree to plant and where to plant it.

The Recommended Tree Species List below has been developed to assist with the tree selection process and should be referenced whenever trees are being planted in the City of Pleasanton. All species included in this list have been filtered through the following considerations:

- **Tree canopy. The City of Pleasanton aims to maintain and grow the Urban Forest. Therefore, trees that provide large, lush canopies must be included in the tree list and planted wherever feasible.** However, some sites don't have the available space for a large tree to grow… Trees with small- and medium-sized canopies have also been included.
- **Species diversity** helps provide resiliency to pest and pathogen infestations. The tree list has been designed to maximize species options for all of the various site scenarios that exist in Pleasanton. The City of Pleasanton intends to maintain species diversity of its inventory such that no one

species represents more than 5%, and no one genus comprises more than 10% of the total City inventory population *(See species diversity sustainability goals in Section 1.4.2)*.

- **Physical constraints such as the size of the planting soil area, canopy spread**, and nearby powerlines or underground utilities, must be considered when choosing the appropriate species for a given planting site.
- **Projected suitability and low maintenance costs.** Individual trees should not require extraneous maintenance requirements to maximize the urban forest benefits throughout the city. Trees that are well-suited for their site will require less maintenance than trees in unsuitable locations.
- **Wildlife Habitat.** Trees that maximize wildlife habitat should be prioritized. In many cases, such as parks and large planting sites, this includes native trees. It must be noted, however, that native trees that thrive in wildland habitats may not thrive in some adjacent urban sites where a tree's access to groundwater may be limited and the soil is generally more acidic, saline, compact, and devoid of symbiotic microorganisms that the tree may benefit from. In such cases, a non-native tree able to provide long-term urban forest benefits may be prioritized.
- **Aesthetic criteria of the planting**. Involve the consideration of species-specific features including fruits, litter, thorns, and seasonal color when selecting tree species.

Table G-2. Recommended Tree Species List

Botanical Name	*Common Name*	Max Height	Max Canopy Diameter	Planting Area	Hardscape Damage Potential	Water Use	Native?	Pest and Disease Vulnerability Notes
Acacia aneura	Mulga	20 feet	15-20 feet	2' to 4'	Low	Very low	N	Root Rot and Invasive Shot Hole Borer
Acacia decurrens	Green wattle	50 feet	10-25 feet	Greater than 7'	High	Very Low	N	Armillaria, Root Rot and Invasive Shot Hole Borer, Beetle Borers
Acacia melanoxylon	Blackwood acacia	50 feet	20 feet	4' to 7'	High	Very Low	N	Phytophthora, Root Rot and Invasive Shot Hole Borer, Beetle Borers, Thrip
Acacia podalyriifolia	Pearl Acacia	20 feet	10-15 feet	2' to 4'	Low	Medium	N	Root Rot, Sooty Mold and Invasive Shot Hole Borer, Beetle Borers
Acacia stenophylla	Shoestring Acacia	30 feet	10-20 feet	4' to 7'	unknown	Very low	N	Invasive Shot Hole Borer
Acer buergeranum	Trident maple	25 feet	20-25 feet	4' to 7'	Low	Moderate	N	Armillaria, Root Rot, Verticillium and Invasive Shot Hole Borer, Aphids
Acer campestre	Hedge maple	35 feet	25-35 feet	4' to 7'	Low	Moderate	N	Armillaria, Root Rot, Verticillium and Aphids
Acer macrophyllum	Big Leaf Maple	80 feet	30-50 feet	Greater than 7'	High	Moderate	Y	Sudden Oak Death, Root Rot, Armillaria, Annosus Root Disease and Invasive Shot Hole Borer, Beetle Borers, California Flathead Borer, Caterpillars
Acer negundo	Box elder	50 feet	35-40 feet	Greater than 7'	Moderate	Moderate	Y	Armillaria, Leaf Blight, Fusarium, Powdery Mildew and Invasive Shot Hole Borer, Aphids, Beetle Borers
Acer palmatum	Japanese maple	25 feet	15-25 feet	4' to 7'	Medium	Moderate	N	Armillaria, Root Rot, Verticillium and Invasive Shot Hole Borer, Aphids
Acer platanoides	Norway Maple	60 feet	35-40 feet	Greater than 7'	High	Moderate	N	Anthracnose, Armillaria, Phytophthora, Root Rot and Aphids
Acer rubrum	Red maple	70 feet	40 feet	Greater than 7'	Moderate	Moderate	N	Armillaria, Phytophthora, Root Rot, Verticillium and Aphids, Beetle Borers, Scales
Acer rubrum 'Armstrong', 'Bowhall', 'October Glory', 'Red Sunset'	Red Maple	60 feet	15-25 feet	Greater than 7'	Moderate	Moderate	N	Armillaria and Aphids

Acer saccharinum	Silver maple	100 feet	50 feet	Greater than 7'	High	Moderate	N	Armillaria, Root Rot, Sooty Mold, Verticillium Wilt and Aphids, Beetle Borers, Scales
Acer tataricum	Tatar maple	25 feet	25 feet	4' to 7'	Low	Moderate	N	Armillaria, Root Rot, Verticillium and Aphids
Acer tataricum subsp. ginnala	Amur maple	25 feet	20-25 feet	4' to 7'	Low	Moderate	N	Armillaria
Acer truncatum	Chinese maple	30 feet	20-30 feet	4' to 7'	Low	Moderate	N	Armillaria, Root Rot, Verticillium and Aphids
Acer x freemanii	Freeman maple	65 feet	30-40 feet	Greater than 7'	Moderate	Moderate	N	Armillaria, Phytophthora, Root Rot, Verticillium and Aphids, Beetle Borers, Scales
Aesculus californica	California buckeye	25 feet	20-30 feet	4' to 7'	Low	Very Low	Y	Armillaria, Phytophthora ramorum Sudden Oak Death, Powdery Mildew and Invasive Shot Hole Borer, Thrip
Aesculus glabra	Ohio Buckeye	80 feet	30 feet	Greater than 7'	Low	Moderate	N	Phytophthora, Powdery Mildew, Root Rot, Rust and Caterpillars
Aesculus hippocastanum	Common horsechestnut	80 feet	40-50 feet	Greater than 7'	High	Moderate	N	Phytophthora, Powdery Mildew, Root Rot, Rust and Caterpillars
Aesculus x carnea	Red horsechestnut	50 feet	30-50 feet	Greater than 7'	Low	Moderate	N	Chlorosis, Powdery Mildew, Rust and Beetle Borers
Aesculus x carnea	Red Horse Chestnut	50 feet	30-50 feet	Greater than 7'	Low	Medium	N	Chlorosis, Powdery Mildew, Rust, Armillaria, Root Rot and Beetle Borers
Afrocarpus gracilior	Fern Pine	70 feet	30-50 feet	Greater than 7'	Low	Moderate	N	Spider mites
Albizia julibrissin	Silk tree	35 feet	20 feet	4' to 7'	Moderate	Moderate	N	Armillaria, Fusarium, Root Rot and Invasive Shot Hole Borer, Caterpillars
Alnus cordata	Italian alder	50 feet	25 feet	Greater than 7'	Moderate	Moderate	N	Powdery Mildew and Beetle Borers
Alnus rhombifolia	White Alder	80 feet	40-50 feet	Greater than 7'	High	High	N	Armillaria, Powdery Mildew and Aphids, Beetle Borers, Caterpillars, Spider Mites
Araucaria bidwillii	Bunya-bunya	100 feet	20-30 feet	Greater than 7'	Moderate	Moderate	N	Root rot
Arbutus 'Marina'	Strawberry tree	40 feet	30 feet	2' to 4'	Low	Low	N	Anthracnose, Phytophthora, Root Rot, Rust and Scales, Thrip

Arbutus menziesii	Pacific madrone	70 feet	50 feet	Greater than 7'	Low	Low	Y	Needle Cast, Sudden Oak Death, Anthracnose, Phytophthora and Caterpillars, Scales, Thrip
Bauhinia x blakeana	Hong kong orchid tree	40 feet	20-25 feet	4' to 7'	Low	Moderate	N	Spider mites, trunk heart rot
Betula jacquemontii	White barked himalayan birch	60 feet	60 feet	Greater than 7'	Moderate	Moderate	N	Armillaria and Aphids, Beetle Borers
Betula nigra	River/red birch	90 feet	40-60 feet	Greater than 7'	Moderate	Moderate	N	Armillaria, Anthracnose and Aphids, Beetle Borers
Betula nigra 'Dura-Heat'	Birch	40 feet	25-35 feet	4' to 7'	Moderate	Moderate	N	Armillaria, Anthracnose and Aphids, Beetle Borers
Betula pendula	European white birch	50 feet	15-25 feet	Greater than 7'	Moderate	Moderate	N	Armillaria, Phytophthora, Root Rot, Sooty Mold and Aphids, Beetle Borers
Betula populifolia	Gray Birch	30 feet	10-20 feet	4' to 7'	Low	Moderate	N	Armillaria, Anthracnose, Crown Rot, Rust and Aphids, Beetle Borers, Leaf Miner
Brachychiton acerifolius	Illawarra flame tree	60 feet	30-40 feet	Greater than 7'	Moderate	Low	N	Caterpillars
Brachychiton discolor	Pink flame tree	70 feet	30 feet	Greater than 7'	Moderate	Moderate	N	Root Rot
Brachychiton populneus	Kurrajong bottle tree	50 feet	30 feet	4' to 7'	Moderate	Low	N	Root Rot and Invasive Shot Hole Borer
Brachychiton rupestris	Bottle Tree	40 feet	20-30 feet	4' to 7'	Moderate	Medium	N	Root Rot
Brahea edulis	Guadalupe palm	25 feet	15 feet	4' to 7'	Low	Moderate	N	Spider mites
Callistemon citrinus	Bottlebrush	25 feet	25 feet	4' to 7'	Low	Moderate	N	Chlorosis
Callistemon viminalis	Weeping Bottlebrush	20 feet	15-20 feet	2' to 4'	Low	Low	N	Armillaria, Root Rot
Calocedrus decurrens	Incense cedar	90 feet	10-15 feet	Greater than 7'	Moderate	Moderate	Y	Mistletoe, Phytophthora, Root Rot, Red Ring Rot and Beetle Borers, Juniper Scale, Western Cedar Bark Beetle
Calodendrum capense	Cape chestnut	40 feet	25-40 feet	4' to 7'	Low	Low	N	Psyllid, Caterpillars
Carpinus betulus	European hornbeam	40 feet	20-30 feet	4' to 7'	Low	Moderate	N	Armillaria, Root Rot and Scales
Carpinus caroliniana	American hornbeam	35 feet	20-30 feet	4' to 7'	Low	Moderate	N	Armillaria, Root Rot

Carpinus japonica	Japanese hornbeam	20 feet	5-10 feet	2' to 4'	Low	Moderate	N	Aphids, Scale, Canker, Blight, Scales
Carya illinoinensis	Pecan	100 feet	70 feet	Greater than 7'	Moderate	Low	N	Chlorosis, Mistletoe, Phytophthora, Root Rot and Aphids, Beetle Borers, Beetle Grubs, Caterpillars
Casuarina cunninghamiana	River she-oak	70 feet	70 feet	Greater than 7'	Low	Moderate	N	Phytophthora, Root Rot
Catalpa speciosa	Western catalpa	60 feet	20-40 feet	Greater than 7'	Moderate	Moderate	N	Anthracnose, Powdery Mildew, Root Rot, Verticillium and Caterpillars
Cedrus atlantica	Atlas cedar	70 feet	35-50 feet	Greater than 7'	Moderate	Moderate	N	Phytophthora, Root Rot, Sooty Mold
Cedrus atlantica 'Glauca'	Atlas cedar	60 feet	25-40 feet	Greater than 7'	Moderate	Moderate	N	Phytophthora, Root Rot, Sooty Mold
Cedrus deodara	Deodar cedar	60 feet	20-30 feet	Greater than 7'	Moderate	Low	N	Armillaria, Phytophthora, Root Rot, Sooty Mold and Beetle Borers
Celtis occidentalis	Common hackberry	80 feet	80 feet	Greater than 7'	Moderate	Moderate	N	Armillaria
Celtis reticulata	Western hackberry	20 feet	5-15 feet	2' to 4'	Low	Low	N	Armillaria, Petal Blight, Flower Blight, Chlorosis
Celtis sinensis	Chinese hackberry	80 feet	40-50 feet	Greater than 7'	Moderate	Moderate	N	Witches broom, Hackberry nipple gall, powdery mildew, leaf spot, Root Rot
Ceratonia siliqua	Carob tree	40 feet	30-40 feet	4' to 7'	High	Low	N	Armillaria, Root Rot
Cercis canadensis	Eastern redbud	40 feet	25-35 feet	4' to 7'	Low	Moderate	N	Anthracnose, Crown Rot, Armillaria, Phytophthora and Caterpillars, Scales
Cercis occidentalis	Western redbud	25 feet	10-20 feet	2' to 4'	Low	Moderate	Y	Crown Rot, Phytophthora, Root Rot and Caterpillars, Scales
Cercis siliquastrum	Judas tree	25 feet	25 feet	4' to 7'	Low	Moderate	N	Crown Rot and Caterpillars
Chamaerops humilis	Mediterranean fan palm	15 feet	10-15 feet	2' to 4'	Low	Moderate	N	Scale
Chilopsis linearis	Desert willow	30 feet	10-20 feet	2' to 4'	Low	Moderate	Y	Root Rot
Chionanthus retusus	Chinese fringe tree	30 feet	6-12 feet	2' to 4'	Low	Moderate	N	Mites, Root Rot
Chitalpa tashkentensis	Chitalpa	35 feet	30 feet	4' to 7'	Low	Moderate	N	Root Rot, Verticillium and Aphids
Cinnamomum camphora	Camphor tree	70 feet	50-60 feet	Greater than 7'	High	Moderate	N	Anthracnose, Armillaria, Phytophthora, Root Rot

Citrus sinensis	Orange, lemon etc.	30 feet	15-25 feet	4' to 7'	Low	Moderate	N	Brown Rot, Chlorosis, Crown Rot, Armillaria and Aphids, Mealy Bugs, Scales, Spider Mites
Cordyline australis	Cordyline hybrids and cvs.	25 feet	12 feet	4' to 7'	Low	Moderate	N	Fungus nats, Mites, Scales, Thrips.
Cornus florida	Eastern dogwood	30 feet	25-30 feet	4' to 7'	Low	Moderate	N	Anthracnose, Phytophthora, Root Rot and Beetle Borers, Scales
Crataegus laevigata 'Crimson Cloud'	English Hawthorn	25 feet	15-20 feet	4' to 7'	Low	Moderate	N	Fire Blight, Powdery Mildew, Root Rot, Rust and Aphids, Beetle Borers
Crataegus lavallei	Hawthorn	25 feet	15-20 feet	4' to 7'	Low	Moderate	N	Leaf Spot Fungus, Fire Blight, Powdery Mildew, Root Rot and Aphids, Beetle Borers
Cupressus sempervirens	Italian cypress	70 feet	10-20 feet	Greater than 7'	Moderate	Moderate	N	Gummosis, Phytophthora, Root Rot and Spider Mites
Elaeagnus angustifolia	Russian olive	30 feet	20 feet	2' to 4'	Low	Moderate	N	Phytophthora, Root Rot, Verticillium and Psyllid
Eriobotrya deflexa	Bronze loquat	25 feet	15-25 feet	4' to 7'	Low	Moderate	N	Fire Blight
Eucalyptus camaldulensis	Red gum	100 feet	45-105 feet	Greater than 7'	Moderate	Moderate	N	Armillaria, Root Rot and Beetle Borers, Psyllid
Eucalyptus cinerea	Ash leaved gum, silver dollar tree	50 feet	20-40 feet	Greater than 7'	Moderate	Moderate	N	Armillaria, Root Rot and Beetle Borers
Eucalyptus citriodora	Lemon-scented Gum	80 feet	50-100 feet	Greater than 7'	Moderate	Low	N	Armillaria, Phytophthora, Root Rot, Eucalyptus Rust (Puccinia psidii) and Beetle Borers, Psyllid, Thrip
Eucalyptus ficifolia	Red-flowering Gum	45 feet	15-60 feet	4' to 7'	Moderate	Low	N	Armillaria, Phytophthora, Root Rot and Invasive Shot Hole Borer, Beetle Borers, Thrip
Eucalyptus nicholii	Nichol's narrow leafed peppermint gum	50 feet	15-40 feet	Greater than 7'	Moderate	Low	N	Armillaria, Root Rot and Beetle Borers
Eucalyptus polyanthemos	Silver dollar gum	80 feet	15-45 feet	4' to 7'	Moderate	Moderate	N	Armillaria, Root Rot and Beetle Borers
Eucalyptus robusta	Swamp mahogany	80 feet	30-75 feet	Greater than 7'	Moderate	Moderate	N	Armillaria, Phytophthora, Root Rot and Beetle Borers
Eucalyptus rudis	Flooded gum	60 feet	25-40 feet	Greater than 7'	Moderate	Moderate	N	Armillaria, Phytophthora, Root Rot and Beetle Borers, Psyllid, Thrip
Eucalyptus sideroxylon	Red iron bark	90 feet	30-60 feet	Greater than 7'	High	Moderate	N	Armillaria, Phytophthora, Root Rot and Beetle Borers, Psyllid, Thrip

Eucalyptus viminalis	Manna gum	20 feet	15-20 feet	2' to 4'	Low	Moderate	N	Armillaria, Root Rot
Euonymus spp.	Euonymous spp.	20 feet	15 feet	2' to 4'	Low	Moderate	N	Powdery Mildew and Scales
Fagus sylvatica	European beech	80 feet	50 feet	Greater than 7'	Moderate	Moderate	N	Canker, Armillaria, Phytophthora, Root Rot and Aphids, Spider Mites
Ficus carica	Edible fig	30 feet	10-20 feet	4' to 7'	Medium	Moderate	N	Canker, Fusarium, Armillaria, Root Rot and Invasive Shot Hole Borer
Ficus microcarpa	Indian Laurel Fig	40 feet	35-40 feet	4' to 7'	Moderate	Moderate	N	Scales, Galls, Mealybugs, Thrips, Whiteflies, Armillaria, Root Rot
Fraxinus americana 'Autumn Purple'	White ash	80 feet	50 feet	Greater than 7'	Moderate	Moderate	N	Anthracnose, Root Rot, Rust, Sooty Mold and Caterpillars, Scales, White Fly
Fraxinus angustifolia	Raywood ash	50 feet	20-30 feet	Greater than 7'	Moderate	Moderate	N	Root Rot, Sooty Mold, Verticillium and Beetle Borers, Scales, White Fly
Fraxinus pennsylvanica	Green ash	50 feet	35-50 feet	Greater than 7'	Moderate	Moderate	N	Anthracnose, Root Rot, Rust, Sooty Mold and Beetle Borers, Scales, White Fly
Fraxinus uhdei	Evergreen ash	80 feet	60 feet	4' to 7'	High	Moderate	N	Fusarium, Root Rot, Sooty Mold, Verticillium and Aphids, Scales, White Fly
Fraxinus velutina	Arizona ash	50 feet	30-40 feet	Greater than 7'	High	Moderate	N	Anthracnose, Mistletoe, Root Rot, Rust, Verticillium Wilt and Beetle Borers, Spider Mites, White Fly
Geijera parviflora	Australian willow	45 feet	20 feet	4' to 7'	Low	Moderate	N	Root rot
Ginkgo biloba 'Princeton Sentry', 'Autumn Gold'	Maidenhair	50 feet	25-35 feet	Greater than 7'	Moderate	Moderate	N	Anthracnose
Gleditsia triacanthos	Honey locust	70 feet	25-35 feet	Greater than 7'	Moderate	Moderate	N	Mistletoe, Phytophthora, Root Rot and Invasive Shot Hole Borer, Caterpillars, Insect Galls, Pod Gall Midge
Grevillea robusta	Silk oak	70 feet	35-40 feet	4' to 7'	Moderate	Moderate	N	Phytophthora, Root Rot and Scales
Gymnocladus dioicus	Kentucky coffee tree	100 feet	40-50 feet	Greater than 7'	Moderate	Moderate	N	Verticillium wilt, Root rot, mites, leafrollers
Hesperocyparis arizonica	Arizona Cypress	50 feet	20 feet	Greater than 7'	Moderate	Moderate	N	Leaf Blight
Heteromeles arbutifolia	Toyon	25 feet	8-15 feet	4' to 7'	Low	Moderate	Y	Sudden Oak Death, Armillaria, Root Rot and Scales, Thrip

Hibiscus syriacus	Rose of sharon	15 feet	6 feet	2' to 4'	Low	Moderate	N	Armillaria, Root Rot and Aphids, Spider Mites
Hymenosporum flavum	Sweetshade	50 feet	15-20 feet	4' to 7'	Low	Moderate	N	Root rot
Jacaranda mimosifolia	Jacaranda	50 feet	15-30 feet	4' to 7'	Moderate	Moderate	N	Oak Root Fungus
Juglans hindsii	Northern California black walnut	60 feet	30-60 feet	Greater than 7'	Moderate	Moderate	Y	Mistletoe, Phytophthora, Root Rot, Sooty Mold and Aphids, Caterpillars
Juglans nigra	Eastern black walnut	100 feet	70 feet	Greater than 7'	High	Moderate	N	Armillaria, Anthracnose, Phytophthora, Root Rot and Beetle Borers, Caterpillars
Juglans regia	English walnut	100 feet	50-60 feet	Greater than 7'	Moderate	Moderate	N	Anthracnose, Bacterial Blight, Canker, Chlorosis and Aphids, Husk Fly, Scales, Spider Mites
Juniperus californica	Calfornia juniper	40 feet	10-40 feet	4' to 7'	Low	Moderate	Y	Armillaria, Root Rot, Rust and Aphids, Beetle Borers, Spider Mites
Juniperus chinensis	Chinese Juniper	60 feet	20-25 feet	Greater than 7'	Low	Moderate	N	Armillaria, Root Rot, Rust and Beetle Borers, Spider Mites
Juniperus scopulorum	Rocky mountain juniper	20 feet	10 feet	2' to 4'	Low	Moderate	N	Armillaria, Root Rot, Rust and Aphids, Beetle Borers, Spider Mites
Koelreuteria bipinnata	Chinese flame tree	40 feet	15-30 feet	4' to 7'	Low	Moderate	N	Root rot, Verticillium
Koelreuteria paniculata	Golden rain tree	40 feet	25-40 feet	4' to 7'	Low	Moderate	N	Root Rot, Verticillium and Beetle Borers, Plant Bug, Scales
Lagerstroemia indica	Crape myrtle	25 feet	25 feet	2' to 4'	Low	Moderate	N	Powdery Mildew, Sooty Mold and Aphids
Laurus nobilis	Sweet bay	40 feet	15-30 feet	4' to 7'	Moderate	Moderate	N	Phytophthora, Root Rot and Psyllid, Scales
Ligustrum japonicum	Japanese privet	15 feet	5-8 feet	2' to 4'	Low	Moderate	N	Armillaria, Root Rot, Sooty Mold, Verticillium
Ligustrum lucidum	Glossy privet	50 feet	35 feet	Greater than 7'	Moderate	Moderate	N	Armillaria, Phytophthora, Root Rot, Sooty Mold and Aphids, Leaf Miner
Liquidambar styraciflua	Sweetgum	80 feet	40 feet	Greater than 7'	High	Moderate	N	Armillaria, Anthracnose, Chlorosis, Sooty Mold and Invasive Shot Hole Borer, Aphids, Caterpillars, Scales
Liriodendron tulipifera	Tulip tree	80 feet	40 feet	Greater than 7'	Moderate	Moderate	N	Anthracnose, Chlorosis, Fusarium, Armillaria and Aphids, Scales

Lophostemon confertus	Brisbane box	50 feet	10-30 feet	4' to 7'	Moderate	Moderate	N	Phytophthora, Root Rot and Scales
Lyonothamnus floribundus	Ironwood	40 feet	15-20 feet	4' to 7'	Moderate	Moderate	N	Phytophthora
Lyonothamnus floribundus ssp. aspleniifolius	Catalina ironwood	40 feet	15-20 feet	4' to 7'	Moderate	Moderate	N	Phytophthora
Magnolia grandiflora	Southern magnolia	80 feet	50-60 feet	Greater than 7'	High	Moderate	N	Armillaria, Root Rot, Verticillium and Invasive Shot Hole Borer, Aphids, Scales, Spider Mites
Magnolia x soulangeana	Saucer magnolia	25 feet	25 feet	4' to 7'	Low	Moderate	N	Armillaria and Aphids, Scales, Spider Mites
Malus domestica	Apple	40 feet	20-25 feet	4' to 7'	Low	Moderate	N	Armillaria, Brown Rot, Canker, Crown Rot and Aphids, Beetle Borers, Coddling Moths, Psyllid
Melaleuca linariifolia	Flaxleaf Paperbark	30 feet	20-25 feet	4' to 7'	Low	Low	N	Chlorosis, Phytophthora, Root Rot
Melaleuca quinquenervia	Cajeput tree	40 feet	15-25 feet	4' to 7'	Low	Moderate	N	Phytophthora, Root Rot
Melaleuca styphelioides	Prickly paperbark	40 feet	10-20 feet	4' to 7'	Low	Low	N	Phytophthora, Root Rot
Melia azedarach	Chinaberry	50 feet	15-25 feet	4' to 7'	Moderate	Moderate	N	Scale, whitefly, sooty mold
Metasequoia glyptostroboides	Dawn redwood	90 feet	12-20 feet	Greater than 7'	Moderate	Moderate	N	Armillaria
Morus alba	White mulberry	50 feet	30-50 feet	Greater than 7'	High	Moderate	N	Chlorosis, Crown Rot, Fusarium, Armillaria and Beetle Borers, Caterpillars, Spider Mites, White Fly
Morus rubra	Red Mulberry	40 feet	50 feet	4' to 7'	High	Moderate	N	Chlorosis, Crown Rot, Fusarium, Armillaria and Beetle Borers, Caterpillars, Spider Mites, White Fly
Nerium oleander	Oleander	20 feet	10-15 feet	2' to 4'	Low	Moderate	N	Armillaria, Sooty Mold and Aphids, Scales
Nyssa sylvatica	Sour gum/tupelo	50 feet	20-30 feet	Greater than 7'	Low	Moderate	N	Fusarium, Phytophthora, Root Rot, Rust
Olea europaea	Olive	30 feet	25-30 feet	4' to 7'	Moderate	Moderate	N	Anthracnose, Armillaria, Phytophthora, Root Rot and Scales, Psyllid
Parkinsonia × 'Desert Museum'	Desert museum palo verde	20 feet	20-25 feet	2' to 4'	Low	Moderate	N	Root rot

Parrotia persica	Persian witch hazel	40 feet	15-35 feet	4' to 7'	Low	Moderate	N	Phytophthora, honey fungus, powdery mildew
Phoenix canariensis	Canary Island date palm	60 feet	40 feet	4' to 7'	Moderate	Moderate	N	Fusarium, Root Rot
Photinia serrulata	Chinese photinia	40 feet	25-30 feet	4' to 7'	Low	Moderate	N	Powdery Mildew, Sooty Mold and Aphids, Scales
Photinia x fraseri	Fraser photinia	50 feet	30-40 feet	Greater than 7'	Moderate	Moderate	N	Sooty Mold and Aphids
Picea abies	Norway spruce	100 feet	25-40 feet	Greater than 7'	High	Moderate	N	Fusarium, Phytophthora, Root Rot, Rust and Aphids, Scales, Spider Mites
Picea pungens	Colorado spruce	70 feet	10-20 feet	Greater than 7'	Moderate	Moderate	N	Armillaria, Phytophthora, Root Rot, Rust and Aphids, Scales, Spider Mites
Pinus brutia	Calabrian pine	80 feet	15-25 feet	4' to 7'	Moderate	Moderate	N	Armillaria and Aphids, Pine Tip Moth
Pinus brutia ssp. eldarica	Eldarica pine	80 feet	15-25 feet	4' to 7'	Moderate	Low	N	Armillaria and Aphids, Pine Tip Moth
Pinus bungeana	Lacebark pine	80 feet	30-50 feet	Greater than 7'	Moderate	Moderate	N	Armillaria and Aphids
Pinus canariensis	Canary Island pine	60 feet	40 feet	4' to 7'	Moderate	Moderate	N	Armillaria, Phytophthora, Root Rot, Sooty Mold and Aphids, Beetle Borers, Spider Mites
Pinus halepensis	Aleppo pine	60 feet	20-40 feet	4' to 7'	Moderate	Low	N	Armillaria, Phytophthora, Root Rot, Pitch Canker and Aphids, Spider Mites
Pinus mugo*	Mugo Pine*	20 feet	15-25 feet	4' to 7'	Low	Medium	N	Armillaria, Needle Cast, Tip Blight, Rust and Nematodes, Weevil, Mites, Scales
Pinus pinea	Italian stone pine	80 feet	40-60 feet	4' to 7'	Moderate	Moderate	N	Armillaria, Phytophthora, Root Rot, Pitch Canker and Aphids
Pinus radiata	Monterey pine	100 feet	25-35 feet	Greater than 7'	Moderate	Moderate	Y	Armillaria, Leaf Blight, Phytophthora, Root Rot and Aphids, Beetle Borers, California Five Spined Engraver Beetle, IPS
Pinus sabiniana	Foothill pine	70 feet	15-20 feet	Greater than 7'	Moderate	Moderate	N	Pitch Canker, Mistletoe, Western Gall Rust, Armillaria and Aphids, California Five Spined Engraver Beetle, IPS
Pinus strobus	Eastern white pine	80 feet	25-35 feet	Greater than 7'	Moderate	Moderate	N	Armillaria, Phytophthora, Root Rot, Rust and Aphids, Beetle Borers
Pinus thunbergii	Japanese black pine	30 feet	20-35 feet	4' to 7'	Moderate	Moderate	N	Armillaria and Aphids

Pinus torreyana	Torrey pine	50 feet	20-25 feet	Greater than 7'	Moderate	Moderate	Y	Armillaria, Pitch Canker and Aphids, Beetle Borers, Spider Mites
Pistacia chinensis	Chinese pistache	40 feet	25-35 feet	4' to 7'	Low	Moderate	N	Verticillium, Root Rot
Pistacia chinensis 'Keith Davey', 'Pearl Street'	Chinese Pistache	40 feet	25-35 feet	4' to 7'	Low	Low	N	Verticillium, Root Rot
Pistacia x 'Red Push'	Red Push Pistache	40 feet	20-40 feet	4' to 7'	Low	Unknown	N	Verticillium
Pittosporum tobira	Mock orange	25 feet	5-15 feet	4' to 7'	Low	Moderate	N	Phytophthora, Root Rot, Sooty Mold and Aphids, Scales
Platanus acerifolia 'Bloodgood', 'Columbia', 'Yarwood'	London plane	85 feet	50-70 feet	Greater than 7'	Moderate	Moderate	N	Yarwood' resistant to powdery mildew. 'Bloodgood' resistant to anthracnose. 'Columbia' resistant to both.
Platanus occidentalis	Texas sycamore	90 feet	50-70 feet	Greater than 7'	Moderate	Moderate	N	Anthracnose, Powdery Mildew and Beetle Borers, Scales, Spider Mites
Platanus racemosa	California Sycamore	80 feet	20-50 feet	Greater than 7'	Moderate	Moderate	Y	Anthracnose, Armillaria, Phytophthora, Mistletoe and Invasive Shot Hole Borer, Leaf Miner, Scales, Spider Mites
Platanus x hispanica	London plane	80 feet	50-70 feet	Greater than 7'	High	Moderate	N	Anthracnose, Powdery Mildew and Invasive Shot Hole Borer, Scales, Spider Mites
Platycladus orientalis	Oriental arborvitae	20 feet	10-15 feet	2' to 4'	Moderate	Moderate	N	Armillaria, Phytophthora, Root Rot and Spider Mites
Podocarpus macrophyllus	Yew pine	30 feet	20 feet	2' to 4'	Low	Moderate	N	Sooty Mold and Mites, Scales
Populus × canadensis	Carolina Poplar	100 feet	40 feet	Greater than 7'	High	Moderate	N	Anthracnose, Canker, Crown Rot, Mistletoe and Aphids, Beetle Borers, Scales, Thrip
Populus alba	White poplar	70 feet	40-60 feet	Greater than 7'	High	Moderate	N	Anthracnose, Canker, Crown Rot, Mistletoe and Aphids, Thrip
Populus deltoides	Eastern cottonwood	100 feet	70 feet	Greater than 7'	High	Moderate	N	Anthracnose, Canker, Crown Rot, Mistletoe and Aphids, Beetle Borers, Beetle Leaves
Populus fremontii	Western cottonwood	80 feet	30-50 feet	Greater than 7'	High	Moderate	N	Anthracnose, Canker, Crown Rot, Mistletoe and Aphids, Beetle Borers, Beetle Leaves, Caterpillars
Populus nigra	Lombardy poplar	100 feet	15-30 feet	Greater than 7'	High	Moderate	N	Armillaria and Aphids

Prunus armeniaca	Stone fruit species	30 feet	10-20 feet	4' to 7'	Low	Moderate	N	Brown Rot, Canker, Crown Rot, Gummosis and Aphids, Beetle Borers, Scales, Thrip
Prunus avium	Stone fruit species	70 feet	20-30 feet	Greater than 7'	Moderate	Moderate	N	Brown Rot, Crown Rot, Gummosis, Armillaria and Aphids, Caterpillars, Scales, Spider Mites
Prunus caroliniana	Carolina laurel cherry	30 feet	15-25 feet	4' to 7'	Low	Moderate	N	Armillaria, Fire Blight, Root Rot, Rust and Scales
Prunus cerasifera	Purple-leaf plum	25 feet	15-20 feet	4' to 7'	Low	Moderate	N	Armillaria, Canker, Leaf Spot and Aphids, Beetle Borers, Caterpillars, Scales
Prunus domestica	Stone fruit species	15 feet	10-15 feet	2' to 4'	Low	Moderate	N	Armillaria, Anthracnose, Fire Blight, Brown Rot and Aphids, Beetle Borers, Caterpillars, Spider Mites
Prunus dulcis	Almond	30 feet	20-30 feet	4' to 7'	Low	Moderate	N	Brown Rot, Canker, Chlorosis, Crown Rot and Beetle Borers, Spider Mites
Prunus ilicifolia	Holly leaf cherry	30 feet	10-25 feet	4' to 7'	Low	Moderate	N	Armillaria, Root Rot, Rust, Sooty Mold and White Flies, Aphids, Caterpillars
Prunus persica	Flowering peach	25 feet	25 feet	4' to 7'	Low	Moderate	N	Brown Rot, Canker, Chlorosis, Crown Rot and Aphids, Beetle Borers, Husk Fly, Scales
Prunus serrulata	Flowering cherry	25 feet	15-25 feet	4' to 7'	Medium	Moderate	N	Canker, Crown Rot, Armillaria, Phytophthora and Caterpillars
Prunus x blireiana	Flowering plum	15 feet	12-15 feet	2' to 4'	Low	Moderate	N	Armillaria, Root Rot, Rust, Sooty Mold and Aphids, Beetle Borers, Caterpillars, Spider Mites
Punica granatum	Pomegranate	15 feet	15 feet	2' to 4'	Low	Moderate	N	Chlorosis, Sooty Mold and Plant Bug, White Fly
Pyrus kawakamii	Evergreen pear	30 feet	15-30 feet	4' to 7'	Low	Moderate	N	Fire Blight, Sooty Mold and Aphids, White Fly
Quercus agrifolia	Coast live oak	70 feet	30-70 feet	4' to 7'	High	Very Low	Y	Sudden Oak Death, Crown Rot, Mistletoe, Armillaria and Carpenterworm, Invasive Shot Hole Borer, Goldspotted Oak Borer, Aphids
Quercus alba	Eastern white oak	100 feet	60-100 feet	Greater than 7'	Low	Moderate	N	Armillaria, Anthracnose, Canker, Leaf Spot and Leaf Miner, Caterpillars, Borer, Aphids

Quercus bicolor	Swamp white oak	70 feet	50 feet	Greater than 7'	Moderate	Moderate	N	Armillaria, Anthracnose, Phytophthora, Root Rot
Quercus chrysolepis	Canyon live oak	70 feet	30 feet	Greater than 7'	Moderate	Moderate	Y	Sudden Oak Death, Crown Rot, Mistletoe, Armillaria and Invasive Shot Hole Borer, Goldspotted Oak Borer, Aphids, Caterpillars
Quercus coccinea	Scarlet oak	70 feet	50 feet	Greater than 7'	Moderate	Moderate	N	Armillaria and Caterpillars, Scales
Quercus douglasii	Blue oak	70 feet	40-50 feet	Greater than 7'	Low	Very Low	Y	Crown Rot, Mistletoe, Armillaria, Brown Rot and Caterpillars, Insect Galls, California Oak Moth, Gall Wasp
Quercus frainetto	Hungarian Oak	100 feet	70 feet	Greater than 7'	Moderate	Moderate	N	Quercus frainetto
Quercus garryana	Garry's oak	90 feet	30-60 feet	Greater than 7'	Low	Low	Y	Crown Rot, Mistletoe, Armillaria, Root Rot and Beetle Borers, Caterpillars, Insect Galls, Scales
Quercus ilex	Holly oak	60 feet	30-60 feet	Greater than 7'	Low	Moderate	N	Anthracnose, Drippy Oak, Root Rot and Scales, Spider Mites
Quercus kelloggii	California black oak	70 feet	30-50 feet	Greater than 7'	Moderate	Low	Y	Sudden Oak Death, Anthracnose, Armillaria, Brown Rot and Goldspotted Oak Borer, Insect Galls, Carpenterworm, California Oak Moth
Quercus lobata	Valley oak	70 feet	50 feet	Greater than 7'	Moderate	Low	Y	Armillaria, Crown Rot, Mistletoe, Root Rot and Invasive Shot Hole Borer, Beetle Borers, Caterpillars, Insect Galls
Quercus macrocarpa 'Urban Pinnacle'	Bur oak, Urban pinnacle bur oak	80 feet	30 feet	Greater than 7'	Moderate	Moderate	N	Armillaria and Aphids, Spider Mites
Quercus palustris	Pin oak	70 feet	30-40 feet	Greater than 7'	Low	Moderate	N	Armillaria and Scales
Quercus robur	English oak	100 feet	30-80 feet	Greater than 7'	Moderate	Moderate	N	Armillaria, Powdery Mildew and Invasive Shot Hole Borer, Insect Galls
Quercus rubra	Red oak	80 feet	50-70 feet	Greater than 7'	Moderate	Moderate	N	Armillaria, Anthracnose, Phytophthora, Root Rot and Aphids, Caterpillars, Insect Galls
Quercus shumardii	Shumard oak	70 feet	40 feet	Greater than 7'	Moderate	Moderate	N	Armillaria and Beetle Borers, Beetle Leaves, Caterpillars, Insect Galls

Quercus suber	Cork oak	70 feet	70 feet	4' to 7'	Moderate	Low	N	Armillaria, Phytophthora, Root Rot and Invasive Shot Hole Borer
Quercus virginiana	Southern live oak	80 feet	60-100 feet	4' to 7'	Moderate	Moderate	N	Armillaria, Phytophthora, Root Rot and Insect Galls
Quercus wislizeni	Interior live oak	70 feet	40-80 feet	Greater than 7'	Moderate	Very Low	N	Armillaria, Crown Rot, Mistletoe, Powdery Mildew and Caterpillars, Coddling Moths, Insect Galls, White Fly
Rhamnus alaternus	Italian buckthorn	20 feet	10-20 feet	2' to 4'	Low	Moderate	N	Armillaria
Rhus laurina	Laurel sumac	20 feet	10-20 feet	4' to 7'	Low	Moderate	Y	Aphids, Psyllids, Scale, Armillaria root rot, canker, powdery mildew
Rhus ovata	Sugar bush	10 feet	5-10 feet	2' to 4'	Low	Moderate	Y	Aphids, Psyllids, Scale, Armillaria root rot, canker, powdery mildew
Robinia ambigua	Pink-flowering Locust	50 feet	20 feet	Greater than 7'	High	Moderate	N	Fusarium, Armillaria, Root Rot and Aphids
Salix babylonica	Weeping willow	50 feet	30-50 feet	Greater than 7'	High	Moderate	N	Anthracnose, Willow Blight, Armillaria, Phytophthora and Invasive Shot Hole Borer, Aphids, Beetle Borers, Caterpillars
Salix laevigata	Red willow	50 feet	15-35 feet	Greater than 7'	High	Moderate	Y	Anthracnose, Willow Blight, Armillaria, Phytophthora and Invasive Shot Hole Borer, Aphids, Beetle Borers, Caterpillars
Salix matsudana	Peking willow	50 feet	30-40 feet	Greater than 7'	High	Moderate	N	Anthracnose, Willow Blight, Canker, Crown Rot and Aphids, Beetle Borers, Caterpillars, Spider Mites
Salix nigra	Black willow	60 feet	30-60 feet	4' to 7'	Moderate	Moderate	N	Willow Blight, Armillaria, Phytophthora, Anthracnose and Aphids, Beetle Borers, Caterpillars, Invasive Shot Hole Borer
Salix scouleriana	Scouler willow	40 feet	20-40 feet	4' to 7'	Moderate	Moderate	Y	Armillaria, Willow Blight, Rust, Sooty Mold and Aphids
Sambucus mexicana	Elderberry	20 feet	10-20 feet	2' to 4'	Low	Moderate	Y	Verticillium and Beetle Borers
Sambucus racemosa	Elderberry	10 feet	5-10 feet	2' to 4'	Low	Moderate	Y	Root Rot, Verticillium
Sapien sebiferum (Triadica sebifera)	Chinese Tallow Tree	40 feet	25-30 feet	4' to 7'	Moderate	Medium	N	None specified
Searsia lancea	African sumac	30 feet	20-35 feet	4' to 7'	Low	Moderate	N	Root Rot, Verticillium

Sequoia sempervirens	Coast redwood	200 feet	15-100 feet	Greater than 7'	Low	Moderate	Y	Armillaria, Phytophthora, Cypress Canker, Root Rot and Beetle Borers, Redwood Bark Beetle
Sequoiadendron giganteum	Giant sequoia	200 feet	30-50 feet	Greater than 7'	High	Moderate	Y	Annosus Root Disease, Armillaria, Phytophthora Root Rot and Carpenter Ant
Sophora japonica (Styphnolobium japonicum)	Japanese Pagoda Tree	70 feet	40-70 feet	Greater than 7'	Low	Medium	N	Canker and Spider Mites
Sorbus aucuparia	European mountain ash	30 feet	15-25 feet	4' to 7'	Low	Moderate	N	Canker, Fire Blight, Rust, Sooty Mold and Beetle Borers
Styphnolobium japonicum	Japanese pagoda tree	70 feet	40-70 feet	Greater than 7'	Low	Moderate	N	Canker and Spider Mites
Syagrus romanzoffianum	Queen palm	50 feet	20-30 feet	4' to 7'	Low	Moderate	N	Butt Rot, Armillaria, Root Rot and Scales, Spider Mites
Taxodium distichum	Bald cypress	80 feet	25-35 feet	Greater than 7'	Moderate	Moderate	N	Phytophthora, Root Rot and Beetle Borers, Beetle Leaves
Taxus brevifolia	Pacific Yew	40 feet	10-20 feet	4' to 7'	Moderate	Moderate	N	Armillaria, Root Rot and Mealy Bugs, Scales, Spider Mites
Tilia americana	American linden	70 feet	20-25 feet	Greater than 7'	Moderate	Moderate	N	Root Rot, Sooty Mold, Verticillium and Aphids, Spider Mites, Scales
Tilia cordata	Little leaf linden	50 feet	15-30 feet	Greater than 7'	Moderate	Moderate	N	Root Rot, Sooty Mold, Verticillium and Aphids
Tilia cordata 'Greenspire', 'Olympic', ‘Sterling’	Little-leaf Linden	60 feet	35-50 feet	Greater than 7'	Moderate	Moderate	N	Root Rot, Sooty Mold, Verticillium and Aphids
Tipuana tipu	Tipu tree	50 feet	25-50 feet	4' to 7'	Moderate	Moderate	N	Psyllids
Trachycarpus fortunei	Windmill palm	50 feet	25-50 feet	4' to 7'	Moderate	Moderate	N	Scales, Aphids
Ulmus americana	American elm	100 feet	100 feet	Greater than 7'	High	Moderate	N	Dutch Elm Disease, Armillaria, Phytophthora, Root Rot and Aphids, Beetle Borers, Beetle Leaves, Scales
Ulmus parvifolia	Chinese elm	60 feet	50-70 feet	Greater than 7'	Moderate	Low	N	Dutch Elm Disease, Armillaria, Phytophthora, Root Rot and Aphids, Beetle Borers, Beetle Leaves, Caterpillars

Ulmus propinqua 'Emerald Sunshine'	Emerald sunshine elm	35 feet	15-25 feet	4' to 7'	Moderate	Low	N	Armillaria, Phytophthora, Root Rot, Sooty Mold and Aphids, Borers, Beetles, Scales
Ulmus pumila	Siberian elm	70 feet	40 feet	Greater than 7'	High	Low	N	Dutch Elm Disease, Armillaria, Phytophthora, Root Rot and Aphids, Beetle Borers, Beetle Leaves, Scales
Umbellularia californica	California bay laurel	80 feet	60-75 feet	Greater than 7'	Moderate	Moderate	Y	Armillaria, Sudden Oak Death, Anthracnose, White Mottled Rot and Beetle Borers, Leaf Miner, Cottony Cushion Scale, Beetle Leaves
Xylosma congesta	Shiny xylosma	25 feet	8-15 feet	2' to 4'	Low	Low	N	Chlorosis and Invasive Shot Hole Borer, Giant Whitefly, Scales, Spider Mites
Yucca gigantea	Giant Yucca	20 feet	10-15 feet	2' to 4'	Low	Low	N	Aphids
Zelkova serrata 'Musashino', 'Village Green', 'Wireless'	Saw leaf zelkova	70 feet	50-65 feet	Greater than 7'	Moderate	Moderate	N	Canker
Ziziphus jujuba	Chinese jujube	30 feet	10-30 feet	4' to 7'	Low	Low	N	Root Rot

Appendix D

i-Tree Report

i-Tree
Ecosystem Analysis

City of Pleasanton

Urban Forest Effects and Values
April 2024

Summary

Understanding an urban forest's structure, function and value can promote management decisions that will improve human health and environmental quality. An assessment of the vegetation structure, function, and value of the City of Pleasanton urban forest was conducted during 2024. Data from 23301 trees located throughout City of Pleasanton were analyzed using the i-Tree Eco model developed by the U.S. Forest Service, Northern Research Station.

- Number of trees: 23,301
- Tree Cover: 225.3 acres
- Most common species of trees: Sycamore spp, Coastal live oak, Coast redwood
- Percentage of trees less than 6" (15.2 cm) diameter: 28.0%
- Pollution Removal: 5.337 tons/year ($21.2 thousand/year)
- Carbon Storage: 10.92 thousand tons ($1.86 million)
- Carbon Sequestration: 333.2 tons ($56.8 thousand/year)
- Oxygen Production: 888.4 tons/year
- Avoided Runoff: 1.426 million gallon/year ($12.7 thousand/year)
- Building energy savings: N/A – data not collected
- Avoided carbon emissions: N/A – data not collected
- Replacement values: $99.4 million

Ton: short ton (U.S.) (2,000 lbs)
Monetary values $ are reported in US Dollars throughout the report except where noted.
Ecosystem service estimates are reported for trees.
With Complete Inventory Projects, oxygen production is estimated from gross carbon sequestration and does not account for decomposition. Oxygen production in Plot Inventory Projects is estimated from net carbon sequestration.

For an overview of i-Tree Eco methodology, see Appendix I. Data collection quality is determined by the local data collectors, over which i-Tree has no control.

Table of Contents

I. Tree Characteristics of the Urban Forest

The urban forest of City of Pleasanton has 23,301 trees with a tree cover of Sycamore spp. The three most common species are Sycamore spp (11.7 percent), Coastal live oak (9.4 percent), and Coast redwood (8.6 percent).

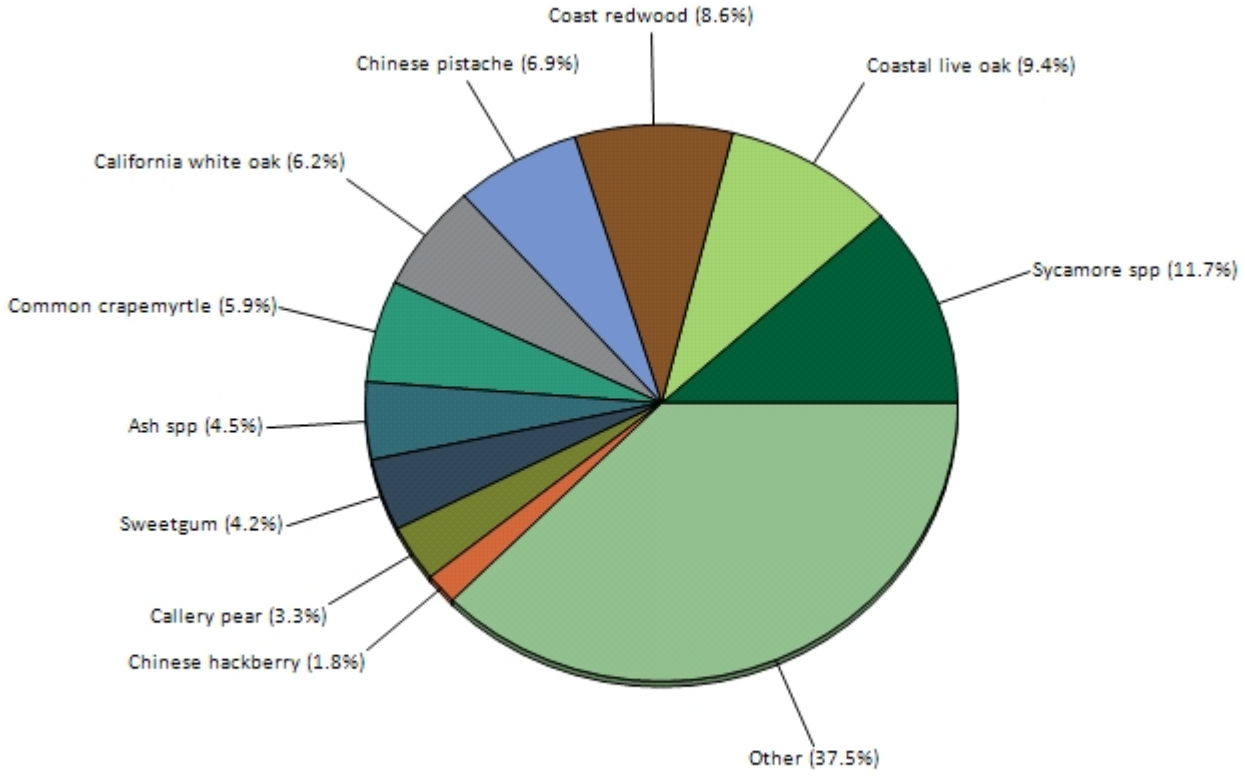


Figure 1. Tree species composition in City of Pleasanton

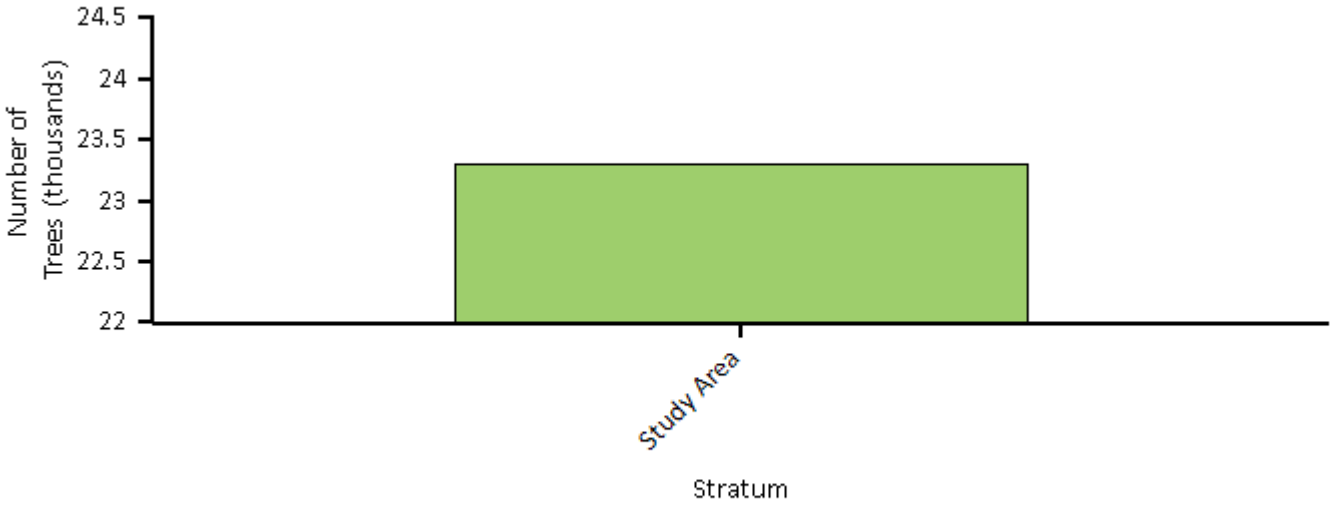


Figure 2. Number of trees in City of Pleasanton by stratum

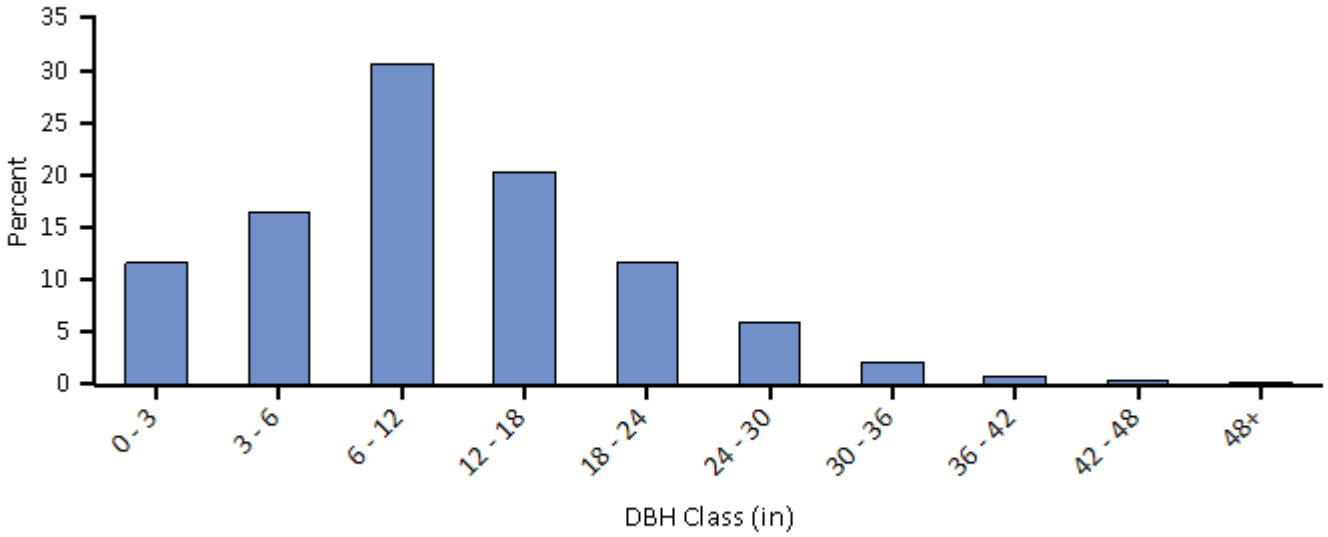


Figure 3. Percent of tree population by diameter class (DBH - stem diameter at 4.5 feet)

Urban forests are composed of a mix of native and exotic tree species. Thus, urban forests often have a tree diversity that is higher than surrounding native landscapes. Increased tree diversity can minimize the overall impact or destruction by a species-specific insect or disease, but it can also pose a risk to native plants if some of the exotic species are invasive plants that can potentially out-compete and displace native species. In City of Pleasanton, about 43 percent of the trees are species native to North America, while 29 percent are native to California. Species exotic to North America make up 57 percent of the population. Most exotic tree species have an origin from Asia (27 percent of the species).

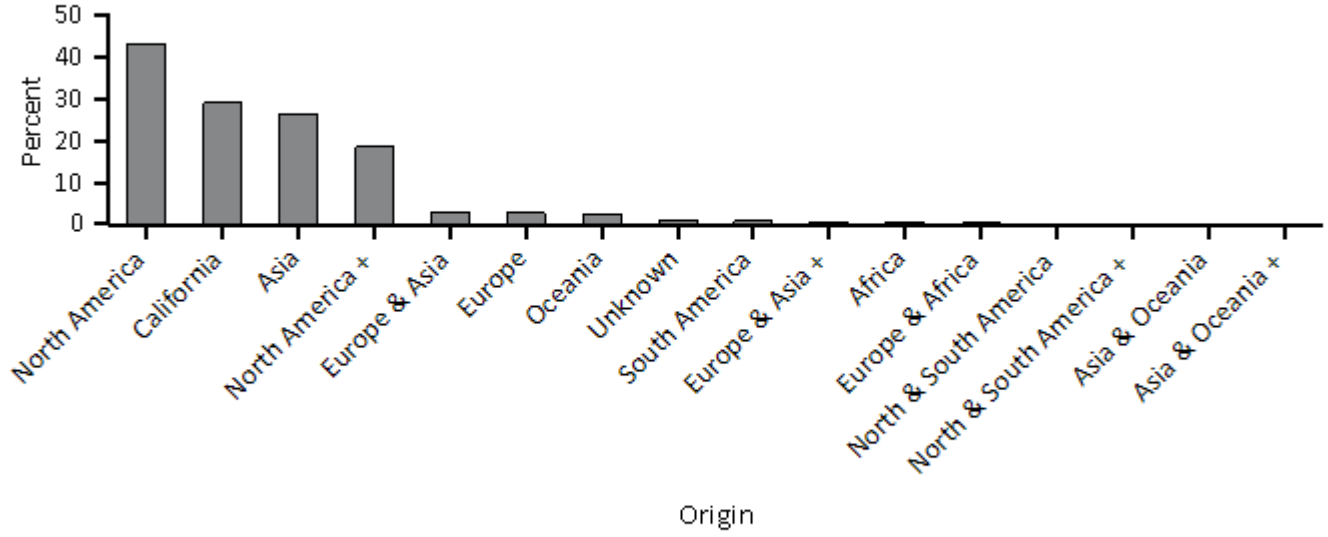


Figure 4. Percent of live tree population by area of native origin, City of Pleasanton

The plus sign (+) indicates the tree species is native to another continent other than the ones listed in the grouping.

Invasive plant species are often characterized by their vigor, ability to adapt, reproductive capacity, and general lack of natural enemies. These abilities enable them to displace native plants and make them a threat to natural areas. Seven of the 246 tree species in City of Pleasanton are identified as invasive on the state invasive species list (California Invasive Species Advisory Committee 2010). These invasive species comprise 0.8 percent of the tree population though they may only cause a minimal level of impact. The three most common invasive species are Chinese tallowtree (0.3 percent of population), California peppertree (0.3 percent), and Blue gum eucalyptus (0.2 percent) (see Appendix V for a complete list of invasive species).

II. Urban Forest Cover and Leaf Area

Many tree benefits equate directly to the amount of healthy leaf surface area of the plant. Trees cover about 225.3 acres of City of Pleasanton and provide 1228 acres of leaf area.

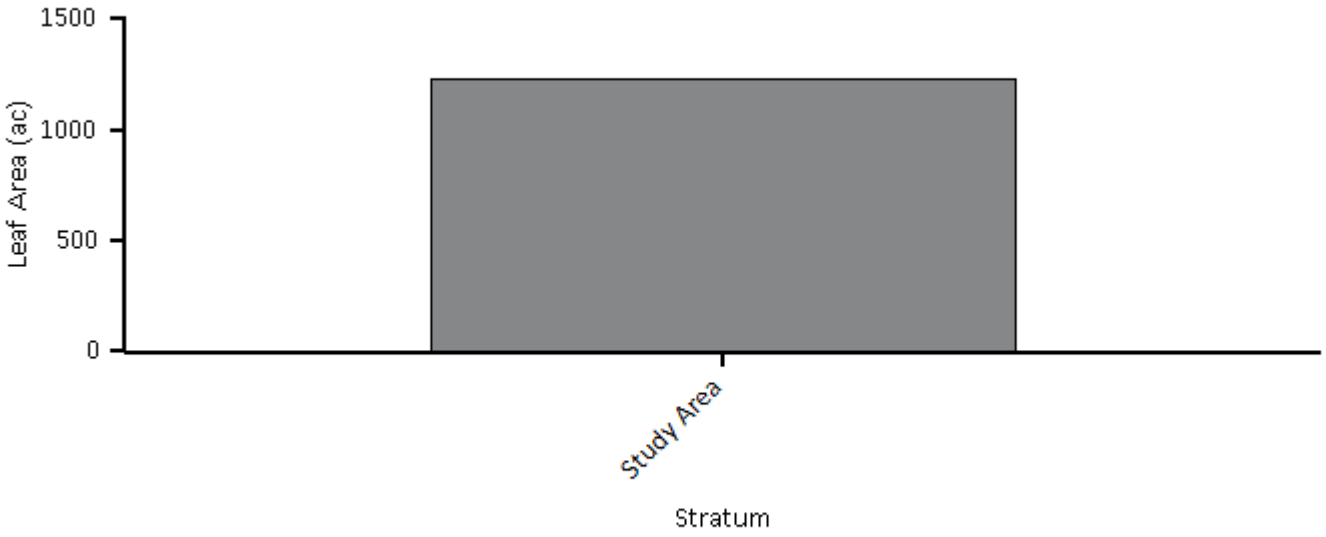


Figure 5. Leaf area by stratum, City of Pleasanton

In City of Pleasanton, the most dominant species in terms of leaf area are Sycamore spp, Coast redwood, and Coastal live oak. The 10 species with the greatest importance values are listed in Table 1. Importance values (IV) are calculated as the sum of percent population and percent leaf area. High importance values do not mean that these trees should necessarily be encouraged in the future; rather these species currently dominate the urban forest structure.

Table 1. Most important species in City of Pleasanton

Species Name	*Percent Population*	*Percent Leaf Area*	*IV*
Sycamore spp	11.7	17.4	29.1
Coast redwood	8.6	12.3	20.9
Coastal live oak	9.4	8.9	18.3
California white oak	6.2	6.4	12.7
Ash spp	4.5	7.2	11.7
Sweetgum	4.2	4.7	8.9
Chinese pistache	6.9	1.9	8.7
Common crapemyrtle	5.9	0.5	6.4
Callery pear	3.3	2.4	5.6
Chinese hackberry	1.8	2.5	4.3

Common ground cover classes (including cover types beneath trees and shrubs) in City of Pleasanton are not available since they are configured not to be collected.

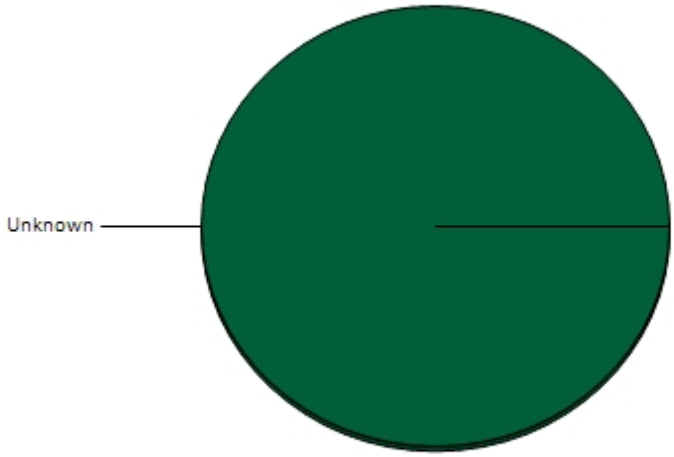


Figure 6. Percent of land by ground cover classes, City of Pleasanton

III. Air Pollution Removal by Urban Trees

Poor air quality is a common problem in many urban areas. It can lead to decreased human health, damage to landscape materials and ecosystem processes, and reduced visibility. The urban forest can help improve air quality by reducing air temperature, directly removing pollutants from the air, and reducing energy consumption in buildings, which consequently reduces air pollutant emissions from the power sources. Trees also emit volatile organic compounds that can contribute to ozone formation. However, integrative studies have revealed that an increase in tree cover leads to reduced ozone formation (Nowak and Dwyer 2000).

Pollution removal[1] by trees in City of Pleasanton was estimated using field data and recent available pollution and weather data available. Pollution removal was greatest for ozone (Figure 7). It is estimated that trees remove 5.337 tons of air pollution (ozone (O3), carbon monoxide (CO), nitrogen dioxide (NO2), particulate matter less than 2.5 microns (PM2.5), particulate matter less than 10 microns and greater than 2.5 microns (PM10*)[2], and sulfur dioxide (SO2)) per year with an associated value of $21.2 thousand (see Appendix I for more details).

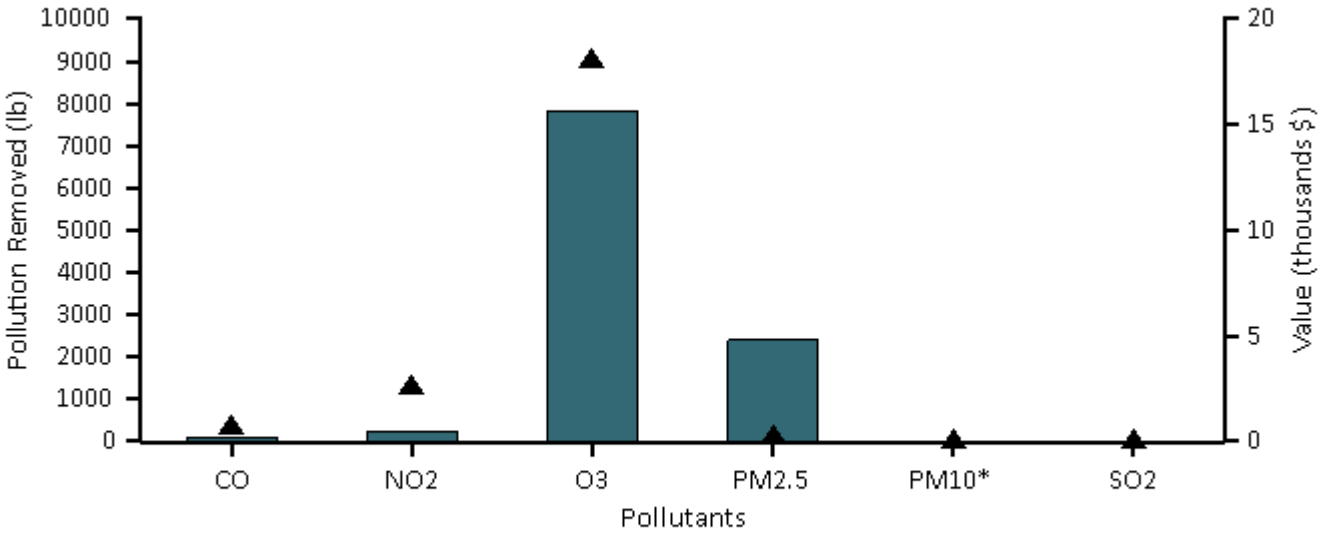


Figure 7. Annual pollution removal (points) and value (bars) by urban trees, City of Pleasanton

[1] PM10* is particulate matter less than 10 microns and greater than 2.5 microns. PM2.5 is particulate matter less than 2.5 microns. If PM2.5 is not monitored, PM10* represents particulate matter less than 10 microns. PM2.5 is generally more relevant in discussions concerning air pollution effects on human health.

[2] Trees remove PM2.5 and PM10* when particulate matter is deposited on leaf surfaces. This deposited PM2.5 and PM10* can be resuspended to the atmosphere or removed during rain events and dissolved or transferred to the soil. This combination of events can lead to positive or negative pollution removal and value depending on various atmospheric factors (see Appendix I for more details).

In 2024, trees in City of Pleasanton emitted an estimated 12.59 tons of volatile organic compounds (VOCs) (7.016 tons of isoprene and 5.57 tons of monoterpenes). Emissions vary among species based on species characteristics (e.g. some genera such as oaks are high isoprene emitters) and amount of leaf biomass. Fifty- one percent of the urban forest's VOC emissions were from Coastal live oak and California white oak. These VOCs are precursor chemicals to ozone formation.[3]

General recommendations for improving air quality with trees are given in Appendix VIII.

[3] Some economic studies have estimated VOC emission costs. These costs are not included here as there is a tendency to add positive dollar estimates of ozone removal effects with negative dollar values of VOC emission effects to determine whether tree effects are positive or negative in relation to ozone. This combining of dollar values to determine tree effects should not be done, rather estimates of VOC effects on ozone formation (e.g., via photochemical models) should be conducted and directly contrasted with ozone removal by trees (i.e., ozone effects should be directly compared, not dollar estimates). In addition, air temperature reductions by trees have been shown to significantly reduce ozone concentrations (Cardelino and Chameides 1990; Nowak et al 2000), but are not considered in this analysis. Photochemical modeling that integrates tree effects on air temperature, pollution removal, VOC emissions, and emissions from power plants can be used to determine the overall effect of trees on ozone concentrations.

IV. Carbon Storage and Sequestration

Climate change is an issue of global concern. Urban trees can help mitigate climate change by sequestering atmospheric carbon (from carbon dioxide) in tissue and by altering energy use in buildings, and consequently altering carbon dioxide emissions from fossil-fuel based power sources (Abdollahi et al 2000).

Trees reduce the amount of carbon in the atmosphere by sequestering carbon in new growth every year. The amount of carbon annually sequestered is increased with the size and health of the trees. The gross sequestration of City of Pleasanton trees is about 333.2 tons of carbon per year with an associated value of $56.8 thousand. See Appendix I for more details on methods.

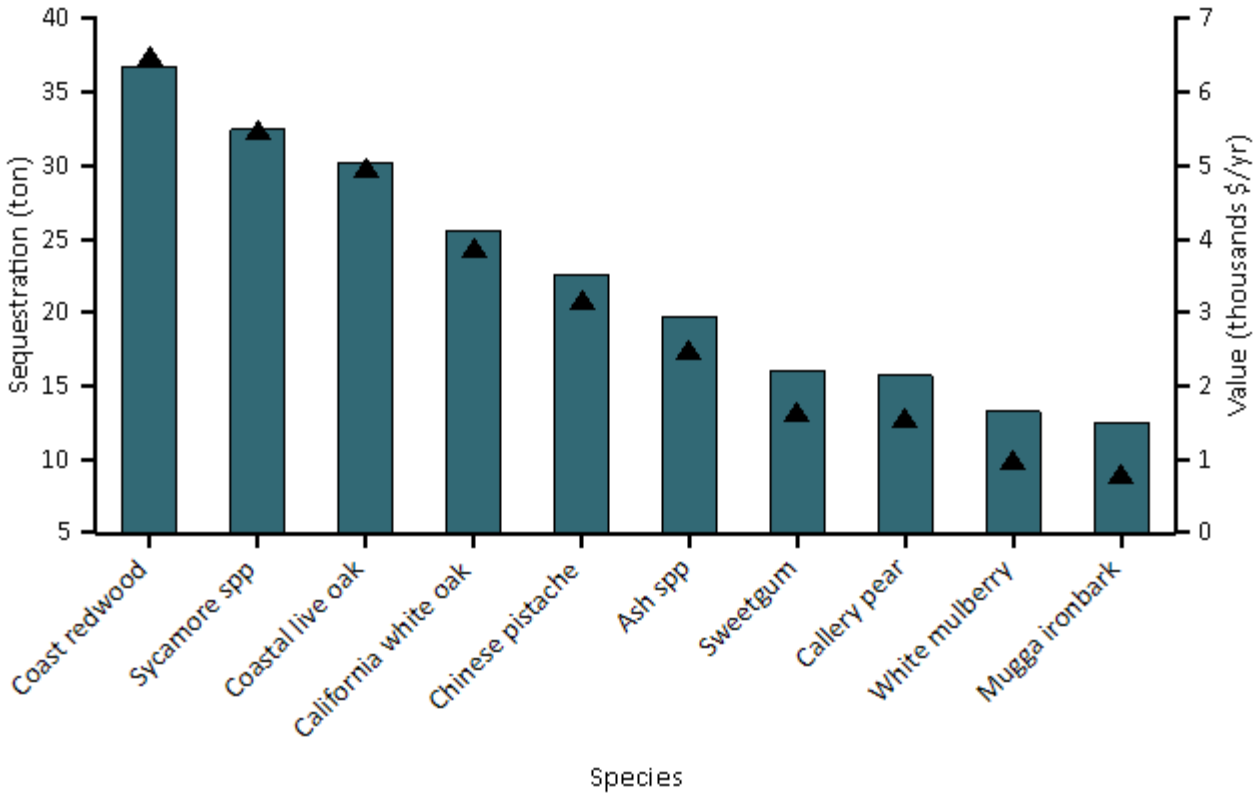


Figure 8. Estimated annual gross carbon sequestration (points) and value (bars) for urban tree species with the greatest sequestration, City of Pleasanton

Carbon storage is another way trees can influence global climate change. As a tree grows, it stores more carbon by holding it in its accumulated tissue. As a tree dies and decays, it releases much of the stored carbon back into the atmosphere. Thus, carbon storage is an indication of the amount of carbon that can be released if trees are allowed to die and decompose. Maintaining healthy trees will keep the carbon stored in trees, but tree maintenance can contribute to carbon emissions (Nowak et al 2002c). When a tree dies, using the wood in long-term wood products, to heat buildings, or to produce energy will help reduce carbon emissions from wood decomposition or from fossil-fuel or wood-based power plants.

Trees in City of Pleasanton are estimated to store 10900 tons of carbon ($1.86 million). Of the species sampled, Coast redwood stores and sequesters the most carbon (approximately 11.2% of the total carbon stored and 11.2% of all sequestered carbon.)

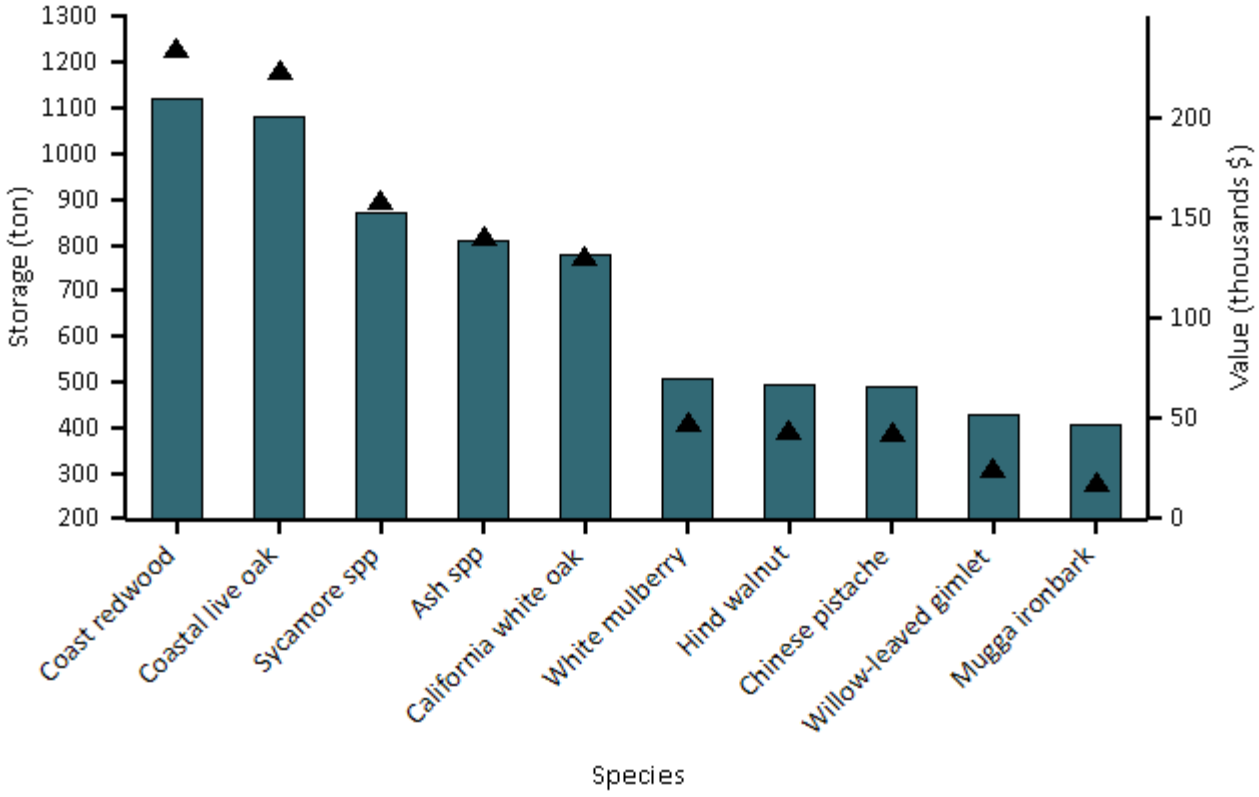


Figure 9. Estimated carbon storage (points) and values (bars) for urban tree species with the greatest storage, City of Pleasanton

V. Oxygen Production

Oxygen production is one of the most commonly cited benefits of urban trees. The annual oxygen production of a tree is directly related to the amount of carbon sequestered by the tree, which is tied to the accumulation of tree biomass.

Trees in City of Pleasanton are estimated to produce 888.4 tons of oxygen per year.[4] However, this tree benefit is relatively insignificant because of the large and relatively stable amount of oxygen in the atmosphere and extensive production by aquatic systems. Our atmosphere has an enormous reserve of oxygen. If all fossil fuel reserves, all trees, and all organic matter in soils were burned, atmospheric oxygen would only drop a few percent (Broecker 1970).

Table 2. The top 20 oxygen production species.

Species	*Oxygen (ton)*	*Gross Carbon Sequestration (ton/yr)*	*Number of Trees*	*Leaf Area (acre)*
Coast redwood	99.37	37.26	2,006	150.81
Sycamore spp	85.96	32.23	2,734	213.45
Coastal live oak	78.96	29.61	2,191	108.69
California white oak	64.36	24.13	1,454	78.73
Chinese pistache	54.96	20.61	1,605	22.83
Ash spp	45.90	17.21	1,045	88.35
Sweetgum	34.67	13.00	977	58.30
Callery pear	33.51	12.57	764	29.02
White mulberry	25.92	9.72	261	23.18
Mugga ironbark	23.57	8.84	87	18.46
Common crapemyrtle	19.93	7.47	1,378	6.50
Tulip tree	19.00	7.12	302	32.12
Deodar cedar	17.81	6.68	339	16.91
Camphor tree	16.22	6.08	215	9.22
Hind walnut	15.92	5.97	275	22.29
Willow-leaved gimlet	11.33	4.25	95	14.79
Holly oak	9.21	3.45	150	10.21
Turkish pine	8.42	3.16	158	12.44
Silver maple	7.95	2.98	123	12.97
Chinese elm	7.79	2.92	117	4.47

VI. Avoided Runoff

Surface runoff can be a cause for concern in many urban areas as it can contribute pollution to streams, wetlands, rivers, lakes, and oceans. During precipitation events, some portion of the precipitation is intercepted by vegetation (trees and shrubs) while the other portion reaches the ground. The portion of the precipitation that reaches the ground and does not infiltrate into the soil becomes surface runoff (Hirabayashi 2012). In urban areas, the large extent of impervious surfaces increases the amount of surface runoff.

Urban trees and shrubs, however, are beneficial in reducing surface runoff. Trees and shrubs intercept precipitation, while their root systems promote infiltration and storage in the soil. The trees and shrubs of City of Pleasanton help to reduce runoff by an estimated 1.43 million gallons a year with an associated value of $13 thousand (see Appendix I for more details). Avoided runoff is estimated based on local weather from the user-designated weather station. In City of Pleasanton, the total annual precipitation in 2021 was 15.2 inches.

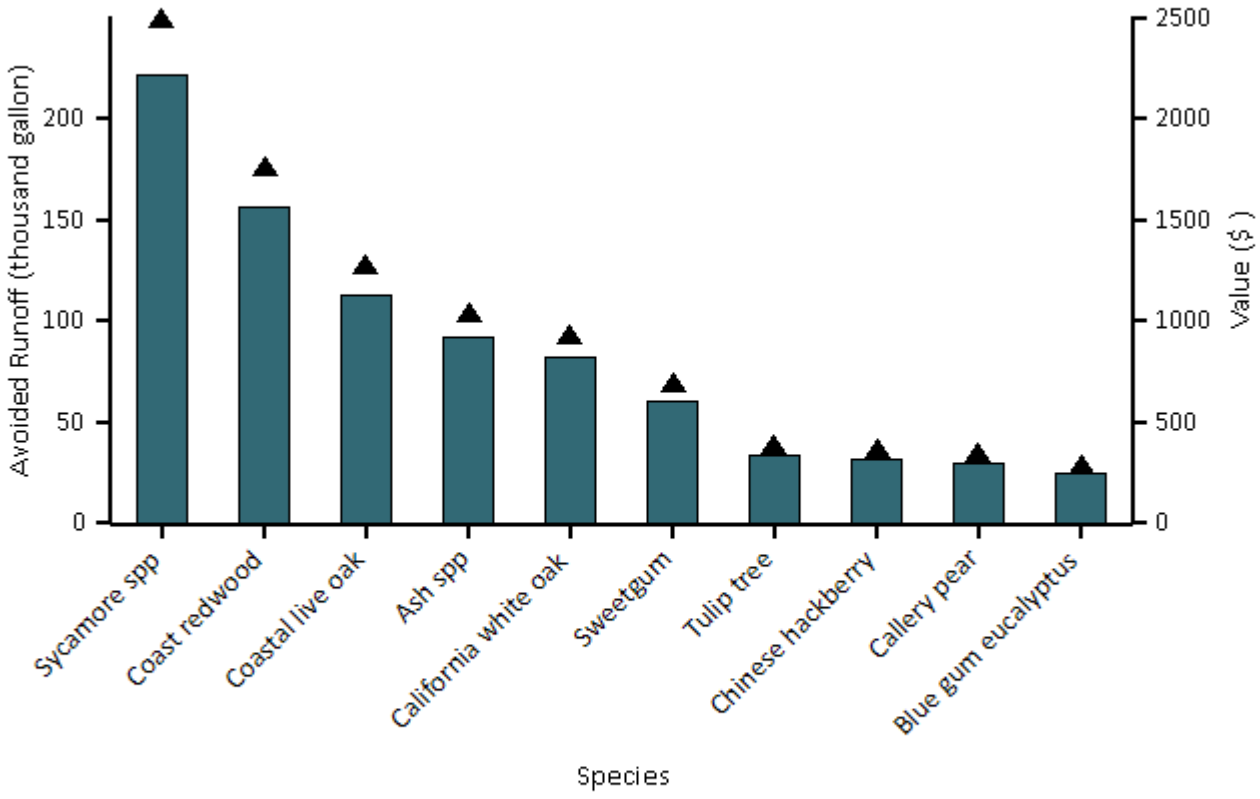


Figure 10. Avoided runoff (points) and value (bars) for species with greatest overall impact on runoff, City of Pleasanton

VII. Trees and Building Energy Use

Trees affect energy consumption by shading buildings, providing evaporative cooling, and blocking winter winds. Trees tend to reduce building energy consumption in the summer months and can either increase or decrease building energy use in the winter months, depending on the location of trees around the building. Estimates of tree effects on energy use are based on field measurements of tree distance and direction to space conditioned residential buildings (McPherson and Simpson 1999).

Because energy-related data were not collected, energy savings and carbon avoided cannot be calculated.

Table 3. Annual energy savings due to trees near residential buildings, City of Pleasanton

	Heating	*Cooling*	*Total*
MBTU[a]	0	N/A	0
MWH[b]	0	0	0
Carbon Avoided (pounds)	0	0	0

[a]MBTU - one million British Thermal Units

[b]MWH - megawatt-hour

Table 4. Annual savings [a]($) in residential energy expenditure during heating and cooling seasons, City of Pleasanton

	Heating	*Cooling*	*Total*
MBTU[b]	0	N/A	0
MWH[c]	0	0	0
Carbon Avoided	0	0	0

[b]Based on the prices of $204.7 per MWH and $12.9396400362223 per MBTU (see Appendix I for more details)

[c]MBTU - one million British Thermal Units

[c]MWH - megawatt-hour

[5] Trees modify climate, produce shade, and reduce wind speeds. Increased energy use or costs are likely due to these tree-building interactions creating a cooling effect during the winter season. For example, a tree (particularly evergreen species) located on the southern side of a residential building may produce a shading effect that causes increases in heating requirements.

VIII. Replacement and Functional Values

Urban forests have a replacement value based on the trees themselves (e.g., the cost of having to replace a tree with a similar tree); they also have functional values (either positive or negative) based on the functions the trees perform.

The replacement value of an urban forest tends to increase with a rise in the number and size of healthy trees (Nowak et al 2002a). Annual functional values also tend to increase with increased number and size of healthy trees. Through proper management, urban forest values can be increased; however, the values and benefits also can decrease as the amount of healthy tree cover declines.

Urban trees in City of Pleasanton have the following replacement values:

- Replacement value: $99.4 million
- Carbon storage: $1.86 million

Urban trees in City of Pleasanton have the following annual functional values:

- Carbon sequestration: $56.8 thousand
- Avoided runoff: $12.7 thousand
- Pollution removal: $21.2 thousand
- Energy costs and carbon emission values: $0

(Note: negative value indicates increased energy cost and carbon emission value)

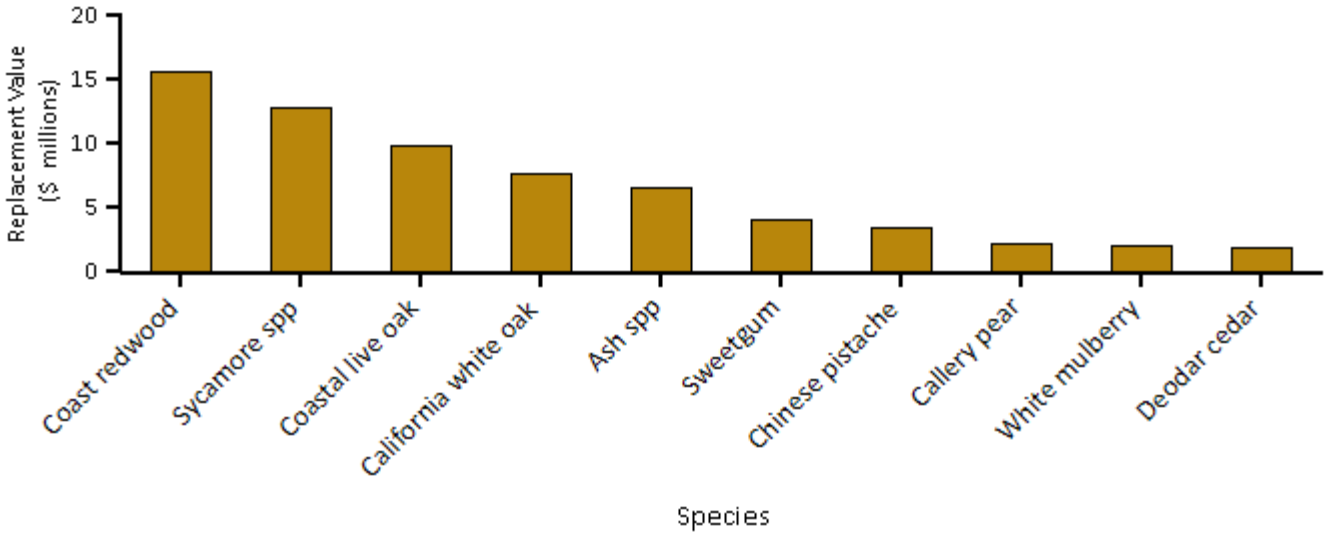


Figure 11. Tree species with the greatest replacement value, City of Pleasanton

IX. Potential Pest Impacts

Various insects and diseases can infest urban forests, potentially killing trees and reducing the health, replacement value and sustainability of the urban forest. As pests tend to have differing tree hosts, the potential damage or risk of each pest will differ among cities.Fifty-three pests were analyzed for their potential impact and compared with pest range maps (Forest Health Technology Enterprise Team 2014) for the conterminous United States to determine their proximity to Alameda County. Six of the fifty-three pests analyzed are located within the county. For a complete analysis of all pests, see Appendix VII.

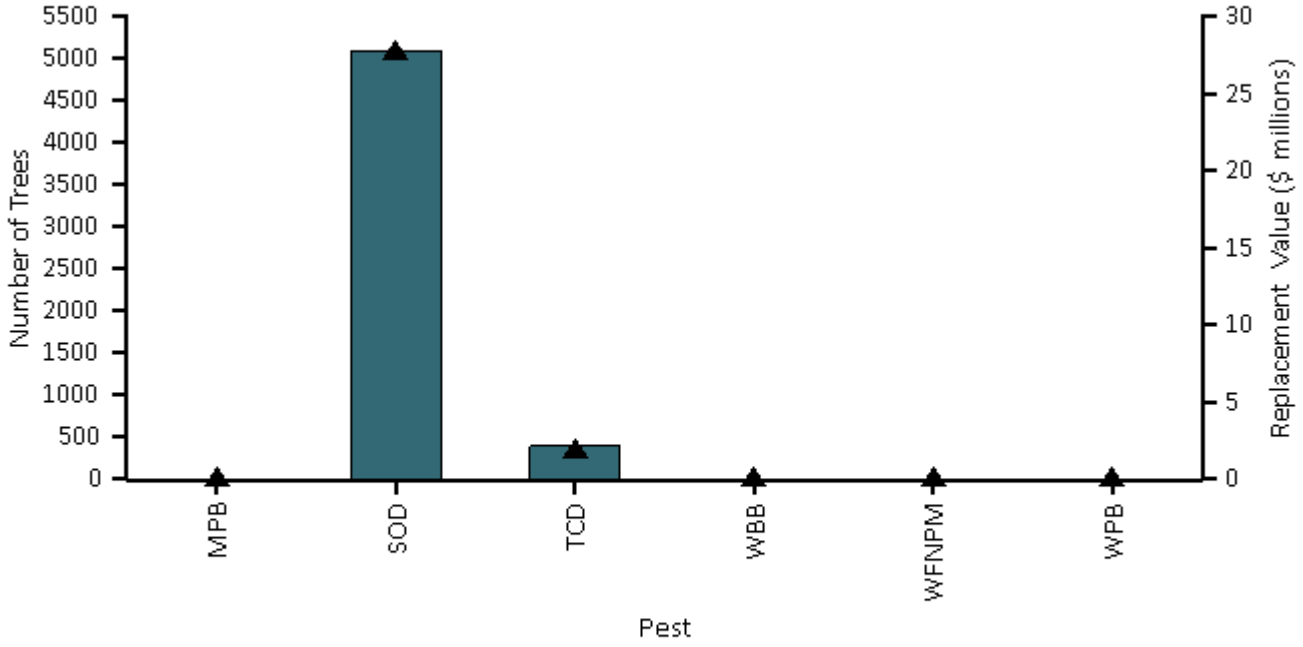


Figure 12. Number of trees at risk (points) and associated compensatory value (bars) for most threatening pests located in the county, City of Pleasanton

Mountain pine beetle (MPB) (Gibson et al 2009) is a bark beetle that primarily attacks pine species in the western United States. MPB has the potential to affect 0.0 percent of the population ($2.31 thousand in replacement value).

Sudden oak death (SOD) (Kliejunas 2005) is a disease that is caused by a fungus. Potential loss of trees from SOD is 21.8 percent ($27.8 million in replacement value).

Thousand canker disease (TCD) (Cranshaw and Tisserat 2009; Seybold et al 2010) is an insect-disease complex that kills several species of walnuts, including black walnut. Potential loss of trees from TCD is 1.5 percent ($2.19 million in replacement value).

Western Bark Beetle (WBB) poses a threat to 0.0 percent of the City of Pleasanton urban forest, which represents a potential loss of $0 in replacement value.

Western Five-Needle Pine Mortality (WFNPM) poses a threat to 0.0 percent of the City of Pleasanton urban forest, which represents a potential loss of $0 in replacement value.

The western pine beetle (WPB) (DeMars and Roettgering 1982) is a bark beetle and aggressive attacker of ponderosa and Coulter pines. This pest threatens 0.0 percent of the population, which represents a potential loss of $0 in replacement value.

Appendix I. i-Tree Eco Model and Field Measurements

i-Tree Eco is designed to use standardized field data and local hourly air pollution and meteorological data to quantify urban forest structure and its numerous effects (Nowak and Crane 2000), including:

- Urban forest structure (e.g., species composition, tree health, leaf area, etc.).
- Amount of pollution removed hourly by the urban forest, and its associated percent air quality improvement throughout a year.
- Total carbon stored and net carbon annually sequestered by the urban forest.
- Effects of trees on building energy use and consequent effects on carbon dioxide emissions from power sources.
- Replacement value of the forest, as well as the value for air pollution removal and carbon storage and sequestration.
- Potential impact of infestations by pests, such as Asian longhorned beetle, emerald ash borer, spongy moth, and Dutch elm disease.

Typically, all field data are collected during the leaf-on season to properly assess tree canopies. Typical data collection (actual data collection may vary depending upon the user) includes land use, ground and tree cover, individual tree attributes of species, stem diameter, height, crown width, crown canopy missing and dieback, and distance and direction to residential buildings (Nowak et al 2005; Nowak et al 2008).

During data collection, trees are identified to the most specific taxonomic classification possible. Trees that are not classified to the species level may be classified by genus (e.g., ash) or species groups (e.g., hardwood). In this report, tree species, genera, or species groups are collectively referred to as tree species.

Tree Characteristics:

Leaf area of trees was assessed using measurements of crown dimensions and percentage of crown canopy missing. In the event that these data variables were not collected, they are estimated by the model.

An analysis of invasive species is not available for studies outside of the United States. For the U.S., invasive species are identified using an invasive species list (California Invasive Species Advisory Committee 2010)for the state in which the urban forest is located. These lists are not exhaustive and they cover invasive species of varying degrees of invasiveness and distribution. In instances where a state did not have an invasive species list, a list was created based on the lists of the adjacent states. Tree species that are identified as invasive by the state invasive species list are cross-referenced with native range data. This helps eliminate species that are on the state invasive species list, but are native to the study area.

Air Pollution Removal:

Pollution removal is calculated for ozone, sulfur dioxide, nitrogen dioxide, carbon monoxide, particulate matter less than 2.5 microns, and particulate matter less than 10 microns and greater than 2.5 microns. PM2.5 is generally more relevant in discussions concerning air pollution effects on human health.

Air pollution removal estimates are derived from calculated hourly tree-canopy resistances for ozone, and sulfur and nitrogen dioxides based on a hybrid of big-leaf and multi-layer canopy deposition models (Baldocchi 1988; Baldocchi et al 1987). As the removal of carbon monoxide and particulate matter by vegetation is not directly related to transpiration, removal rates (deposition velocities) for these pollutants were based on average measured values from the literature (Bidwell and Fraser 1972; Lovett 1994) that were adjusted depending on leaf phenology and leaf area. Particulate removal incorporated a 50 percent resuspension rate of particles back to the atmosphere (Zinke 1967). Recent updates (2011) to air quality modeling are based on improved leaf area index simulations, weather and

pollution processing and interpolation, and updated pollutant monetary values (Hirabayashi et al 2011; Hirabayashi et al 2012; Hirabayashi 2011).

Trees remove PM2.5 and PM10* when particulate matter is deposited on leaf surfaces (Nowak et al 2013). This deposited PM2.5 and PM10* can be resuspended to the atmosphere or removed during rain events and dissolved or transferred to the soil. This combination of events can lead to positive or negative pollution removal and value depending on various atmospheric factors. Generally, PM2.5 and PM10* removal is positive with positive benefits. However, there are some cases when net removal is negative or resuspended particles lead to increased pollution concentrations and negative values. During some months (e.g., with no rain), trees resuspend more particles than they remove. Resuspension can also lead to increased overall PM2.5 and PM10* concentrations if the boundary layer conditions are lower during net resuspension periods than during net removal periods. Since the pollution removal value is based on the change in pollution concentration, it is possible to have situations when trees remove PM2.5 and PM10* but increase concentrations and thus have negative values during periods of positive overall removal. These events are not common, but can happen.

For reports in the United States, default air pollution removal value is calculated based on local incidence of adverse health effects and national median externality costs. The number of adverse health effects and associated economic value is calculated for ozone, sulfur dioxide, nitrogen dioxide, and particulate matter less than 2.5 microns using data from the U.S. Environmental Protection Agency's Environmental Benefits Mapping and Analysis Program (BenMAP) (Nowak et al 2014). The model uses a damage-function approach that is based on the local change in pollution concentration and population. National median externality costs were used to calculate the value of carbon monoxide removal (Murray et al 1994).

For international reports, user-defined local pollution values are used. For international reports that do not have local values, estimates are based on either European median externality values (van Essen et al 2011) or BenMAP regression equations (Nowak et al 2014) that incorporate user-defined population estimates. Values are then converted to local currency with user-defined exchange rates.

For this analysis, pollution removal value is calculated based on the prices of $1,488 per ton (carbon monoxide), $3,479 per ton (ozone), $714 per ton (nitrogen dioxide), $0 per ton (sulfur dioxide), $120,163 per ton (particulate matter less than 2.5 microns), $0 per ton (particulate matter less than 10 microns and greater than 2.5 microns).

Carbon Storage and Sequestration:

Carbon storage is the amount of carbon bound up in the above-ground and below-ground parts of woody vegetation. To calculate current carbon storage, biomass for each tree was calculated using equations from the literature and measured tree data. Open-grown, maintained trees tend to have less biomass than predicted by forest-derived biomass equations (Nowak 1994). To adjust for this difference, biomass results for open-grown urban trees were multiplied by 0.8. No adjustment was made for trees found in natural stand conditions. Tree dry-weight biomass was converted to stored carbon by multiplying by 0.5.

Carbon sequestration is the removal of carbon dioxide from the air by plants. To estimate the gross amount of carbon sequestered annually, average diameter growth from the appropriate genera and diameter class and tree condition was added to the existing tree diameter (year x) to estimate tree diameter and carbon storage in year x+1.

Carbon storage and carbon sequestration values are based on estimated or customized local carbon values. For international reports that do not have local values, estimates are based on the carbon value for the United States (U.S. Environmental Protection Agency 2015, Interagency Working Group on Social Cost of Carbon 2015) and converted to local currency with user-defined exchange rates.

For this analysis, carbon storage and carbon sequestration values are calculated based on $171 per ton.

Oxygen Production:

The amount of oxygen produced is estimated from carbon sequestration based on atomic weights: net O2 release (kg/yr) = net C sequestration (kg/yr) × 32/12. To estimate the net carbon sequestration rate, the amount of carbon sequestered as a result of tree growth is reduced by the amount lost resulting from tree mortality. Thus, net carbon sequestration and net annual oxygen production of the urban forest account for decomposition (Nowak et al 2007). For complete inventory projects, oxygen production is estimated from gross carbon sequestration and does not account for decomposition.

Avoided Runoff:

Annual avoided surface runoff is calculated based on rainfall interception by vegetation, specifically the difference between annual runoff with and without vegetation. Although tree leaves, branches, and bark may intercept precipitation and thus mitigate surface runoff, only the precipitation intercepted by leaves is accounted for in this analysis.

The value of avoided runoff is based on estimated or user-defined local values. For international reports that do not have local values, the national average value for the United States is utilized and converted to local currency with user-defined exchange rates. The U.S. value of avoided runoff is based on the U.S. Forest Service's Community Tree Guide Series (McPherson et al 1999; 2000; 2001; 2002; 2003; 2004; 2006a; 2006b; 2006c; 2007; 2010; Peper et al 2009; 2010; Vargas et al 2007a; 2007b; 2008).

For this analysis, avoided runoff value is calculated based on the price of $0.01 per gallon.

Building Energy Use:

If appropriate field data were collected, seasonal effects of trees on residential building energy use were calculated based on procedures described in the literature (McPherson and Simpson 1999) using distance and direction of trees from residential structures, tree height and tree condition data. To calculate the monetary value of energy savings, local or custom prices per MWH or MBTU are utilized.

For this analysis, energy saving value is calculated based on the prices of $204.70 per MWH and $12.94 per MBTU.

Replacement Values:

Replacement value is the value of a tree based on the physical resource itself (e.g., the cost of having to replace a tree with a similar tree). Replacement values were based on valuation procedures of the Council of Tree and Landscape Appraisers, which uses tree species, diameter, condition, and location information (Nowak et al 2002a; 2002b). Replacement value may not be included for international projects if there is insufficient local data to complete the valuation procedures.

Potential Pest Impacts:

The complete potential pest risk analysis is not available for studies outside of the United States. The number of trees at risk to the pests analyzed is reported, though the list of pests is based on known insects and disease in the United States.

For the U.S., potential pest risk is based on pest range maps and the known pest host species that are likely to experience mortality. Pest range maps for 2012 from the Forest Health Technology Enterprise Team (FHTET) (Forest Health Technology Enterprise Team 2014) were used to determine the proximity of each pest to the county in which

the urban forest is located. For the county, it was established whether the insect/disease occurs within the county, is within 250 miles of the county edge, is between 250 and 750 miles away, or is greater than 750 miles away. FHTET did not have pest range maps for Dutch elm disease and chestnut blight. The range of these pests was based on known occurrence and the host range, respectively (Eastern Forest Environmental Threat Assessment Center; Worrall 2007).

Relative Tree Effects:

The relative value of tree benefits reported in Appendix II is calculated to show what carbon storage and sequestration, and air pollutant removal equate to in amounts of municipal carbon emissions, passenger automobile emissions, and house emissions.

Municipal carbon emissions are based on 2010 U.S. per capita carbon emissions (Carbon Dioxide Information Analysis Center 2010). Per capita emissions were multiplied by city population to estimate total city carbon emissions.

Light duty vehicle emission rates (g/mi) for CO, NOx, VOCs, PM10, SO2 for 2010 (Bureau of Transportation Statistics 2010; Heirigs et al 2004), PM2.5 for 2011-2015 (California Air Resources Board 2013), and CO2 for 2011 (U.S. Environmental Protection Agency 2010) were multiplied by average miles driven per vehicle in 2011 (Federal Highway Administration 2013) to determine average emissions per vehicle.

Household emissions are based on average electricity kWh usage, natural gas Btu usage, fuel oil Btu usage, kerosene Btu usage, LPG Btu usage, and wood Btu usage per household in 2009 (Energy Information Administration 2013; Energy Information Administration 2014)

- CO2, SO2, and NOx power plant emission per KWh are from Leonardo Academy 2011. CO emission per kWh assumes 1/3 of one percent of C emissions is CO based on Energy Information Administration 1994. PM10 emission per kWh from Layton 2004.
- CO2, NOx, SO2, and CO emission per Btu for natural gas, propane and butane (average used to represent LPG), Fuel #4 and #6 (average used to represent fuel oil and kerosene) from Leonardo Academy 2011.
- CO2 emissions per Btu of wood from Energy Information Administration 2014.
- CO, NOx and SOx emission per Btu based on total emissions and wood burning (tons) from (British Columbia Ministry 2005; Georgia Forestry Commission 2009).

Appendix II. Relative Tree Effects

The urban forest in City of Pleasanton provides benefits that include carbon storage and sequestration, and air pollutant removal. To estimate the relative value of these benefits, tree benefits were compared to estimates of average municipal carbon emissions, average passenger automobile emissions, and average household emissions. See Appendix I for methodology.

Carbon storage is equivalent to:

- Amount of carbon emitted in City of Pleasanton in 11 days
- Annual carbon (C) emissions from 7,730 automobiles
- Annual C emissions from 3,170 single-family houses

Carbon monoxide removal is equivalent to:

- Annual carbon monoxide emissions from 1 automobiles
- Annual carbon monoxide emissions from 4 single-family houses

Nitrogen dioxide removal is equivalent to:

- Annual nitrogen dioxide emissions from 91 automobiles
- Annual nitrogen dioxide emissions from 41 single-family houses

Sulfur dioxide removal is equivalent to:

- Annual sulfur dioxide emissions from 0 automobiles
- Annual sulfur dioxide emissions from 0 single-family houses

Annual carbon sequestration is equivalent to:

- Amount of carbon emitted in City of Pleasanton in 0.3 days
- Annual C emissions from 200 automobiles
- Annual C emissions from 100 single-family houses

Appendix III. Comparison of Urban Forests

A common question asked is, "How does this city compare to other cities?" Although comparison among cities should be made with caution as there are many attributes of a city that affect urban forest structure and functions, summary data are provided from other cities analyzed using the i-Tree Eco model.

I. City totals for trees

City	*% Tree Cover*	*Number of Trees*	*Carbon Storage (tons)*	*Carbon Sequestration (tons/yr)*	*Pollution Removal (tons/yr)*
Toronto, ON, Canada	26.6	10,220,000	1,221,000	51,500	2,099
Atlanta, GA	36.7	9,415,000	1,344,000	46,400	1,663
Los Angeles, CA	11.1	5,993,000	1,269,000	77,000	1,975
New York, NY	20.9	5,212,000	1,350,000	42,300	1,676
London, ON, Canada	24.7	4,376,000	396,000	13,700	408
Chicago, IL	17.2	3,585,000	716,000	25,200	888
Phoenix, AZ	9.0	3,166,000	315,000	32,800	563
Baltimore, MD	21.0	2,479,000	570,000	18,400	430
Philadelphia, PA	15.7	2,113,000	530,000	16,100	575
Washington, DC	28.6	1,928,000	525,000	16,200	418
Oakville, ON , Canada	29.1	1,908,000	147,000	6,600	190
Albuquerque, NM	14.3	1,846,000	332,000	10,600	248
Boston, MA	22.3	1,183,000	319,000	10,500	283
Syracuse, NY	26.9	1,088,000	183,000	5,900	109
Woodbridge, NJ	29.5	986,000	160,000	5,600	210
Minneapolis, MN	26.4	979,000	250,000	8,900	305
San Francisco, CA	11.9	668,000	194,000	5,100	141
Morgantown, WV	35.5	658,000	93,000	2,900	72
Moorestown, NJ	28.0	583,000	117,000	3,800	118
Hartford, CT	25.9	568,000	143,000	4,300	58
Jersey City, NJ	11.5	136,000	21,000	890	41
Casper, WY	8.9	123,000	37,000	1,200	37
Freehold, NJ	34.4	48,000	20,000	540	22

II. Totals per acre of land area

City	*Number of Trees/ac*	*Carbon Storage (tons/ac)*	*Carbon Sequestration (tons/ac/yr)*	*Pollution Removal (lb/ac/yr)*
Toronto, ON, Canada	64.9	7.8	0.33	26.7
Atlanta, GA	111.6	15.9	0.55	39.4
Los Angeles, CA	19.6	4.2	0.16	13.1
New York, NY	26.4	6.8	0.21	17.0
London, ON, Canada	75.1	6.8	0.24	14.0
Chicago, IL	24.2	4.8	0.17	12.0
Phoenix, AZ	12.9	1.3	0.13	4.6
Baltimore, MD	48.0	11.1	0.36	16.6
Philadelphia, PA	25.1	6.3	0.19	13.6
Washington, DC	49.0	13.3	0.41	21.2
Oakville, ON , Canada	78.1	6.0	0.27	11.0
Albuquerque, NM	21.8	3.9	0.12	5.9
Boston, MA	33.5	9.1	0.30	16.1
Syracuse, NY	67.7	10.3	0.34	13.6
Woodbridge, NJ	66.5	10.8	0.38	28.4
Minneapolis, MN	26.2	6.7	0.24	16.3
San Francisco, CA	22.5	6.6	0.17	9.5
Morgantown, WV	119.2	16.8	0.52	26.0
Moorestown, NJ	62.1	12.4	0.40	25.1
Hartford, CT	50.4	12.7	0.38	10.2
Jersey City, NJ	14.4	2.2	0.09	8.6
Casper, WY	9.1	2.8	0.09	5.5
Freehold, NJ	38.3	16.0	0.44	35.3

Appendix IV. General Recommendations for Air Quality Improvement

Urban vegetation can directly and indirectly affect local and regional air quality by altering the urban atmosphere environment. Four main ways that urban trees affect air quality are (Nowak 1995):

- Temperature reduction and other microclimate effects
- Removal of air pollutants
- Emission of volatile organic compounds (VOC) and tree maintenance emissions
- Energy effects on buildings

The cumulative and interactive effects of trees on climate, pollution removal, and VOC and power plant emissions determine the impact of trees on air pollution. Cumulative studies involving urban tree impacts on ozone have revealed that increased urban canopy cover, particularly with low VOC emitting species, leads to reduced ozone concentrations in cities (Nowak 2000). Local urban management decisions also can help improve air quality.

Urban forest management strategies to help improve air quality include (Nowak 2000):

Strategy	*Result*
Increase the number of healthy trees	Increase pollution removal
Sustain existing tree cover	Maintain pollution removal levels
Maximize use of low VOC-emitting trees	Reduces ozone and carbon monoxide formation
Sustain large, healthy trees	Large trees have greatest per-tree effects
Use long-lived trees	Reduce long-term pollutant emissions from planting and removal
Use low maintenance trees	Reduce pollutants emissions from maintenance activities
Reduce fossil fuel use in maintaining vegetation	Reduce pollutant emissions
Plant trees in energy conserving locations	Reduce pollutant emissions from power plants
Plant trees to shade parked cars	Reduce vehicular VOC emissions
Supply ample water to vegetation	Enhance pollution removal and temperature reduction
Plant trees in polluted or heavily populated areas	Maximizes tree air quality benefits
Avoid pollutant-sensitive species	Improve tree health
Utilize evergreen trees for particulate matter	Year-round removal of particles

Appendix V. Invasive Species of the Urban Forest

The following inventoried tree species were listed as invasive on the California invasive species list (California Invasive Species Advisory Committee 2010):

Species Name[a]	*Number of Trees*	*% of Trees*	*Leaf Area (ac)*	*Percent Leaf Area*
Chinese tallowtree	72	0.3	2.7	0.2
California peppertree	66	0.3	2.0	0.2
Blue gum eucalyptus	40	0.2	23.6	1.9
Tree of heaven	6	0.0	0.2	0.0
Punk tree	2	0.0	0.0	0.0
Russian olive	1	0.0	0.0	0.0
Brazilian peppertree	1	0.0	0.0	0.0
Total	**188**	**0.81**	**28.60**	**2.33**

[a]Species are determined to be invasive if they are listed on the state's invasive species list

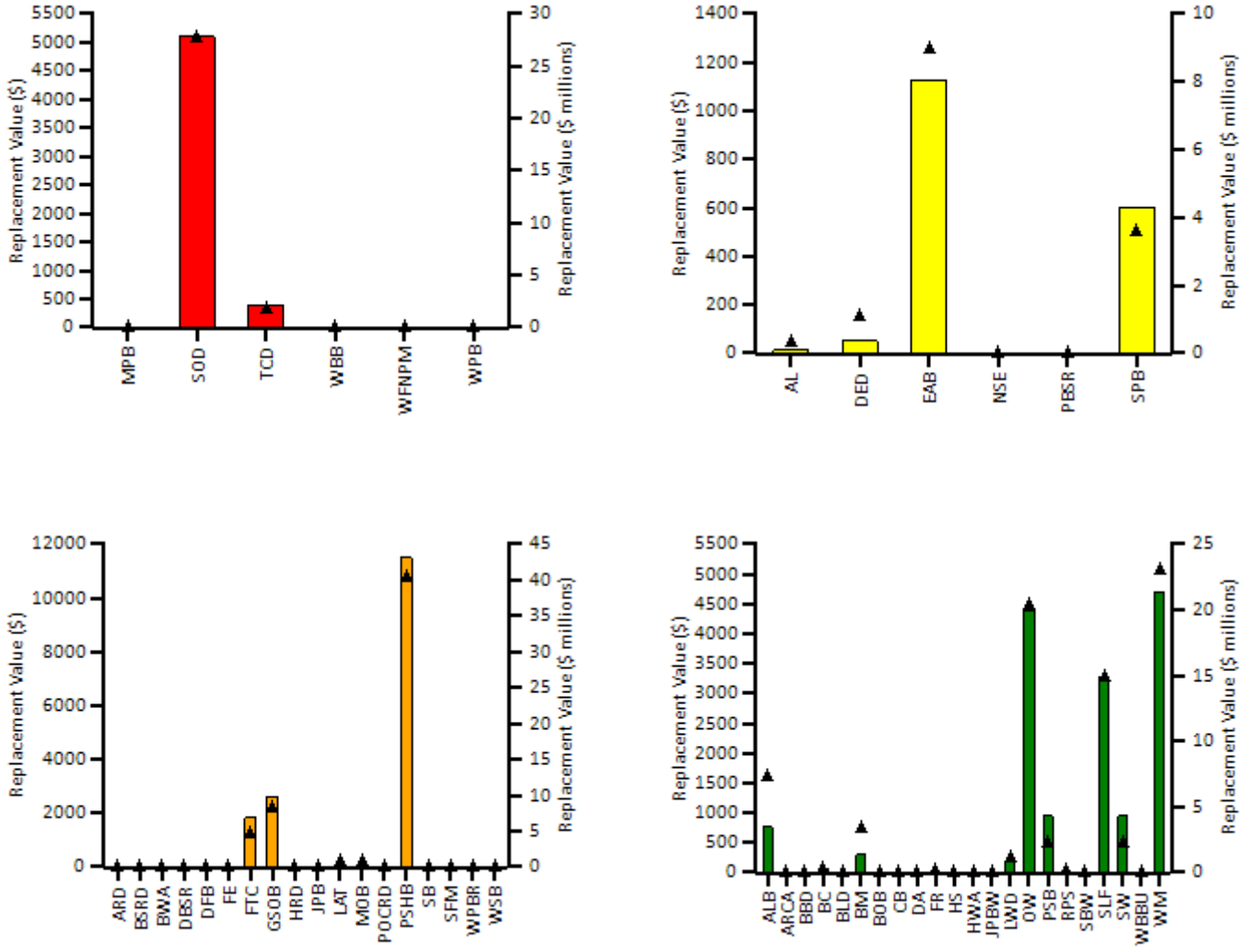
Appendix VI. Potential Risk of Pests

Fifty-three insects and diseases were analyzed to quantify their potential impact on the urban forest. As each insect/ disease is likely to attack different host tree species, the implications for {0} will vary. The number of trees at risk reflects only the known host species that are likely to experience mortality.

Code	Scientific Name	Common Name	Trees at Risk (#)	Value ($ millions)
AL	Phyllocnistis populiella	Aspen Leafminer	45	0.09
ALB	Anoplophora glabripennis	Asian Longhorned Beetle	1,596	3.45
ARCA	Neodothiora populina	Aspen Running Canker	0	0.00
ARD	Armillaria spp.	Armillaria Root Disease	1	0.00
BBD	Neonectria faginata	Beech Bark Disease	4	0.00
BC	Sirococcus clavigignenti juglandacearum	Butternut Canker	63	0.34
BLD	Litylenchus crenatae mccannii	Beech Leaf Disease	2	0.00
BM	Euproctis chrysorrhoea	Browntail Moth	750	1.38
BOB	Tubakia iowensis	Bur Oak Blight	0	0.00
BSRD	Leptographium wageneri	Black Stain Root Disease	0	0.00
BWA	Adelges piceae	Balsam Woolly Adelgid	1	0.00
CB	Cryphonectria parasitica	Chestnut Blight	0	0.00
DA	Discula destructiva	Dogwood Anthracnose	1	0.00
DBSR	Leptographium wageneri var. pseudotsugae	Douglas-fir Black Stain Root Disease	0	0.00
DED	Ophiostoma novo-ulmi	Dutch Elm Disease	153	0.37
DFB	Dendroctonus pseudotsugae	Douglas-Fir Beetle	0	0.00
EAB	Agrilus planipennis	Emerald Ash Borer	1,256	8.07
FE	Scolytus ventralis	Fir Engraver	0	0.00
FR	Cronartium quercuum f. sp. Fusiforme	Fusiform Rust	18	0.00
FTC	Malacosoma disstria	Forest Tent Caterpillar	1,228	6.82
GSOB	Agrilus auroguttatus	Goldspotted Oak Borer	2,201	9.80
HRD	Heterobasidion irregulare/ occidentale	Heterobasidion Root Disease	2	0.00
HS	Neodiprion tsugae	Hemlock Sawfly	0	0.00
HWA	Adelges tsugae	Hemlock Woolly Adelgid	0	0.00
JPB	Dendroctonus jeffreyi	Jeffrey Pine Beetle	0	0.00
JPBW	Choristoneura pinus	Jack Pine Budworm	1	0.00
LAT	Choristoneura conflictana	Large Aspen Tortrix	196	0.38
LWD	Raffaelea lauricola	Laurel Wilt	252	0.85
MOB	Xyleborus monographus	Mediterranean Oak Borer	177	0.26
MPB	Dendroctonus ponderosae	Mountain Pine Beetle	1	0.00
NSE	Ips perturbatus	Northern Spruce Engraver	0	0.00
OW	Ceratocystis fagacearum	Oak Wilt	4,484	19.98
PBSR	Leptographium wageneri var. ponderosum	Pine Black Stain Root Disease	0	0.00
POCRD	Phytophthora lateralis	Port-Orford-Cedar Root Disease	0	0.00
PSB	Tomicus piniperda	Pine Shoot Beetle	502	4.30

Code	Scientific Name	Common Name	Trees at Risk (#)	Value ($ millions)
PSHB	Euwallacea nov. sp.	Polyphagous Shot Hole Borer	10,776	43.07
RPS	Matsucoccus resinosae	Red Pine Scale	28	0.07
SB	Dendroctonus rufipennis	Spruce Beetle	4	0.02
SBW	Choristoneura fumiferana	Spruce Budworm	4	0.02
SFM	subalpine fir mortality summary	Subalpine Fir Mortality	0	0.00
SLF	Lycorma delicatula	Spotted Lanternfly	3,287	14.85
SOD	Phytophthora ramorum	Sudden Oak Death	5,079	27.83
SPB	Dendroctonus frontalis	Southern Pine Beetle	505	4.32
SW	Sirex noctilio	Sirex Wood Wasp	502	4.30
TCD	Geosmithia morbida	Thousand Canker Disease	338	2.19
WBB	Dryocoetes confusus	Western Bark Beetle	0	0.00
WBBU	Acleris gloverana	Western Blackheaded Budworm	0	0.00
WFNPM	western five-needle pine mortality summary	Western Five-Needle Pine Mortality	0	0.00
WM	Operophtera brumata	Winter Moth	5,074	21.35
WPB	Dendroctonus brevicomis	Western Pine Beetle	0	0.00
WPBR	Cronartium ribicola	White Pine Blister Rust	1	0.00
WSB	Choristoneura occidentalis	Western Spruce Budworm	4	0.02

In the following graph, the pests are color coded according to the county's proximity to the pest occurrence in the United States. Red indicates that the pest is within the county; orange indicates that the pest is within 250 miles of the county; yellow indicates that the pest is within 750 miles of the county; and green indicates that the pest is outside of these ranges.



Note: points - Number of trees, bars - Replacement value

Based on the host tree species for each pest and the current range of the pest (Forest Health Technology Enterprise Team 2014), it is possible to determine what the risk is that each tree species in the urban forest could be attacked by an insect or disease.

Spp. Risk	Risk Weight	Species Name	AL	ALB	ARCA	ARD	BBD	BC	BLD	BM	BOB	BSRD	BWA	CB	DA	DBSR	DED	DFB	EAB	FE	FR	FTC	GSOB	HRD	HS	HWA	JPB	JPBW	LAT	LWD	MOB	MPB	NSE	OW	PBSR
	21	Norway spruce																																	
	12	Coastal live oak																																	
	12	Eastern white pine																																	
	11	European beech																																	
	11	Willow spp																																	
	10	Northern red oak																																	
	10	Plum spp																																	
	10	Oak spp																																	
	9	Bigleaf maple																																	
	9	California black oak																																	
	9	Pin oak																																	
	9	Red willow																																	
	9	Blue spruce																																	
	8	Camphor tree																																	
	8	Holly oak																																	
	8	Elm spp																																	
	8	California buckeye																																	
	8	Black walnut																																	
	8	California laurel																																	
	8	European white birch																																	
	7	American elm																																	
	7	Birch spp																																	
	7	Black willow																																	
	7	Scouler willow																																	
	6	Ash spp																																	
	6	River birch																																	
	6	Boxelder																																	
	6	White alder																																	
	6	Corkscrew willow																																	
	6	Cottonwood spp																																	
	5	California white oak																																	
	5	Shamel ash																																	
	5	Interior live oak																																	
	5	Maple spp																																	
	5	Scarlet oak																																	
	5	Live oak																																	
	5	Japanese black pine																																	
	5	Freeman maple																																	
	5	Persian silk tree																																	
	5	Trident maple																																	
	5	Japanese maple																																	

Spp. Risk	Risk Weight	Species Name	AL	ALB	ARCA	ARD	BBD	BC	BLD	BM	BOB	BSRD	BWA	CB	DA	DBSR	DED	DFB	EAB	FE	FR	FTC	GSOB	HRD	HS	HWA	JPB	JPBW	LAT	LWD	MOB	MPB	NSE	OW	PBSR
	5	American basswood																																	
	5	Horse chestnut																																	
	5	Shumard oak																																	
	5	Sweet cherry																																	
	5	Peach																																	
	5	Gray birch																																	
	5	White oak																																	
	4	Coast redwood																																	
	4	Tulip tree																																	
	4	Hind walnut																																	
	4	White mulberry																																	
	4	Turkish pine																																	
	4	Canary island pine																																	
	4	Japanese zelkova																																	
	4	Chinese elm																																	
	4	Italian stone pine																																	
	4	Persian ironwood																																	
	4	Fremont cottonwood																																	
	4	Pagoda tree																																	
	4	Aleppo pine																																	
	4	Cork oak																																	
	4	Monterey pine																																	
	4	Bay laurel																																	
	4	Gray pine																																	
	4	Japanese flowering cherry																																	
	4	Siberian elm																																	
	4	Vinegartree																																	
	4	American sycamore																																	
	4	Pacific madrone																																	
	4	Acacia spp																																	
	4	Fraser photinia																																	
	4	English oak																																	
	4	Tree of heaven																																	
	4	Green ash																																	
	4	Toyon																																	
	4	Common fig																																	
	4	Lacebark pine																																	
	4	Basswood spp																																	
	4	Chinese juniper																																	
	4	Chinaberry																																	
	4	Torrey pine																																	
	3	Chinese pistache																																	
	3	Sweetgum																																	
	3	Callery pear																																	

Spp. Risk	Risk Weight	Species Name	AL	ALB	ARCA	ARD	BBD	BC	BLD	BM	BOB	BSRD	BWA	CB	DA	DBSR	DED	DFB	EAB	FE	FR	FTC	GSOB	HRD	HS	HWA	JPB	JPBW	LAT	LWD	MOB	MPB	NSE	OW	PBSR
	3	Red maple																																	
	3	California sycamore																																	
	3	Pear spp																																	
	3	Southern magnolia																																	
	3	Silver maple																																	
	3	Blackwood																																	
	3	Olive spp																																	
	3	Honeylocust																																	
	3	River she-oak																																	
	3	Apple spp																																	
	3	Chinese tallowtree																																	
	3	White ash																																	
	3	California peppertree																																	
	3	Strawberry tree																																	
	3	Mexican fan palm																																	
	3	Norway maple																																	
	3	Goldenrain tree																																	
	3	Atlas cedar																																	
	3	English walnut																																	
	3	Olive																																	
	3	Baldcypress																																	
	3	Red gum eucalyptus																																	
	3	Italian alder																																	
	3	Babylon weeping willow																																	
	3	European hornbeam																																	
	3	Pride of bolivia																																	
	3	Silver dollar eucalyptus																																	
	3	Chinese flame tree																																	
	3	Saucer magnolia																																	
	3	Northern catalpa																																	
	3	Sliver dollar eucalyptus																																	
	3	Cercidium spp																																	
	3	Sweetgum spp																																	
	3	Carolina laurelcherry																																	
	3	Citrus spp																																	
	3	Blue jacaranda																																	
	3	Carob																																	
	3	Pecan																																	
	3	Chinese fringe tree																																	
	3	Incense cedar																																	
	3	Dawn redwood																																	
	3	Brazilian peppertree																																	

Spp. Risk	Risk Weight	Species Name	AL	ALB	ARCA	ARD	BBD	BC	BLD	BM	BOB	BSRD	BWA	CB	DA	DBSR	DED	DFB	EAB	FE	FR	FTC	GSOB	HRD	HS	HWA	JPB	JPBW	LAT	LWD	MOB	MPB	NSE	OW	PBSR
	2	Blue oak																																	
	2	Swamp white oak																																	
	2	White poplar																																	
	2	Narrow-leafed ash																																	
	2	Autumn applause ash																																	
	2	Moraine ash																																	
	2	Eastern cottonwood																																	
	1	Glossy privet																																	
	1	Black tupelo																																	
	1	Buckeye spp																																	
	1	Black locust																																	
	1	Tatar maple																																	
	1	Red horsechestnut																																	
	1	Hedge maple																																	
	1	Common plum																																	
	1	Amur maple																																	
	1	Apricot																																	
	1	Ohio buckeye																																	
	1	American hornbeam																																	
	1	Northern hackberry																																	
	1	Walnut spp																																	
	1	Pomegranate																																	
	1	Beech spp																																	
	1	Sour Cherry																																	
	1	Purple blow maple																																	
	1	Flowering dogwood																																	
	1	Rose-of-sharon																																	
	1	European mountain ash																																	
	1	Oriental arborvitae																																	

Spp. Risk	Risk Weight	Species Name	POCRD	PSB	PSHB	RPS	SB	SBW	SFM	SLF	SOD	SPB	SW	TCD	WBB	WBBU	WFNPM	WM	WPB	WPBR	WSB
	21	Norway spruce																			
	12	Coastal live oak																			
	12	Eastern white pine																			
	11	European beech																			
	11	Willow spp																			
	10	Northern red oak																			
	10	Plum spp																			
	10	Oak spp																			
	9	Bigleaf maple																			
	9	California black oak																			
	9	Pin oak																			
	9	Red willow																			
	9	Blue spruce																			

Spp. Risk	Risk Weight	Species Name	POCRD	PSB	PSHB	RPS	SB	SBW	SFM	SLF	SOD	SPB	SW	TCD	WBB	WBBU	WFNPM	WM	WPB	WPBR	WSB
	8	Camphor tree																			
	8	Holly oak																			
	8	Elm spp																			
	8	California buckeye																			
	8	Black walnut																			
	8	California laurel																			
	8	European white birch																			
	7	American elm																			
	7	Birch spp																			
	7	Black willow																			
	7	Scouler willow																			
	6	Ash spp																			
	6	River birch																			
	6	Boxelder																			
	6	White alder																			
	6	Corkscrew willow																			
	6	Cottonwood spp																			
	5	California white oak																			
	5	Shamel ash																			
	5	Interior live oak																			
	5	Maple spp																			
	5	Scarlet oak																			
	5	Live oak																			
	5	Japanese black pine																			
	5	Freeman maple																			
	5	Persian silk tree																			
	5	Trident maple																			
	5	Japanese maple																			
	5	American basswood																			
	5	Horse chestnut																			
	5	Shumard oak																			
	5	Sweet cherry																			
	5	Peach																			
	5	Gray birch																			
	5	White oak																			
	4	Coast redwood																			
	4	Tulip tree																			
	4	Hind walnut																			
	4	White mulberry																			
	4	Turkish pine																			
	4	Canary island pine																			
	4	Japanese zelkova																			
	4	Chinese elm																			
	4	Italian stone pine																			
	4	Persian ironwood																			

Spp. Risk	Risk Weight	Species Name	POCRD	PSB	PSHB	RPS	SB	SBW	SFM	SLF	SOD	SPB	SW	TCD	WBB	WBBU	WFNPM	WM	WPB	WPBR	WSB
	4	Fremont cottonwood																			
	4	Pagoda tree																			
	4	Aleppo pine																			
	4	Cork oak																			
	4	Monterey pine																			
	4	Bay laurel																			
	4	Gray pine																			
	4	Japanese flowering cherry																			
	4	Siberian elm																			
	4	Vinegartree																			
	4	American sycamore																			
	4	Pacific madrone																			
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	4	Green ash																			
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	4	Common fig																			
	4	Lacebark pine																			
	4	Basswood spp																			
	4	Chinese juniper																			
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	3	Sweetgum																			
	3	Callery pear																			
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	3	Blackwood																			
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	3	Apple spp																			
	3	Chinese tallowtree																			
	3	White ash																			
	3	California peppertree																			
	3	Strawberry tree																			
	3	Mexican fan palm																			
	3	Norway maple																			
	3	Goldenrain tree																			

Spp. Risk	Risk Weight	Species Name	POCRD	PSB	PSHB	RPS	SB	SBW	SFM	SLF	SOD	SPB	SW	TCD	WBB	WBBU	WFNPM	WM	WPB	WPBR	WSB
	3	Atlas cedar																			
	3	English walnut																			
	3	Olive																			
	3	Baldcypress																			
	3	Red gum eucalyptus																			
	3	Italian alder																			
	3	Babylon weeping willow																			
	3	European hornbeam																			
	3	Pride of bolivia																			
	3	Silver dollar eucalyptus																			
	3	Chinese flame tree																			
	3	Saucer magnolia																			
	3	Northern catalpa																			
	3	Sliver dollar eucalyptus																			
	3	Cercidium spp																			
	3	Sweetgum spp																			
	3	Carolina laurelcherry																			
	3	Citrus spp																			
	3	Blue jacaranda																			
	3	Carob																			
	3	Pecan																			
	3	Chinese fringe tree																			
	3	Incense cedar																			
	3	Dawn redwood																			
	3	Brazilian peppertree																			
	2	Blue oak																			
	2	Swamp white oak																			
	2	White poplar																			
	2	Narrow-leafed ash																			
	2	Autumn applause ash																			
	2	Moraine ash																			
	2	Eastern cottonwood																			
	1	Glossy privet																			
	1	Black tupelo																			
	1	Buckeye spp																			
	1	Black locust																			
	1	Tatar maple																			
	1	Red horsechestnut																			
	1	Hedge maple																			
	1	Common plum																			
	1	Amur maple																			
	1	Apricot																			

Spp. Risk	Risk Weight	Species Name	POCRD	PSB	PSHB	RPS	SB	SBW	SFM	SLF	SOD	SPB	SW	TCD	WBB	WBBU	WFNPM	WM	WPB	WPBR	WSB
	1	Ohio buckeye																			
	1	American hornbeam																			
	1	Northern hackberry																			
	1	Walnut spp																			
	1	Pomegranate																			
	1	Beech spp																			
	1	Sour Cherry																			
	1	Purple blow maple																			
	1	Flowering dogwood																			
	1	Rose-of-sharon																			
	1	European mountain ash																			
	1	Oriental arborvitae																			

Note:
Species that are not listed in the matrix are not known to be hosts to any of the pests analyzed.

Species Risk:

- Red indicates that tree species is at risk to at least one pest within county
- Orange indicates that tree species has no risk to pests in county, but has a risk to at least one pest within 250 miles from the county
- Yellow indicates that tree species has no risk to pests within 250 miles of county, but has a risk to at least one pest that is 250 and 750 miles from the county
- Green indicates that tree species has no risk to pests within 750 miles of county, but has a risk to at least one pest that is greater than 750 miles from the county

Risk Weight:
Numerical scoring system based on sum of points assigned to pest risks for species. Each pest that could attack tree species is scored as 4 points if red, 3 points if orange, 2 points if yellow and 1 point if green.

Pest Color Codes:

- Red indicates pest is within Alameda county
- Red indicates pest is within 250 miles county
- Yellow indicates pest is within 750 miles of Alameda county
- Green indicates pest is outside of these ranges

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Appendix E

Funding Sources

Funding Sources

The City of Pleasanton needs additional funding sources to meet their urban forestry goals. Currently, the allocated urban forestry fund ranges annually from $20,000 to $40,000 and is supplemented by the General Fund to cover the remaining majority (97%) of annual urban forest costs. Funding strategies may include incurring fees throughout urban forestry operations, partnering with local non-profit organizations and educational institutions, or neighboring entities such as Alameda County to address shared issues.

Fees, Assessments, and Taxes

Voter approved fees, assessment, or tax measures can be one method to generate the additional revenue needed for the care of the urban forest. The level of funding required varies with the selected strategy. Details regarding potential methods are found in **Table E-1.**

Urban Forest Program and Tree Removal Permit Fees

The City does not currently charge for tree removal permits. Associating a low cost with this permit review process can incur funding for the program. This strategy may also reduce the request for permit review, and protect more trees, as community members at times reconsider engaging in a permitting process when a fee is associated.

When a tree is removed and there is no viable vacant site on the property of the removal, an in-lieu fee structure can be created. Private property owners that are unable to plant a mitigation tree can instead, contribute to an in-lieu bank. Once funds are in the in-lieu bank, fees should be allocated towards the urban forestry program. This funding can be used to plant new trees in the 'right tree, right place', on public land, decreasing costs for the City while providing a pathway for residents to contribute to the urban forestry program when their property does not allow for a mitigation tree.

Municipal and Utility Partnerships

Cities are often siloed in their operational practices. However, some cities take the initiative to identify departments addressing similar issues and explore if a partnership can be developed to most effectively use public resources. Collaborating with streets departments to cost share on repairing tree and infrastructure conflicts is one method. Other examples include hosting water wise events in partnership with water providers to educate the community on how to properly water trees and conserve water. Historically in California, utility providers have engaged in urban forestry by hosting tree giveaways of waterwise or native trees or providing rebates for native tree planting on private property. Energy providers often include in their engagement material, how the 'right tree, in the right place' can save residents on energy and heating costs throughout the year and have partnered with non-profit organizations and municipalities to enhance private tree planting for energy costs. Energy providers who remove or top City trees to avoid a utility infrastructure conflict have been known to mitigate tree removal or topping by providing the City with a mitigation tree to plant on public land. If an agreement is reached, including a requirement that mitigation trees need to consider the potential mature stature of the removed tree, and therefore lost canopy cover. This exchange aims to mitigate this loss with a like- or larger-stature mitigation tree. Identifying entities that impact urban forestry in Pleasanton and approaching partnership discussions with the intent to reach creative solutions can be a method to increase resources for the urban forestry program and community members as a low-cost strategy for the City.

Grant Partnerships

Public funding sources often target disadvantaged communities based on state or federal assessment tools. Although the City of Pleasanton is not considered a disadvantaged community and has a low level of unemployment and workforce needs, there are select opportunities where the City may be competitive with additional partnership.

Exploring partnerships with regional entities and other community-based organizations for grant projects where urban forestry efforts are an eligible expense is one of the strategies to increase competitiveness. State and Federal entities such as the US Forest Service, Environmental Protection Agency, California Natural Resources Agency, and CalFire may fund urban forestry efforts as part of their projects. Topics for funding typically include, stormwater management, green infrastructure, urban greening, green schools, environmental education, urban and community forestry, wood innovation, workforce development, and youth engagement, among others. Partnering with educational institutions and non-profit organizations on grant proposals that service regional areas, including disadvantaged communities may be another strategy. The City of Pleasanton may provide value to the partnering target entities by providing in-kind support for a grant proposal or administration, engaging the youth program for volunteers to engage with community members, or by providing match funds for the project. **Table E-2** details various grant programs which align with urban forestry efforts.

Engaging regional landowners with needs that more clearly align with grant guidelines has the potential for a more competitive proposal as it promotes collaboration among various entities and helps address regional issues of land management. The City of Pleasanton received recent funding for wildfire fuel reduction programming. According to the updated CalFire High Fire Severity Zone map, the City of Pleasanton includes select areas where the wildfire risk is high or moderate, which were changed from a State Responsibility Area to a Local Responsibility Area in 2024. The area with a 'high' rating would be an eligible project area, and the City abuts larger wildland areas with both 'high' and 'moderate' ratings managed by Alameda County. Exploring partnerships for public funding through the wildfire perspective is an opportunity for the City's urban forest.

Fire protection planning includes tree management recommendations within wildland urban interface/intermix (WUI) areas with a goal to retain trees and reduce wildfire risk. Discussing trees in WUI areas as a part of urban forest management, allows for education of why trees outside of the WUI should be planted, maintained, and retained to maximize canopy cover. Community Wildfire Protection Plans, a current funding category, often includes a large community education component. Partnering for wildfire risk reduction grant funding is an opportunity to support UFMP goals to increase canopy cover in appropriate areas while decreasing wildfire risk in WUI areas.

Community Resources

National community-based organizations such as American Forests, the Arbor Day Foundation, the National Wildlife Federation, and regional groups such as the California Urban Forests Council, at times, invest in programs to assist in urban forestry efforts regardless of disadvantaged community status. These organizations have hosted programs that give residents free trees to plant on their private property. Increasing canopy cover on private property is a continued challenge for many public entities, and public funding sources do not fund private property enhancements. These partnerships help to fill that gap and provide free urban forestry resources, education, and trees for private property.

Volunteer tree planting events are a popular activity among communities. Groups like Kiwanis, Rotary Clubs, beautification groups, and school groups have historically supported volunteer efforts including tree planting and providing urban forestry education and canvassing, and may be interested in collaboration as the City explores the community's appetite for urban forestry advocacy.

When trees and infrastructure conflict, a public tree or a private tree may be causing damage to potentially both public and private infrastructure. Although cities continuously address and mitigate these issues, the time from the initial inquiry to repair may be lengthy and cumbersome. Some residents may be interested in prioritizing the repair of the infrastructure in front of their home, with a desire to provide funding for prioritization. In these cases, some cities have obliged to this request and share the repair cost with residents to satisfy the resident. Although this will increase administrative burden on staff, cost-sharing may be an appealing method for the City, as the cost is supplemented by the resident, and resident satisfaction increases.

Table E-1. Federal or State Grant Funding

Funding Program	Agency	Description
Urban and Community Forestry Grants	CAL FIRE	Multiple grant programs supported by the Urban and Community Forestry Program have funded tree planting, tree inventories, urban wood and biomass utilization, blighted urban lands improvements, urban forest planning, and green schoolyards to advance the goals and objectives of supporting healthy urban forests and reducing greenhouse gas emissions. https://www.fire.ca.gov/what-we-do/grants/urban-and-community-forestry-grants
Green Schoolyards Grant	CAL FIRE	One of the grants under the CAL FIRE Urban and Community Forestry Grant program that is specifically targeted towards improving tree canopy on school facilities. A FAQ sheet about the program can be found here: Green Schoolyards Grant Webinar - Q&A Combined.xlsx
Active Transportation	California Department of Transportation	This program provides funding to encourage increased use of active modes of transportation, such as biking and walking. Trees and other vegetation are significant components of several eligible projects under the Active Transportation Program, including parks, trails, and safe routes to schools. Applicants include public agencies, transit agencies, school districts, tribal governments, and nonprofit organizations. * Disadvantaged Communities are guaranteed a minimum of 25% of the entire program's funding.
Storm Water	California State Water Resources Control Board	The State Water Resources Control Board is funding surface and groundwater storage, ecosystem and watershed protection and restoration, and drinking water protection through the Storm Water Grant Program. The program prioritizes multiple benefit projects, including projects that increase tree canopy. Approximately $200 million in grant funding have been awarded.
Community Wildfire Defense Grants	US Forest Service	The Bipartisan Infrastructure Law authorizes the $1 billion, five-year CWDG Program funding. This program funds the development or revision of Community Wildfire Protection Plans and to implement projects described in a Community Wildfire Protection Plan that are less than ten years old. The program prioritizes at-risk communities: - In an area identified as having high or very high wildfire hazard potential, - Are low income,

		- Have been impacted by a severe disaster that affects the risk of wildfire.
Wood Innovations, Community Wood, and Wood Products Infrastructure Assistance	US Forest Service	Grant funding will support proposals that increase demand and create new and innovative uses for sustainably sourced wood. Funded proposals include converting heating systems in schools to sustainable biomass boilers, installing cutting-edge equipment in sawmills and processing facilities to increase efficiency, supporting innovative housing using mass timber, and more.
Urban Wood Reuse	CAL FIRE	CAL FIRE has a grant assistance program that awards funding for Cities and non-profit organizations to develop an urban wood reuse program. In Northern California, the Sacramento Tree Foundation (SacTree) received CAL FIRE funding to begin the 'Urban Wood Rescue' program (https://www.urbanwoodrescue.com). Through this program, SacTree can run a mill that provides lumber and other wood products to local makers and artisans, generating funding to support its operations and contributing to local markets.
Environmental Enhancement and Mitigation	California Natural Resources Agency	This program was created by California Streets and Highways Code Section 164.56 (Article XIX, Section 1, of the State Constitution), which authorizes the legislature to allocate up to $7 million each fiscal year from the Highway Users Tax Account (Motor Vehicle Revenues, Section 2100) for environmental enhancement and mitigation projects that are directly or indirectly related to the environmental impact of modifying existing transportation facilities or for the design, construction, or expansion of new transportation facilities. The applicant entity is not required to be a transportation- or highway-related organization and partnerships are encouraged. Urban forestry projects designed to offset vehicular emissions of carbon dioxide are eligible.

Table E-2. Fees, Assessments, Taxes

Mechanism	Description
Parcel Tax*	A parcel tax is a special tax levied for the provision of special benefits. Revenues from special taxes must be used for the specific purpose for which they are intended, so a parcel tax would create a dedicated funding stream for street trees. Similar to a special assessment, a parcel tax cannot be based on the value of property; however, the amount levied on each parcel need not be directly related to the benefits provided (ILG 2008). Cities have the flexibility to levy parcel taxes as they see fit, but they are typically based on lot square footage or levied as a flat tax, with the same amount per parcel (CTD 2012a). Parcel taxes are designed to encompass entire cities and therefore, are good candidates for a citywide street tree program, as opposed to the district-level approach that often occurs under special assessments.
Landscape and Lighting Assessment Districts*	LLADs are a form of special assessment that finance improvements to landscaping, lighting and open space, along with open space acquisition. The Landscape and Lighting Act of 1972 authorizes municipal agencies in California to initiate and administer LLADs. The creation of a LLAD, as with any special assessment, requires the preparation of an Engineer's Report that demonstrates the nexus between fees assessed and benefits provided, followed by majority (50 percent plus one) approval via a special ballot, pursuant to Proposition 218. LLADs

	are widely used throughout California to fund a range of public realm improvements and services related to street trees, streetscape improvements, street and traffic lights, and recreational facilities, among others. As with parcel taxes, LLADs typically fund more than just street tree planting, establishment care, and maintenance. While a LLAD could be designed for street trees alone, the process may attract other agencies in need of additional revenue and interested in expanding the scope to services, such as park and recreation maintenance. One caution would be to avoid setting the assessment so high as to generate voter backlash. Local municipalities have often convened focus groups to determine the appropriate assessment level.
General Obligation Bonds*	Local governments commonly use General Obligation (GO) bonds to fund construction and improvement of projects involving real property (e.g., buildings, infrastructure, and parks). GO bonds typically carry low interest rates, making them attractive for capital projects, which may include tree planting. However, funding is available for discrete projects, often over a limited time rather than an extended period. In addition, ongoing maintenance is ineligible for GO bond funding pursuant to federal tax law. California cities pay debt service from GO bonds through ad valorem property taxes, where assessments are based on property value. As a result, the issuance of GO bonds requires two-thirds voter approval (State Treasurer 2008).
Maintenance Assessment Districts*	The Landscape and Lighting Act of 1972 authorizes Maintenance Assessment Districts (MADs), which are closely related to LLADs. The key difference is that charter cities, can create MADs for the provision of services not specifically authorized under state law, thereby broadening their use (Griffin, pers. comm., 2012). MADs may be used to finance street tree care, but as with a LLAD, a MAD intended for street trees alone could also attract the attention of other agencies interested in funding the provision of additional non-related services.
Community Benefit Districts*	Community Benefit Districts (CBDs) are used to finance neighborhood revitalization, commonly in commercial areas. Special benefits typically include public safety, economic development, beautification, and streetscape improvements. Formation of a CBD requires property owners to petition the appropriate local agency and demonstrate an interest in paying for additional services. A non-profit Board of Directors typically comprised of property owners, businesses, and government representatives administers a CBD. While CBDs may include street tree planting and maintenance, this is rarely the focus.
Annexation of Existing Neighborhoods to Community Facilities Districts	Currently State law requires a 2/3 majority support on the ballots returned to form a new maintenance district or to annex property into an existing maintenance district under Mello-Roos law. This approach creates a new special tax to be levied, with revenue collected being limited to the specific neighborhood and for the specific services noted at time of formation or annexation. Funds would be protected specifically for the street trees or park trees within the boundary of the CFD annexation.
Enhanced Infrastructure Financing Districts (EIFD)	A certain geographic boundary of the City would be established as an EIFD, where a portion of the tax increment could be designated for urban forest maintenance along with other services benefitting the district. Recognizing the argument that healthy, well maintained urban forests of streetscapes, parks and greenways increase property values, allocating a portion of tax increment could be one consideration as a funding strategy.

Appendix F

Land Cover Classification and Canopy Cover Analysis Methodology

Land Cover Classification Methodology

The 2022 land cover classification was created using 2022 aerial imagery and lidar provided by the City. Dudek produced the land cover product by creating a composite image using red, green, and blue from the satellite imagery, normalized difference vegetation index (NDVI) (a measure of photosynthesis derived from infrared bands in the satellite imagery), and height data derived from the lidar. The composite image was then segmented, and representative training samples were selected from the segments for each land classification. The composite image and training samples were loaded into a deep learning model, using the Unet classifier architecture. The land classification was manually edited in problem areas. A stratified random sample of over 50 locations was used for each land classification to generate a confusion matrix to calculate overall accuracy measures.

Canopy Change Analysis Methodology

The canopy change analysis utilized urban tree canopy cover products from two different years. The 2012 canopy cover product was purchased from EarthDefine. The 2018 canopy cover product was freely downloaded from the U.S. Forest Service (USFS). According to the methodology, the 2018 product was created by EarthDefine using 2018 National Agriculture Imagery Program (NAIP) aerial imagery and lidar data collected by the U.S. Geological Survey. The NAIP imagery was acquired during the growing season and included four spectral bands (red, green, blue, and near infrared) at a 60-cm spatial resolution.

The 2018 canopy cover product did not cover the entire city boundary. Approximately 12% of the city boundary, primarily non-urban and forested areas in the west and some areas in the east, were excluded from this analysis. The urban boundary defined in the 2018 product was used as the analysis boundary because it is expected to be freely available every four years. This provides a consistent boundary for future analyses, should the City choose to monitor canopy cover progress using this data source.

Appendix G

City Staff Interviews

City Staff Interviews

Between August and October 2023, Dudek conducted interviews with staff from the Public Works and Planning Departments to understand the effectiveness of the urban forest management program. An interview was also conducted with the Hacienda General Manager to gain a better understanding of Pleasanton's biggest business park's management of urban trees. Nine city staff were invited to attend group interviews, which were conducted virtually via Zoom. The list of departments invited to the interviews is included below.

- Public Works Department
  - Inspection
- Engineering
- Utilities
- Parks
- Landscape Architecture
- Community Development Department
- Planning
- Traffic Engineering
- City Attorney's office

Some of the questions explored included the following:

- What are the various tree and urban forest-related functions of your role?
- How does your Department/Office/business interface with other Departments that manage trees?
- What are the most common issues with trees that you deal with or see in your Department?
- What are the greatest challenges/opportunities facing the City's urban forest?
- How do you envision the City's urban forest in 25 years?

The interviews explored the role each stakeholder had in influencing City tree management, clarified internal City procedures, and informed areas where the City could improve management of the urban forest. Major themes shared during the interviews are presented below in **Table 5-7.**

Summary of Staff Interview Comments

Theme	Staff Comments
Infrastructure Conflicts	▪ Most common problem: tree roots lifting sewer line, curb and/or gutter ▪ How they're identified: Ground monitoring by Public Works Engineering Technician- street walking assessments. Physically walk capital improvement project sites to mark tree/ sidewalk issues before project construction commences. ▪ 30% of City's liability claims are related to trees. ▪ ADA compliant sidewalk maintenance is common.
Ownership and Responsibilities	▪ Some uncertainty on who oversees and maintains creek, stream, pond, and other waterway trees. ▪ Also need to determine if greenbelts and meter boxes are public or

Summary of Staff Interview Comments

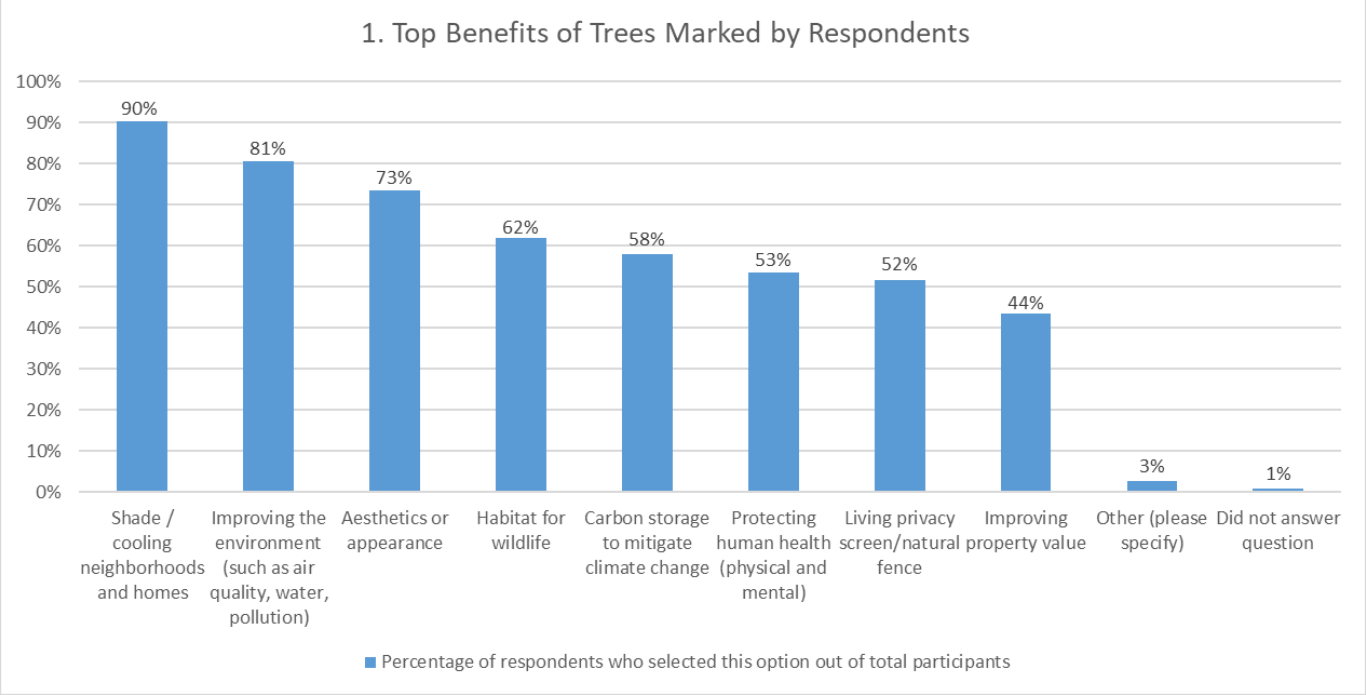
Theme	Staff Comments
	private? ▪ Waterway trees are not inventoried.
Tree Maintenance, Irrigation, and Planting	▪ Need more flexibility to current standards to allow for balance between what is best for tree and best for product/project/or service. ▪ Plant trees with larger clearance between curb and sidewalk to allow for growth and prevent potential future damage. ▪ Install larger root barriers if not sufficient room for a tree. ▪ Need more staff expertise on pruning. ▪ Recycled water used on commercial irrigation properties, doesn't do well with Redwoods. ▪ 23,000 service connections, water provided to all young trees.
Biggest Challenges	▪ Public perception of trees. ▪ Redwoods do not do well with recycled water. ▪ Heavy clay content in soil makes plant establishment difficult- consider with future species recommendation palette. ▪ Overall confusion across parties regarding who maintains different trees. ▪ Monoculture of trees in street program, need for diversity to increase resiliency from future pests, diseases and climatic changes. ▪ Not enough staff to adequately look at tree roots before pruning, backlog of work. ▪ Parking lot shade requirements vs. number of parking space minimums. ▪ No landscape design guidelines/ development requirements. ▪ No planning-design-review mechanism to ensure landscaping not removed.
Biggest Opportunities	▪ Education and outreach to increase community buy-in and support in maintaining the UF. ▪ Explain how trees and a well-maintained landscape increase property value. ▪ Clarify Heritage Tree ordinance, make process more transparent and systematic. ▪ Better enforcement of tree replacement. ▪ Better tree maintenance on hiking trails to prevent liability claims. ▪ Use more root barriers. ▪ Inventory of all City trees to clarify maintenance responsibilities and streamline liability claims process. ▪ Incentivize tree plantings where there are less requirements for tree density on properties. ▪ Emphasis on importance of shade from trees in future high temperature events in educational outreach. ▪ Clear management guidelines and inventory analysis of trees. ▪ Add traffic & tree clearance code. ▪ Monetary value of trees to provide with removal requests. ▪ Improve removal ratio, define ratio sizes and credits. ▪ Existing interdepartmental communications are efficient.

Appendix H

Survey Results

CITY OF PLEASANTON – HERITAGE TREE ORDINANCE SURVEY RESULTS 10-31-2023

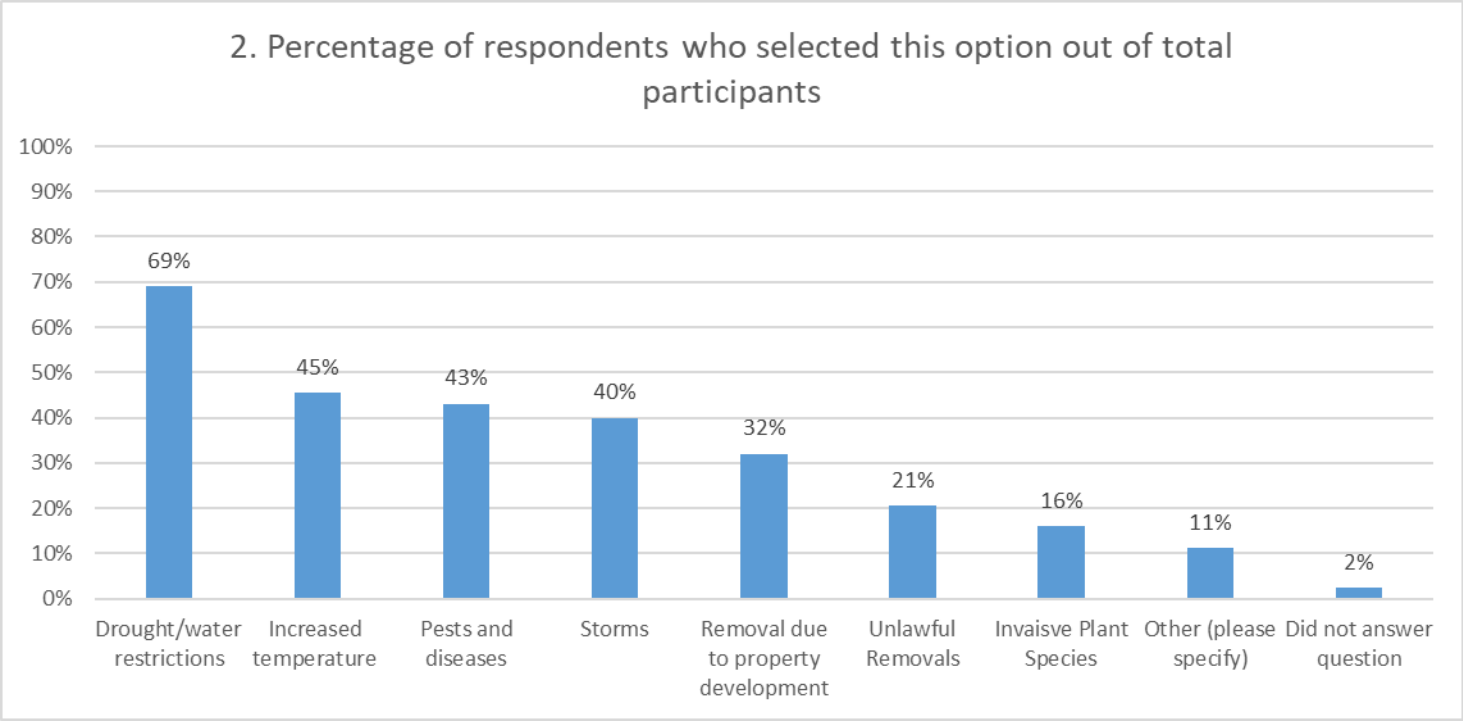
1. Of the following options, select the most important benefits that trees provide in your neighborhood (select all that apply).		
Tree Benefit Category (full description):	Most important benefits of trees according to respondents	Percentage of respondents who selected this option out of total participants
Shade / cooling neighborhoods and homes	545	90%
Improving the environment (such as air quality, water, pollution)	486	81%
Aesthetics or appearance	443	73%
Habitat for wildlife	373	62%
Carbon storage to mitigate climate change	349	58%
Protecting human health (physical and mental)	322	53%
Living privacy screen/natural fence	312	52%
Improving property value	263	44%
Other (please specify)	16	3%
Did not answer question	5	1%



Question 1: Of the following options, select the most important benefits that trees provide in your neighborhood – "Other" Responses

Other Responses	Count
Protecting against soil erosion through soil stabilization	3
Noise Abatement	3
Better Quality of Life	3
Increased oxygen	2
Promote bikeable and walkable community, and promote safety by slowing down drivers	2
Stormwater Abatement	1
Provide food	1
Provide good material for compost (for deciduous trees in the fall)	1
Notification of Seasons	1

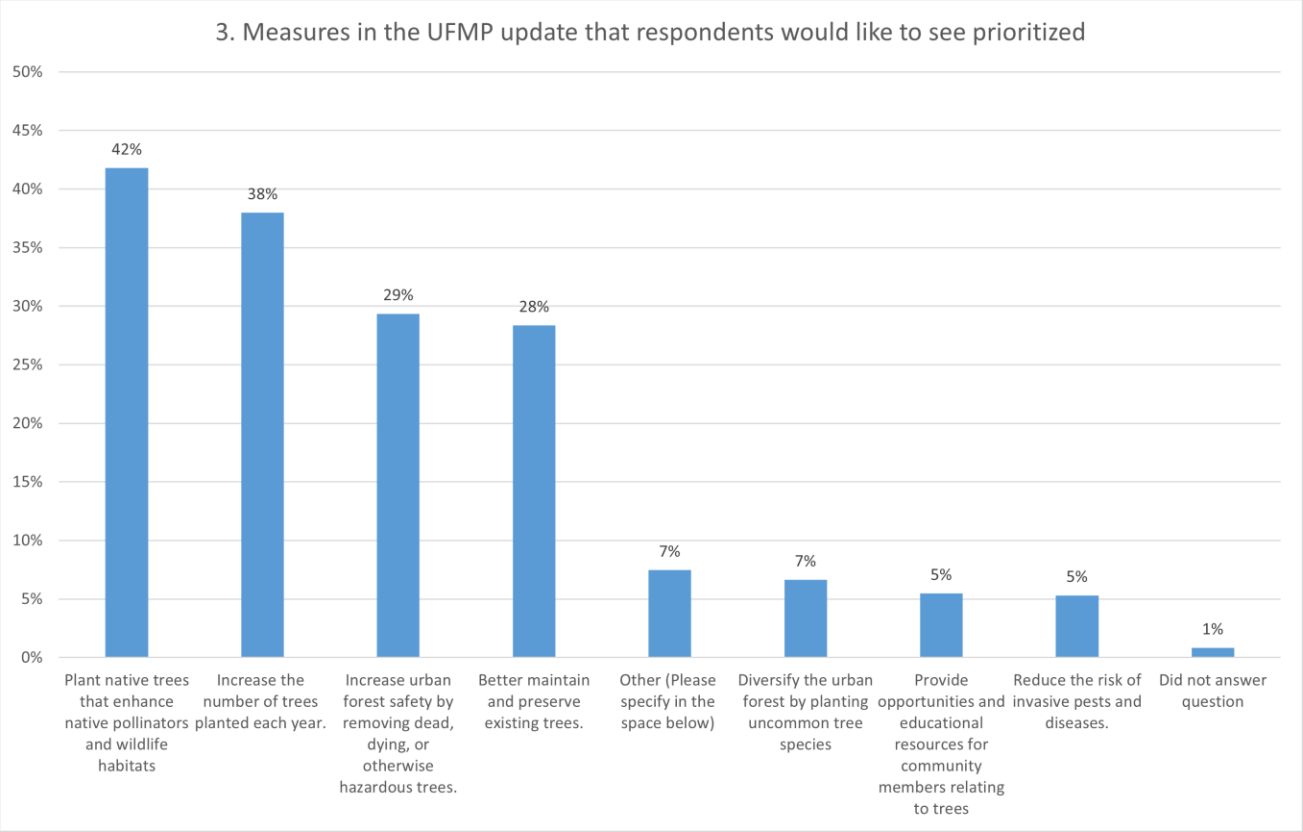
2. Of the following options, select the threats facing trees in your neighborhood (select all that apply)		
Neighborhood Tree Threat Category (full description):	Top threats facing trees according to respondents	Percentage of respondents who selected this option out of total participants
Drought/water restrictions	416	69%
Increased temperature	274	45%
Pests and diseases	260	43%
Storms	241	40%
Removal due to property development	193	32%
Unlawful Removals	124	21%
Invasive Plant Species	97	16%
Other (please specify)	67	11%
Did not answer question	14	2%



Question 2: Of the following options, select the threats facing trees in your neighborhood – "Other" Responses

Other Responses	Count
Improper tree trimming or lack of tree trimming, poor tree management	18
Aging, dead or dying trees	12
Wrong species of trees planted for the area	3
Water quality, chemicals in irrigation water or recycled water	3
The City /Pleasanton parks dept (not enforcing ordinance, improper trimming, not replacing dead trees etc)	2
Fallen Foliage unsafe	1
Fire risk	1
Above ground powerlines	1
Human encroachment and restrictive planting spaces	1
Constraints of time and money to water and maintain trees	1
Lawful removals that seem unnecessary.	1
Kids racing electric bikes through nature areas (Kottinger) and causing erosion.	1
Lack of plantable areas for trees	1
Fake turf leading to increased ground temperatures	1

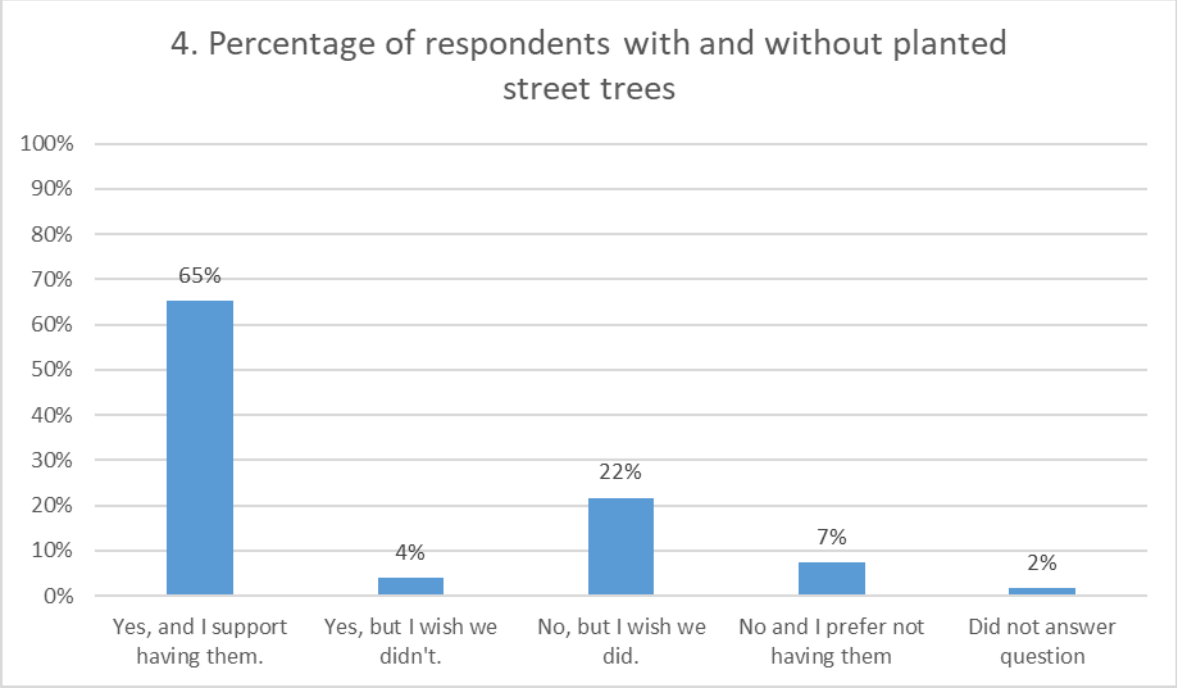
3. Pleasanton's Urban Forest Master Plan will be a comprehensive guide for the City's tree management for the next 25 years. What would you like to see the City prioritize?		
Preferences for City Priorities in UFMP (full description):	Number of survey respondents who selected the following UFMP Prioritization category:	Measures in the UFMP update that respondents would like to see prioritized
Plant native trees that enhance native pollinators and wildlife habitats	252	42%
Increase the number of trees planted each year.	229	38%
Increase urban forest safety by removing dead, dying, or otherwise hazardous trees.	177	29%
Better maintain and preserve existing trees.	171	28%
Other (Please specify in the space below)	45	7%
Diversify the urban forest by planting uncommon tree species	40	7%
Provide opportunities and educational resources for community members relating to trees	33	5%
Reduce the risk of invasive pests and diseases.	32	5%
Did not answer question	5	1%



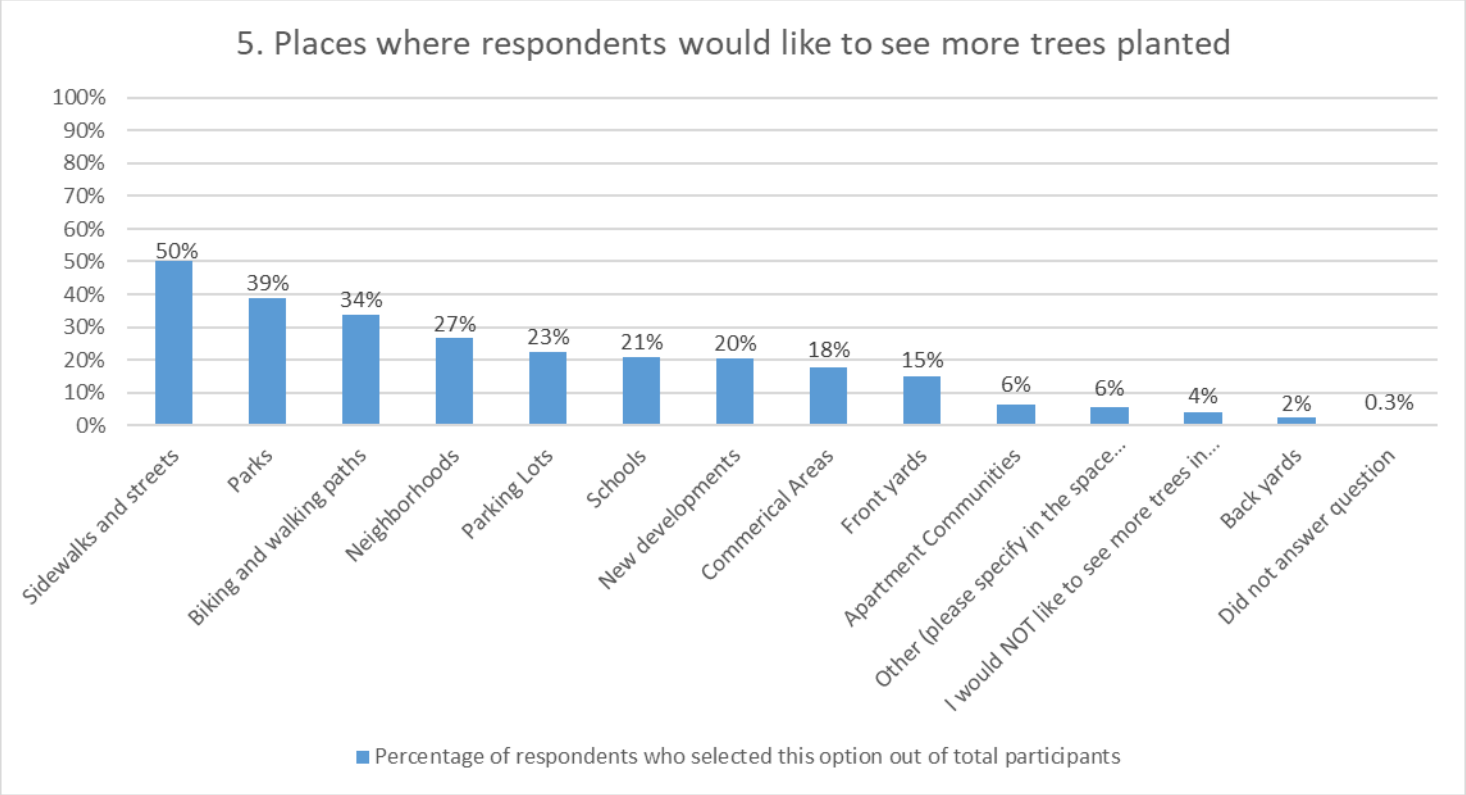
Question 3: Pleasanton's Urban Forest Master Plan will be a comprehensive guide for the City's tree management for the next 25 years. What would you like to see the City prioritize? – "Other" Responses

Other Responses	Count
Remove Eucalyptus trees that pose a fire or fallen limb risk	6
Provide financial incentives or assistance to property owners for maintaining trees or removing dead or diseased trees	4
Reduce or get rid of tree permit requirements for removing trees on private property	4
Better tree pruning and maintenance	3
Replace dead and dying trees	3
Don't plan trees that produce lots of pollen	3
Equity of tree coverage	2
Hold people who remove trees illegally accountable	2
Plant fruit bearing trees and harvest for local food	2
Create and preserve adequate planting space	1
Plant more native shrubs	1
Right species right place	1
Keep dead or dying trees that don't present a risk for wildlife habitat	1
Put power lines underground	1
Proactively mitigate wildfire threats	1
Heat Mitigation	1
Rewild our hills, maybe even buy ranch spaces to rewild the area.	1
Create exemptions for tree removal when related to property line	1
Reduce or get rid of tree permit requirements for removing trees that pose a hazard	1
Add more rules around trees and development	1
Make rules around trees clearer	1

4. Does your neighborhood have planted street trees (street trees- any tree that is planted in the public right-of-way near and along the roadways which shade sidewalks and grow over the road)?		
Feelings on Planted City Trees Category:	Number of survey respondents who selected this option	Percentage of respondents who selected this option out of total participants
Yes, and I support having them.	393	65%
Yes, but I wish we didn't.	24	4%
No, but I wish we did.	131	22%
No and I prefer not having them	44	7%
Did not answer question	11	2%



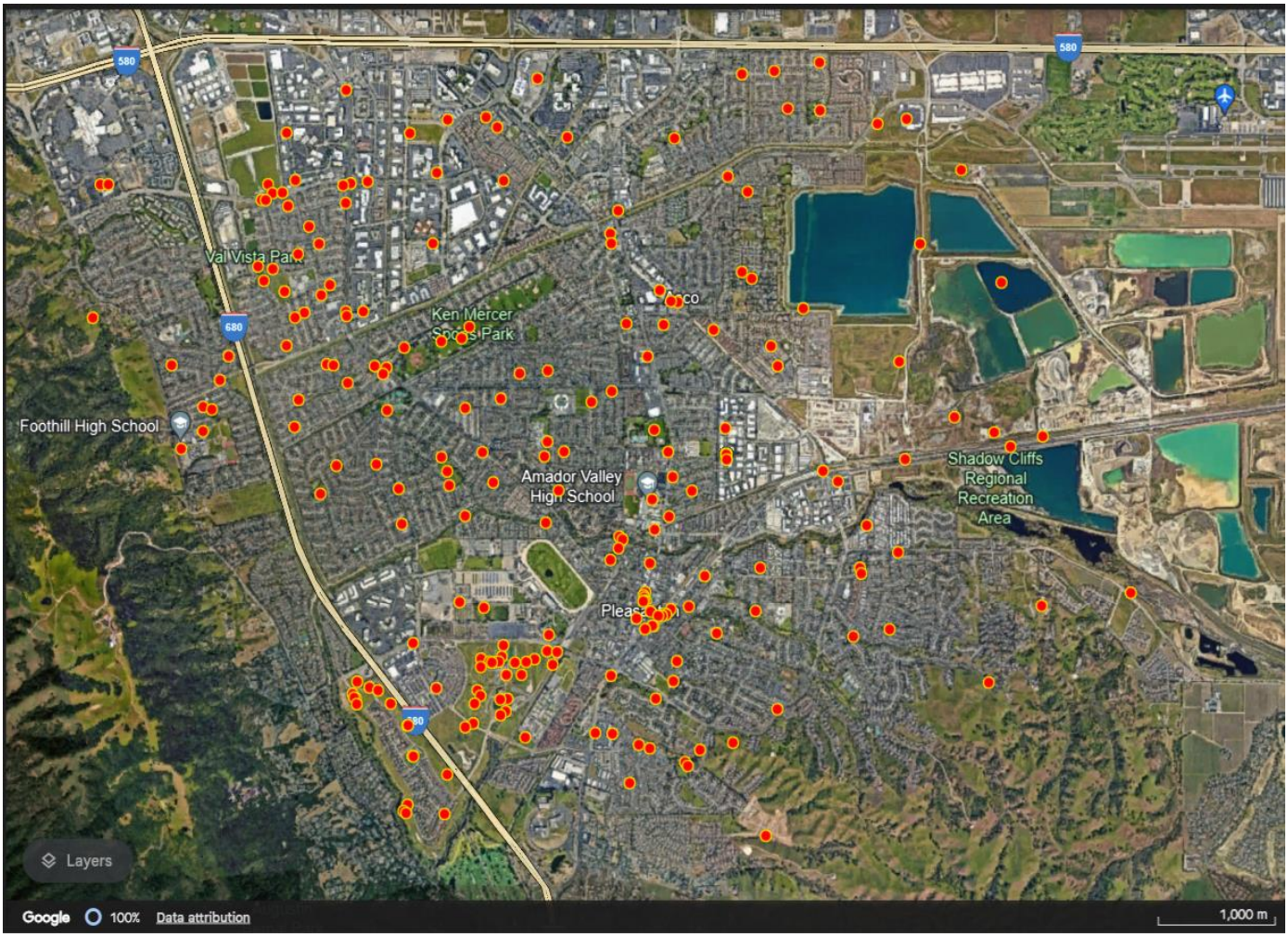
5. Where would you like to see more trees planted in Pleasanton?		
Where respondents would like trees planted category (full description):	Number of survey respondents who selected this option:	Percentage of respondents who selected this option out of total participants
Sidewalks and streets	303	50%
Parks	235	39%
Biking and walking paths	203	34%
Neighborhoods	162	27%
Parking Lots	136	23%
Schools	125	21%
New developments	122	20%
Commercial Areas	106	18%
Front yards	90	15%
Apartment Communities	38	6%
Other (please specify in the space below)	34	6%
I would NOT like to see more trees in Pleasanton	23	4%
Back yards	14	2%
Did not answer question	2	0.3%



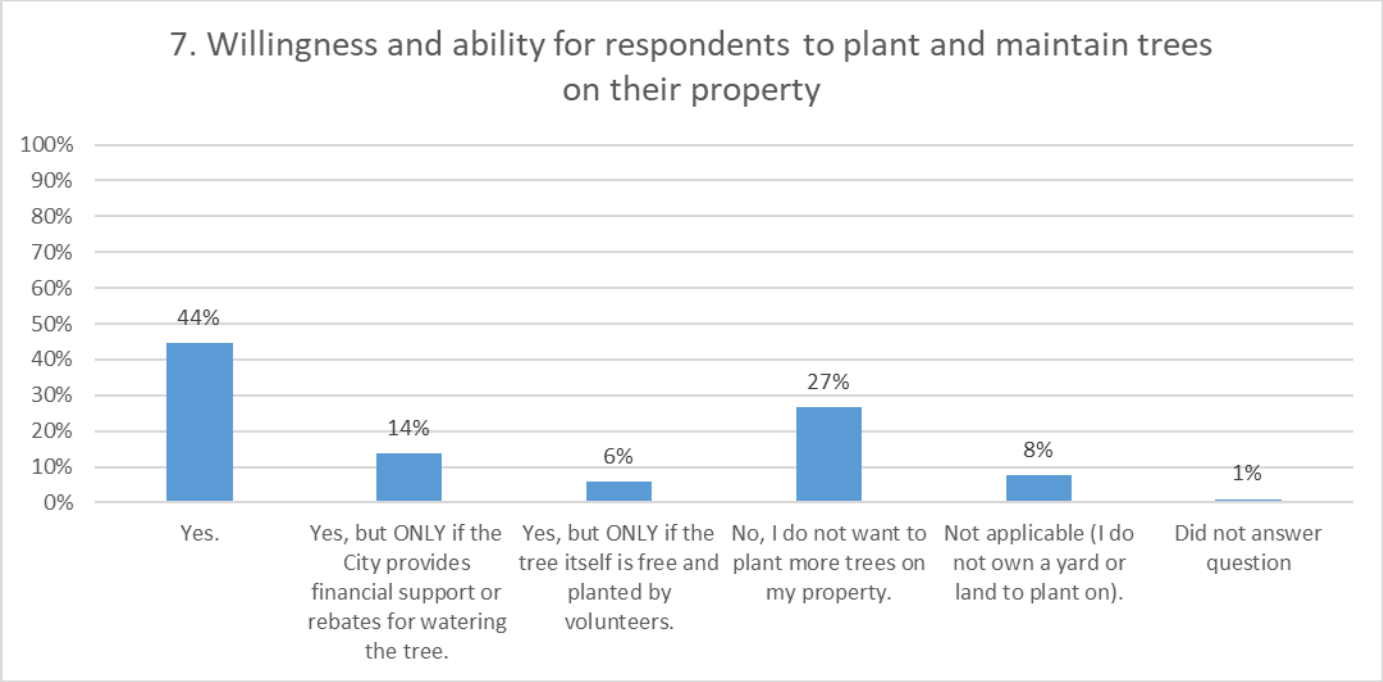
Question 5: Where would you like to see more trees planted in Pleasanton? – "Other" Responses

Other Responses	Count
Better management of existing trees	6
Everywhere	4
Content with existing trees	2
HOA managed open space	1
Near freeways	1
Downtown/Main St.	2
More trees are not needed, but meaningful management of existing trees.	1
The new sports complex off Bernal is very bare looking, it's a bit of an eyesore coming off the freeway, heading to our Downtown.	1
I would like to see the street trees that had to be removed on Second Street, replaced by the City. This would preserve the old town look of Second Street!	1
Where the roots won't impact roads, bike lanes, sidewalks and parks.	1
Valley Ave between Busch and Stanley and also Valley Ave from sports park roundabouts to Richert Lumber	1
Stoner Drive along the treatment fields and the sidewalks	1
In places that can accommodate and lack shade trees	1
Where they are needed as recommended by an actual arborist.	1
Marilyn Kane trail	1
If a building was built without an understanding of direct solar gain through windows that heats up a building and then the use of air conditioning, encourage trees on south and west sides of buildings.	1

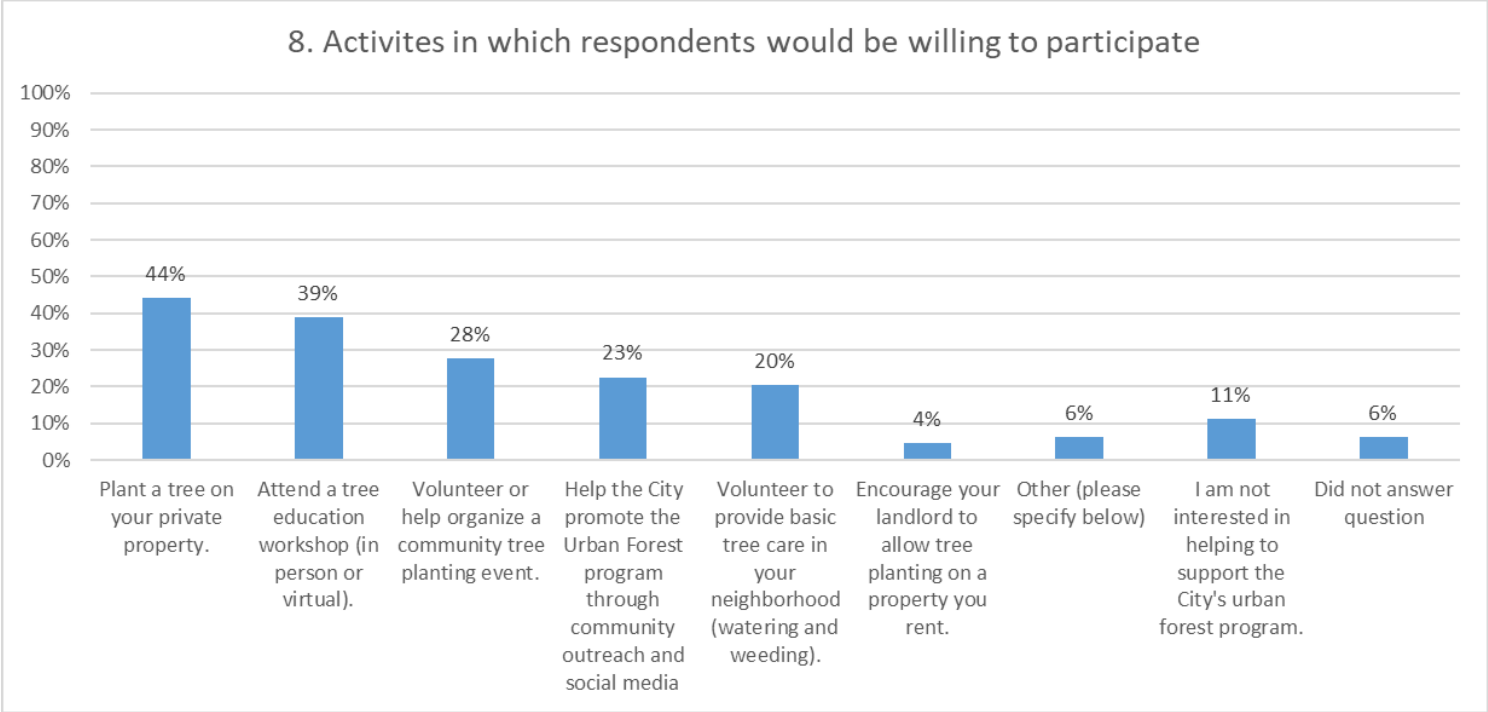
6. Where should the City of Pleasanton plant more trees?



7. Would you be willing to plant, maintain, and care for a tree on your property?		
Feelings on Planted City Trees Category (full description):	Number of survey respondents who selected this option	Percentage of respondents who selected this option out of total participants
Yes.	268	44%
Yes, but ONLY if the City provides financial support or rebates for watering the tree.	83	14%
Yes, but ONLY if the tree itself is free and planted by volunteers.	35	6%
No, I do not want to plant more trees on my property.	160	27%
Not applicable (I do not own a yard or land to plant on).	46	8%
Did not answer question	6	1%



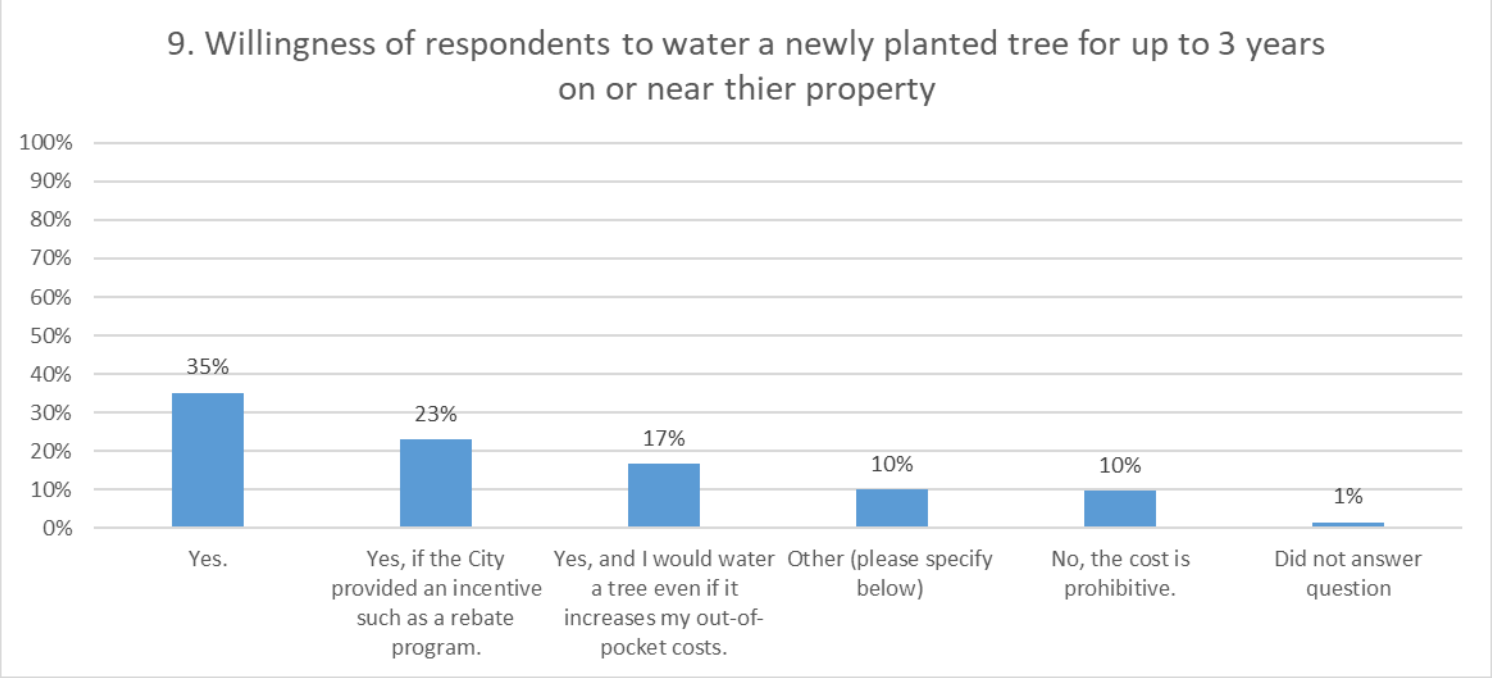
8. Which of the following activities would you be willing to participate in?		
Activities that respondents would do Category (full description):	Number of survey respondents who selected this option:	Percentage of respondents who selected this option out of total participants
Plant a tree on your private property.	266	44%
Attend a tree education workshop (in person or virtual).	235	39%
Volunteer or help organize a community tree planting event.	167	28%
Help the City promote the Urban Forest program through community outreach and social media	136	23%
Volunteer to provide basic tree care in your neighborhood (watering and weeding).	123	20%
Encourage your landlord to allow tree planting on a property you rent.	27	4%
Other (please specify below)	38	6%
I am not interested in helping to support the City's urban forest program.	67	11%
Did not answer question	38	6%



Question 8: Which of the following activities would you be willing to participate in? – "Other" Responses

Other Responses	Count
Old age or personal health prevents active involvement	4
Volunteer to plant trees	3
Voluntarily planting trees on their own property	2
Help identify/send photos of damaged, diseased or hazardous trees	2
Help consult and advise on tree decisions - for those with credentials	2
Advocate for native trees such as Oaks, which are being removed by developers	1
Assist with grant writing for the City	1
Donate money	1
Community Garden opportunities	1
Clean out storm drains that get blocked in winter	1
Volunteer to remove dead and non-native trees and plant native trees along Arroyo Del Valle.	1
Landscape freeway ramps	1
Brainstorm ways to improve water situation	1
Be an engaged citizen	1
In the interest of shrub awareness for carbon sequestration, I'm happy to show mature, successful examples on my property. I'll also share seeds.	1

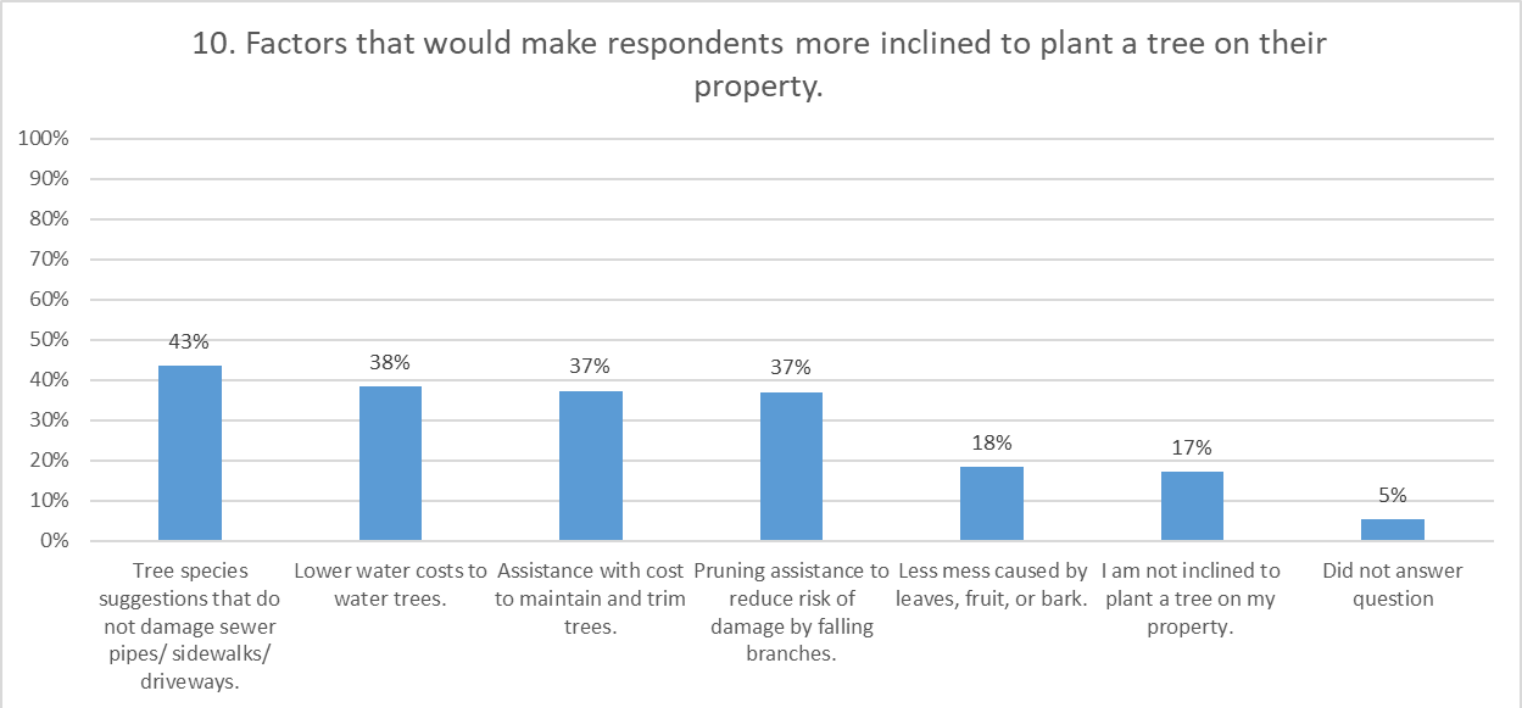
9. Would you be willing to water a newly planted tree for up to three years on or near your property?		
Feelings on Planted City Trees Category (full description):	Number of survey respondents who selected this option	Percentage of respondents who selected this option out of total participants
Yes.	212	35%
Yes, if the City provided an incentive such as a rebate program.	139	23%
Yes, and I would water a tree even if it increases my out-of-pocket costs.	100	17%
Other (please specify below)	60	10%
No, the cost is prohibitive.	59	10%
Did not answer question	9	1%



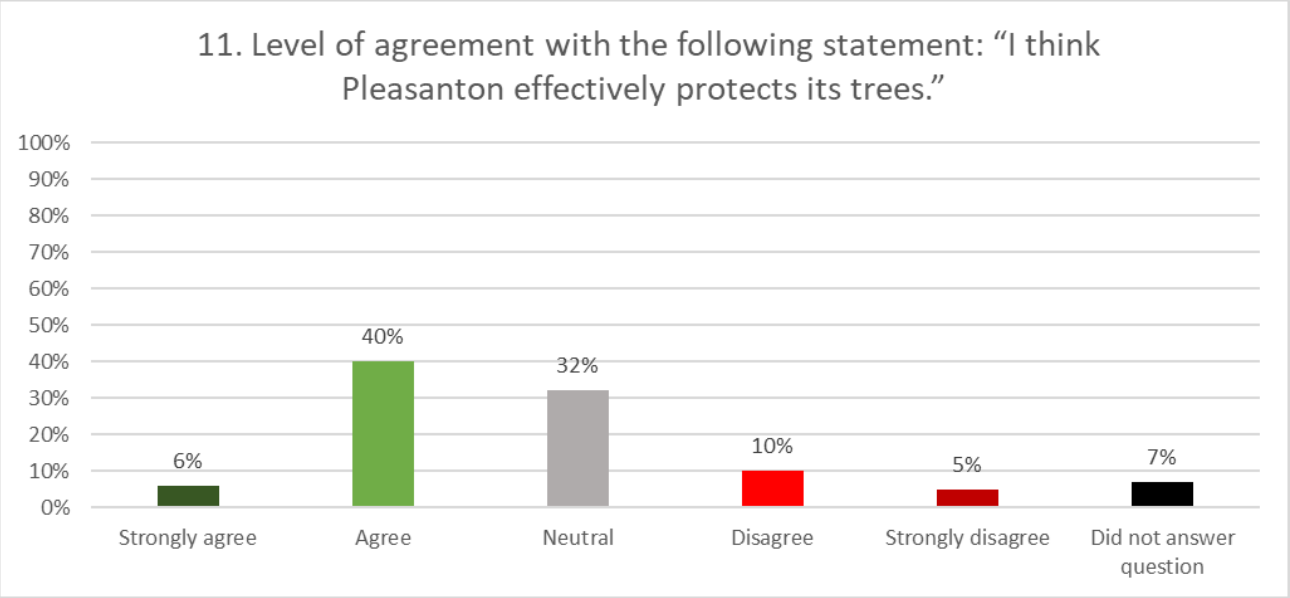
Question 9: Would you be willing to water a newly planted tree for up to three years on or near your property? - "Other" Responses

Other Responses	Count
I already have many trees on my property, no room for additional trees	15
I cannot physically deal with this due to age or health condition	8
I live in an apartment, or rent	3
I do not live in Pleasanton	2
Time commitment, sustained maintenance	2
The trees I am requesting to be replaced already have a watering system.	1
No access to outdoor water at my apt complex	1
Could only assist with weed pulling and brush removal around native trees	1
Need additional information on costs and time commitment needed to care for a tree	1
I already volunteer to maintain the Sensory Garden by the Senior Center	1

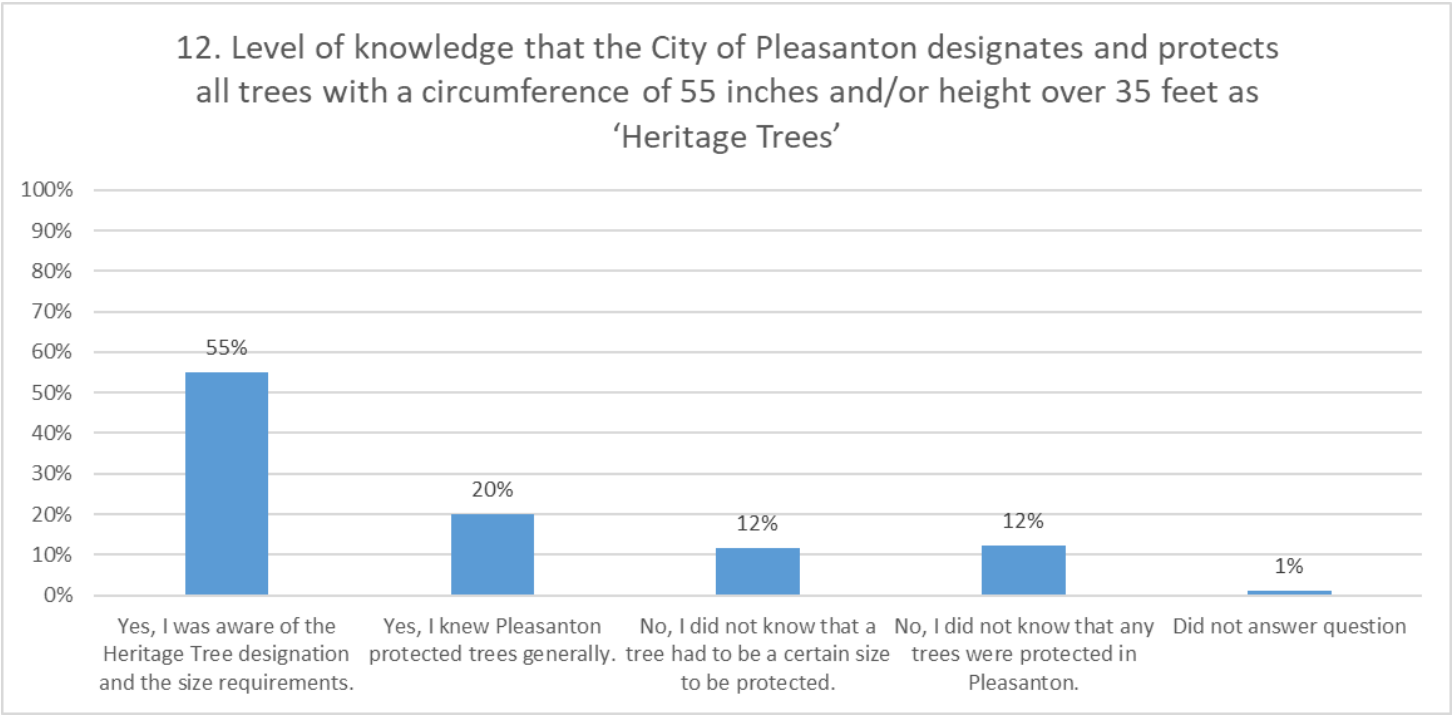
10. What factors would make you more inclined to plant a tree on your property?		
Factors that would make respondents more inclined to plant a tree on their property Category (full description):	Number of survey respondents who selected this option:	Percentage of respondents who selected this option out of total participants
Tree species suggestions that do not damage sewer pipes/ sidewalks/ driveways.	262	43%
Lower water costs to water trees.	232	38%
Assistance with cost to maintain and trim trees.	225	37%
Pruning assistance to reduce risk of damage by falling branches.	223	37%
Less mess caused by leaves, fruit, or bark.	111	18%
I am not inclined to plant a tree on my property.	103	17%
Did not answer question	33	5%



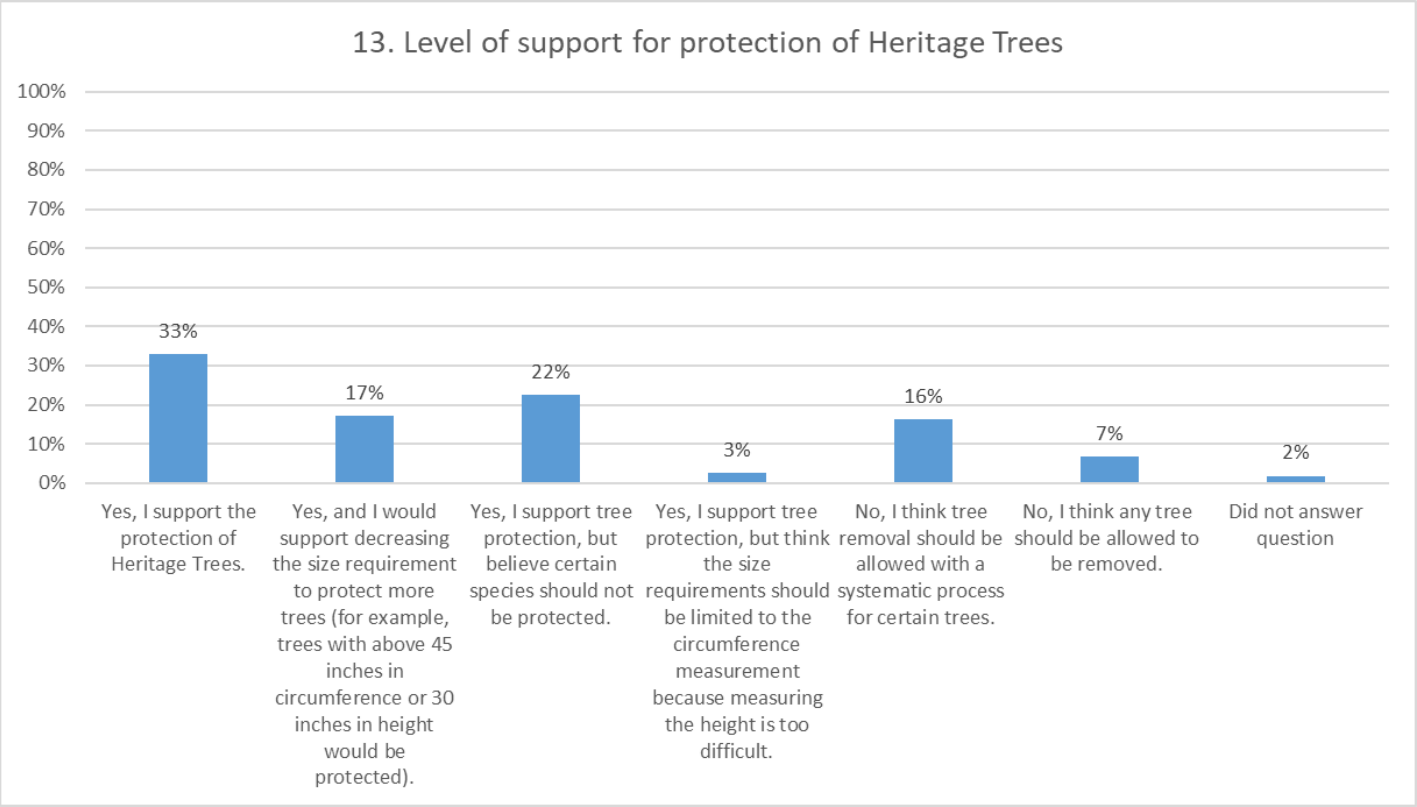
11. Please select your level of agreement with the following statement: “I think Pleasanton effectively protects its trees.”		
Level of agreement on statement: "Pleasanton effectively protects its trees" Category:	Number of survey respondents who selected this option	Percentage of respondents who selected this option out of total participants
Strongly agree	36	6%
Agree	242	40%
Neutral	193	32%
Disagree	61	10%
Strongly disagree	29	5%
Did not answer question	42	7%



12. Did you know that the City of Pleasanton designates and protects all trees with a circumference of 55 inches and/or height over 35 feet as 'Heritage Trees'?		
Level of knowledge that the City of Pleasanton designates and protects all trees with a circumference of 55 inches and/or height over 35 feet as 'Heritage Trees'?	**Number of survey respondents who selected this option**	**Percentage of respondents who selected this option out of total participants**
Yes, I was aware of the Heritage Tree designation and the size requirements.	332	55%
Yes, I knew Pleasanton protected trees generally.	121	20%
No, I did not know that a tree had to be a certain size to be protected.	70	12%
No, I did not know that any trees were protected in Pleasanton.	74	12%
Did not answer question	6	1%

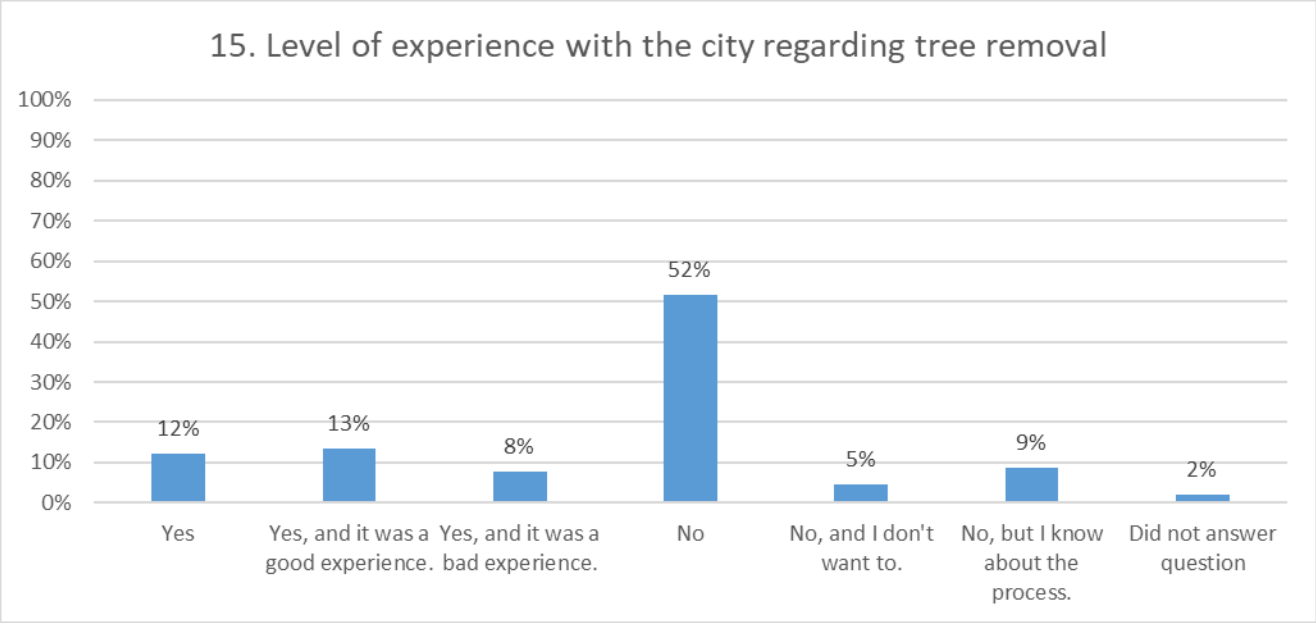


13. Do you support this level of protection for Heritage Trees?		
Level of support for protection of Heritage Trees category (full description):	Number of survey respondents who selected this option	Percentage of respondents who selected this option out of total participants
Yes, I support the protection of Heritage Trees.	198	33%
Yes, and I would support decreasing the size requirement to protect more trees (for example, trees with above 45 inches in circumference or 30 inches in height would be protected).	104	17%
Yes, I support tree protection, but believe certain species should not be protected.	135	22%
Yes, I support tree protection, but think the size requirements should be limited to the circumference measurement because measuring the height is too difficult.	16	3%
No, I think tree removal should be allowed with a systematic process for certain trees.	98	16%
No, I think any tree should be allowed to be removed.	41	7%
Did not answer question	11	2%

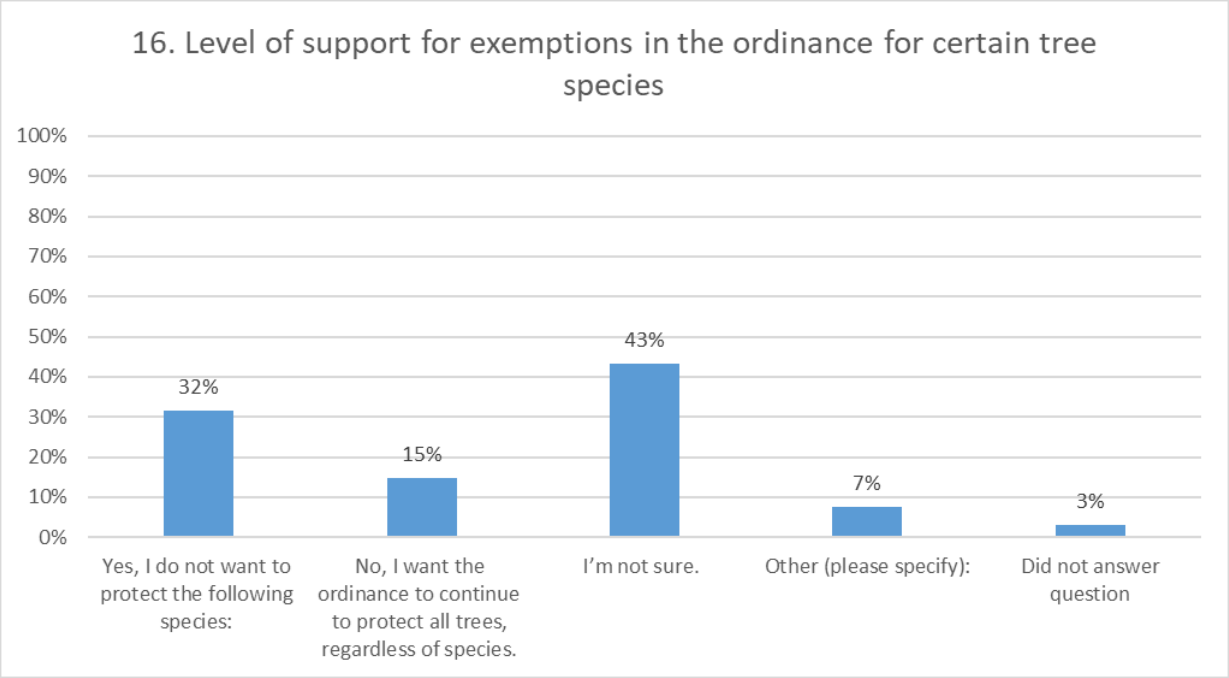


14. Did you know that there is a penalty for removing Heritage Trees without a permit?		
Level of knowledge that there are penalties for removing Heritage trees without a permit Category (full description):	Number of survey respondents who selected this option	Percentage of respondents who selected this option out of total participants
Yes.	466	77%
Yes, I have personally received this penalty or know someone who has.	9	1%
No, I did not know about penalties for Heritage Trees in Pleasanton.	73	12%
No, I did not know there were any regulations or policies around trees.	46	8%
Did not answer question	9	1%

15. Have you had experience with the city regarding tree removal?		
Level of experience with the city regarding tree removal Category (full description):	Number of survey respondents who selected this option	Percentage of respondents who selected this option out of total participants
Yes	74	12%
Yes, and it was a good experience.	81	13%
Yes, and it was a bad experience.	47	8%
No	311	52%
No, and I don't want to.	28	5%
No, but I know about the process.	52	9%
Did not answer question	10	2%

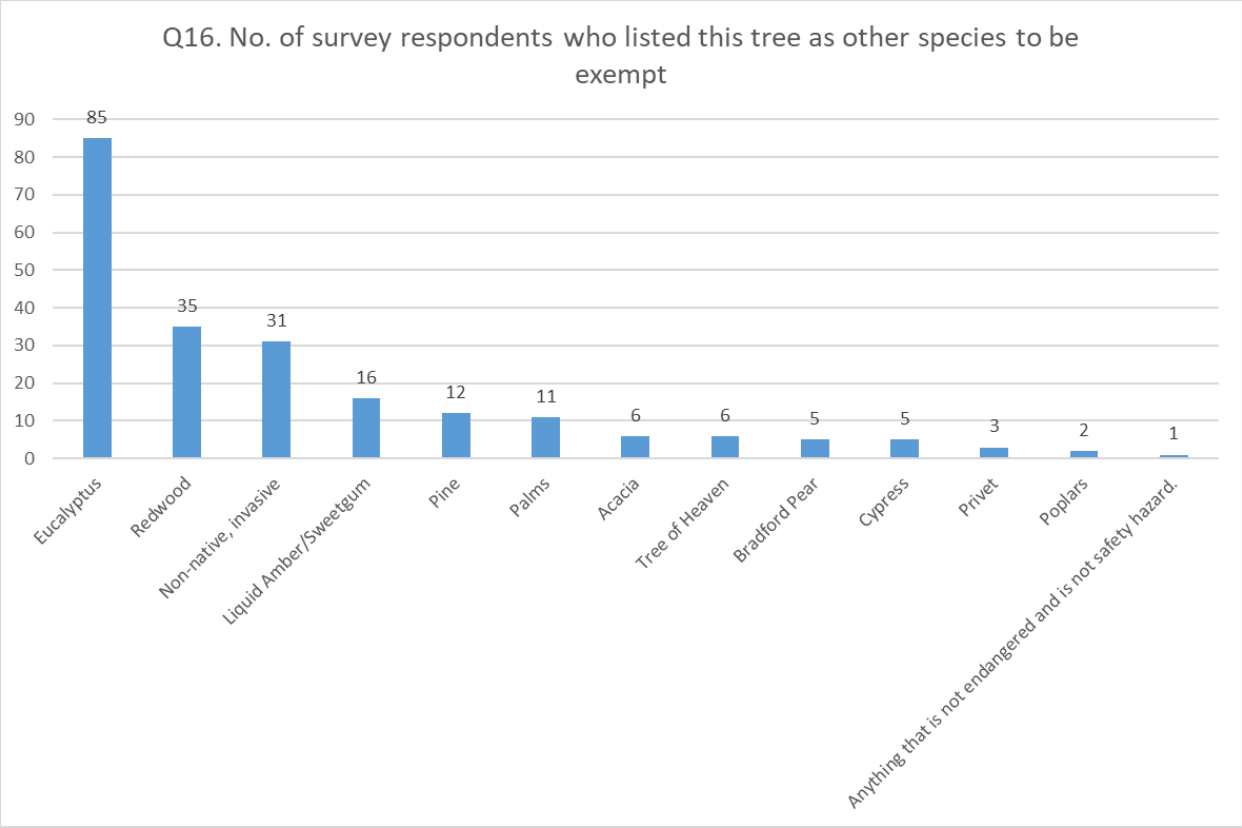


16. Do you support exemptions in the ordinance for certain tree species?		
Level of support for exemptions in the ordinance for certain tree species Category (full description):	Number of survey respondents who selected this option	Percentage of respondents who selected this option out of total participants
Yes, I do not want to protect the following species:	190	32%
No, I want the ordinance to continue to protect all trees, regardless of species.	89	15%
I'm not sure.	261	43%
Other (please specify):	45	7%
Did not answer question	18	3%

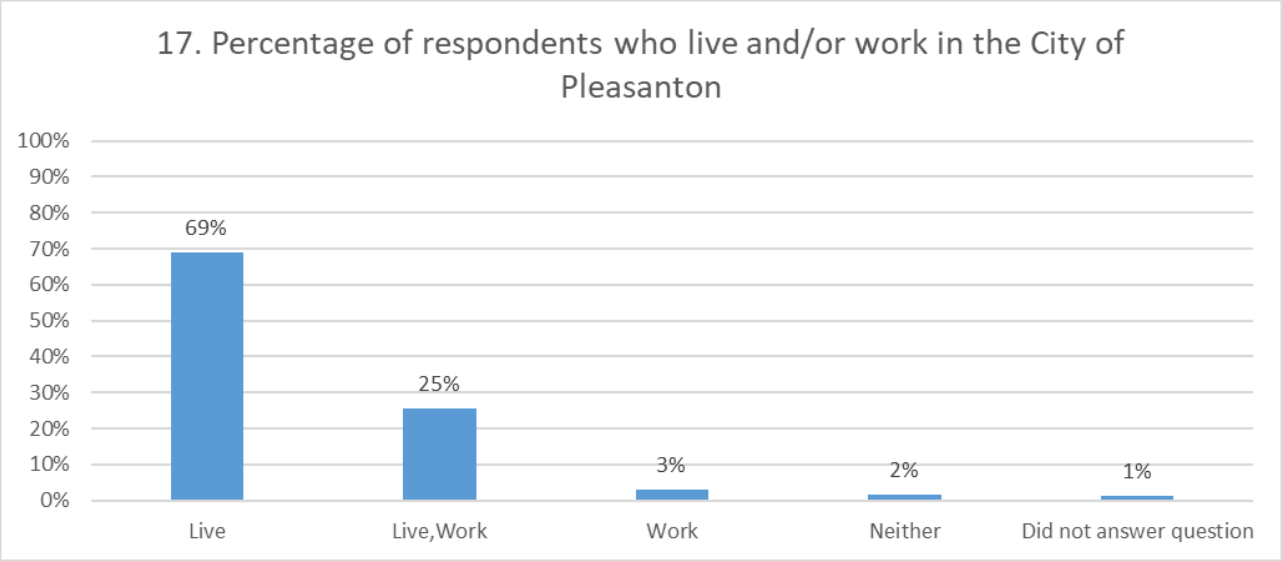


Question 16: Do you support exemptions in the ordinance for certain tree species? - "Other" Responses

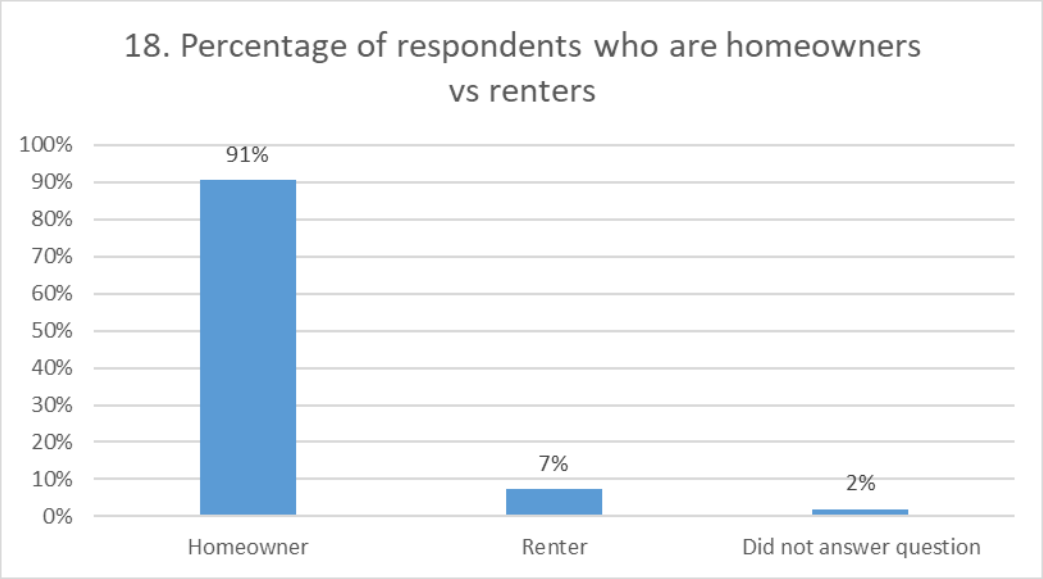
Other Responses	Number of survey respondents who listed this tree as other species to be exempt
Eucalyptus	85
Redwood	35
Liquid Amber/Sweetgum	16
Non-native, invasive	31
Pine	12
Palms	11
Acacia	6
Tree of Heaven	6
Bradford Pear	5
Cypress	5
Privet	3
Poplars	2
Anything that is not endangered and is not safety hazard.	1



17. Do you live or work in the City of Pleasanton?		
Do you live or work in City of Pleasanton Category:	Number of survey respondents who selected this option	Percentage of respondents who selected this option out of total participants
Live	415	69%
Live, Work	153	25%
Work	18	3%
Neither	10	2%
Did not answer question	7	1%

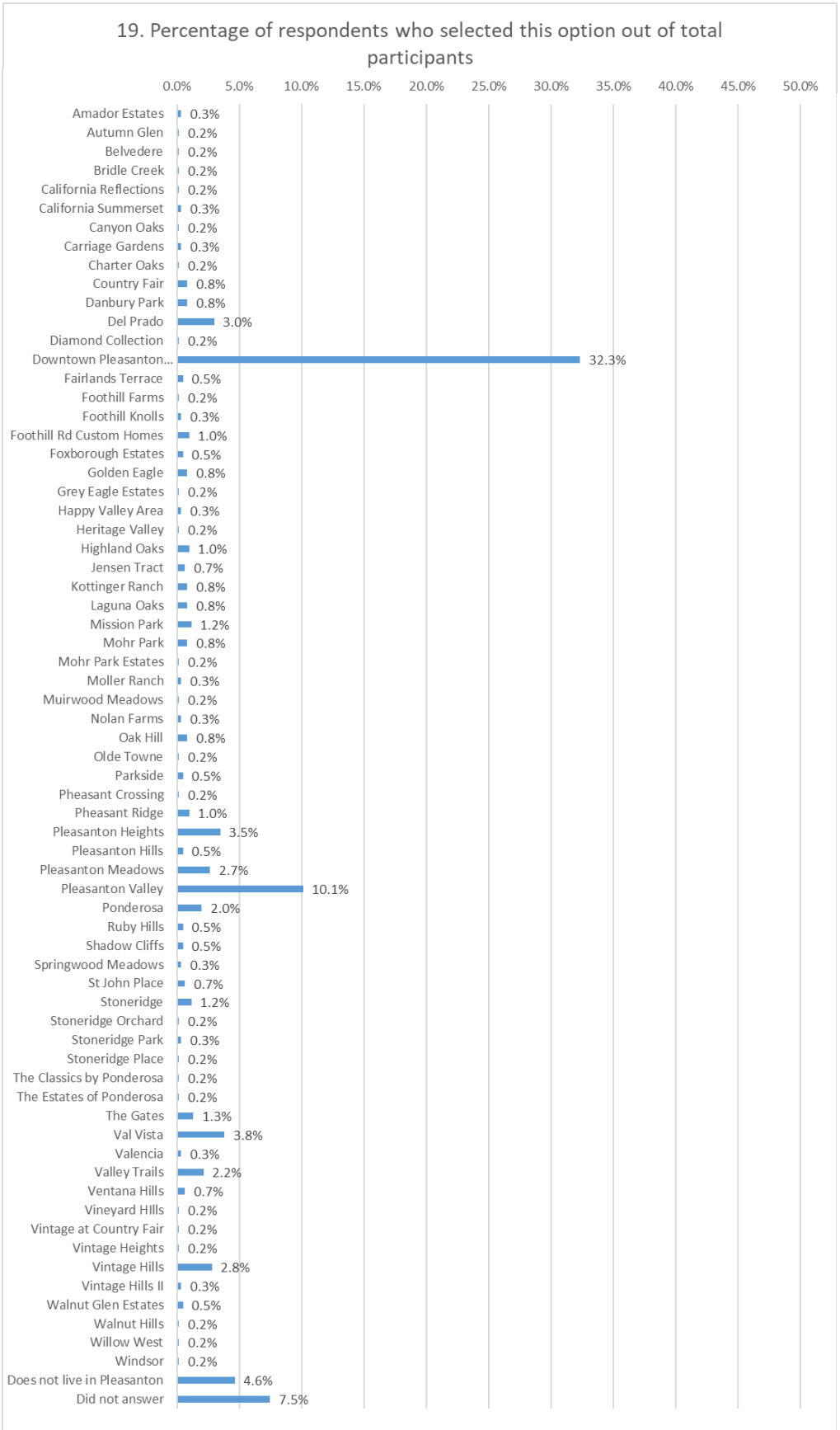


18. Which best describes your current housing situation?		
Current housing situation Category:	Number of survey respondents who selected this option	Percentage of respondents who selected this option out of total participants
Homeowner	546	91%
Renter	45	7%
Did not answer question	12	2%

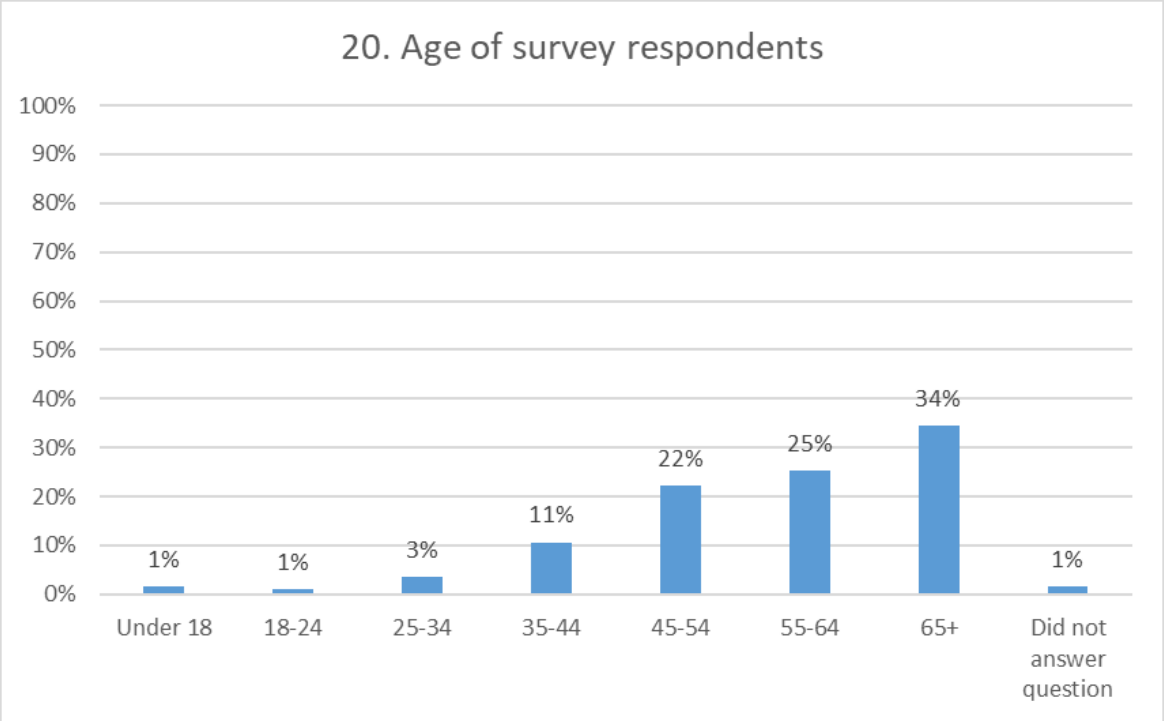


19. What neighborhood do you live in?		
Neighborhood	Number of survey respondents who selected this option	Percentage of respondents who selected this option out of total participants
Amador Estates	2	0.3%
Autumn Glen	1	0.2%
Belvedere	1	0.2%
Bridle Creek	1	0.2%
California Reflections	1	0.2%
California Summerset	2	0.3%
Canyon Oaks	1	0.2%
Carriage Gardens	2	0.3%
Charter Oaks	1	0.2%
Country Fair	5	0.8%
Danbury Park	5	0.8%
Del Prado	18	3.0%
Diamond Collection	1	0.2%
Downtown Pleasanton Area	195	32.3%
Fairlands Terrace	3	0.5%
Foothill Farms	1	0.2%
Foothill Knolls	2	0.3%
Foothill Rd Custom Homes	6	1.0%
Foxborough Estates	3	0.5%
Golden Eagle	5	0.8%
Grey Eagle Estates	1	0.2%
Happy Valley Area	2	0.3%
Heritage Valley	1	0.2%
Highland Oaks	6	1.0%
Jensen Tract	4	0.7%
Kottinger Ranch	5	0.8%
Laguna Oaks	5	0.8%
Mission Park	7	1.2%
Mohr Park	5	0.8%
Mohr Park Estates	1	0.2%
Moller Ranch	2	0.3%
Muirwood Meadows	1	0.2%
Nolan Farms	2	0.3%
Oak Hill	5	0.8%
Olde Towne	1	0.2%
Parkside	3	0.5%
Pheasant Crossing	1	0.2%
Pheasant Ridge	6	1.0%

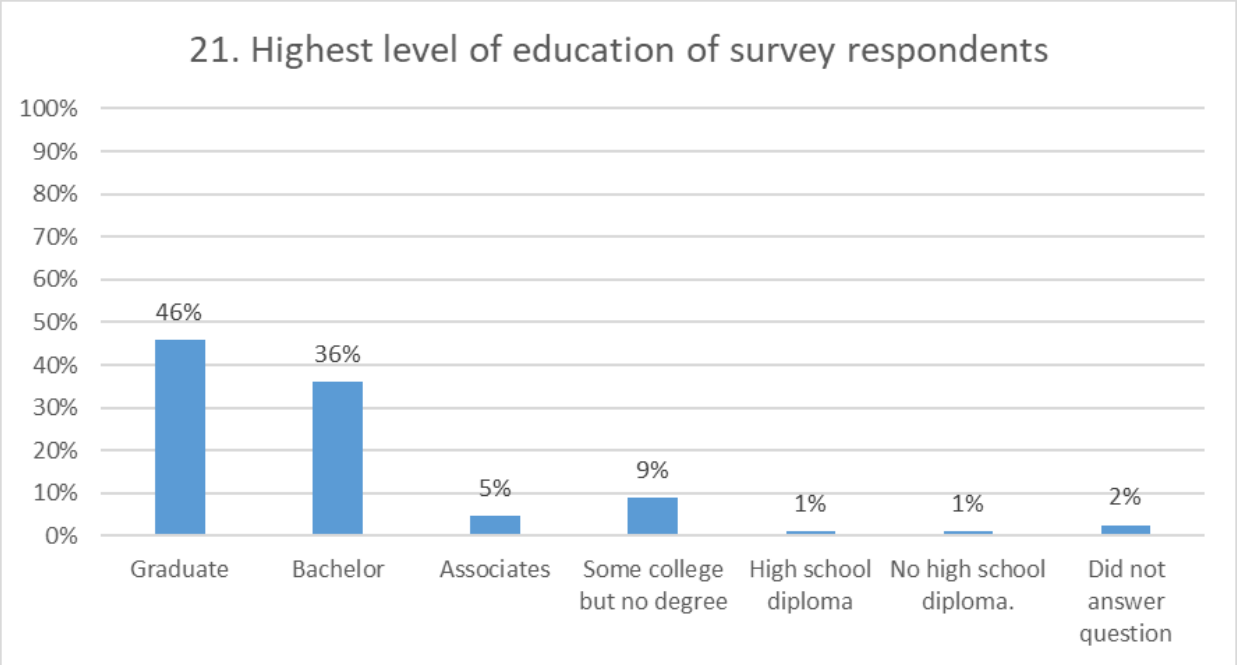
Pleasanton Heights	21	3.5%
Pleasanton Hills	3	0.5%
Pleasanton Meadows	16	2.7%
Pleasanton Valley	61	10.1%
Ponderosa	12	2.0%
Ruby Hills	3	0.5%
Shadow Cliffs	3	0.5%
Springwood Meadows	2	0.3%
St John Place	4	0.7%
Stoneridge	7	1.2%
Stoneridge Orchard	1	0.2%
Stoneridge Park	2	0.3%
Stoneridge Place	1	0.2%
The Classics by Ponderosa	1	0.2%
The Estates of Ponderosa	1	0.2%
The Gates	8	1.3%
Val Vista	23	3.8%
Valencia	2	0.3%
Valley Trails	13	2.2%
Ventana Hills	4	0.7%
Vineyard Hills	1	0.2%
Vintage at Country Fair	1	0.2%
Vintage Heights	1	0.2%
Vintage Hills	17	2.8%
Vintage Hills II	2	0.3%
Walnut Glen Estates	3	0.5%
Walnut Hills	1	0.2%
Willow West	1	0.2%
Windsor	1	0.2%
Does not live in Pleasanton	28	4.6%
Did not answer	45	7.5%


19. Percentage of respondents who selected this option out of total participants
0.0%
5.0%
10.0%
15.0%
20.0%
25.0%
30.0%
35.0%
40.0%
45.0%
50.0%
Amador Estates 0.3%
Autumn Glen 0.2%
Belvedere 0.2%
Bridle Creek 0.2%
California Reflections 0.2%
California Summerset 0.3%
Canyon Oaks 0.2%
Carriage Gardens 0.3%
Charter Oaks 0.2%
Country Fair 0.8%
Danbury Park 0.8%
Del Prado 3.0%
Diamond Collection 0.2%
Downtown Pleasanton... 32.3%
Fairlands Terrace 0.5%
Foothill Farms 0.2%
Foothill Knolls 0.3%
Foothill Rd Custom Homes 1.0%
Foxborough Estates 0.5%
Golden Eagle 0.8%
Grey Eagle Estates 0.2%
Happy Valley Area 0.3%
Heritage Valley 0.2%
Highland Oaks 1.0%
Jensen Tract 0.7%
Kottinger Ranch 0.8%
Laguna Oaks 0.8%
Mission Park 1.2%
Mohr Park 0.8%
Mohr Park Estates 0.2%
Moller Ranch 0.3%
Muirwood Meadows 0.2%
Nolan Farms 0.3%
Oak Hill 0.8%
Olde Towne 0.2%
Parkside 0.5%
Pheasant Crossing 0.2%
Pheasant Ridge 1.0%
Pleasanton Heights 3.5%
Pleasanton Hills 0.5%
Pleasanton Meadows 2.7%
Pleasanton Valley 10.1%
Ponderosa 2.0%
Ruby Hills 0.5%
Shadow Cliffs 0.5%
Springwood Meadows 0.3%
St John Place 0.7%
Stoneridge 1.2%
Stoneridge Orchard 0.2%
Stoneridge Park 0.3%
Stoneridge Place 0.2%
The Classics by Ponderosa 0.2%
The Estates of Ponderosa 0.2%
The Gates 1.3%
Val Vista 3.8%
Valencia 0.3%
Valley Trails 2.2%
Ventana Hills 0.7%
Vineyard HIlls 0.2%
Vintage at Country Fair 0.2%
Vintage Heights 0.2%
Vintage Hills 2.8%
Vintage Hills II 0.3%
Walnut Glen Estates 0.5%
Walnut Hills 0.2%
Willow West 0.2%
Windsor 0.2%
Does not live in Pleasanton 4.6%
Did not answer 7.5%

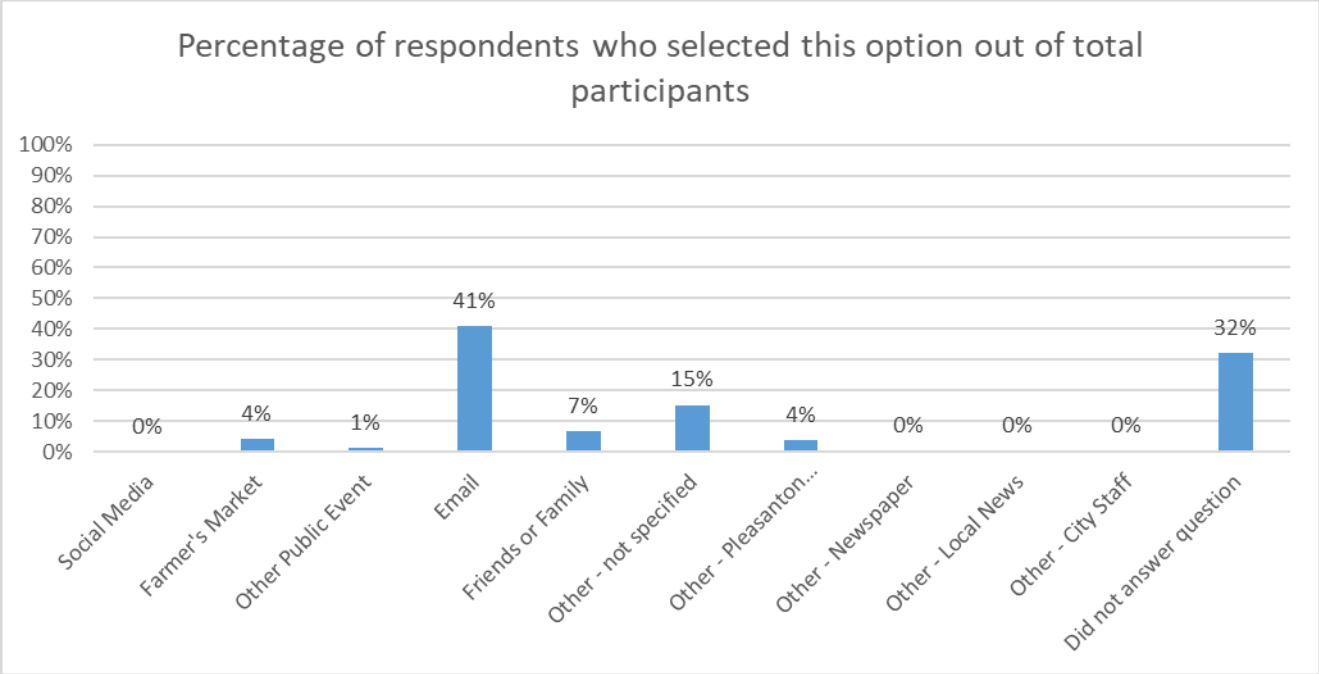
20. Which of the following age groups are you a part of?		
Age Category:	Number of survey respondents who selected this option	Percentage of respondents who selected this option out of total participants
Under 18	9	1%
18-24	6	1%
25-34	21	3%
35-44	64	11%
45-54	134	22%
55-64	152	25%
65+	208	34%
Did not answer question	9	1%



21. What is the highest level of education you have attained?		
Highest level of education Category:	Number of survey respondents who selected this option	Percentage of respondents who selected this option out of total participants
Graduate	276	46%
Bachelor	218	36%
Associates	28	5%
Some college but no degree	53	9%
High school diploma	6	1%
No high school diploma	7	1%
Did not answer question	15	2%



22. How did you hear about this survey?		
Where did participant hear about survey Category:	Number of survey respondents who selected this option	Percentage of respondents who selected this option out of total participants
Social Media	0	0%
Farmer's Market	25	4%
Other Public Event	7	1%
Email	246	41%
Friends or Family	40	7%
Other - not specified	65	15%
Other - Pleasanton Patch/Weekly	22	4%
Other - Newspaper	2	0%
Other - Local News	2	0%
Other - City Staff	1	0%
Did not answer question	193	32%



Other Responses	Count
Pleasanton Patch/Weekly	22
Newspaper	2
Local News	2
City Staff	1

Appendix I

Recommendations

Table I-1. Recommendations by Section

Chapter	Sub-Section	Section Title	Recommendations
1	1.2.1	Budget	Explore new potential funding sources to increase the urban forestry budget and reduce funds drawn from the General Fund and Urban Forestry Fund
	1.2.2	Funding Pleasanton's Future Urban Forest Goals	The City should first focus on filling the 1,106 vacant sites in the target neighborhoods along with creating the tree-giveaway program for private residences. The City should also explore opportunities to reduce the number of new tree sites to be created by identifying any undocumented vacant sites that already exist in parks, medians, parkways and rights-of-way. Identify which public tree sites with smaller trees can be replaced with larger canopy tree species, without creating infrastructure conflicts. Create and maintain a standardized system for tracking tree plantings by private residents and businesses. Focus on building relationships with target schools and research funding opportunities like CALFIRE's Green Schoolyards grant program that may be able to provide resources for tree planting projects, outreach and education in the target neighborhoods. Analyze the success of the initial tree giveaway programs and consider whether creating a new front yard ordinance is needed. Consider whether to reduce the length of the tree establishment program to save additional costs.
	1.2.3	Staffing	Explore the capacity of current positions or create a new Urban Forestry Team that's overseen by a dedicated Urban Forest Manager (who is a certified arborist) to coordinate with all City departments on implementation of the UFMP and to oversee urban forestry programming, tree care and management, and community engagement efforts including finding and applying for grants, educating the public, and coordinating with non-profits.
	1.2.4	Annual Tree Service Data	Continue to keep current and detailed records on the total number of pruning, plantings, and other services performed by the City each year.
	1.3.1	Tree Planting	Ensure an equal number of replacement trees are planted when City trees are removed
			Aim to first fill all 1,106 viable vacant sites with trees in target neighborhoods, and continue filling other vacant tree sites as funding allows.

			For detailed information on the number of trees required to achieve canopy cover goals and the specific areas of the city where tree plantings should be concentrated, please refer to Chapters 2 and 3 of the Technical Assessment
	1.3.1.1	Tree Selection	Tree planting should start with a site analysis. Once site characteristics are understood, consult the updated tree list to find an appropriate species that matches the site conditions.
			Develop and maintain a set of notes on the species list and regularly evaluate City tree species that are especially beneficial or problematic, or well- or poorly suited for specific locations within the City.
			Maintain species diversity of the City's tree inventory.
	1.3.2	Establishment Care	Establish and maintain a formalized three-year establishment care program that includes watering, mulching, and removal of stakes for all newly planted City trees.
			Allocate a long-term funding stream toward establishment care
	1.3.3	Tree Pruning	Conduct structural pruning while trees are young and developing branching structure (Gilman 2002). This pruning method helps to correct structural defects when the tree is smaller, therefore reducing the labor associated with pruning the tree. Formative pruning offers an opportunity to increase tree safety without significantly increasing City funding for tree maintenance. Implement young tree pruning practice as described in **Appendix J**
			Consider reducing the current five-year pruning cycle to a seven-year pruning cycle and shifting those funding resources to new tree planting and/or establishment care.
	1.3.4	Infrastructure Conflicts	Proper species selection in the planting phase will help minimize the frequency of costly infrastructure conflicts. Refer to **Appendix C: Recommended Tree Species List.**
			Consult **Table 1-10** in the Technical Assessment to determine the most appropriate mitigation option when presented with an infrastructure conflict. Also refer to **Appendix K**.

	1.3.5	Tree Removal	Ensure all trees listed for removal are removed within one month to limit the City's potential liability from tree claims.
			Prioritize alternatives to tree removal, such as sidewalk redesign and root pruning. These methods can help preserve existing trees and maintain urban canopy cover.
			Implement replacements for all City trees removed at a 1:1 ratio or greater.
			Evaluate the environmental consequences of tree removal, such as habitat loss and reduced air quality. This assessment can guide decisions to minimize negative impacts.
	1.3.6	Urban Wood Reuse	Consider alternative and creative uses for urban wood repurposing, such as partnership projects with local schools, artisans, and lumber mills.
			Encourage municipal tree work contractors to provide mulch to residents or consider establishing mulch giveaway locations throughout the City. Another resource to inform residents about is the website chipdrop.com.
	1.3.7	Tree Risk Inspections	Implement tree risk assessment and mitigation procedures developed by the International Society of Arboriculture (Smiley et. al. 2017)
			Develop a periodic tree risk assessment program to inspect City trees, focusing on trees in high occupancy areas. Develop a periodic park tree risk assessment program. Trees with conditions that present a greater risk than the City is willing to accept should be promptly mitigated.
	1.3.8	Tree Maintenance Responsibilities	Utilize **Appendix L: Tree Maintenance Responsibilities** as a guideline to determine tree maintenance responsibilities.
2	2.3	Canopy Cover Assessment	Consider conducting further analysis to identify specific areas of increased canopy to better understand the factors driving this expansion.
	2.4	Increasing Canopy Cover	Increase city-wide canopy cover to 30% by 2050
	2.4.1	Private Property	Consider implementing an In-lieu fee and alternatives (within the Tree Preservation Ordinance) when protected trees are removed and on-site replacement is not feasible

			Host a series of outreach events to help community understand the new tree ordinance
			Host annual tree education events centered around the UFMP initiatives, the tree ordinance, and tree plantings
	2.5	Species Diversity	Increase diversity of City-managed tree species to meet genus and species diversity goals
	2.6	DSH Distribution	Develop a detailed tree planting succession plan that identifies areas with a high concentration of mature trees and schedules the planting of younger trees nearby. This ensures that as mature trees decline, there are already younger trees in place to take over. Develop long-term planting plans aimed at maintaining the age diversity recommendations shown in Table 2-9.
	2.7	Tree Condition and Relative Performance Index	Implement a strategic planting plan and install only species from the recommended tree species list during new and replacement tree plantings
3	3.2	What Environmental Equity Means to Pleasanton	Focus on investing in neighborhoods with the highest canopy needs/Tree Equity Scores, engaging residents in the process of expanding and maintaining their local tree canopy and preserving existing mature trees. By prioritizing resources where they are needed most, Pleasanton can reduce canopy gaps and ensure that all residents benefit from the urban forest.
4	4.2.1	City of Pleasanton Design Guidelines	It is recommended that the City add Standard Details for: ▪ Nursery Stock Standards ▪ Spacing Guidelines ▪ Young tree establishment ▪ Pruning guidelines
	4.4	Other Laws Pertaining to Trees	In response to AB 1572 (Non-functional Turf Ban) and to account for this loss of automated sprinkler irrigation, the City should consider installing drip irrigation or instituting a summer deep watering program for new and young trees. In addition, the City should also increase efforts for planting more trees on private property, to make up for any potential future tree deaths resulting from the lost sprinkler irrigation.
5	5.1.1	Online Surveys	Continue to outreach to City residents to ensure that diverse prospective are heard and valued

Appendix J

Arboriculture Best Management Practices

- Nursery Stock Standards
- Tree Spacing Guidelines for Residential Yards and City Streets
- Tree Planting Guidelines
- Tree Staking Guidelines
- Watering Guidelines
- Young Tree Pruning
- Mature Tree Pruning
- Tree Risk Assessment Qualification (TRAQ)
- Trees and High Wind
- Mature Tree Protection During Construction Guidelines
- Tree Care for Wildlife and Migratory Bird Treaty Act
- Tree Replacement to Expand Canopy Cover

City of Pleasanton Existing Tree-Related Landscaping Design Standards

- Tree Planting Detail (806)
- Root Barrier Detail (807)
- Root Pruning (824)
- Tree Protection Detail (829)

Appendix J

Nursery Stock Standards

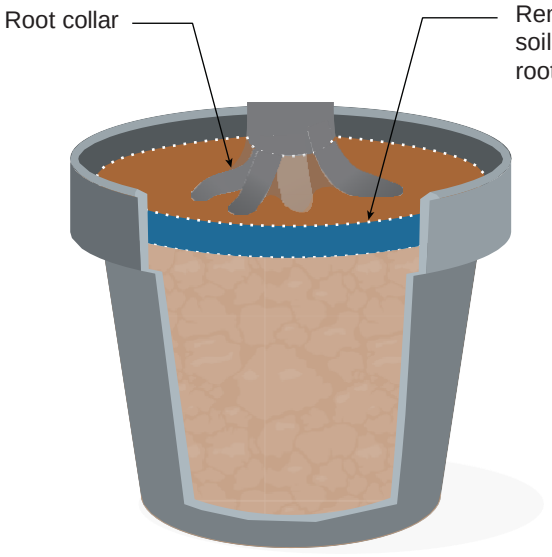
Introduction

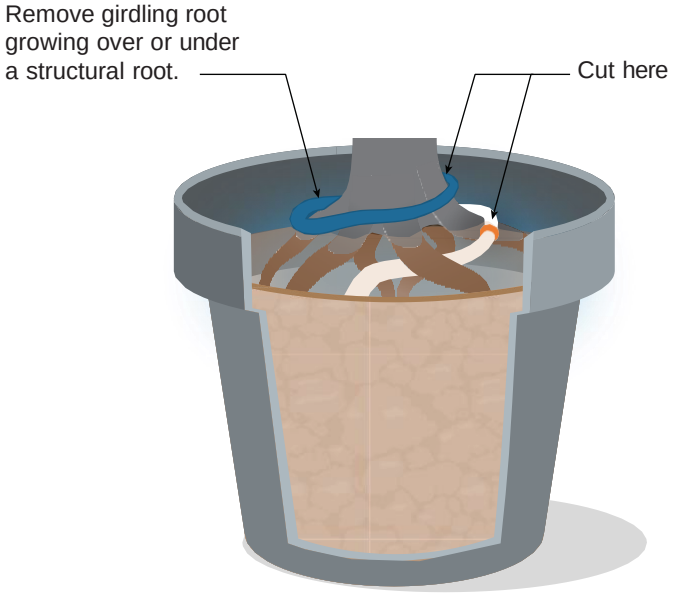
The quality of nursery stock has lasting effects on tree longevity, highlighting the importance of nursery stock inspection and selection. This appendix visually displays the nursery selection BMPs and provides explanations on why this practice is important for tree longevity.

Table of Nursery Stock Characteristics

Characteristic	Reasoning	Relation to Longevity
Root ball	Inspect root ball to ensure roots are white in color.	Healthy roots are necessary for tree roots to efficiently absorb water and nutrients and provide the entire tree with resources for tree growth and health.
	Reject stock that have roots with a sour smell.	
	Remove girdling roots at the time of planting or reject stock.	Girdling roots restrict the tree's water and nutrient flow from roots to the rest of the tree reducing growth and health.
	Ensure structural roots are horizontal and reach the root ball periphery.	Trees with horizontal roots and balanced root structure enable the roots to access larger soil areas which may contain more nutrients and water to provide to the tree.
Branching structure	Look for specimens with a strong, central leader, branch aspect ratio less than 1/3rd of the trunk for each primary branch, with even branch distribution both radially and vertically.	Trees with optimal structure will have less defects to correct as the tree establishes into landscape. When trees are pruned or corrected for defects at the time of planting, trees need resources to compartmentalize the wound and heal. By avoiding these defects, trees will be able to establish without a need for greater resources including water.
Quality of stock	Trees should be healthy and vigorous with no signs of drought stress, die-back, pest or disease, and no signs of mechanical injury.	Healthy trees with no signs of stress establish into the landscape more readily.

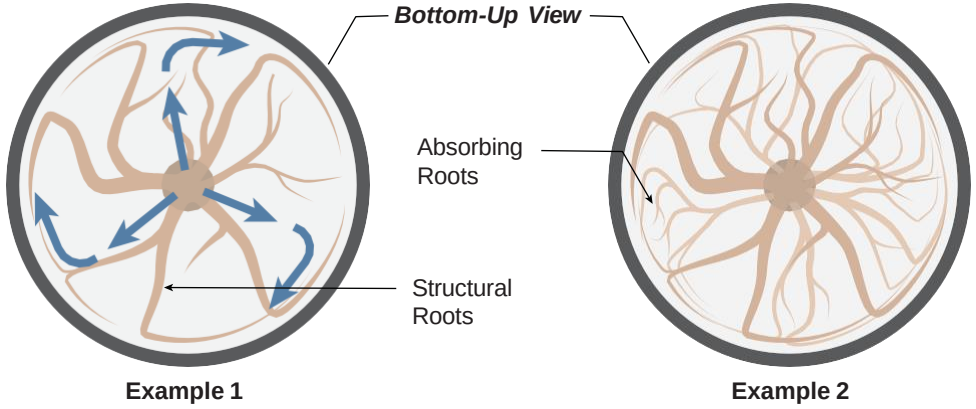
Root Correction for Container Grown Trees





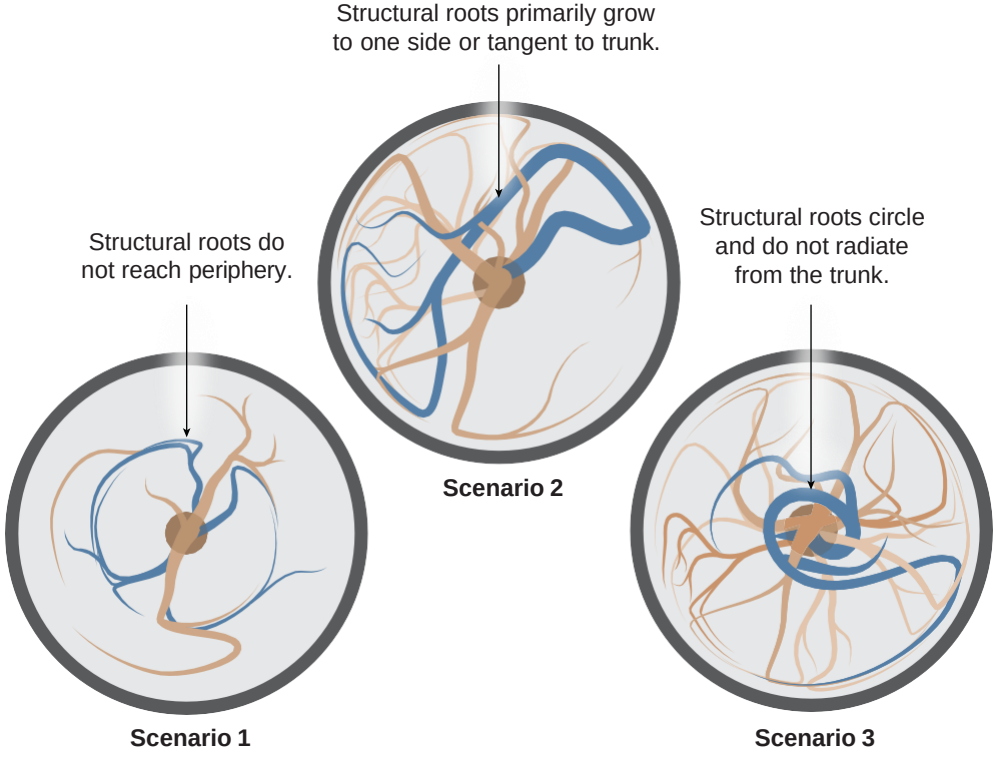
Accept

Roots radiate from trunk and reach each side of root ball without deflecting down or around.



Example 1 **Example 2**

Reject



Scenario 1 **Scenario 2** **Scenario 3**

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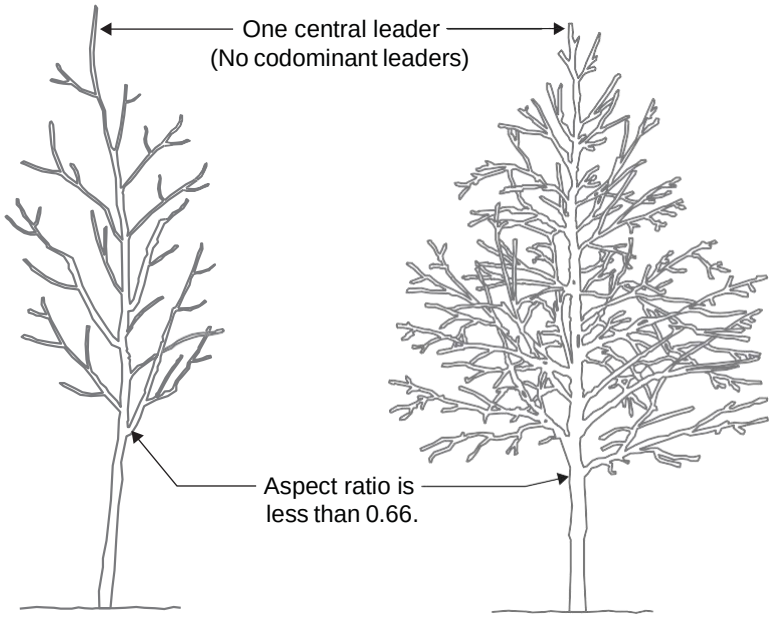
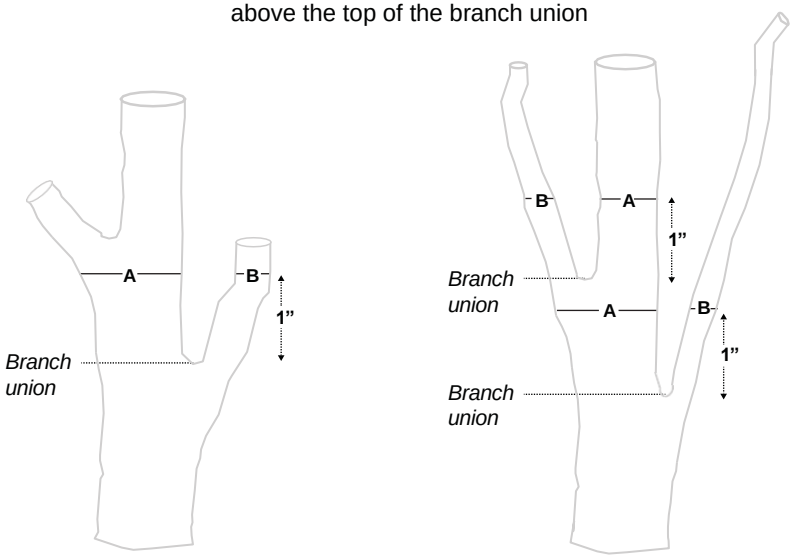
Nursery Stock Selection

Accept

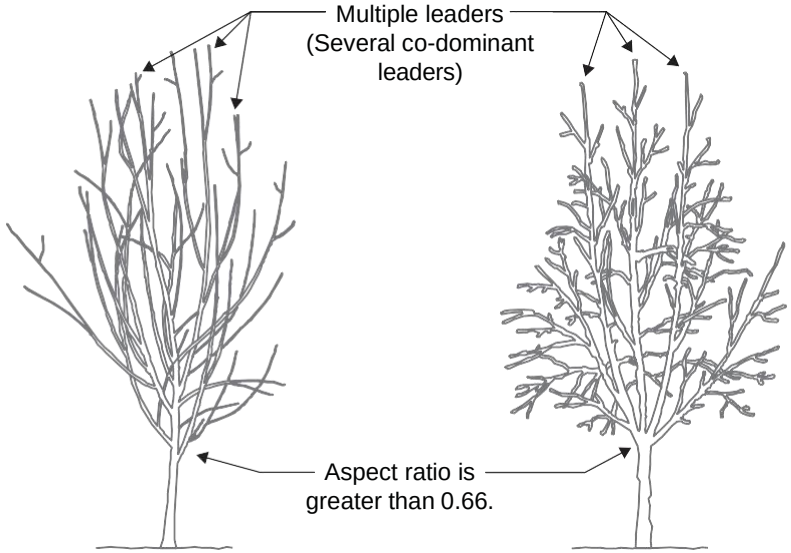


Accept

Aspect ratio of B:A less than 0.66 as measured 1"
above the top of the branch union

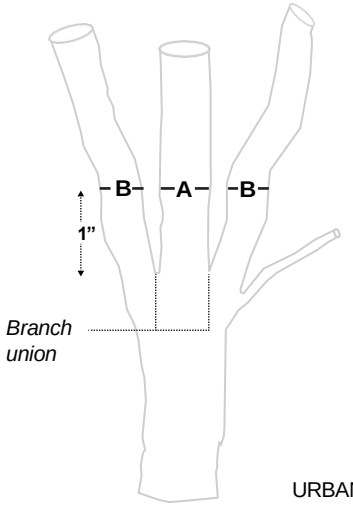


Reject



Reject

Aspect ratio of B:A greater than or equal to 0.66 as measured 1"
above the top of the branch union.



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NOTE: 1. *Nursery stock with significant mechanical injury, serious root defects, and trees that show signs of dehydration are to be rejected.* ***2.*** *Aspect ratio shall be less than 0.66 on all branch unions. Aspect ratio is the diameter of branch (B) divided by the diameter of the trunk (A) as measured 1" above the top of the branch union.* ***3.*** *Any tree not meeting the crown observations detail may be rejected.*

Appendix J

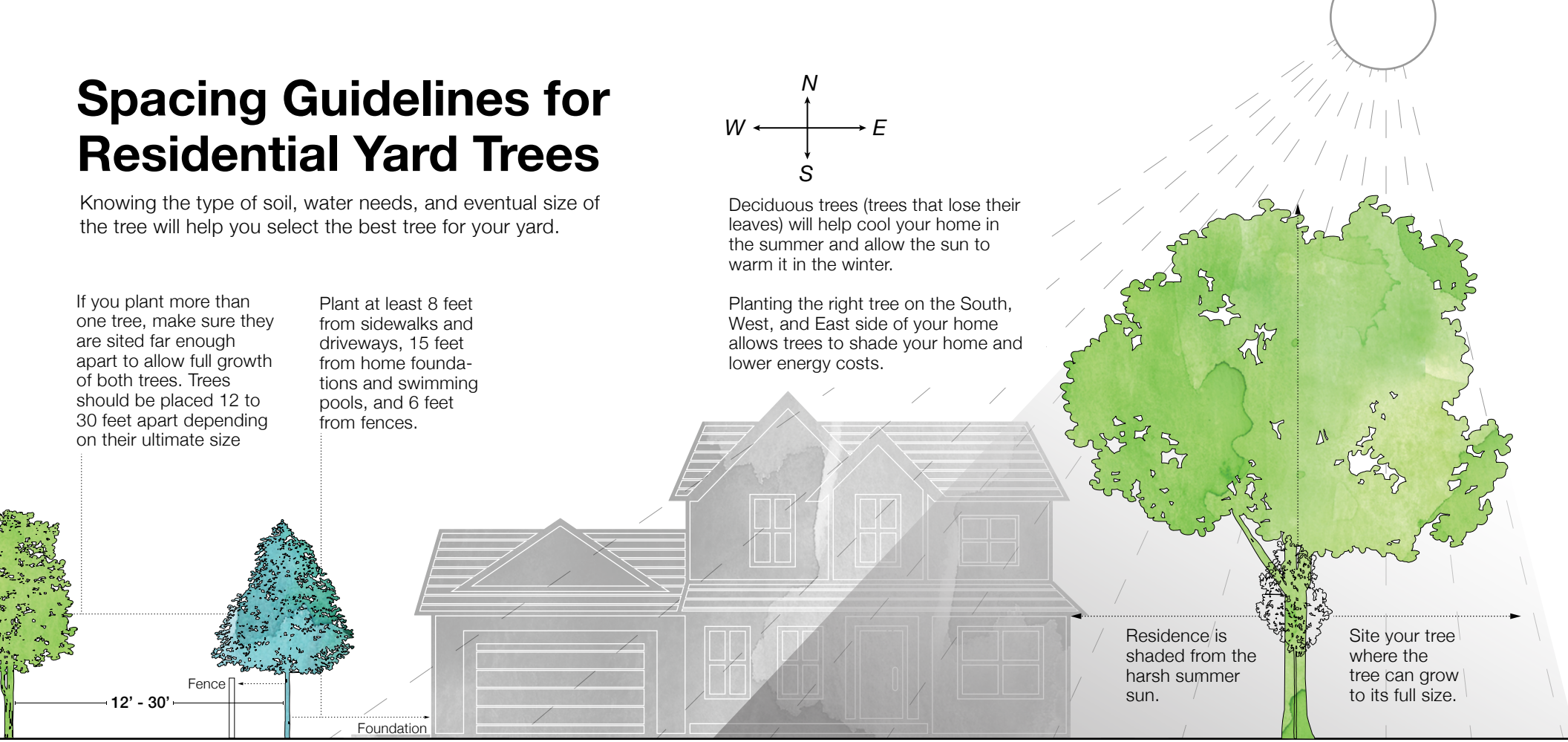
Tree Spacing Guidelines for Residential Yards and City Streets

Spacing Guidelines for Residential Yard Trees

Knowing the type of soil, water needs, and eventual size of the tree will help you select the best tree for your yard.

If you plant more than one tree, make sure they are sited far enough apart to allow full growth of both trees. Trees should be placed 12 to 30 feet apart depending on their ultimate size

Plant at least 8 feet from sidewalks and driveways, 15 feet from home foundations and swimming pools, and 6 feet from fences.



Deciduous trees (trees that lose their leaves) will help cool your home in the summer and allow the sun to warm it in the winter.

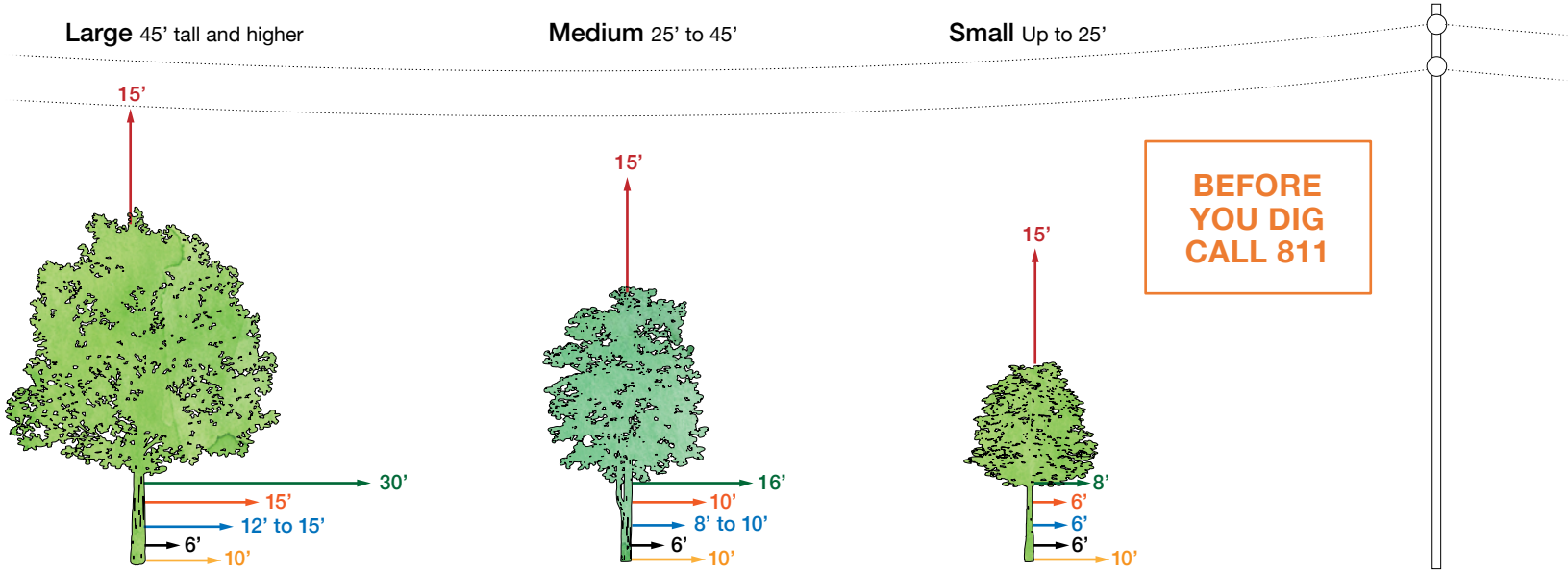
Planting the right tree on the South, West, and East side of your home allows trees to shade your home and lower energy costs.

Residence is shaded from the harsh summer sun.

Site your tree where the tree can grow to its full size.

Spacing requirements by tree size

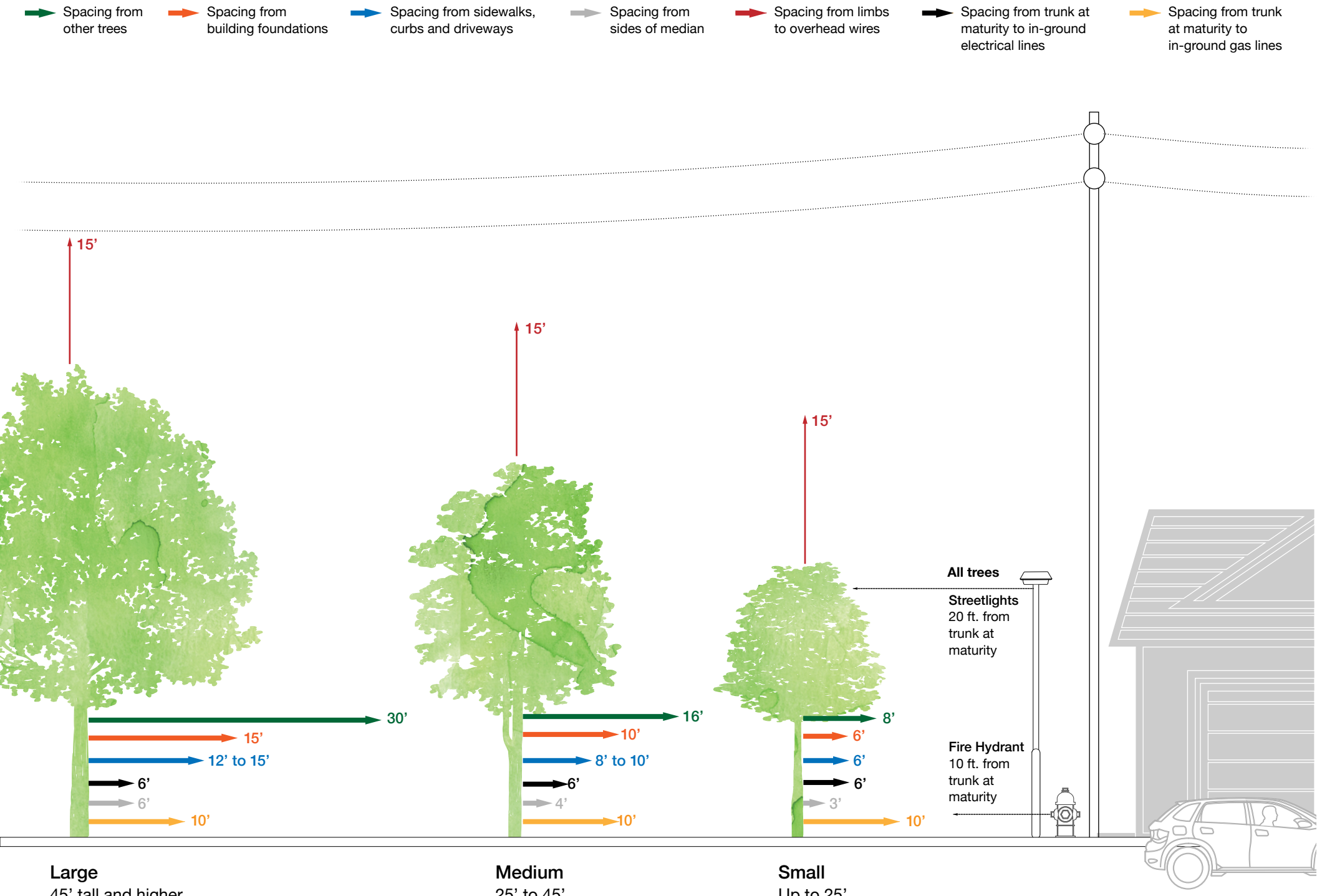
- Spacing from other trees
- Spacing from building foundations
- Spacing from sidewalks. curbs and driveways
- Spacing from limbs to overhead wires
- Spacing from trunk at maturity to in-ground electrical lines
- Spacing from trunk at maturity to in-ground gas lines



BEFORE YOU DIG CALL 811

Source: Sacramento Tree Foundation

Spacing Guidelines for Street Trees



Large
45’ tall and higher

Medium
25’ to 45’

Small
Up to 25’

Appendix J

Tree Planting Guidelines

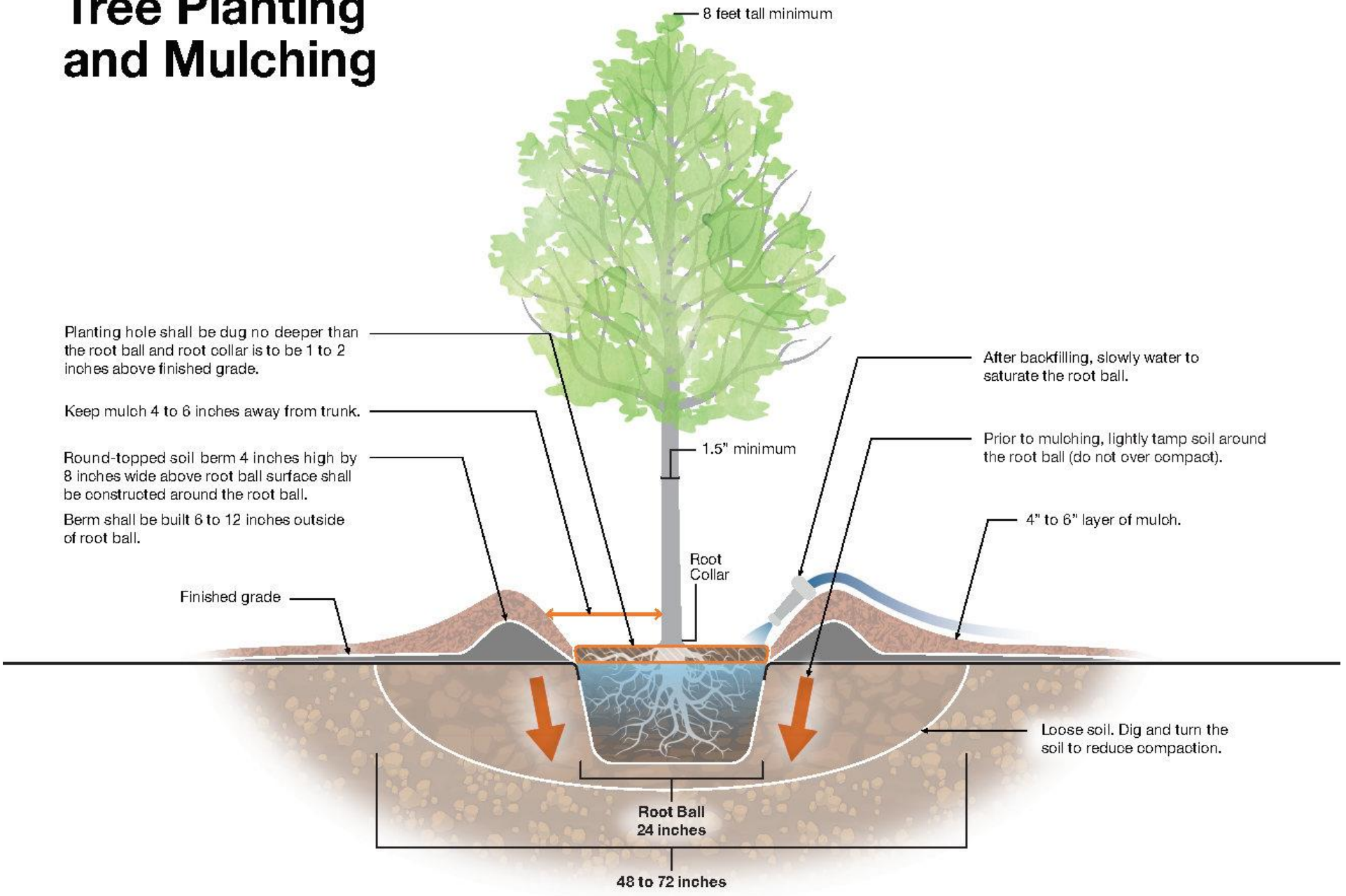
Introduction

Tree establishment and long-term survival can be impacted greatly by the actions taken during planting, such as the width and depth of the planting hole, placing the tree at the right depth, and proper staking. Refer to this appendix covers tree planting details and use the appendix for tree spacing guidelines to minimize future infrastructure conflicts. The table below provide explanations on why these practices are important for tree longevity.

Table D-1. Tree Planting Characteristics

Characteristic	Reasoning	Relation to Longevity
Planting depth	Planting a tree too deep or too shallow will inhibit the tree's establishment and growth.	If planted too shallow, tree roots will not have soil to establish in, decreasing the water and nutrients available to the tree overall. Planting a tree too deeply, may cause roots to suffocate and cause root rot.
Water at planting	Ensure newly planted trees receives 15 gallons of water, applied slowly upon planting.	Watering a tree after planting reduces transplant shock experienced by the tree and its roots, helping establishment.
Staking at planting	Trees that lean at the time of planting should be staked with one, two, or three stakes and supported by flexible ties. Each stake and tie shall allow movement of the tree trunk to develop trunk taper.	Leaning trees can be corrected to grow vertically with the support of stakes and ties. Trees that grow with a lean into maturity can potentially cause conflicts with pedestrian or vehicle paths of travel. Tying stakes to a tree too tightly will prevent movement of the tree, slowing the growth of the trunk and inhibiting establishment of a strong root system that can support the tree during high wind events.
Plant early in the planting season	Plant trees in winter months while rain events are likely and high heat events are less frequent.	Planting new trees in winter months will allow the tree to take advantage of rain events and limited heat stress. Providing water to newly planted trees through the planting season when not naturally occurring, assist the tree in the early phases of establishment.

Tree Planting and Mulching



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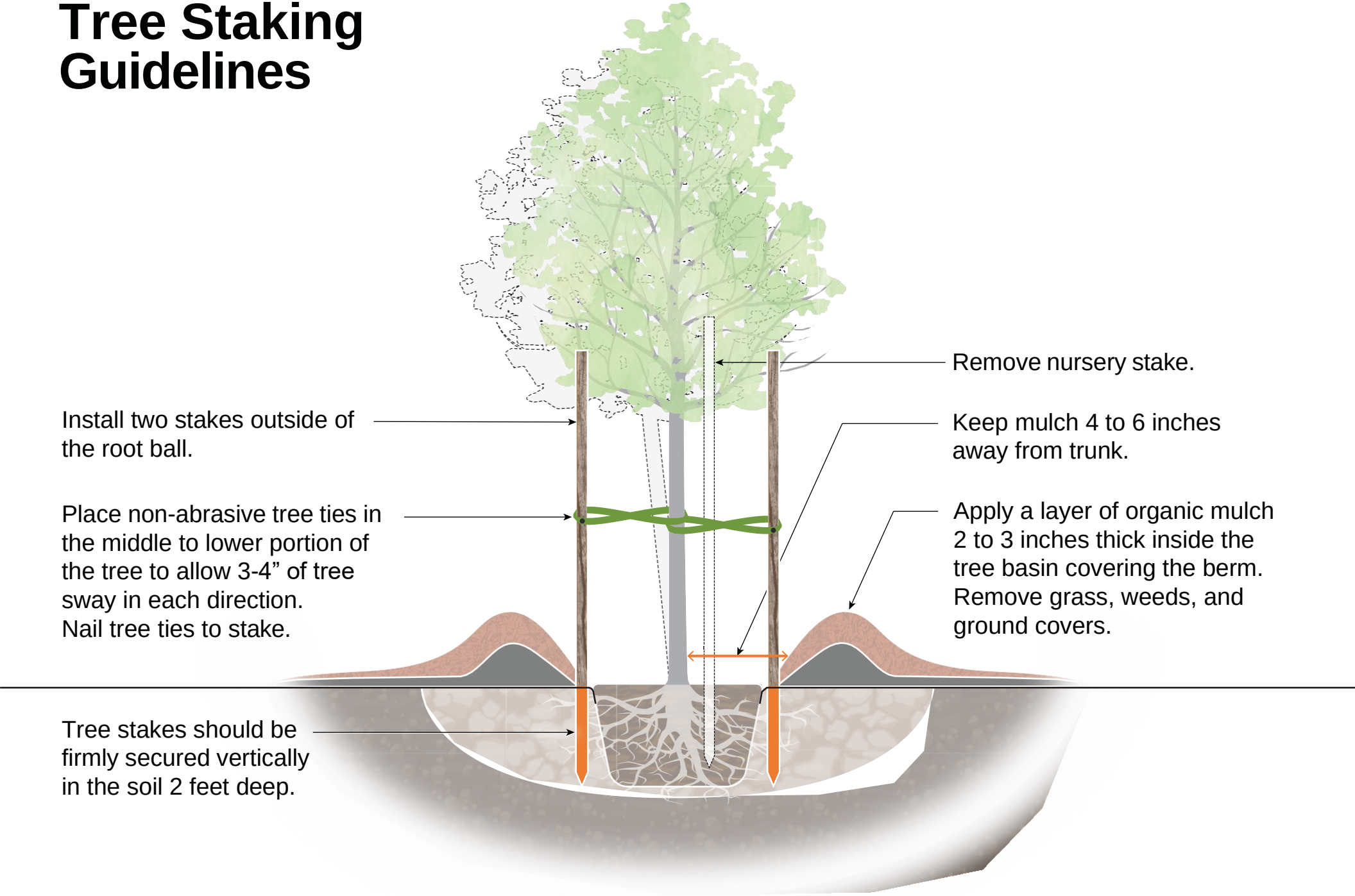
Tree Staking Guidelines

Tree Staking Guidelines



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Appendix J

Tree Watering Guidelines

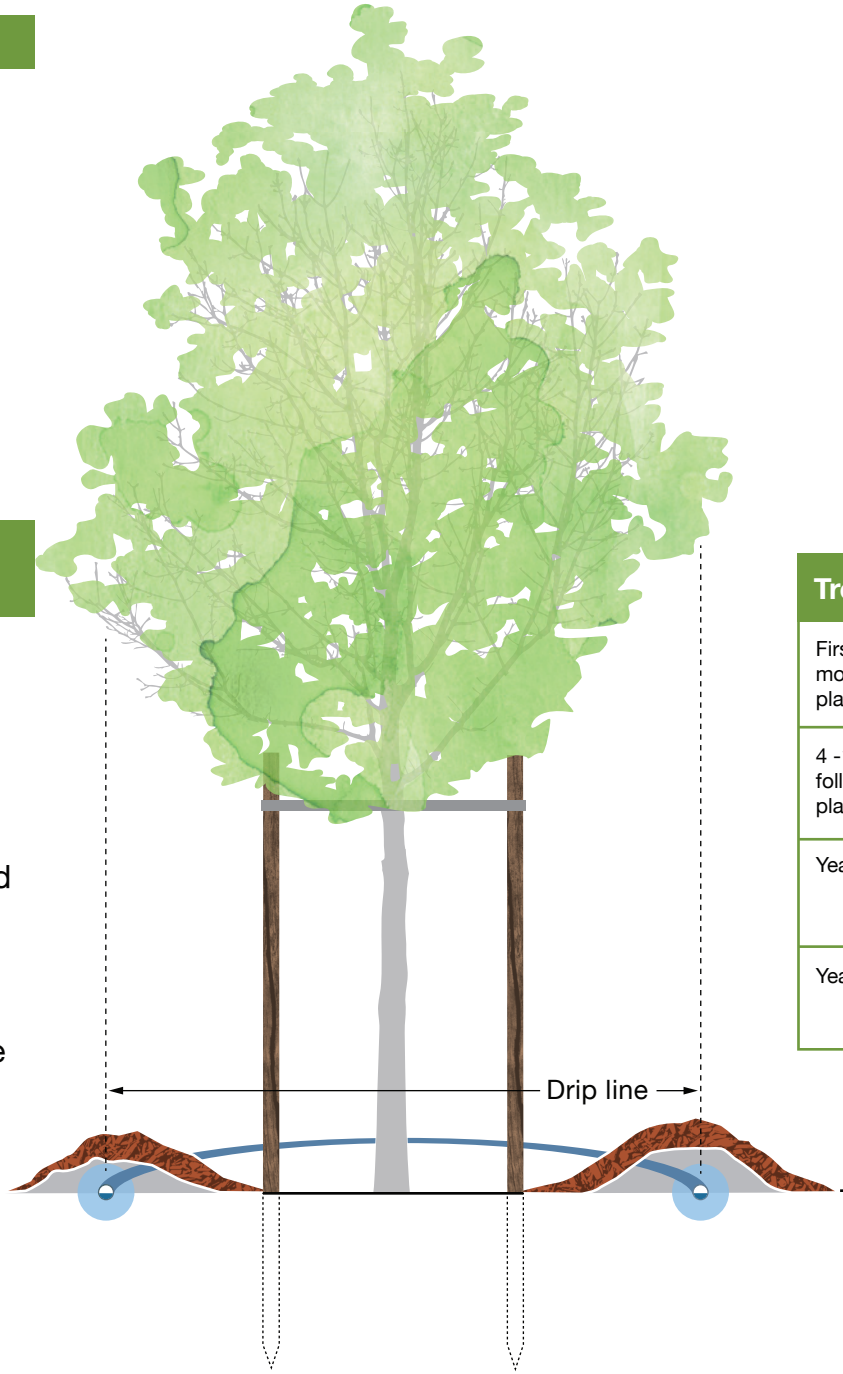
Watering Guidelines

Watering for Wet Seasons

- Prolonged saturated soil can lead to tree mortality.
- Turn off irrigation during rain events.
- To avoid over watering a newly planted tree, monitor soil moisture after rain events.
- If soil is saturated, stop watering. Resume watering when soil is dry.

Watering Guidelines for Hot and Dry Seasons

- Prolonged and unexpected extreme heat waves can threaten a newly planted trees survivability by depleting the available water inside the tree and in the soil.
- During these periods trees may need additional watering once or twice a week to be sustained.
- It is critical to provide additional water as soon as possible during extreme heat events to maintain tree health and vigor.



Tree Age	Frequency	Quantity
First 3 months after planting	Deep water by filling basin twice a week	10-15 gallons per watering
4 -12 months following planting	Fill the water basin every week or every other week	10-15 gallons
Year 2 - 3	Every 2 - 4 weeks May through October	15-20 gallons
Year 4 - 7	Once a month May through October	deep watering

Appendix J

Young Tree Pruning Guidelines

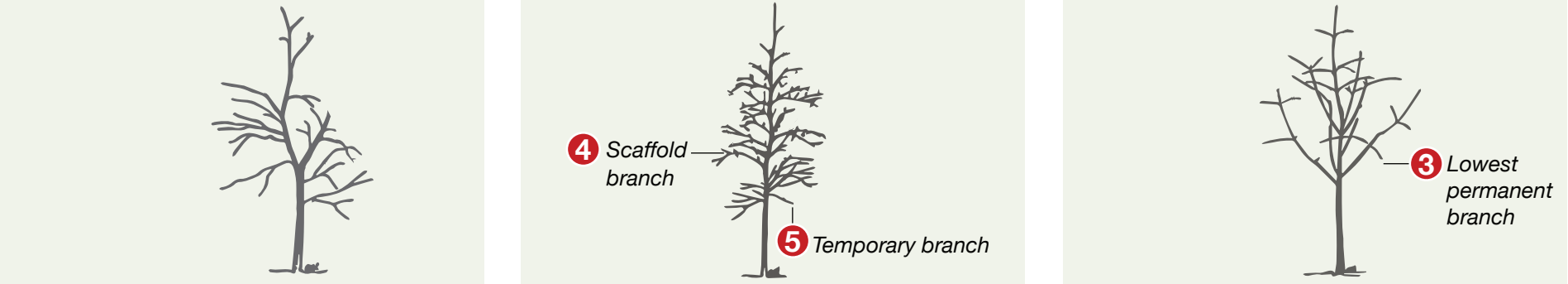
Pruning to Improve Young Tree Structure

1. Remove broken branches.
2. Select central leader and remove competing leaders.
3. Select lowest permanent branch.
4. Select scaffold branches.
5. Select low temporary branches. Cut back and leave as temporary.

BEFORE PRUNING

WHAT TO PRUNE

AFTER PRUNING



NOTE: 1. At the time of planting, limit pruning to removal of broken, dead, or diseased branches only.
2. Young Tree Structural Pruning is to occur only after trees establish and resume normal growth rates following planting.

Structural Pruning: A Guide for the Green Industry
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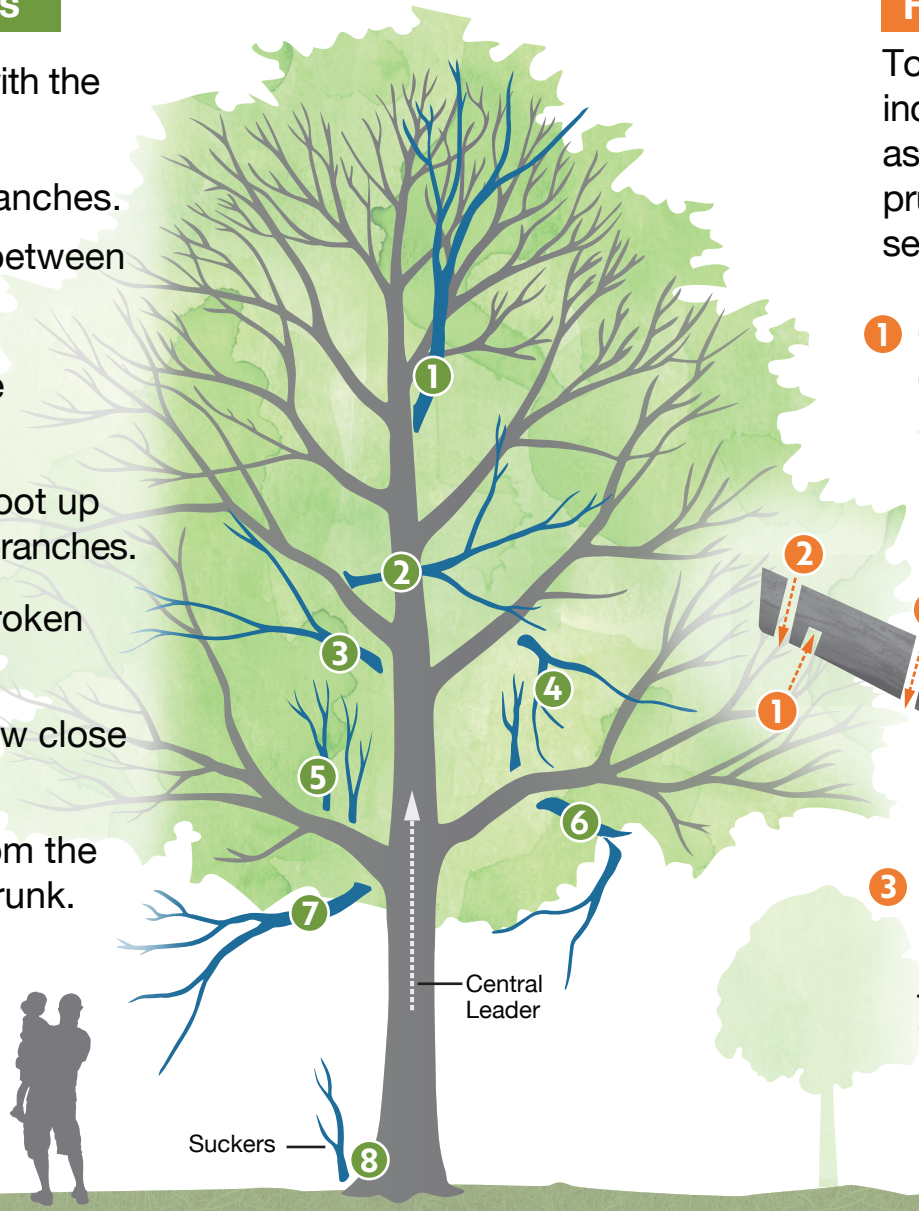
Appendix J

Mature Tree Pruning Guidelines

Tree Pruning

Healthy Pruning Cuts

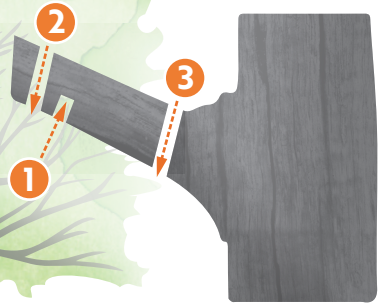
1. Limbs that compete with the tree's central leader.
2. Rubbing, crossing branches.
3. Inadequate spacing between branches.
4. Awkward unattractive branches.
5. Watersprouts that shoot up from main "scaffold" branches.
6. Dead, diseased, or broken limbs.
7. Limbs that sag or grow close to the ground.
8. Suckers that grow from the roots or base of the trunk.



How to Make a Pruning Cut

To prune a tree limb larger than 2 inches in diameter cleanly and safely, as shown in the image above, use a pruning saw and make these three sequential cuts:

1. On the bottom of the limb between 6 and 12 inches from the trunk; cut about one-quarter of the way through.



2. Through the limb from the top, starting about 1 inch beyond the first cut. The weight of the branch may cause it to snap off before the cut is complete.
3. Cut completely through the short remaining stub from top to bottom just beyond the swollen branch collar. Support the stub while sawing to make a clean cut.

Appendix J

Tree Risk Assessment Qualification (TRAQ)

Introduction

The International Society of Arboriculture (ISA) developed a specialized Tree Risk Assessment Qualification (TRAQ), training arborists to effectively assess tree risk using a systematic and documented process. TRAQ arborists are equipped to systematically assess tree health, structural integrity, likelihood of tree failure, time frame in which failure may occur, likelihood of impact to target (e.g., people, home, car), and severity of impact should it occur. TRAQ arborists are trained to consider solutions to mitigate tree risk prior to considering removal as a recommendation.

Tree risk management begins with the tree owner establishing an acceptable level of risk (ISA 2017) and identifying the appropriate level of assessment to determine the risk of individual trees. Three levels of risk assessment exist in the ISA TRAQ program which vary in detail and equipment used to complete the assessment: level 1 limited visual assessment, level 2 basic assessment, and level 3 advanced assessment (shown in the table below). Municipalities often utilize all levels of assessment throughout the City to balance risk assessment programs with responsible use of public funds. A level 1 assessment is often used to first identify trees that are high risk. Once high-risk trees or areas of concern are identified, a level 2 assessment occurs for individual trees and mitigation follows, A level 3 assessment is typically reserved for trees of significance, protected trees, or large mature trees that provide value to the community with costly replacement. Effective risk management depends on tree risk assessments being conducted on a regular basis, occurring every 3-5 years as tree risk conditions may develop as trees continue to mature. By utilizing these three assessment levels, the City can manage tree risk prior to failure and retain trees where risk can be mitigated.

ISA Risk Assessment Levels

Risk Assessment Level	Description
Level 1	'Windshield' survey to identify high risk trees while driving or walking. Only major defects or concerns are observed and recorded.
Level 2	360-degree observation of the crown, limbs, and trunk. Determination of targets (homes, people, cars) that may be impacted by tree or limb failure. Level of damage to the target should impact occur.
Level 3	Advanced assessments of the roots, stem, or crown. Analyze internal aspects of trees using sophisticated tools and technology.

Appendix J

Trees and High Wind

Introduction

High wind events can result in costly damage to trees throughout a City. Minimizing wind related damage to trees is a priority for the City. The table below exhibits tree characteristics and management practices that influence tree risk in high wind areas. Findings are based on arboricultural best management practices and wind and tree management research studies. However, it should be noted that in extreme weather events, many tree failures are unexpected and happen to healthy trees.

Findings For Tree Care in High Wind Areas

Findings	Considerations
Damage to roots from construction can impact a tree's structural stability for decades following.	Susceptibility to windstorms may warrant more stringent protection criteria such as larger Tree Protection Zones (TPZs) than other municipalities.
Certain pruning methods of branches and roots can have detrimental effects on a tree's structural integrity.	Pruning methods such as topping and lion tailing should be prohibited. Pruning trees to establish structurally sound trees with proper trunk and branch taper decrease risk of failure in high wind areas. Exercise caution and consider long term impacts when root pruning on the windward side of a tree.
Most trees fall in the same direction as the prevailing winds during the storm.	Use data from past storms to analyze potential targets at risk based on historic wind direction.
Each species of tree has specific traits such as root vigor, wood composition, and branch structure.	Use the species list, observations from past storms, and online resources to discern which species are suitable to plant in areas vulnerable to high winds.

Source: Gilman, Ed (2015). Storm Damage Prevention: Lessons Learned. Web. Accessed March 2024. International Society of Arboriculture (2017). Tree Risk Assessment, Second Edition.

Appendix J

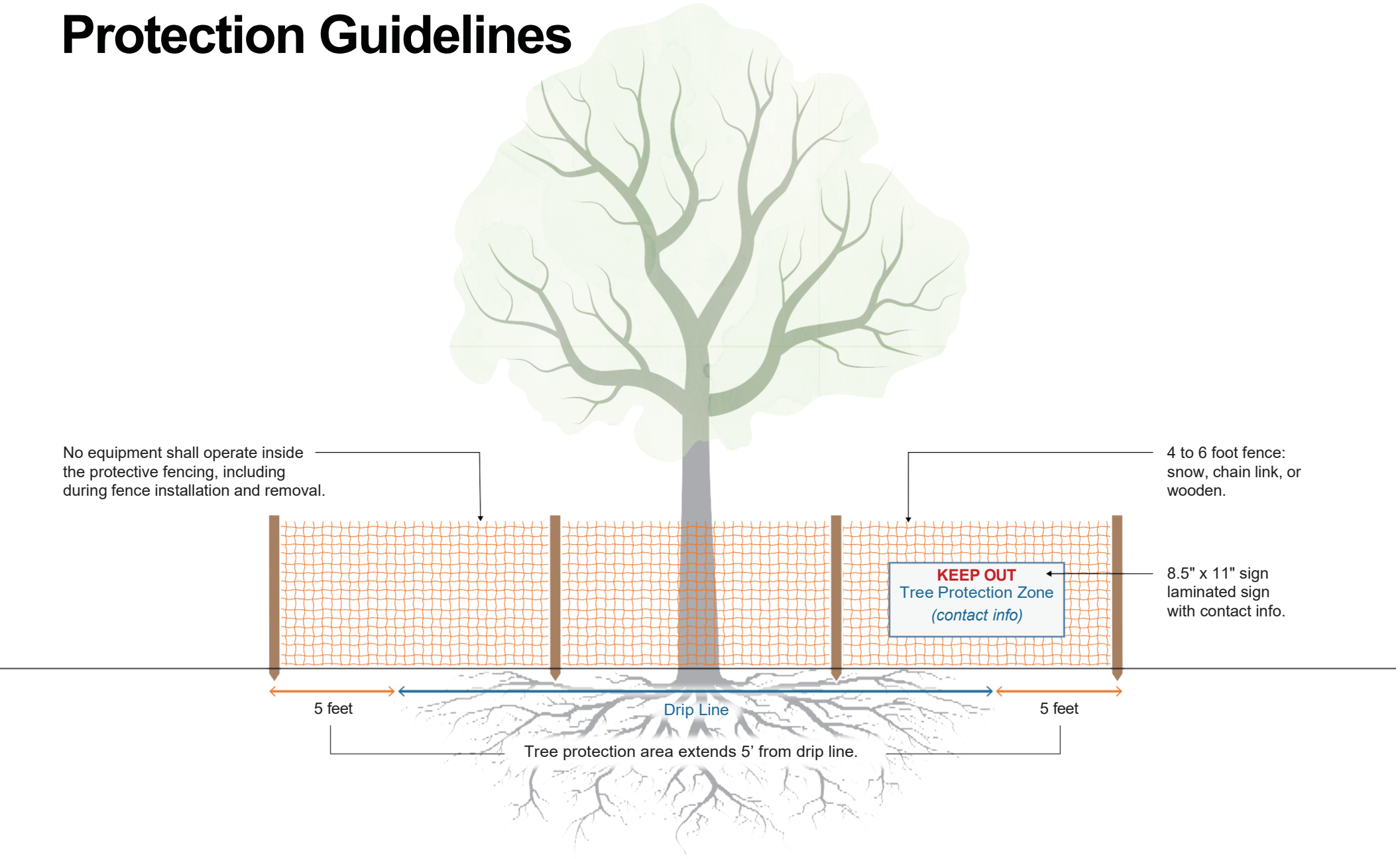
Mature Tree Protection During Construction Guidelines

Introduction

Construction for development, maintenance, and renovation can pose threats to tree survivability in numerous ways. Threats include injury to roots, trunks, and branches; soil compaction; soil contamination; and improper pruning. Including an arborist in the planning stages of construction helps avoid damage when trees intersect with the built environment. Arborists identify which trees will be retained or removed, create site-specific tree protection protocols, and establish areas where replacement trees will be planted. Pleasanton's Municipal Code (§17.16.070) provides guidelines for the mandatory tree protections during construction. Further detail for tree protection requirements may have significant benefits on the urban forest, as described below:

1. **Tree Protection Zones:** A Tree Protection Zone (TPZ) is an area surrounding a tree and its critical root zone where no grading, excavation, construction activity, equipment storing, or vehicle parking is to occur. The purpose of the TPZ is to protect all parts of the tree, both above and below ground. The size of TPZ ranges between tree owners; however, research suggests that a TPZ should be at least 1.5 inches wide per every inch DSH (Day et al. 2010). A successful TPZ is surrounded by signed fencing that reads "Keep Out: Tree Protection Zone."
2. **Reducing Compaction:** When soil is compacted, water and oxygen available to tree roots is limited, leading to detrimental issues for a tree. In construction areas, compaction occurs purposefully through mechanical compaction or incidentally through the passage of vehicles and construction equipment over soil containing a tree's roots.
3. **Minimizing Effects of Grade Changes:** The optimal zone for root growth is within the first 12 inches of soil depth. Any change in grade within a tree's rooting zone will likely cause negative impacts for tree health. The degree to which these impacts affect the tree depends on the age of the tree, species, prior stressors, and environmental factors.
4. **Inspection:** Trees impacted during construction, maintenance, or renovations, should be monitored for decline annually by an ISA Certified Arborist for the first 5 years after construction. Monitoring should include photographs, annual reports, and mitigation techniques if necessary.

Mature Tree Protection Guidelines



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Appendix J

Tree Care for Wildlife and the Migratory Bird Treaty Act

Introduction

Tree care professionals need to be aware of their impact on wildlife because their activities can directly or indirectly harm animals. Direct harm includes injuring or killing wildlife or removing nests with eggs or young. Indirect harm involves actions like removing vegetation that protects nests from weather or predators. Understanding these impacts helps arborists balance their work with wildlife care, ensuring they minimize harm while maintaining and creating habitats. This awareness is crucial for preserving urban biodiversity and supporting species that depend on specific tree structures, like dead branches.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act of 1918 (MBTA) (16 U.S.C. 703-712) plays a significant role in tree care by protecting migratory birds from harm during tree care activities. Here are some key points:

Protection of Birds: The MBTA makes it illegal to harm, kill, or disturb migratory birds, their nests, or their eggs without a permit. This includes both direct harm (e.g., cutting down a tree with an active nest) and indirect harm (e.g., removing vegetation that protects a nest).

Industry Standards: Tree care professionals must follow best practices to comply with the MBTA. This includes conducting pre-work inspections to identify and avoid disturbing active nests.

Minimizing Impact: The MBTA encourages arborists to adopt methods that minimize the impact on bird habitats. This can involve timing tree care activities to avoid nesting seasons (birds in California generally nest between February and August) and using techniques that reduce the risk of disturbing birds.

Legal Implications: Violating the MBTA can result in significant fines and penalties. Therefore, municipalities and tree care companies must be diligent in their practices to avoid unintentional harm to migratory birds.

By adhering to the MBTA, tree care professionals can help protect bird populations and contribute to the conservation of biodiversity in urban environments.

Minimizing Impacts to Wildlife During Tree Care:

Tree care work varies in its risk to wildlife, and proper preparation and on-site actions can reduce these impacts. Best management practices for minimizing impacts for wildlife are organized into the following categories:

Training:

Ensuring tree care workers are aware of wildlife and can involve trained professionals when needed. Training levels range from basic awareness to Wildlife Trained Arborists to Wildlife Biologist with specialized knowledge in wildlife protection and habitat assessment.

Project Preparation:

Assessing the breeding season and habitat value of a site to categorize the work and minimize impacts. This involves desktop reviews and site visits to understand potential wildlife presence. In California, nesting season for birds is generally from February through August. For standalone projects involving trees, work

should be done outside of these nesting season months if possible. For municipalities that need to prune thousands of trees each year, it is usually not possible to conduct pruning and removal activities only during the non-nesting season months, so measures should be implemented to minimize impacts to birds and other wildlife.

Tree care work can be roughly divided into three categories, based on the level of expertise and caution required to mitigate impacts to wildlife:

	Low Habitat Value	High Habitat Value	Sensitive Habitat
Non-breeding Season	Category 1	Category 2	Category 3
Breeding Season	Category 2	Category 3	Category 3

Summary of Categories for Minimizing Impacts to Wildlife:

- **Category 1**: Low value habitat during the non-breeding season. Nesting wildlife are least likely to be encountered. A pre-work inspection by a tree care worker with awareness training is recommended.
- **Category 2**:
    - Low value habitat during the breeding season, where nesting wildlife are more likely to be encountered.
    - High value habitat during the non-breeding season, where valuable habitats are more likely to be encountered.
    - A pre-work inspection by a Wildlife Trained Arborist is recommended.
- **Category 3**:
    - High value habitat during the breeding season or sensitive habitat at any time of the year, where nesting wildlife and valuable habitats are more likely to be encountered.
    - Best practice is to contact a Wildlife Biologist for direction. Companies with a programmatic approach may use a well-trained arborist to minimize impacts.
    - The Wildlife Biologist will provide recommendations on how the project can proceed, which may include timing or methodological changes. Permits from regulatory agencies may be required for work in sensitive areas.

Note: Wildlife can nest year-round in any habitat, so the assessed category may change during fieldwork. Signs of wildlife encountered during fieldwork may require further expertise.

Fieldwork:

Practices should be implemented based on the project's category to protect wildlife during tree care activities. Staff with the appropriate training should conduct the pre-work inspection as mentioned above. If active nests are found that may be impacted by the tree work, the Wildlife Biologist should delay the work

until the young no longer depend on the nest and work can safely proceed. In some cases the Wildlife Biologist may be able to suggest alternative methods to use near the nest, which are discussed below.

Considerations for Work Performed Near Active Bird Nests:

Special guidelines for working near nests to avoid disturbing breeding wildlife include:

- The duration of the work to be completed
- The tools being used
- The species involved
- The distance of the work to the active nest
- The status of the nest (e.g. eggs present, parent incubating, young unable to fly, mature nestlings close to fledging),
- The location specifics (e.g. urban vs. rural)
- The environmental conditions (temperature and wind)

Many nests require sufficient cover to provide protection from the elements and disguise from predators so vegetation removal should be minimized around nests. Additionally, a no-activity buffer, or an area in which no work should occur, should be established around the nest where possible.

Emergencies:

Wildlife emergencies during tree work involve situations where wildlife are injured, orphaned, or in danger, or where nests are abandoned or disturbed. The priority is to avoid these emergencies, but appropriate responses are crucial when they occur:

- **Contacting Wildlife Rehabilitators**: If wildlife are injured or abandoned, contact a local wildlife rehabilitator. Provide detailed information about the situation and species involved. The rehabilitator will guide the next steps, which may include doing nothing to allow parents to return or safely transporting the wildlife.

- **Continuing Work**: After a wildlife emergency, consult a Wildlife Biologist before resuming work. If no emergencies occur and no nesting wildlife are observed, continue working while remaining vigilant. Contact a Wildlife Trained Arborist or Wildlife Biologist if unsure how to proceed.

- **Human Health and Safety Emergencies**: These involve immediate risks to human health or safety. A Wildlife Biologist can help coordinate permission to remove active nests with the US Fish and Wildlife Service and other agencies. In extreme situations, action may be taken before permission is received, but this should be a last resort.

These guidelines help ensure that tree care activities are conducted responsibly, minimizing harm to wildlife while addressing emergencies effectively.

Municipalities and contractors can adopt a programmatic approach to consistently apply these practices across multiple sites. The goal is to balance tree care with wildlife protection, ensuring minimal harm while maintaining habitat value.

References:

U.S. Fish And Wildlife Service. “Migratory Bird Treaty Act of 1918.” Accessed October 9, 2024. https://www.fws.gov/law/migratory-bird-treaty-act-1918

Basset, Corey; Donohue, Kara; Gilpin, Ryan. 2022. Tree Care for Wildlife Best Management Practices with Western Chapter ISA Appendices. https://treecareforbirds.com/wp-content/uploads/2022/04/Tree-Care-for-Wildlife-BMPs-4.13.22-2.pdf

Appendix J

Tree Replacement to Expand Canopy Cover

TREE REMOVAL AND REPLACEMENT TO

EXPAND CANOPY COVER

IF YOU REMOVE...

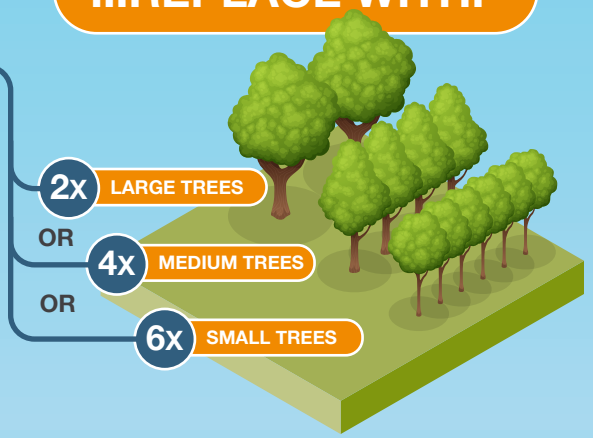
1x Large Tree

Height: 55'+

Example Species:
- Coast Live Oak (*Quercus agrifolia*)
- Aleppo Pine (*Pinus halpensis*)
- Engelmann Oak (*Quercus engelmanii*)

Benefits:
Large trees should be planted wherever space allows. A large tree provides six times more shade, stores seven times as much carbon, and captures five times more water than a small tree.

...REPLACE WITH:

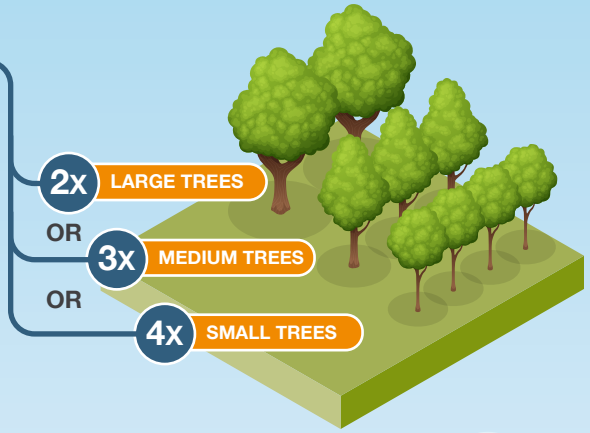


1x Medium Tree

Height: 35' to 55'

Example Species:
- Box Elder (*Acer negundo*)
- Jacaranda (*Jacaranda mimosifolia*)
- Australian Willow (*Geijera parviflora*)

Benefits:
Medium trees strike a balance between the benefits of larger trees and the spatial requirements of small trees. Medium trees are beneficial to have along parkways and in commercial space that may not allow large trees.

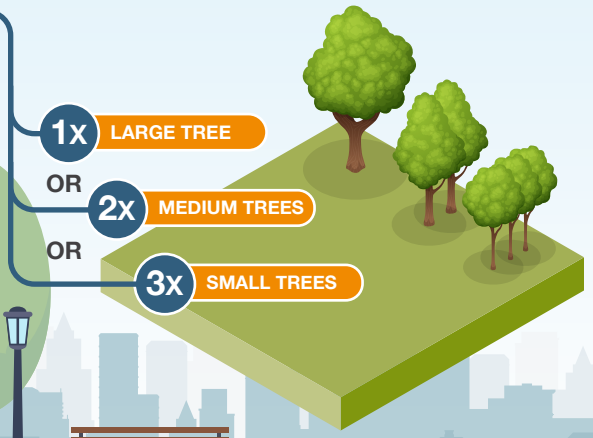


1x Small Tree

Height: Under 35'

Example Species:
- Toyon (*Heteromeles arbutifuloia*)
- Desert Willow (*Chilopsis linearis*)
- Western Redbud (*Cercis occidentalis*)

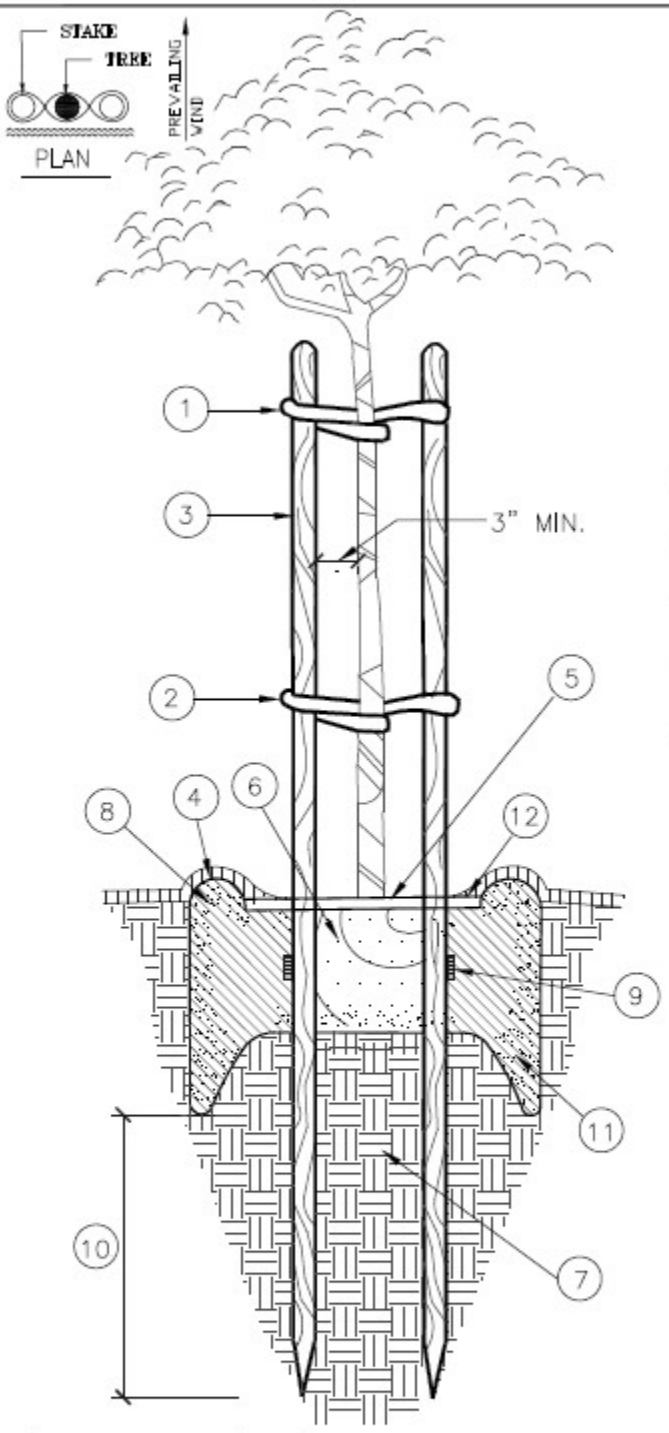
Benefits:
Small trees are best used when a larger tree may conflict with surrounding infrastructure such as powerlines or nearby buildings. Small trees are also used to fill in gaps in the landscape and create visual interest.



Appendix J

City of Pleasanton Existing Tree-Related Landscaping Design Standards

- Tree Planting Detail (806)
- Root Barrier Detail (807)
- Root Pruning (824)
- Tree Protection Detail (829)



1. ATTACH TREE TIE TO STAKE WITH 2 GALVANIZED SCREWS OR ROOFING NAILS
2. (2) 1" WIDE X 30" RECYCLED TIRE RUBBER TREE TIE IN FIGURE 8 PATTERN; 2 PER TREE
3. 3" DIAMETER X 10' TREATED LODGE POLE PINE STAKE. STAKE TO PLUMB
4. TEMPORARY WATERING BASIN: 4" HIGH BERM X MINIMUM 3' DIAMETER. (NOT TO BE USED IN TURF AREAS)
5. SET TOP OF ROOT BALL 2" ABOVE FINISH GRADE TO ALLOW FOR SETTLEMENT
6. WELL DEVELOPED TREE ROOT BALL
7. NATIVE SOIL, COMPACTED TO 85% OR UNDISTURBED
8. BACKFILL MIX PER SPECIFICATIONS OR SOILS REPORT
9. FERTILIZER TABLETS PER SPECIFICATIONS
10. DRIVE STAKE 2'–0" MINIMUM INTO UNDISTURBED SOIL. INSTALLED STAKE SHOULD SUSTAIN 50 POUNDS DEFLECTION AT TOP OF STAKE AND RETURN TO PLUMB POSITION WHEN RELEASED
11. PLANTING HOLE SHALL BE TWICE DIAMETER OF TREE ROOT BALL; SCARIFY SIDES AND BOTTOM OF HOLE
12. 3" LAYER OF WOOD MULCH, HOLD MULCH BACK A MINIMUM OF 3" FROM TRUNK
13. TREES MAY REQUIRE ROOT BARRIER IF PLANTED WITHIN 8 FT. OF PAVED AREAS, SUBJECT TO CITY LANDSCAPE ARCHITECT

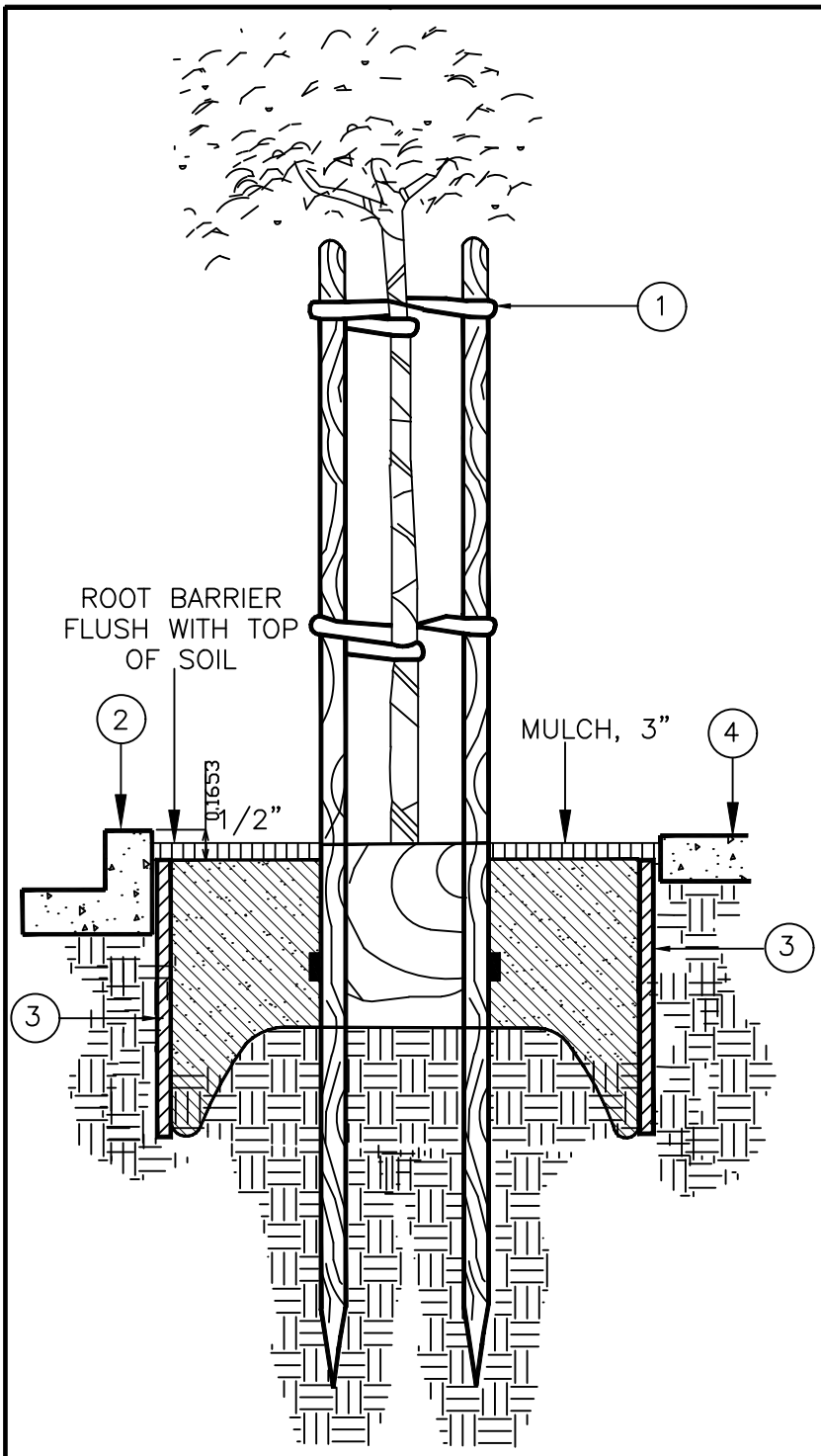
DRAWN BY: STAFF
CHECKED BY: AN
SCALE: NTS

CITY OF PLEASANTON

STANDARD DETAILS
LANDSCAPE
TREE PLANTING DETAIL

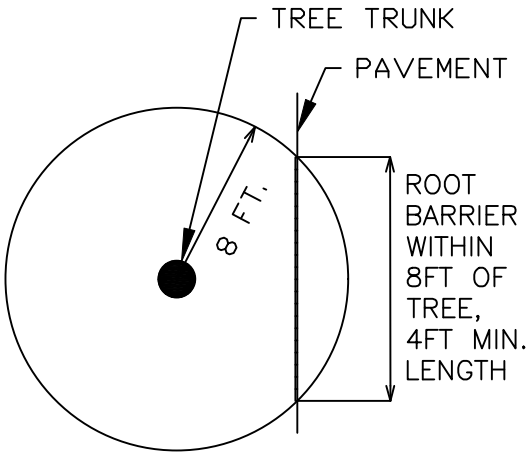
REGISTERED PROFESSIONAL ENGINEER
ADAM MATTHEW NELSEN
No. 78830
Exp. 9/30/2025
CIVIL
STATE OF CALIFORNIA

DATE : 1/24
DWG NO. 806



SECTION

1. TREE, REFER TO CITY STANDARD DETAIL 806
2. CURB AND GUTTER OR OTHER PAVING
3. UB–24" PANEL TYPE" ROOT CONTROL BARRIER BY "DEEP ROOT CORP." OR APPROV. EQ.
4. SIDEWALK
5. TREES MAY REQUIRE ROOT BARRIER IF PLANTED WITHIN 8 FT. OF PAVED AREAS SUBJECT TO CITY LANDSCAPE ARCHITECT



PLAN

DRAWN BY: STAFF

CHECKED BY: AN

SCALE: NTS

CITY OF PLEASANTON

STANDARD DETAILS

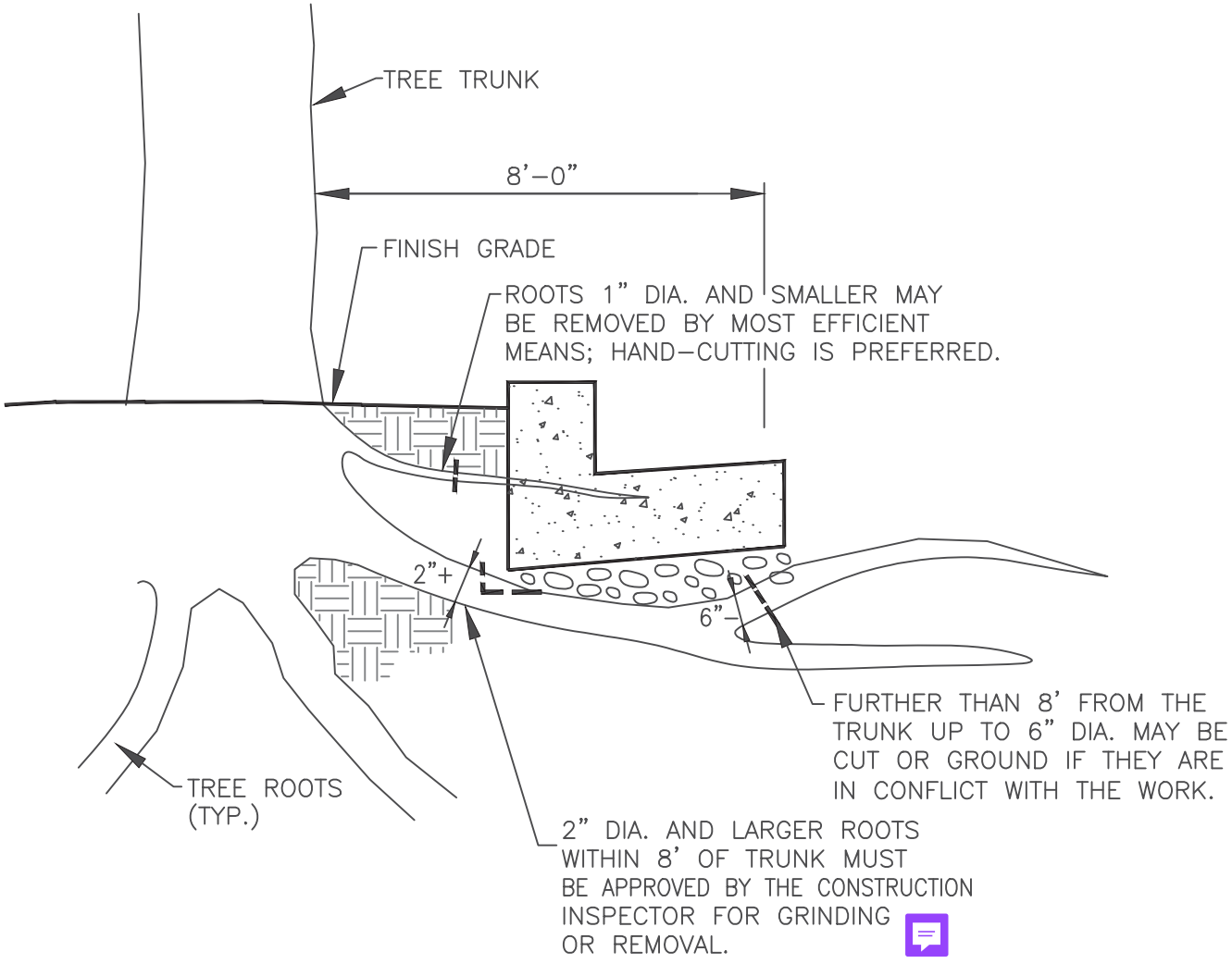
LANDSCAPE

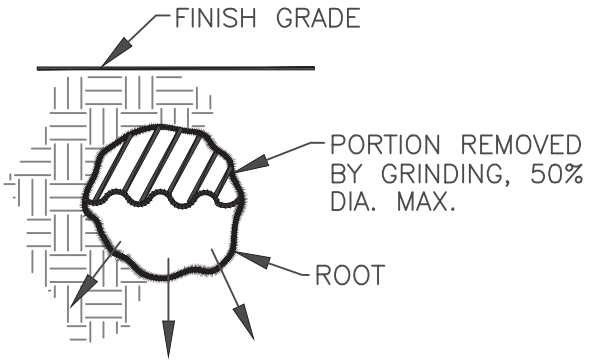
ROOT BARRIER DETAIL

REGISTERED PROFESSIONAL ENGINEER
ADAM MATTHEW NELKIE
No. 78830
Exp. 9/30/2025
CIVIL
STATE OF CALIFORNIA

DATE : 1/24

DWG NO. 807





NOTE:

1. SEE CITY STANDARD SPECIFICATIONS.

DRAWN BY: STAFF		
CHECKED BY: AN		
SCALE: N.T.S.		

CITY OF PLEASANTON

STANDARD DETAILS
LANDSCAPE
ROOT CUTTING DETAIL

PROFESSIONAL ENGINEER
REGISTERED
STEPHEN M KIRKPATRICK
No. C 053367
Exp. 06/30/2017
CIVIL
STATE OF CALIFORNIA

DATE : 4/16 | DWG NO. 824

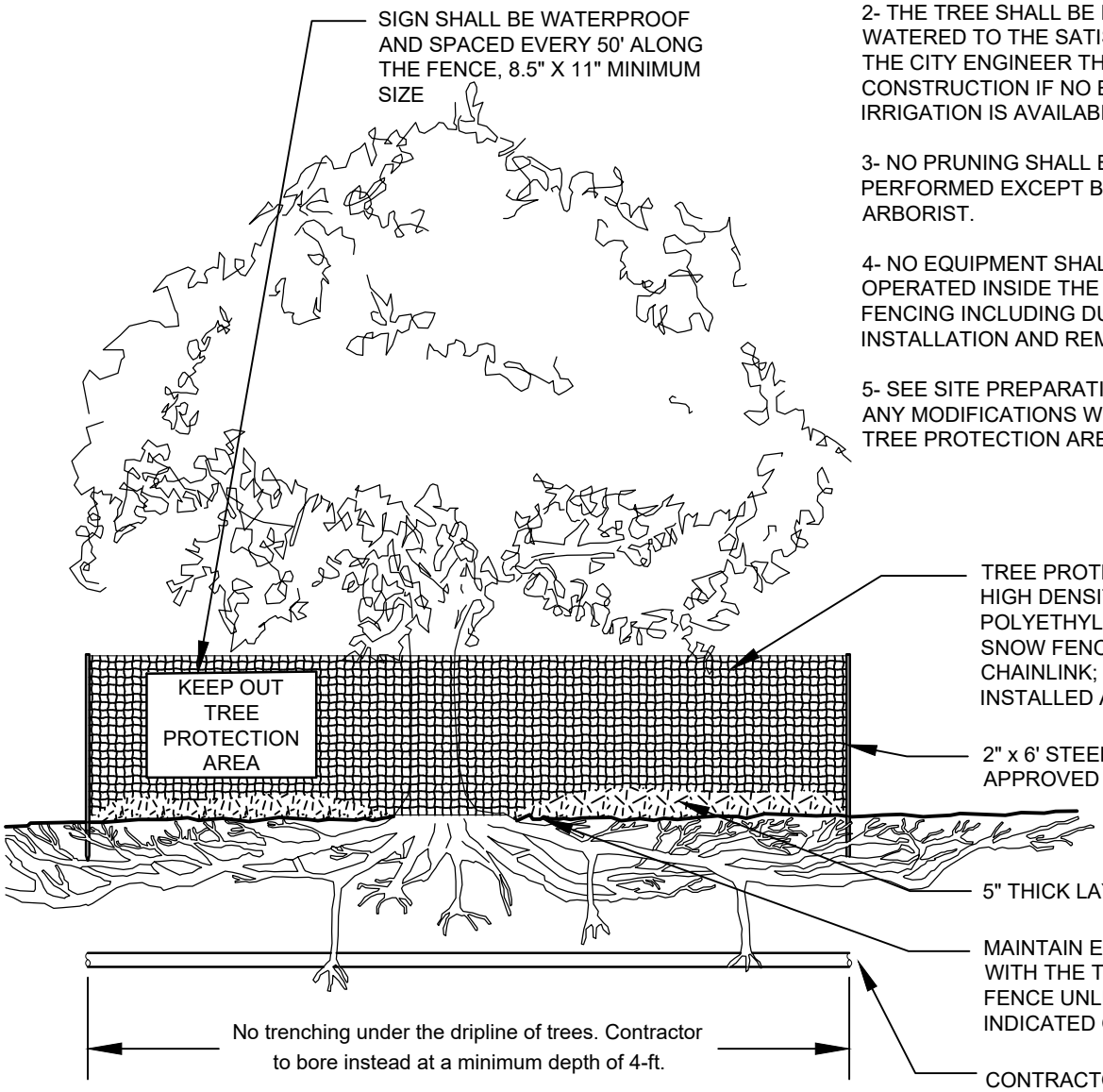
Notes:
1- SEE CITY STANDARD SPECIFICATIONS FOR ADDITIONAL TREE PROTECTION REQUIREMENTS.

2- THE TREE SHALL BE HAND WATERED TO THE SATISFACTION OF THE CITY ENGINEER THROUGH CONSTRUCTION IF NO EXISTING IRRIGATION IS AVAILABLE.

3- NO PRUNING SHALL BE PERFORMED EXCEPT BY APPROVED ARBORIST.

4- NO EQUIPMENT SHALL BE OPERATED INSIDE THE PROTECTIVE FENCING INCLUDING DURING FENCE INSTALLATION AND REMOVAL.

5- SEE SITE PREPARATION PLAN FOR ANY MODIFICATIONS WITHIN THE TREE PROTECTION AREA.



SECTION VIEW

DRAWN BY: STAFF		
CHECKED BY: AN		
SCALE: N.T.S.		

CITY OF PLEASANTON

STANDARD DETAILS

LANDSCAPE

TREE PROTECTION

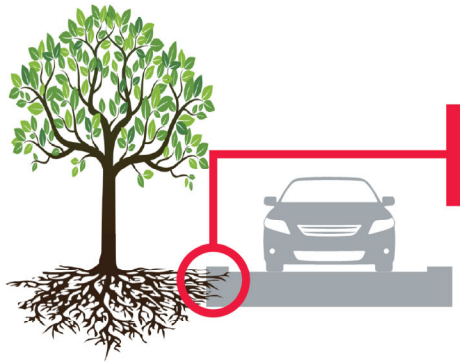
REGISTERED PROFESSIONAL ENGINEER
ADAM MATTHEW NELKIE
No. 78830
Exp. 9/30/2025
CIVIL
STATE OF CALIFORNIA

DATE : 7/24 | DWG NO. 829

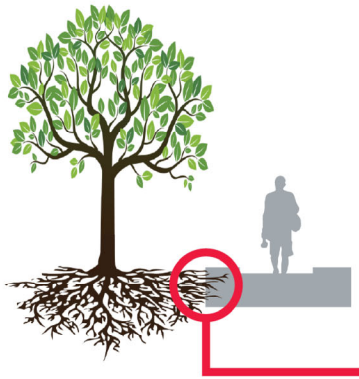
Appendix K

Infrastructure Conflicts and Sidewalk Solutions

What to do for tree ROOT conflicts with ROADWAYS and SIDEWALKS



ROAD (ROOTS)

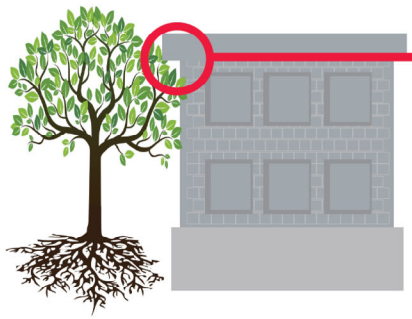


SIDEWALK (ROOTS)

What is the tree's health condition?

- *Poor* → **Tree may be a candidate for removal**
- *Fair/Good* → **Can infrastructure be adapted to mitigate for conflict?**
  - Yes → **Alternative Sidewalk technologies**; **Meander Sidewalks**; **Bridge sidewalk over roots**; **Expand tree well space**; **Sidewalk bulb-outs**
  - No → **Do roots need to be cut on more than 90° of the tree's radius?**
    - Yes → **Tree may be a candidate for removal**
    - No → **Are conflicting roots within a distance 3x the diameter of the tree?**
      - Yes → **Tree may be a candidate for removal**
      - No → **Are conflicting roots greater than 3" in diameter?**
        - Yes → **Tree may be a candidate for removal**
        - No → **Root Prune and repair road**

What to do for tree CROWN and BUILDING conflicts

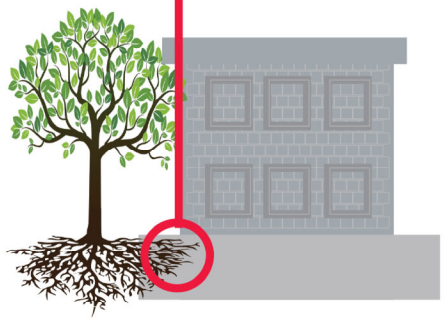


Building (crown)

What is the tree's health condition?

- Poor → Tree may be a candidate for removal
- Fair/Good → Will the conflict be mitigated to an acceptable level if 30% or less of the crown is removed?
  - No → Tree may be a candidate for removal
  - Yes → Prune canopy

What to do for tree ROOT and BUILDING conflicts



Building (roots)

What is the tree's health condition?

- Poor → Tree may be a candidate for removal
- Fair/Good → Do roots need to be cut on more than 90° of the tree's radius?
  - Yes → Tree may be a candidate for removal
  - No → Are conflicting roots within a distance 3x the diameter of the tree?
    - Yes → Tree may be a candidate for removal
    - No → Are conflicting roots greater than 3" in diameter?
      - Yes → Tree may be a candidate for removal
      - No → Root Prune and repair sidewalk

Sidewalk Repair and Maintenance

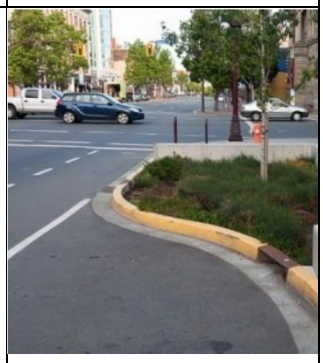
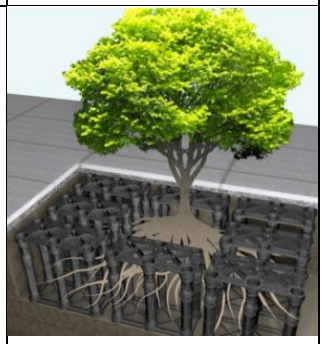
Mature trees causing infrastructure conflicts can be seen in buckling sidewalks or uneven pathways throughout the City. This is a result from planting the wrong tree in the wrong space, and is observed in many cities. Urban trees planted long ago may have applied the most recent research and available knowledge at the time, however, a tree's lifecycle spans longer than human, and arboriculture research on the 'right tree' for the 'right place' advances as the industry, and the trees, mature. Research continues to learn more about root damage potential for common urban tree species, however arboriculture BMPs and recommended species lists provide research based guidelines, allowing Pleasanton's urban forestry program to actively plant the 'right tree' in the 'right place.'

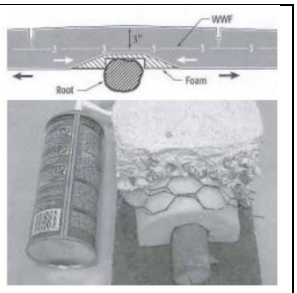
When a tree and infrastructure conflict occur, the tree is growing out of its planting site, meaning the tree is a large, maturing tree. Large maturing trees in urban environments provide the most benefits for the community including cleaner air, stormwater mitigation, heat mitigation, shade, and wildlife habitat, among others. As a tree matures, the provide benefits to the surrounding community increase. Because of a tree's lifespan, it takes years for young trees to grow to replace the benefits of a removed tree. Removing mature trees without considering these benefits increase the potential for future generations to live without areas shaded by canopy cover, enjoyed by residents today.

Urban forestry in Pleasanton aims to balance safe and usable infrastructure with protecting mature trees to provide these benefits. Removing trees for a municipal urban forestry program is a necessary maintenance practice. Tree and infrastructure conflicts may be avoided at the time of planting, or infrastructure may be mitigated to preserve a mature tree. Exploring the potential conflict resolution methods prior to recommending a tree for removal is necessary and aligns with the City's urban forestry goals. When existing trees and infrastructure conflict, identifying which trees provide enough benefits and are in a healthy enough condition to preserve through sidewalk or other infrastructure repair, is an imperative process in urban forestry management. The table below contains a list of sidewalk solutions which are feasible at tree planting and when protecting an existing tree while resolving sidewalk conflicts and should be considered at planting and when a conflict arises. Responsible use of public funds, preserving the long-term benefits of urban forestry, and doing so with an intentional, strategic methodology, are all priorities of the City and leadership of Pleasanton.

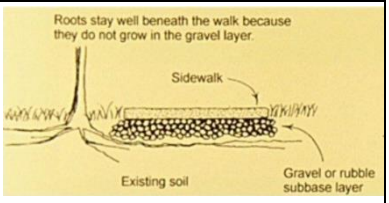
Table L-1. Mitigation Methods for Tree and Infrastructure Conflict

Method	Description	Benefits	Considerations	Example Image
Pervious Concrete	A high-porosity concrete that allows air and water to reach soil and tree roots.	May reduce stormwater runoff, encourage deeper root growth, reduce root damage to sidewalks, provide better growing conditions.	Requires deeper excavation for installation, requires more maintenance than standard concrete. Cost is a concern.	
Reinforced or Thicker Slab	Concrete reinforced with steel rebar or wire mesh and/ or poured thicker near edges.	Helps resist uplift of tree roots, may be used to correct uplift after other corrective actions have been taken.	May not be compatible with future utility installation, should not be used where additional root growth is anticipated. Expensive, worst-case scenario only.	
Expansion Joints	Separations between two sections of sidewalk at any interval.	Allow for some movement of concrete, used to control the location of sidewalk cracking.	Not recommended for areas where significant additional root growth is anticipated, short-term solution. Wide joints can serve as tripping hazard.	
Tree Pits/ Expanded Tree Pits	Cutout in the sidewalk in which a tree is planted.	Provides space for new plantings where previously not possible.	Must establish minimum sizing requirements to ensure adequate soil volume, difficult to implement in private easement areas.	

Bridging	A panel installed above overgrown tree roots connecting other sections of sidewalk surrounding overgrown roots, creating a slight rise in the sidewalk.	Provides grade separation between tree root zone and sidewalk, allows tree roots to grow in soil, potential materials include concrete or steel panels, may be used to preserve a high value tree.	Site-specific requirements determine if this resolution is feasible, a nonslip surface treatment is required for metal/ steel materials, additional ADA requirements apply. Still slippery with non-skid plates.	
Curving or Offset Sidewalk	Modify sidewalk path to accommodate for tree preservation.	Gives trees more growth space, increases pedestrian safety by separating sidewalks from vehicular traffic.	Requires adequate space in the right-of-way, requires coordination with private property owners, care must be taken to ensure ADA compliance.	
Curb Extensions (bulb outs)	Extends the sidewalk a short distance, often at an intersection, providing additional pedestrian space and narrowing roadways.	Increases pedestrian safety through traffic calming and shortening crossing distances.	Impacts to drainage and existing utilities, site specific transportation conditions or impacts. High maintenance costs due to landscape and irrigation.	
Easement/ Suspended Pavement Systems	Pavement supported by and lifted over a void space filled with soil for root growth.	Creates a viable tree site where previously not possible.	Involves removing and repaving sidewalks, considerations for site-specific grading requirements. Requires coordination with the resident.	

Foam Underlay	A foam layer of support between pavement and existing soil or tree roots.	Help prevent root damage, offers an alternative to root pruning.	Best used to repair damage caused by mature tree roots, not a long-term solution, not recommended for tree species known to have rapid root growth, leads to more work for the City in the future.	

Conflict Prevention Methods Before Planting

Method	Description	Benefits	Considerations	Example Image
Lowered Tree Sites	A cutout in the sidewalk in which a hole is dug several feet deep, typically with metal grates placed over the hole and around the trunk of the tree.	Prevents soil compaction with reduced pedestrian traffic, enables installation of a tree at a site with limited planting space.	Existence of underground infrastructure, increased maintenance due to accumulation of debris, must include a drainage plan to avoid oversaturation of soil.	
Modified Gravel Layer	A layer of gravel between pavement and existing soil or tree roots.	Suppressed root growth, more longevity than foam underlay, thickness of gravel around roots can be adjusted to accommodate tree size. Cost saving option at installation.	Potential to wound tree roots, increasing susceptibility to soilborne pathogens. Will not work for panels that have already been lifted.	

Root Barriers	A physical barrier installed to prevent roots from causing damage to nearby structures or infrastructure.	Deters root growth to limit hardscape damage, such as curbs, gutters, and sidewalks.	Deters roots where root barrier exists, does not address all tree root issues, not an arboriculture BMP. Cost effective. In line with City of Rancho Cucamonga Municipal Code 17.56.50.I.	
Monolithic Sidewalks	A single layer of concrete with no curb breaks or visible joints between the sidewalk and curb or street.	Reduces potential for future weakness in pavement infrastructure. Cost effective, no maintenance for curb edges.	Provides an accessible and safe walking surface with reduced tripping hazards. Not recommended for tree species known to have rapid root growth due to increased risk of cracking.	

Appendix L

Tree Maintenance Responsibilities

Introduction

The City of Pleasanton acknowledges the importance of clearly defining tree maintenance responsibilities, particularly when trees planted by citizens within public easements lead to disputes involving public works or incur significant upkeep expenses. It is understood that a more detailed policy could prevent misunderstandings and ensure that both the city and its residents know who is accountable for the care and potential issues arising from these trees. The following guidelines have been developed to help the City ensure that safety and tree health is maximized in the public right of way.

Permitted tree plantings:

- A (free) tree planting permit is required to plant a tree in the city's right of way. The applicant will confirm the following in the permit application:
- The species chosen must be on the city's approved planting list and be the appropriate size for the site. The tree's proximity to surrounding roads, sidewalk, underground utilities, powerlines, and other nearby structures should be considered.
- The tree must be planted in a manner that the future canopy will not grow on to neighboring property.
- The applicant will plant the tree with a method consistent with the city's tree planting guidelines.
- All permitted tree plantings will be inputted into the city's inventory software system and managed by the city

Unpermitted tree plantings:

- Unpermitted trees can be identified as trees in the public right of way that are not part of the city's inventory.
- The city may remove any unpermitted tree planting within the public right of way. The city will provide the neighboring property a 30-day notice before removal, unless removal is necessary to address an emergency.
- If the tree qualifies as a heritage tree, the removal must be approved by the heritage tree board
- The city will provide the adjacent homeowners with planting alternatives and planting permit information.

Appendix M

City Document Review

City Document Review

This section reviews and highlights key documents that the city has published in regard to the health and maintenance of their urban forest.

Pleasanton General Plan 2005 - 2025

Plan Summary: A city's General Plan determines community goals and aspirations of community development. Future growth for development, natural areas, infrastructure projects, and others are decided based on community outreach and needs of the city. The General Plan is where to find the intent of city planners and what the expectation is for the product, being the overall health and wellbeing of the city. This section focuses on how the General Plan interacts with the urban forest and what can be improved on to ensure that development keeps the urban forest in the forefront of expansion.

Table M-1. General Plan Highlights

Goal/Policy	Section	Relation to UFMP
Vision Statement As our city approaches buildout in the next few years, we will strive to maintain these desirable qualities by continuing to develop a safe, convenient, and uncongested circulation system, comprehensive system of bicycle and pedestrian trials, additional recreational and cultural facilities for the health and well-being of our residents, and by preserving our natural resources, including water and air quality, and our community's environmental sensitivity.	Vision Statement	The spirit of the vision statement revolves around the health, safety, recreation, and preservation of environmental ecosystems. This UFMP discovers the baseline of assets that Pleasanton has that will enable better measurement of progress during the next phases of city expansion.
Goal 1: Policy 1: Program 1.1: Biennially assess community sustainability and quality of life in Pleasanton through measures such as: traffic congestion and delay, energy use, water quality and availability, fiscal sustainability, air quality, extent of tree canopy, and park acreage and bike path/trail miles per capita	Land Use Element	While this goal is biennial, a UFMP is generally usable for 20 - 30 years with an update every 10 – 15 years. It is recommended to maintain an updated tree inventory and canopy cover analysis, no more than five years old to keep data current on the progress of the urban forest.
The City maintains 15,000 trees while private home and business owners maintain over 60,000 trees.	Community Charter	With a recommendation to maintain an updated City-tree inventory no more than five years old, future updates to the UFMP will show progress towards reaching Pleasanton's canopy cover goal.
Policy 17, Program 17.1: In existing and new residential areas, where such principles will not conflict with surrounding development patterns or the physical conditions of the site, encourage the use of traditional residential neighborhood Planning which incorporates large canopy street trees and 6' - 10' wide parkway strips	Community Charter	Developers and residents will be able to utilize this UFMP as a reference document to select trees to plant and follow on research for complimentary understory like water-wise plants.
Policy 17, program 17.5 Consider a City sponsored street tree replacement	Community Charter	Section 2 of this UFMP lists which neighborhoods have the lowest canopy

program in neighborhoods where street trees have died, been removed, or substantially damaged		cover and should be used to determine locations for tree giveaway programs and educational workshops.
Policy 17, Program 17.8 Adopt a City street tree ordinance to protect existing and future street trees that are maintained by property owners, and establish Planting, care, and pruning standards.	Community Charter	Decisions makers are encouraged to use a UFMP to guide their decisions when drafting an ordinance around trees so that it is in line with their city's urban forest goals.
Policy 9, Program 9.1 Complete and infill the street tree and median landscaping along streets, when feasible	Community Charter	This policy aligns with recommended actions in the UFMP for the City to fill vacant planting sites in order to maintain and increase the City's overall canopy cover.
Heritage Tree Requirements Trees over 55" in circumference or 35' in height are Heritage trees	Conservation and Open Space Element	Depending on the tree, 35' may be harder or easier to reach. Changing the Heritage Tree requirement to not just be about size but about species can help sculpt the kinds of trees that are desired. Referencing an approved tree list can help guide whatever is being planted to be a desired species.
Policy 2: Preserve Heritage trees throughout the Planning Area. Pleasanton Municipal Code Chapter 17.16, Tree Preservation, when reviewing future development projects	Conservation and Open Space Element	An update to the Heritage Tree ordinance is included in this UFMP to better clarify the permitting process, tree replacement requirements, and penalties, which is intended to provide better protections for heritage trees.
Policy 13: Program: 13.5 Partner with the California Department of Forestry and Fire Prevention and Firewise Communities to identify measures that reduce the fire	Public Safety Element	A wildfire planning chapter is included in this UFMP which analyzes current high fire hazard areas, clarifies maintenance responsibilities, and makes recommendations for both the City and private residents on how to decrease risk of wildfire through defensible space, tree maintenance, and tree species selection.
Goal 1, Policy 1, Program 1.12: Compile a list of recommended landscaping species, including trees, that are native and drought tolerant. Include discussion of any wildlife habitat values of these species.	Water Element	This UFMP includes a tree species selection palette that provides a solution for Pleasanton's Water Element, and other documents that reference tree selection and placement.
Goal 3, Policy 3, Program 3.12: Conserve Pleasanton's urban forest, including trees in parks and on private property as well as streets trees, so as to continue and enhance surface water filtration and community character	Water Element	This goal aligns with the Guiding Principles in the UFMP to protect and grow the City's tree canopy.
Goal 2, Policy 6, Program 6.3: "Also implement the program in the Water Element to conserve Pleasanton's urban forest as well as programs in the Community Character Element to	Air Quality Element	This UFMP calls out the need to educate residents on the many benefits of trees including the shade they provide which reduces the urban

replace and protect street trees. Tree shade not only helps lower energy use during hot months, most tree species remove air pollutants from the environment."		heat island effect and their natural air filtering capabilities.
Goal 1, Policy 4, Program 4.2: Continue to implement parking lot tree Planting standards that would substantially cool parking areas and help cool the surrounding environment.	Energy Element	This UFMP includes a recommended tree species selection palette that should be referenced when selecting trees to plant for shade and limited dropped tree litter.

Climate Action Plan 2.0

Plan Summary: Climate Action Plans (CAP) project where planners and residents envision their City's future across various environmental factors and timelines, typically surrounding total greenhouse gas (GHG) emissions. Each objective set forth in the CAP requires benchmarks to help reach goals within a set timeframe. Most CAPs include themes and actions that encompass several environmental subtasks to help manage, guide, and achieve specific goals. The themes of the City of Pleasanton's CAP 2.0 are building & energy, transportation & land use, materials & consumption, natural systems, water resources, and community resilience & wellbeing.

Pleasanton's overall target set within the CAP 2.0 is to reduce GHG emissions to 4.1 $MTCO_2e$ per capita by 2030 and work towards per-capita carbon neutrality by 2045. The CAP 2.0 also acknowledges that as cities continue to develop and grow, so does their need to balance such growth with maintaining the community's culture without depleting natural resources, such as the urban forest, that contribute to overall quality of life and the ability of future generations to experience such environmental benefits. By integrating the CAP 2.0 with the Urban Forest Master Plan, Pleasanton aims to enhance its carbon-sequestering green infrastructure, promote clean energy, secure a sustainable water supply, and foster a thriving local economy.

Table M-2. Climate Action Plan Relation to UFMP

How the Climate Action Plan Addresses Trees		
Goal/Policy	**Section**	**Relation to UFMP**
Green space is accessible to all, healthy, and abundant. Climate change is projected in everything the City and community does. Moreover, the community is more resilient to both climate and non - climate risks	Vision	Vision statements and objectives establish and project intent on how and why projects are being started. The explicate focus on green space that is accessible ensures that trees will be more abundant, and equitably distributed throughout the community. Just as important, including the maintenance of the green spaces will keep long term sustainability and costs in the minds of planners.
Green Space and Carbon Storage Residents emphasized the importance of expanding green spaces and ensuring proper soil management, both to support healthy habitat and increase local carbon sequestration. This has resulted in in focusing the Natural Systems Strategy on local ecosystem resilience	Community Engagement Themes	Community engagement highlighted their desire for an increased green space that not only provides recreation but to also store large amounts of carbon. Trees absorb carbon dioxide through photosynthesis, which they then store as carbon in their trunks, branches, leaves, and roots. Increasing street trees, parks, and using trees as natural barriers are all ways to meet the community's desire to expand green spaces while increasing local carbon sequestration.
Key Performance Indicators for 2030 vs 2017	Natural Systems	Including key performance indicators (KPIs) is necessary to ensure that progress is being

How the Climate Action Plan Addresses Trees		
Goal/Policy	**Section**	**Relation to UFMP**
- Increase carbon sequestration 1,000 net $MTCO_2e$ in 2030 - Increase tree canopy - Increase trees planted		reached. With 700 acres of undeveloped open space being earmarked for enhanced natural recreation and ecosystem resilience, the inclusion of a forest management plan will help facilitate the goal of reducing 1% of local emissions. These KPIs can help guide UFMP goals for priority planting areas and underscores the City's commitment to reaching such goals.
Strategy NS-1. P13. Urban Forest Master Plan They City will develop and implement an Urban Forest Master Plan that includes best practices for tree health and maintenance and reevaluates community tree regulations. The UFMP needs to protect and increase tree canopy and native habitat, and ensure trees are replanted with right size right place mentality with the right amount of soil volume.	Natural Systems	Urban Forest Master Plan is being developed and will guide planners on various tree species selection, priority planting areas, costs associated, and recommended expansions based off current forest conditions.
Monitoring, Evaluation, and Reporting The City will use CAPDash, a cloud-based tool, to monitor CAP progress with inventories for carbon being completed every three years.	Monitoring, Evaluation, and Reporting	Reaching desired outcomes requires continual tracking and benchmarking. For urban forests, the best management practice for new inventory is five years. This inventory data can then be used in iTree to calculate environmental benefits of those trees such as carbon storage.

Downtown Specific Plan

Plan Summary: City of Pleasanton's Downtown Specific Plan, according to its introduction, serves as the "primary regulatory guide for preserving and enhancing the 319-acre downtown area."

Table M-3. Downtown Specific Plan Relation to UFMP

How the Downtown Specific Plan Addresses Trees		
Goal/Policy	**Section**	**Relation to UFMP**
Section 5 Mobility and Parking Current sidewalk trees on Main Street will be moved from the sidewalk to the roadway where future parking spot will be.	Chapter 5: Mobility and Parking	Moving trees is a high-risk task. Moving trees to the roadway will also increase the risk of tree mortality from compacted soil, lack of water access, pollution from the roadway, and possible infrastructure damage on the roadway from tree root growth.
LD-P.66 Conservation of the Arroyo del Valle Conduct an assessment of existing conditions, including topography, waterline location, trees, and other major natural site features	Chapter 4: Land Use and Design	Possible cross funding opportunities to lower costs for both internal government organizations.
LD-P.69 Main Street When replacement of existing trees is required to provide a wider unobstructed pedestrian path on the sidewalk, shift street trees to new wells within the parked zone, in a manner that retains as many of the on street parking spaces as possible.	Chapter 4: Land Use and Design	Prioritizing parking spaces allows for non-ideal locations of trees to be replanted. This will eventually lead to an accelerated decline of the tree, which increases the risk of tree failure resulting in greater risk to public and private property damage and pedestrian safety. Moreover, the loss of canopy cover where a tree used to be and the time needed to grow a

How the Downtown Specific Plan Addresses Trees		
Goal/Policy	**Section**	**Relation to UFMP**
		new tree in its place. One tree may not be an issue but if the placement of every tree that is moved is secondary to parking spaces, then there is a strong possibility of a large percentage of tree death along the corridor
LD-P.73 Secondary Streets Remove and replace street trees that are in poor condition and add new trees and grate in places that do not have street trees	Chapter 4: Land Use and Design	Reaching the desired canopy goal of 25% in all neighborhoods is just one step on the path towards a healthy urban forest. Ensuring trees that are planted are healthy, growing, and resilient is paramount throughout the urban forest development. Section 1.3 covers the BMPs for pruning, removal requirements, and tree inspections to ensure the trees being counted towards the canopy cover are in an acceptable state.
LD-P.77 Street Tree and Sidewalk Consistency Require planting of street trees and uninterrupted sidewalks in residential neighborhoods. Street trees should be planted with consistent spacing and use a consistent palette of species to establish a regular streetscape pattern	Chapter 4: Land Use and Design	This UFMP provides a recommend tree species selection list that is climate adapted for future temperatures and droughts. Using said list in conjunction with the Priority Planting Score, found in Section 2, assists planners on where to focus tree planting efforts when on the path to increased canopy. Ensure to follow the sustainability metrics outlined in Section 2.5 to prevent planting too many of the same species or genus in one area to prevent mass die off from climatic or pest event(s).
LD-P.78 Mature and Heritage Trees Preserve mature and heritage trees	Chapter 4: Land Use and Design	Creating penalties for illegal tree removal and drafting clear guidelines for when a tree becomes mature or a designated as a Heritage tree will be requirements within the new Tree Ordinance.
LD-P.79 Tree Survey Conduct a street tree survey of the existing species and condition of trees in residential neighborhoods and determine which trees are healthy and preferred by residents.	Chapter 4: Land Use and Design	A new inventory of all public trees was completed in July of 2024. The UFMP calls for community engagement to understand residents' preferences and concerns around trees.

Master Plan for the Downtown Parks and Trails system

Plan Summary: City of Pleasanton's Master Plan for the Downtown Parks and Trails System has planned the next serval years development through expansion of services, backfill of existing infrastructure, and more park/trail system for public use.

Table M-4. Master Plan for the Downtown Parks and Trails System Relation to UFMP

How the Master Plan for the Downtown Parks and Trails System Addresses Trees		
Goal/Policy	**Section**	**Relation to UFMP**
Current Trail Maintenance Resources City Parks Division is responsible for maintaining most of the trials in the current system. The Division is currently divided into six working crews with the sixth crew, Area 6, having the responsibility for maintaining trials along with several other responsibilities:	Current Trail Maintenance Resources	Area 6 crew has logged 40, 60, and 63 hours of tree maintenance from 2016-2018, respectively. An increase in the number of trees being planted, especially young trees, will require additional upkeep in the first three years after planting.

How the Master Plan for the Downtown Parks and Trails System Addresses Trees		
Goal/Policy	**Section**	**Relation to UFMP**
streetscape irrigation maintenance, street tree planting and water and open space maintenance.		

City of Pleasanton Design Guidelines

Pleasanton applies a combination of landscape design requirements through conditions of approval on all projects that come through the City's Planning department, through the Tree Preservation Ordinance (Ch. 17.16), Cal Green Building Code requirements, and through requirements for certain development projects to complete wildfire management plans. . While the Pleasanton does not have one standard document with all landscape design standards, the City does have a set of Tree Establishment Details which are discussed below in **Table 4-2.**

Standard Details: The below table summarizes where Pleasanton's details are not in compliance with ANSI standards and ISA best management practices.

Table M-5. Pleasanton Tree Establishment Details

Document	Context	Recommended Update
Tree Planting Detail 806	(2) 1" Wide x 30" recycled tire rubber tree tie in figure 8 pattern; 2 per tree	It is recommended that the rubber tree tie is secured loosely, allowing the tree to sway. *(Swaying at youth encourages the tree to develop a tapered trunk better suited for high wind events)*
	Temporary watering basin: 4" high berm x minimum 3' diameter. (Not to be used in turf areas)	Consider adding the following language: "Berms should be periodically expanded so the full root zone is watered and can be removed when the establishment care/watering period is over."
	Well-developed root ball	Not descriptive enough for non-specialists to discern. May be beneficial for the city to have an additional detail for nursery stock standards **(See Appendix J).**
	Native soil, compacted to 85% or undisturbed	Consider clarifying that the soil filled back into the planting hole should be compacted, but the soil beneath tree planting hole should be uncompacted and undisturbed.
	Fertilizer tablets per specifications	Consider removing from city standards. A consistent supply of mulch every 2-3 years is generally sufficient for nutrient provision. *(ISA BMPs state that fertilizer generally does not aid in establishment, and fertilizer tablets are only necessary if soil tests report low nutrient levels).*
	3" layer of wood mulch, hold mulch back a minimum of 3" from trunk	Consider adding replenishment of mulch as needed on an annual basis.
	Trees may require root barrier if planted within 8 ft. of paved areas, subject to City Landscape Architect.	Recommended that the city has a separate and more elaborate resource regarding spacing guidelines.
Root Barrier Detail 807	*General Comment*	If the city struggles with root barrier performance, it may be a function of soil aeration. Tree root growth is largely dependent on availability of oxygen within the soil. Trees resist growing roots deep into soil if the soil is poorly aerated. Since root barriers guide roots downward, they are least effective in poorly aerated

		soils, which are commonplace in the urban environment.
Root Pruning Detail 824	2” dia. And larger roots within 8’ of trunk must be approved by the construction inspector for grinding or removal.	Replace “Construction Inspector” with “Certified Arborist"
Tree Protection Detail 829	Tree Protection Zone (TPZ)	Consider adding specifications for a TPZ which should be at least 1.5 inches wide per every inch DSH, rather than just having the protected area be equal to the dripline of the tree.
	Height of TPZ fencing	Consider adding specifications that the TPZ fencing must be four to six feet tall.
	5” of Mulch	Generally, mulch is only required when a protective fence cannot be installed around the tree. Consider adding a note that the mulch should be reduced to 2 to 4 inches after the completion of the project
	Inspection and monitoring	Consider adding a requirement for an ISA Certified Arborist to be present on site to inspect and monitor trees that are impacted during construction, maintenance, or renovation activities.

Recommended additional Standard Details:

- Nursery Stock Standards
- Spacing Guidelines
- Young tree establishment
- Pruning guidelines

See Appendix J: Arboriculture BMPs