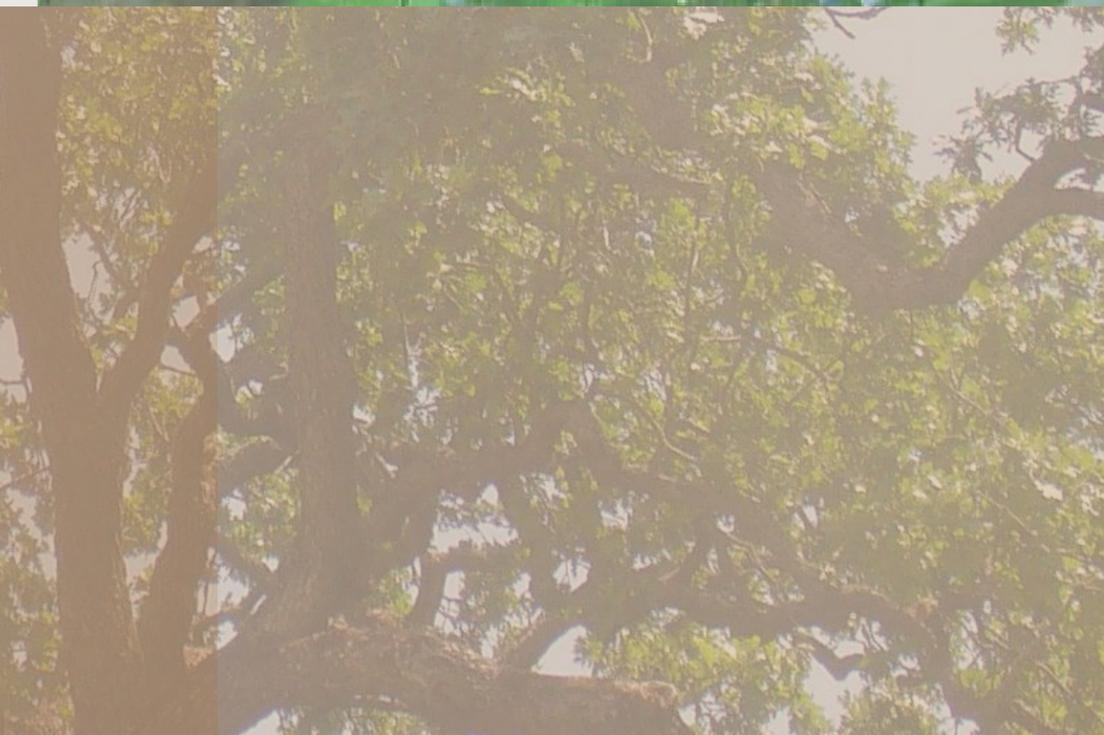


CITY OF WOODLAND

URBAN FOREST MASTER PLAN

2019



"THE CREATION OF A THOUSAND FORESTS IS IN ONE ACORN."
- RALPH WALDO EMERSON



CITY OF WOODLAND

URBAN FOREST MASTER PLAN

2019

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SCOPE AND PURPOSE

The purpose of the Woodland Urban Forest Master Plan (UFMP) is to provide a framework for the long-term care, preservation, and expansion of the community's public trees. The UFMP recognizes the significance of environmental and socioeconomic benefits from urban trees and their relationship with community values and expectations for a high quality of life. It is intended to support and guide urban forest programming over the next 20 years. Specifically, the UFMP aims to:

- Provide direction for the management of the community tree resource to maximize resilience, benefits, and health
- Explore opportunities and solutions for sustainable funding and tree maintenance activities
- Engage the community to increase awareness and appreciation for trees and canopy
- Promote a shared vision and goal for canopy cover across the community

The UFMP identifies goals and actions for the long and short-term support of these purposes. It identifies appropriate resources to adequately manage community trees. It is intended to remain flexible and dynamic, allowing for the exploration and implementation of the actions as funding and resources permit. The development of the UFMP included a comprehensive review of existing policies and regulations, current funding and maintenance levels, analysis of the extent, condition, and composition of the existing resources (i.e., trees), stakeholder concerns, and community input.

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EXECUTIVE SUMMARY

Woodland has a long-standing appreciation for trees and a reputation for proactive stewardship of its natural resources. Also known as the "City of Trees", Woodland was named for its beginning in a grove of oak trees. A number of heritage oaks dating back to the 1800's are still standing and contributing to the urban forest.

An urban forest is the collection of trees, public and private, that grow within a city or town. A resilient urban forest supports the resilience of the community. Woodland's community urban forest includes more than 14,000 publicly-managed trees on streets, in parks, and at City facilities. The Urban Forest Master Plan (UFMP) provides long-term goals for promoting the health and resilience of this vital community resource.

The structure of the UFMP is based on the understanding of what we have, what we want, how we get there, and how we are doing. This structure, referred to as adaptive management, is commonly used for resource planning and management (Miller, R.W.) and provides a good conceptual framework for urban forest programming.

"AS STEWARDS OF COMMUNITY TREES, WOODLAND'S URBAN FOREST MANAGERS RECOGNIZE THE IMPORTANCE OF MAXIMIZING THE VALUE OF AVAILABLE RESOURCES THROUGH EFFICIENT OPERATIONS AND PROACTIVE PROGRAMMING TO PROVIDE THE GREATEST RETURN ON THE COMMUNITY'S INVESTMENT."
 – CITY OF WOODLAND URBAN FOREST MASTER PLAN, 2019



WHAT DO WE HAVE?

The planning process for the UFMP included a comprehensive review and assessment of:

- Land cover across the community (Map 1), including tree canopy, impervious surface, grass/low-lying vegetation, bare soils, and open water
- The community tree resource (public tree inventory), including composition and structure, benefits, and the benefit versus investment ratio
- Forestry operations, including funding and current service levels
- Guiding documents, including the General Plan 2035, the Climate Action Plan (2035 CAP), City Ordinance, state law, and other regulatory and policy documents.
- Vision and guidance provided by partners and stakeholders

The review process established that Woodland has built a firm foundation for an exceptional urban forestry program. The community places a strong emphasis on preserving natural resources. An assessment of 2017 land cover revealed that the average canopy cover (public and private) across Woodland

WHAT DO WE WANT?

is 14.5%. This resource has sequestered (i.e., stored) more than 148,000 tons of carbon and annually provides \$568,075 in benefits to air quality and stormwater runoff reduction.

A previous canopy assessment in 2009, established an initial benchmark of 6.9% average tree canopy. Since that time, Woodland's tree canopy has increased from 667 acres, in 2009, to 1,394 acres as of 2017. That's more than a 100% increase! This amazing growth is attributable to established trees that have continued to mature as well as ongoing tree planting in vacant sites and in new developments.

Analysis of the community tree resource (public trees) found 14,166 trees currently in the inventory. Since the previous analysis in 2010, the inventory has increased by 1,026 trees (7.8%). Each year, public trees are providing nearly \$1.7 million in environmental and socioeconomic benefits. To replace the community tree resource with trees of the same size, species, and condition would cost nearly \$30.5 million.

Woodland's forestry crew strives to maintain community trees on a 7-year pruning schedule, dependent upon available resources. Most tree work is funded by the General Fund, with the exception of neighborhoods that are covered by a Landscape and Lighting District that provides funding for additional services.

Each year, proactive planting programs replace over-mature trees that require removal and add new trees where space allows. In addition to the forestry crew, Woodland benefits from the support of the Woodland Tree Foundation. Since their formation in 2000, the Foundation has planted nearly 5,000 trees on public and private property. The Woodland Tree Foundation was also instrumental in securing grant funding from CAL FIRE to support the development of the UFMP.

Besides forestry staff, there are multiple stakeholders, internal and external, who play a role in the planning, design, care, and advocacy of the urban forest. The development of the UFMP included engagement and collaboration with City leadership and staff, utility providers, the Woodland Tree Foundation, and members of the public who participated in a community meeting and online survey. In addition to input received from partners and stakeholders, multiple guiding documents including the General Plan 2035 and 2035 CAP provided vision for the UFMP.

Woodland's Urban Forest Benchmarks	
Urban Tree Canopy (Public and Private)	
Acres	1,394
Average Canopy Cover	14.5%
Carbon Stored (tons)	148,194
Total Annual Benefits:	\$568,075
Community Tree Resource (Public Trees)	
Number of Trees	14,166
Number of Species	170
Prevalence of Top Ten Species	52.1%
Species Exceeding Recommended 10%	2
Stocking Level	99.4%
Replacement Value	\$30,446,427
Carbon Stored (tons)	9,011
Total Annual Benefits:	\$1,656,735
Annual per Tree Benefit	\$116.95

Objectives identified in the 2035 CAP include increasing canopy cover to 25% by 2035. The Plan further recommends that the UFMP adopt a no-net-loss policy for the community tree resource and identify sustainable funding for forestry operations. In addition to this high-level direction, partners and stakeholders identified the following challenges and opportunities for the urban forest:

- Increase resilience in the urban forest to mitigate fluctuations in weather and changes in climate
- Maintain a recommended palette of tree species appropriate for a variety of different spaces and landscapes
- Maintain the community tree resource through best management practices to promote the health, safety, and longevity of public trees
- Promote efficiency and effectiveness in urban forestry programming
- Preservation of large, mature trees, particularly heritage oaks
- Maximize the benefits from trees and preserve the quality of life for residents and visitors
- Engage with the community and partners to increase awareness, appreciation, and knowledge of trees, tree maintenance, and canopy

As a result, the UFMP identifies four key areas of focus:

- Tree Canopy
- Community Tree Resource
- Urban Forestry Programming
- Partners

How Do We Get There?

To address the four areas of focus, the UFMP identifies 15 goals for promoting tree canopy, enhancing the value and benefits of the community tree resource, optimizing urban forestry programming, and engaging and collaborating with partners. Each of these goals is supported by comprehensive actions and sub-actions. It takes a community to steward an urban forest and the UFMP includes specific actions for increasing outreach and education. Additionally, there are five existing policies that provide direction and identify actions effecting urban forestry operations.

Existing Policies include:

1. 2035 Climate Action Plan (2035 CAP)
2. California Model Water Efficient Landscape Ordinance (MWELo)
3. City Ordinances and Standards
4. Approved Tree List
5. Best Management Practices

How Are We Doing?

The long-term success of the UFMP will be measured through the realization of plan goals and demonstrated through increased value and environmental services from the urban forest. The Plan identifies methods of measurement, priorities, potential partners, and estimated costs. The UFMP is intended to be a dynamic tool that can and should be updated in response to available resources and opportunities. One of the greatest measures of success for the UFMP will be its level of success in meeting community expectations for the care and preservation of Woodland's urban forest.

Focus	Tree Canopy	Community Tree Resource	Urban Forestry Programming	Partners
Policy	<ul style="list-style-type: none"> • 2035 Climate Action Plan • California Model Water Efficient Landscape Ordinance (MWELo) • Ordinances and Standards 	<ul style="list-style-type: none"> • Approved Tree List (public trees) 	<ul style="list-style-type: none"> • Best Management Practices 	
Goals	<ul style="list-style-type: none"> • Preserve and enhance canopy cover • Plant trees • Periodically review Tree Ordinance and Engineering Standards 	<ul style="list-style-type: none"> • Maintain public tree inventory data • Maintain public trees on a 7-year cycle • Manage the public tree inventory for species diversity • Periodically calculate/review ecosystem benefits 	<ul style="list-style-type: none"> • Optimized urban forestry programming • Ensure planning documents reference the Urban Forest Master Plan • Annually review the Urban Forest Master Plan and revise every 10 years • Sustainable Urban Forestry Funding 	<ul style="list-style-type: none"> • Community outreach and engagement • Collaborate with Partners • State of the Urban Forest Report
Primary Actions	<ul style="list-style-type: none"> • Increase canopy cover to 25% by 2035 • Review and implement tree preservation requirements in city ordinance • Evaluate incentives for tree planting on residential and private property • Explore community support for heritage and significant tree protection on private property • Use GIS data to identify and prioritize planting sites • Conduct urban tree canopy assessment every 10-years • Review design and construction standards to trees and planting sites 	<ul style="list-style-type: none"> • Maintain Approved Tree List • Develop an annual work plan • Maintain all public trees on a 7-year pruning and maintenance cycle (dependent upon funding/resources) • Standardize and create a policy guide for tree inspection protocol • Complete a resource analysis every 10-years • Review Approved Tree List at minimum every 5-years • Review changes to benefits, composition, and benefit versus investment ratio 	<ul style="list-style-type: none"> • Continue to follow best management practices • Develop a Policy and Procedures Manual for urban forestry • Develop a Risk Management Plan and policy for urban forestry operations • Define quality assurance protocols for urban forestry operations • Explore community support for a Park District overlay that would provide dedicated funding to parks and urban forestry • Identify opportunities for additional sources of revenue • Qualify and apply for TCIA Accreditation 	<ul style="list-style-type: none"> • Engage the community in the analysis, alternatives, and recommendations for further urban forestry related planning processes and potential code changes • Continue to collaborate with City departments, nonprofits, and neighborhood groups • Continue to promote outreach materials that communicate information about trees and the urban forest • Maintain Tree City USA status • Explore partnerships that can identify and support opportunities for grants and financial assistance for low-income residents • Continue to develop the urban forest web page

Map 1. Woodland Land Cover

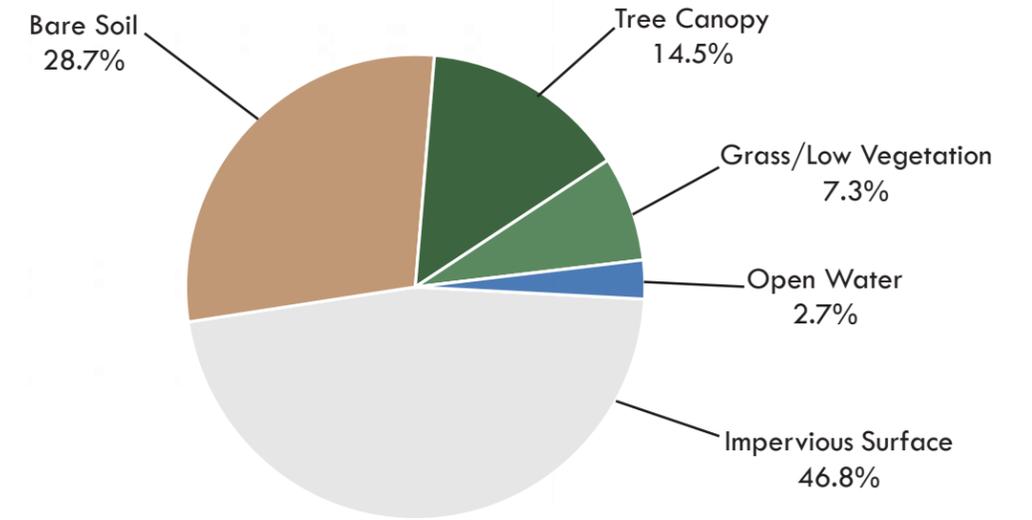
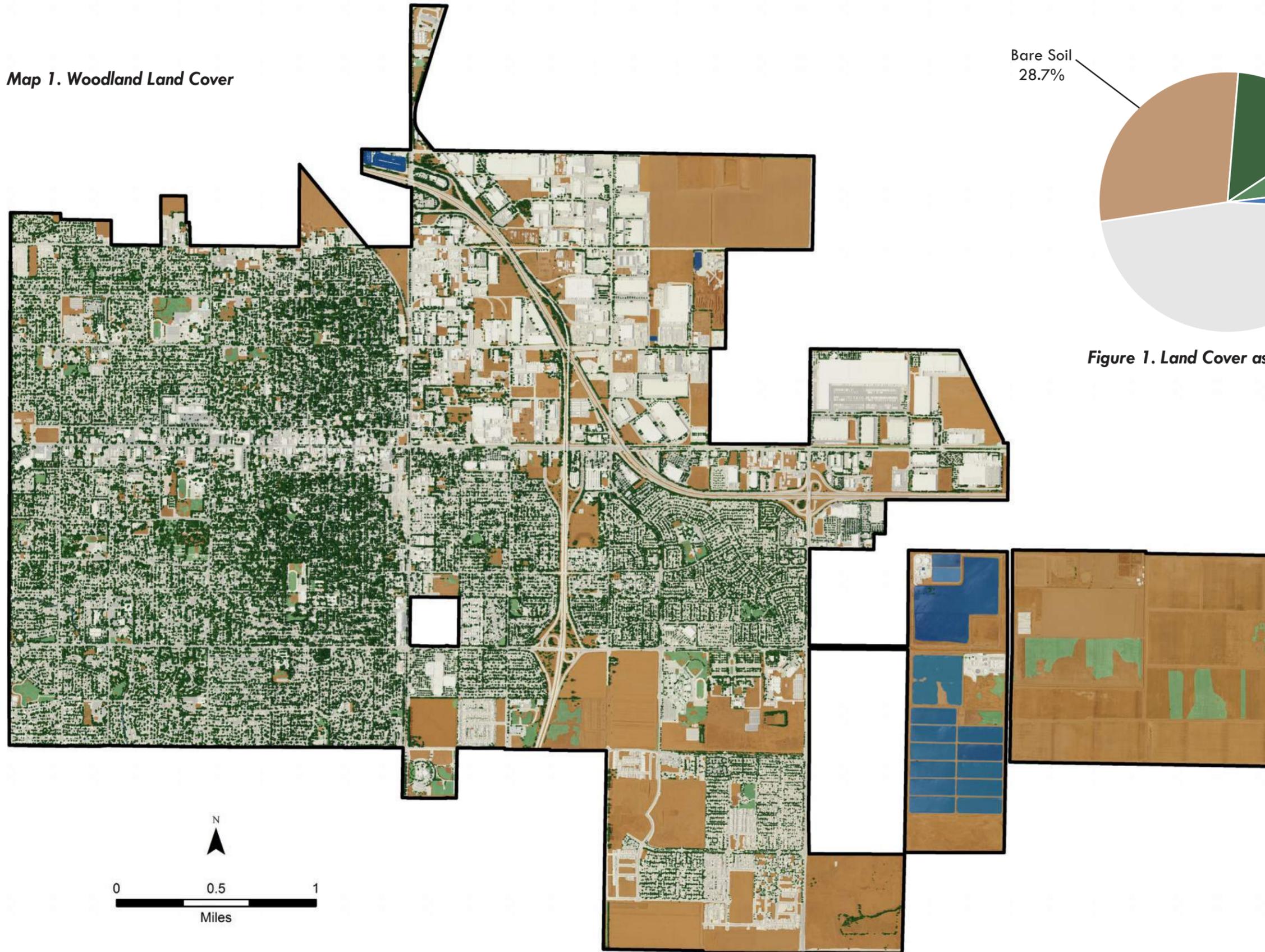


Figure 1. Land Cover as a Percentage



INTRODUCTION

COMMUNITY

Woodland is located in the Central Valley of California. The Yolo Bypass and the Sacramento River are to the east of Woodland and the Capay Valley and Coast Mountain Range are to the west. Woodland enjoys a Mediterranean climate, 69-feet above sea level. With an average of 269-days of sunshine a year, residents enjoy ample opportunity for outdoor activities (Sperling's, 2018). The average annual precipitation is 21.4-inches. Most precipitation occurs during the rainy season from October through April. January has the lowest average temperature of 38°F. Typical hot and dry summers provide average high temperatures of 96°F in July (Western Regional Climate Center, 2016).

Changes in climate and weather patterns will continue to impact the species of trees that can successfully establish and thrive in Woodland. Climate change alters precipitation seasons and patterns, fire occurrence and severity, and regional temperature norms. These changes blur the lines of established plant hardiness zones and the species that can be grown in a given region. Around the world, foresters are reviewing plant material lists in a proactive effort to ensure that urban

tree planting efforts result in increased resiliency and species diversity in anticipation of climate shifts and escalations in disease and invasive pests.

Woodland has a strong appreciation for its natural resources and civic pride in the relationship between people and the land. The community is mostly surrounded mainly by farms and agricultural land. Woodland combines historic, small-town charm with plentiful outdoor amenities. Historically, the economy has largely been based on agriculture. Due to the fertility of the Central Valley, Yolo County remains one of the largest crop producers in the state to this day.

Woodland enjoys a small-town population of 60,426 (California Department of Finance, 2018). The 2010 population density for Woodland was 3,624.7 people per square mile. Woodland is a diverse community with a rich racial makeup; 34,904 (62.9%) White, 855 (1.5%) African American, 726 (1.3%) Native American, 3,458 (6.2%) Asian, 169 (0.3%) Pacific Islander, 12,488 (22.5%) from other races. Respondents who identified as Hispanic or Latino of any race were 26,289 persons (47.4%)

HISTORY

Woodland began to boom with the arrival of the railroad in 1869. Shortly thereafter, in 1871, the town was formally incorporated. Regular train and telegraph service connected residents to the outside world, and they soon enjoyed a full range of City services, including gas, water electricity and telephones, streetlights, and graveled streets. Main Street grew quickly and bustled with new stores, hotels restaurants, and banks.

By 1910, Woodland was the largest city in the county, with a population of 3,187. For the next 40-years, Woodland remained a remarkably stable community, growing slowly but steadily in population, businesses and industries. Its industrial plants were principally agricultural; three rice mills, a sugar beet refinery, and a tomato cannery were built during this period.

The post-war period meant explosive growth for California and for Woodland as well. Between 1950 and 1980, Woodland's population tripled, and the town today is growing faster than ever. Industrial plants and distribution centers have grown up in the northeast, and there are new subdivisions and shopping centers around the town's perimeter. Since the late 1960's,

there has been a resurgence of interest in preserving the town's historic buildings, and an impressive number of them have been restored for use as homes, offices, stores and museums.

CITY OF WOODLAND MISSION

The City of Woodland is guided by principles that include quality of life, safety, community outreach, and effective planning. The adopted budget for the fiscal year 2018-2019 states that the mission of Woodland is:

"The City of Woodland will create and sustain community vitality by: Providing Quality Services, Programs and Facilities, Safeguarding Our Community, Promoting Community Involvement, and Planning for Our City's Future"

CITY OF WOODLAND VISION

The 2035 General Plan defines a vision for Woodland:

"In 2035, Woodland is a highly desirable community to live, learn, work, and recreate. It has maintained its small-town feel while maturing into an attractive, vibrant, and sustainable city that celebrates its architectural heritage and cultural diversity. Woodland is a healthy community with livable neighborhoods, a thriving downtown, well maintained infrastructure, excellent schools, recreational amenities, and a seamless network of trails and paths. The city is the region's center of agricultural technology and food production and is recognized globally as a leader in sustainable agriculture. The community is prosperous and fiscally sound, offering abundant employment opportunities to its diverse and creative workforce. Woodland has become a destination for visitors seeking to experience its unique agricultural, historical, recreational, cultural, and entertainment amenities."

GUIDING PRINCIPLES

The City of Woodland's guiding principles represent long-standing community values, vision, and commitment to quality of life issues. (2035 General Plan Update). Guiding principles that are directly supported by the Urban Forest Master Plan include:

- **Quality and Character:** Retain and enhance Woodland's quality of life, its distinctive identity and small-town characteristics.
- **Orderly Development:** Promote new growth while achieving an orderly pattern of community development, consistent with economic, social, fiscal and environmental needs.
- **Mobility Options:** Coordinate land use and transportation planning to provide a range of attractive and viable transportation options, such as bicycle, pedestrian, and transit.
- **Safety:** Ensure that Woodland remains a safe place to live, protected from natural and man-made hazards.
- **Environmental Stewardship:** Foster a sustainable community for the next generation and protect and improve the quality of the natural environment.
- **Health and Recreation:** Provide all residents with opportunities to live an active, healthy, and green lifestyle.

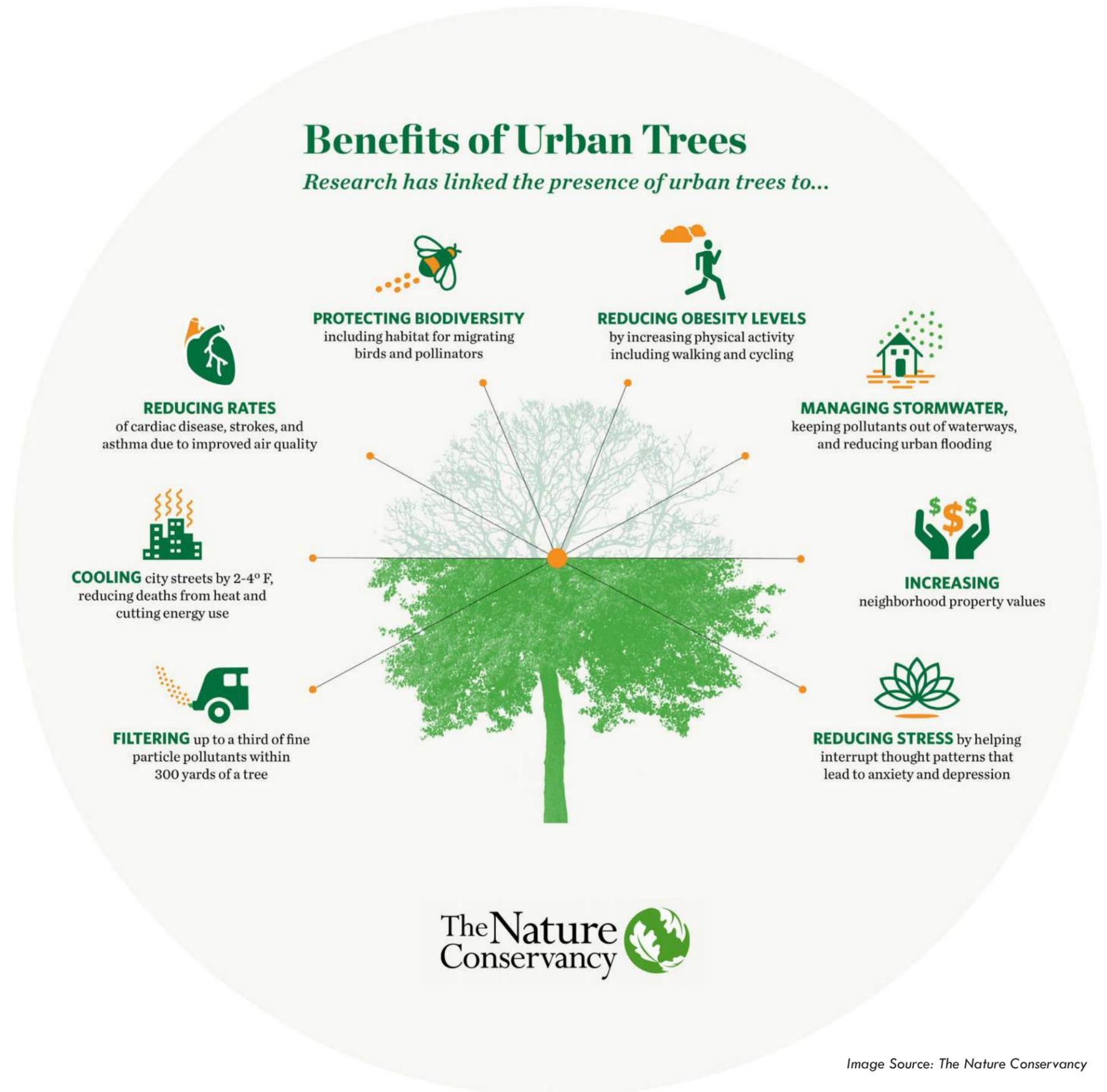
**"THE CARE OF THE EARTH IS OUR MOST ANCIENT AND MOST WORTHY, AND AFTER ALL, OUR MOST PLEASING RESPONSIBILITY."
- WENDELL BERRY**

TREE AND CANOPY BENEFITS

Trees in the urban forest work continuously to mitigate the effects of urbanization and development and protect and enhance lives within the community in many ways. Healthy trees are vigorous, producing more leaf surface and canopy cover area each year. The amount and distribution of leaf surface area are the driving force behind the urban forest's ability to produce services for the community (Clark et al, 1997).

Services (i.e. benefits) include:

- Energy Savings
- Air Quality Improvements
- Carbon Dioxide Reductions
- Water Quality Improvements
- Aesthetics & Socioeconomics
- Health Benefits
- Wildlife



ENERGY SAVINGS

Urban trees and forests modify climate and conserve energy in three principal ways:

- Producing shade for dwellings and hardscape reduces the energy needed to cool the building with air conditioning (Akbari et al., 1997)
- Tree canopies engage in evapotranspiration, which leads to the release of water vapor from tree canopies and cools the air (Lyle, 1996)
- Trees in dense arrangements may reduce mean wind speed and solar radiation below the top of the tree canopy by up to ~90% compared to open areas (Heisler and DeWalle, 1988)

An urban heat island is an urban area or metropolitan area that is significantly warmer than its surrounding rural areas due to human activities.

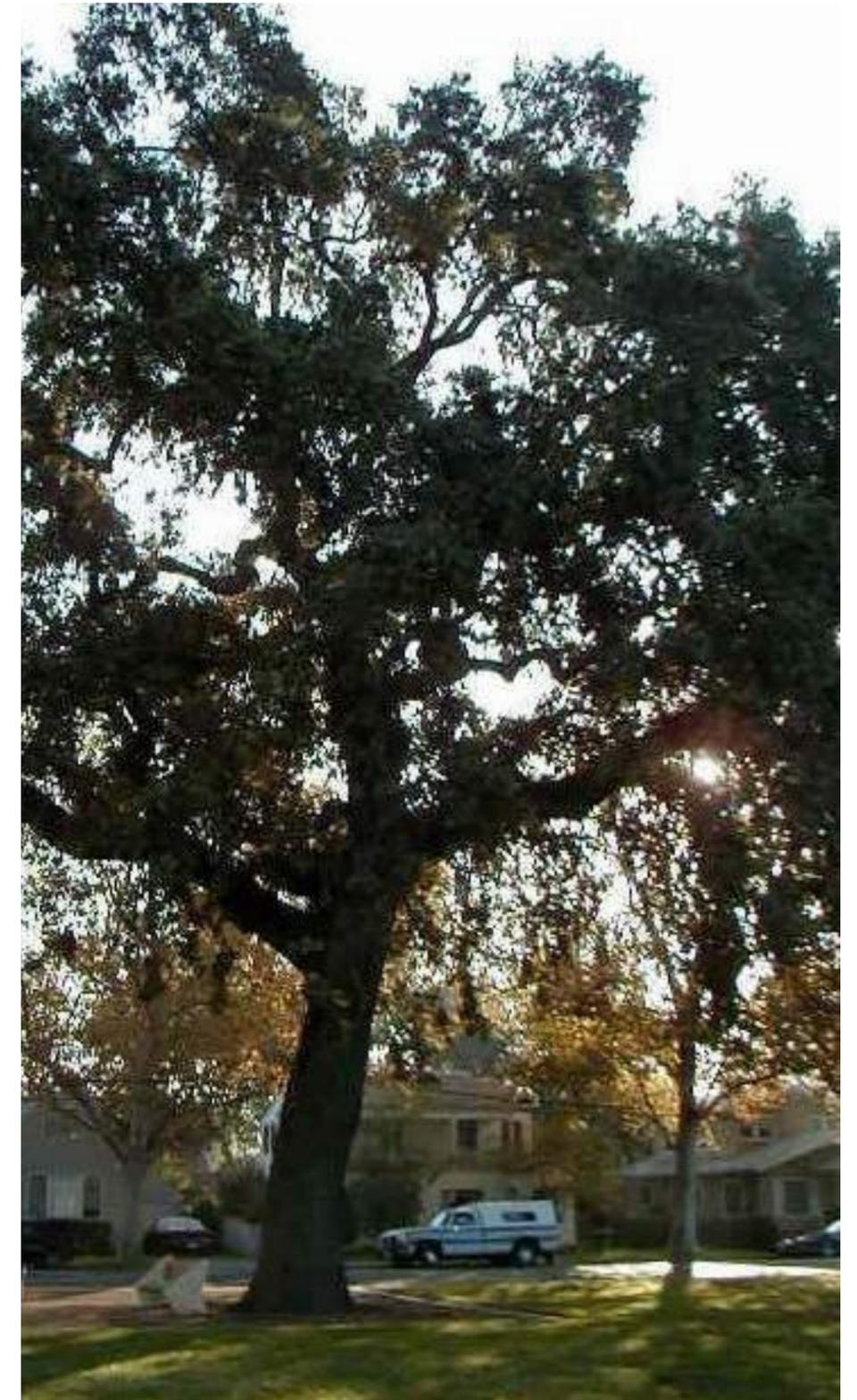
Trees reduce energy use in summer by cooling the surrounding areas and shading-built environments. Shade from trees reduces the amount of radiant energy absorbed and stored by hardscapes and other impervious surfaces, thereby reducing the heat island effect, a term that describes the increase in urban temperatures in relation to surrounding locations. Transpiration releases water vapor from tree canopies, which cools the surrounding area. Evapotranspiration, alone or in combination with shading, can help reduce peak summer temperatures by 2 to 9°F (1 to 5°C) (Huang et al., 1990). The energy-saving potential of trees and other landscape vegetation can mitigate urban heat islands directly by shading heat-absorbing surfaces, and indirectly through evapotranspirational cooling (McPherson, 1994). Studies on the heat island effect show that temperature differences of more than 9°F (5°C) have been observed between city centers without adequate canopy cover and more vegetated suburban areas (Akbari et al., 1997).

Trees also reduce energy use in winter by mitigating heat loss. Trees reduce wind speeds by up to 50% and influence the movement of warm air and pollutants along streets and out of urban canyons. Urban canyons are streets flanked by dense blocks of buildings, which can affect local conditions, including temperature, wind, and air quality.

By reducing air movement into buildings and against conductive surfaces (e.g., glass and metal siding), trees reduce conductive heat loss from buildings, translating into potential annual heating savings of 25% (Heisler, 1986).

Three trees properly placed around the home can save \$100-\$250 annually in energy costs. Shade from trees significantly mitigates the urban heat island effect - tree canopies provide surface temperature reductions on wall and roof surfaces of buildings ranging from 20-45°F and temperatures inside parked cars can be reduced by 45°F. Reducing energy use has the added bonus of reducing carbon dioxide (CO₂) emissions from fossil fuel power plants.

**A SINGLE 18 INCH DIAMETER VALLEY OAK ON
A RESIDENTIAL PROPERTY IN WOODLAND
ANNUALLY CONSERVES APPROXIMATELY 200
KILOWATT HOURS OF ELECTRICITY AND ONE
THERM OF NATURAL GAS.
– NATIONAL TREE BENEFIT CALCULATOR
(TREEBENEFITS.COM)**



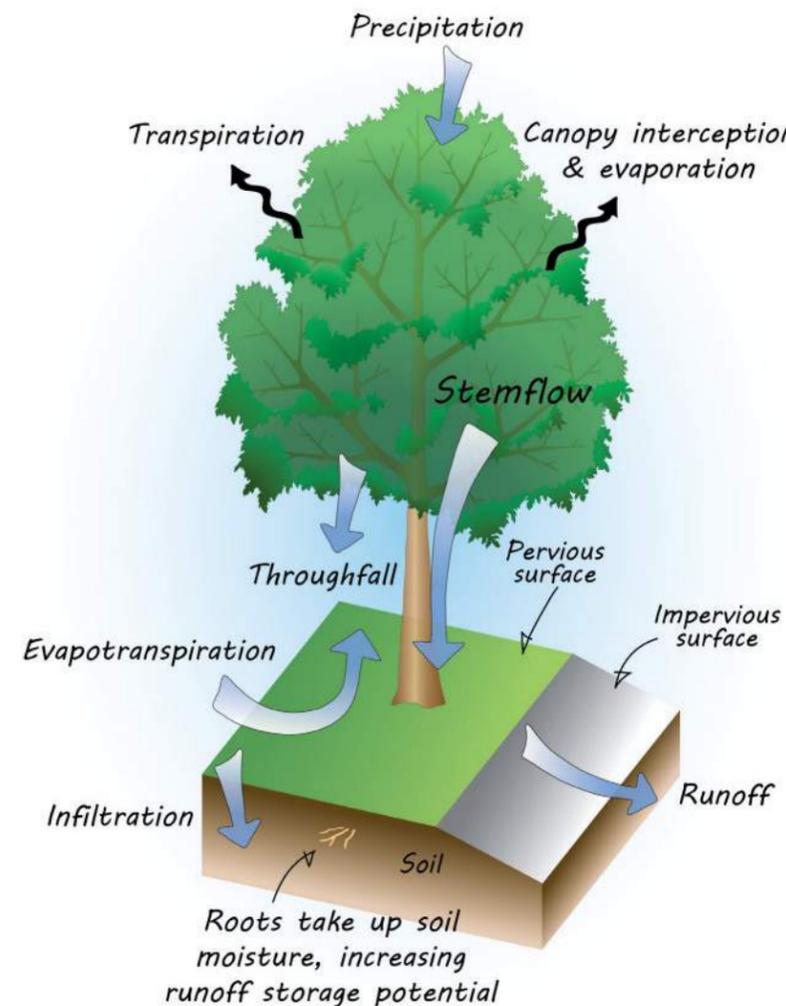
WATER QUALITY IMPROVEMENTS

Trees and forests improve and protect the quality of surface waters, such as creeks and rivers, by reducing the impacts of stormwater runoff through:

- Interception
- Increasing soil capacity and rate of infiltration
- Reducing soil erosion

Trees intercept rainfall in their canopy, which acts as a mini-reservoir (Xiao et al, 1998). During storm events, this interception reduces and slows runoff. In addition to catching stormwater, canopy interception lessens the impact of raindrops on barren soils. Root growth and decomposition increase the capacity and rate of soil infiltration by rainfall and snow-melt (McPherson et al, 2002). Each of these processes greatly reduces the flow and volume of stormwater runoff, avoiding erosion and preventing sediments and other pollutants from entering streams, rivers, and lakes.

Urban stormwater runoff is a major source of pollution for surface waters and riparian areas, threatening aquatic and other wildlife as well as human populations. Requirements for stormwater management are becoming more stringent and costly. Reducing runoff and incorporating urban trees in stormwater management planning has the added benefit of reducing the cost of stormwater management, including the expense of constructing new facilities necessary to detain and control stormwater as well as the cost of treatment to remove sediment and other pollutants.



AIR QUALITY IMPROVEMENTS

Trees improve air quality in five fundamental ways:

- Lessening particulate matter (e.g., dust and smoke)
- Absorbing gaseous pollutants
- Providing shade and transpiring
- Reducing power plant emissions by decreasing energy demand among buildings
- Increasing oxygen levels through photosynthesis

Trees protect and improve air quality by intercepting particulate matter (PM10), including dust, pollen, and smoke. The particulates are filtered and held in the tree canopy until precipitation rinses the particulates harmlessly to the ground. Trees absorb harmful gaseous pollutants like ozone (O₃), nitrogen dioxide (NO₂), and sulfur dioxide (SO₂). Shade and transpiration reduce the formation of O₃, which is created at higher temperatures. Scientists are now finding that some trees may absorb more volatile organic compounds (VOCs) than previously thought (Karl, T. 2010; Science Now, 2010). VOCs are carbon-based particles emitted from automobile exhaust, lawnmowers, and other human activities.

CARBON DIOXIDE REDUCTIONS

As environmental awareness continues to increase, governments are paying particular attention to global warming and the effects of greenhouse gas (GHG) emissions. As energy from the sun (sunlight) strikes the Earth's surface, it is reflected into space as infrared radiation (heat). Greenhouse gases absorb some of this infrared radiation and trap this heat in the atmosphere, increasing the temperature of the Earth's surface. Many chemical compounds in the Earth's atmosphere act as GHGs, including methane (CH₄), nitrous oxide (N₂O), carbon dioxide (CO₂), water vapor, and human-made gases/aerosols. As GHGs increase, the amount of energy radiated back into space is reduced and more heat is trapped in the atmosphere. An increase in the average temperature of the earth may result in changes in weather, sea levels, and land-use patterns, commonly referred to as "climate change." In the last 150-years, since large-scale industrialization began, the levels of some GHGs, including CO₂, have increased by 25% (U.S. Energy Information Administration).

California's Global Warming Solutions Act (AB 32) passed in 2006 set the 2020 GHG emissions reduction goal into law. In December 2007, the California Air Resources Board (ARB) approved the 2020 emission limit of 427 million metric tons of carbon dioxide equivalent (CO₂). As of 2007, regulations require that the largest industrial sources of GHG must report and verify their emissions. In 2011, the ARB adopted the cap-and-trade regulation. Under a cap-and-trade system, an upper limit (or cap) is placed on GHG emissions. This cap can be applied to any source, industry, region, or other jurisdictional level (e.g., state, national, or global). Regulated entities are required to either reduce emissions to required limits or purchase (trade) emission offsets to meet the cap. In 2011, the ARB approved four offset protocols for issuing carbon credits under cap-and-trade, including the Forest Offset Protocol (ARB, 2011). This Protocol recognizes the key role forests play in fighting climate change.

The USDA Forest Service Urban Ecosystems and Social Dynamics Program (EUP) recently led the development of an Urban Forest Project Reporting Protocol. The Protocol, which

incorporates methods of the Kyoto Protocol and Voluntary Carbon Standard (VCS), establishes methods for calculating reductions, provides guidance for accounting and reporting, and guides urban forest managers in developing tree planting and stewardship projects that could be registered for GHG reduction credits (offsets). The Protocol can be applied to urban tree planting projects within municipalities, campuses, and utility service areas anywhere in the United States. Trees and forests reduce atmospheric carbon dioxide CO₂ in two ways:

- Directly, through growth and carbon sequestration
- Indirectly, by lowering the demand for energy

Trees and forests directly reduce CO₂ in the atmosphere through growth and sequestration of CO₂ in woody and foliar biomass. Indirectly, trees and forests reduce CO₂ by lowering the demand for energy and reducing the CO₂ emissions from the consumption of natural gas and the generation of electric power.



HEALTH BENEFITS

Exposure to nature, including trees, has a healthy impact on humans, such as reduced symptoms of Attention Deficit Hyperactivity Disorder (ADHD), and faster recovery from surgery (Ulrich, 1984). Additional benefits include:

- Fortification of human health
- Reduced illness decreased reliance on medication, and quicker recovery from injury or illness
- Higher test scores
- Increased worker productivity
- Reduced symptoms of ADHD

The importance of green spaces in urban areas and the role they play in reducing crime and aggressive behavior has been recognized by sociologists. Research shows that the greener a building's surroundings are, the fewer total crimes. This is true for both property crimes and violent crimes. Landscape vegetation around buildings can mitigate irritability, inattentiveness, and decreased control over impulses, all of which are well-established psychological precursors to violence. Residents in public housing reported 25.0% fewer domestic crimes when landscapes and trees were planted near their homes (Kuo, 2001).

A study of individuals living in 28 identical high-rise apartment units found residents who live near green spaces had a stronger sense of community, better mental health, coped better with stress and hardship, were less aggressive and violent and managed problems more effectively than those living away from green space (Kuo, 2001). Other research has revealed lower incidence of depressive symptoms in neighborhoods with greater access to green space (Jennings et al., 2016).

In addition to offering children a place to play, natural settings contribute to child development in at least three critical areas. Children who spend time in green settings have improved:

- Creativity
- Imagination and Cognitive function
- Intellect

Children with ADHD experienced reduced symptoms when exposed to green environments and spending time in nature (Faber, 2009).



WILDLIFE

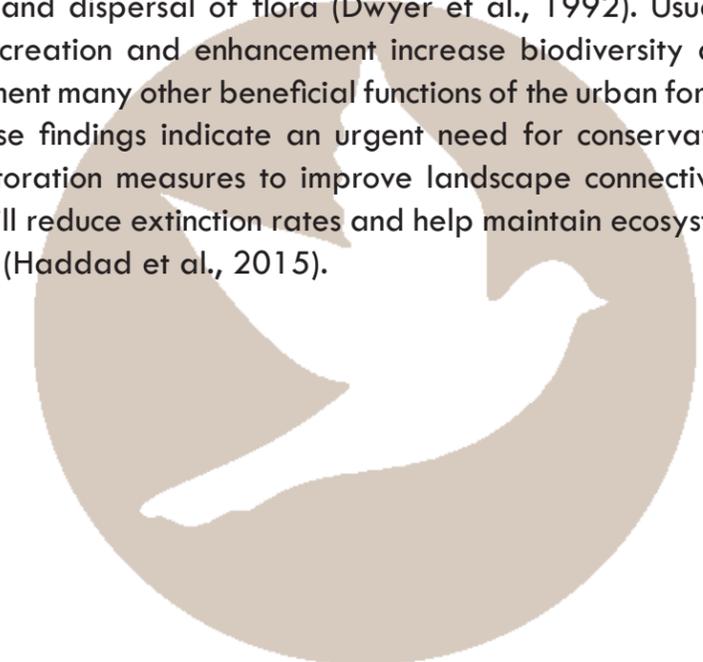
Trees provide important habitats for numerous birds, insects (including bees), and other animal species. Their greatest contributions include:

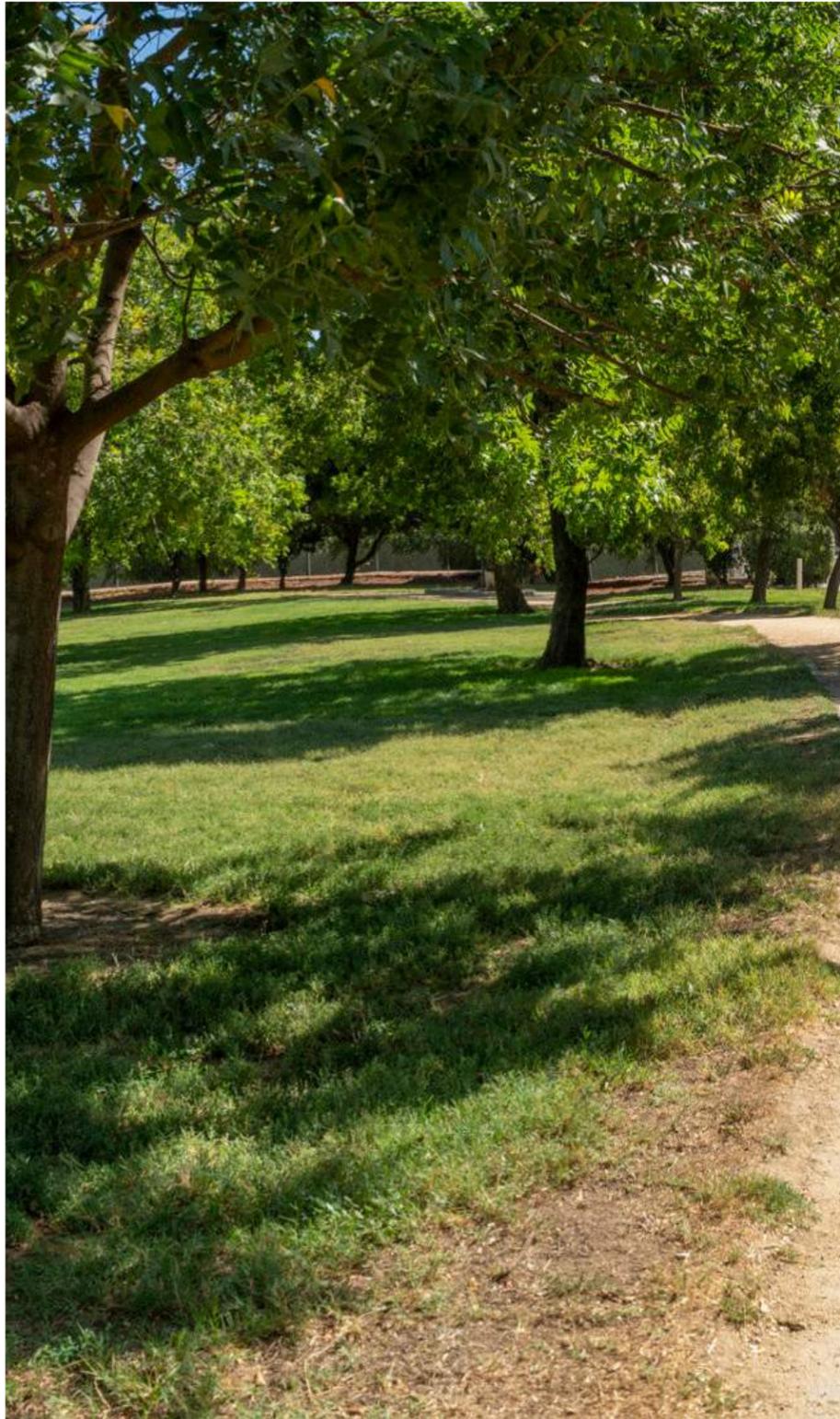
- Preservation and optimization of wildlife habitat
- Increase in movement corridors for wildlife

Furthermore, trees and forest lands provide critical habitat (for foraging, nesting, spawning, etc.) for mammals, birds, fish, and other aquatic species.

Trees can offer pollinators a valuable source of flowering plants. By including an array of flowering trees that provide pollen and nectar in the urban forest, bees are provided with additional food sources.

To enhance wildlife habitat, numerous communities have developed programs to preserve valuable existing natural areas and to restore the habitat on degraded lands. Restoration of urban riparian corridors and their linkages to surrounding natural areas have facilitated the movement of wildlife and dispersal of flora (Dwyer et al., 1992). Usually habitat creation and enhancement increase biodiversity and complement many other beneficial functions of the urban forest, and these findings indicate an urgent need for conservation and restoration measures to improve landscape connectivity, which will reduce extinction rates and help maintain ecosystem services (Haddad et al., 2015).





AESTHETICS & SOCIOECONOMICS

While perhaps the most difficult to quantify, aesthetic and socio-economic services from trees may be among their greatest contributions, including:

- Beautification, comfort, and aesthetics
- Increase in shade and privacy
- Opportunities for recreation
- Increased community walk-ability
- Reduction in violence
- Creation of a sense of place and history
- Increased property values

Some of these services are captured as a percentage of property values, through higher sales prices where individual trees and forests are located. While some of the services of forests are intangible and/or difficult to quantify (e.g., the impacts on physical and psychological health, crime, and violence), studies provide empirical evidence that these services do exist (Kaplan, 1989; Ulrich, 1986). There is limited knowledge about the physical processes at work, and their interactions make quantification imprecise. In addition, trees and forests have positive economic services for retailers. There is documented evidence that trees promote better business by stimulating more frequent and extended shopping and a willingness to pay more for goods and parking (Wolf, 2007).



CALCULATING TREE BENEFITS

Communities can calculate the benefits of their urban forest by using a complete inventory or sample data in conjunction with the USDA Forest Service i-Tree software tools. This state-of-the-art, peer-reviewed software suite considers regional environmental data and costs to quantify the ecosystem services unique to a given urban forest resource. Individuals can calculate the benefits of trees to their property by using the National Tree Benefit Calculator (www.treebenefits.com/calculator) or with i-Tree Design (www.itreetools.org/design).



WHAT DO WE HAVE?

HISTORY OF URBAN FORESTRY IN WOODLAND

Officially named in 1859 with the establishment of the first post office, Woodland was named for its location in a grove of oak trees. Today, some of the original native valley oaks (dating back to the 1800's) are still standing, including some specimens that are included in the community tree inventory. Woodland has a long-standing connection and appreciation for its trees, further expressed by the valley oak tree that graces the City's official flag.

1900's

A 1940 ordinance strengthened tree management policies and created a Tree Commission to oversee the care of public trees and manage tree removal requests. Coordinated public tree planting efforts began in the 1950's when the City collaborated with the Chamber of Commerce to promote community shade and beautification.

2000's

The National Arbor Day Foundation first recognized Woodland as a Tree City USA in 2000. Also established in 2000, the Woodland Tree Foundation is a non-profit, volunteer-driven organization that supports urban forestry programming. To date, the group has planted over 4,500 trees on both public and private property and maintains a strong working relationship with the City.



In 2009, the City contracted with DRG to conduct a complete inventory of City-managed trees. The inventory identified the location (GPS), species, size, and condition of 13,140 trees on streets, in parks, and at City facilities. The data was used to develop a comprehensive analysis of the composition and benefits of the community tree resource and to establish benchmarks for measuring change. In conjunction with the inventory, DRG also completed a canopy assessment, benchmarking 2009 tree canopy cover (public and private trees) at 6.9%.

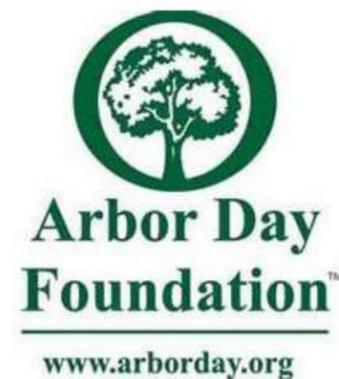
Also in 2009, the California Climate Action Registry recognized Woodland as a Climate Action Leader for demonstrated recognition of the impact a community can have on the environment at a local, state, and global level.

In 2014 the City adopted a Climate Action Plan (2020 CAP) with a target of increasing the canopy by 6,000 trees by 2020. By 2016 the community had reached over 50% of that goal. In 2017, the City updated the CAP (2035 CAP), identifying the urban forest and open space as one of six focus areas for addressing greenhouse gas emissions and climate change. 2035 CAP objectives include development and adoption of an urban forest master plan (UFMP) and expanding canopy

cover to 25%. The CAP encourages the UFMP to identify sustainable funding and to adopt a policy of no-net-loss for the community tree resource.

In 2016 the U.S. Conference of Mayors honored Woodland with a Climate Protection Award for its "2,400 Trees Campaign". The campaign was a joint effort between the City and the Woodland Tree Foundation, with funding from PG&E and the John & Eunice Davidson Fund, to plant 2,400 trees in a 24-month period (July 2014 through June 2016). In 2017, the City of Woodland contracted with DRG to develop an UFMP that will guide urban forestry programming over the next 20 years. The development process included an updated resource analysis of community trees and an updated tree canopy assessment (public and private trees). The City's General Plan 2035 provides an emphasis on historic preservation, agricultural sustainability, and environmental stewardship. True to their vision and stated strategy, the City of Woodland has taken positive steps to ensure the continued vitality, growth, and sustainability of the community and the urban forest.

Recognized by The National Arbor Day Foundation as a Tree City, USA since 2000, ample evidence exists throughout the community that Woodland takes great pride in being the "City of Trees." Woodland has endeavored to develop a healthy tree canopy which is reflected by the first celebration of Arbor Day in 1903.



URBAN TREE CANOPY

The development of the UFMP included an urban tree canopy (UTC) assessment to update the previous GIS tree canopy map layer produced in 2010 (Urban Forest Resource Analysis and Community Canopy Study, 2010). Tree canopy is the layer of leaves, branches, and stems of trees and other woody plants that cover the ground when viewed from above. Understanding the location and extent of tree canopy is critical to developing and implementing sound management strategies that will promote the smart growth and resiliency of Woodland's urban forest and the invaluable services it provides.

The UTC assessment provides a bird's-eye-view of the entire urban forest and includes consideration of tree canopy along with other primary land cover, including impervious surface, bare soils, and water. This information helps managers better understand tree canopy in relation to other geospatial data, including:

- Distribution of tree canopy within the community
- Geopolitical patterns in canopy distribution
- Identification of potential planting areas

The 2017 UTC assessment updates tree canopy benchmarks and provides a historical perspective for measuring changes that have occurred the urban forest since 2010 (Urban Tree Canopy Assessment, 2018). The analysis does not distinguish between trees on public and private property since the benefits of trees extend beyond property lines. The information can be used by urban forest managers to explore tree canopy in conjunction with other available metrics, including geography, land use, and community demographics. This information also establishes a baseline for assessing future change.

LAND COVER SUMMARY

The City of Woodland encompasses approximately 15 square miles (9,624 acres), of which approximately 1,394 acres are tree canopy. Excluding impervious surface and other areas that are unsuitable or unlikely to support canopy (e.g., sports fields, cemeteries), and open water (260 acres), Woodland contains approximately 3,469 additional acres which have the potential to support tree canopy. The following characterizes land cover in Woodland:

- 14.5% existing canopy including, trees and woody shrubs.
- 46.8% (4,500 acres) impervious surface, which includes; roads, parking lots, and structures.
- 35.2 acres of canopy in parks, an average of 30.1% canopy cover.
- 73.2% of tree canopy is in fair or better condition.
- 148,194 tons of stored carbon in woody and foliar biomass.
- 50.5% canopy potential (including existing canopy and potential planting acres).
- \$568,075 in annual benefits to air quality and stormwater runoff
- Since 2009, overall canopy has increased by 727 acres (109%) and the percentage of tree canopy cover has increased from 6.9% to 14.5%.
- Since 2009, canopy in parks has increased by 7.69 acres (27.9%) and the percentage of tree canopy cover in parks has increased from 16.8% to 19.6%.

TREE CANOPY HEALTH

Canopy health can be determined using near-infrared imagery and Normalized Difference Vegetation Index (NDVI) transformation. NDVI values are averaged over time to establish normal growing conditions in a region. Further analysis can then characterize the health of vegetation relative to the established normal condition. This allows identification of where plants are in very good condition and where they are in decline. The results of this analysis provided detailed canopy health information when viewed and analyzed in GIS software (Map 2).

In Woodland, 73.2% of the canopy is comprised of trees in fair or better condition. Healthy trees are vigorous, often producing more leaf surface area each year (Figure 2). 14.8% of Woodland's canopy is made up of trees in poor condition or dead or dying. The remaining 11.9% from this analysis are considered shadows or unclassified. This important baseline data can contribute to understanding forest health over time. The data can also be used as a comparison should emerging pests or disease become an issue.



Close-up of canopy health assessment

Map 2. Woodland Canopy Health

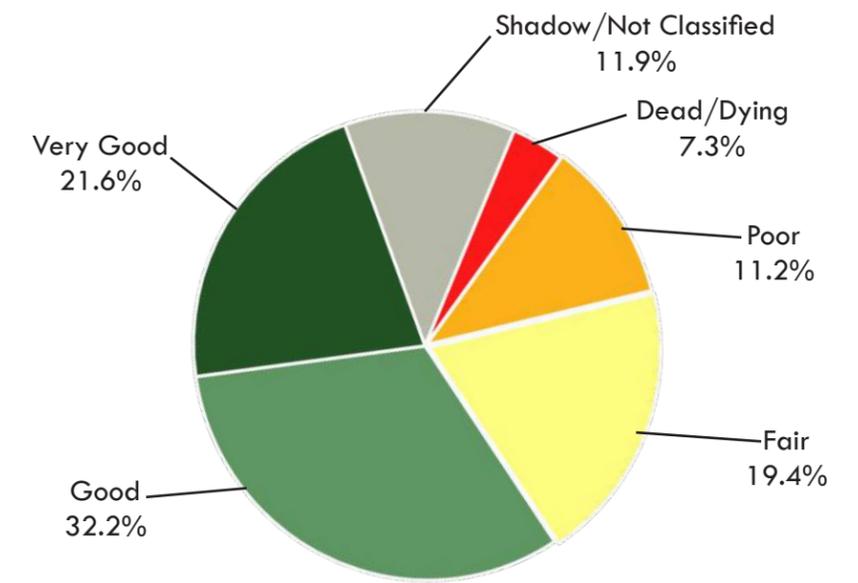
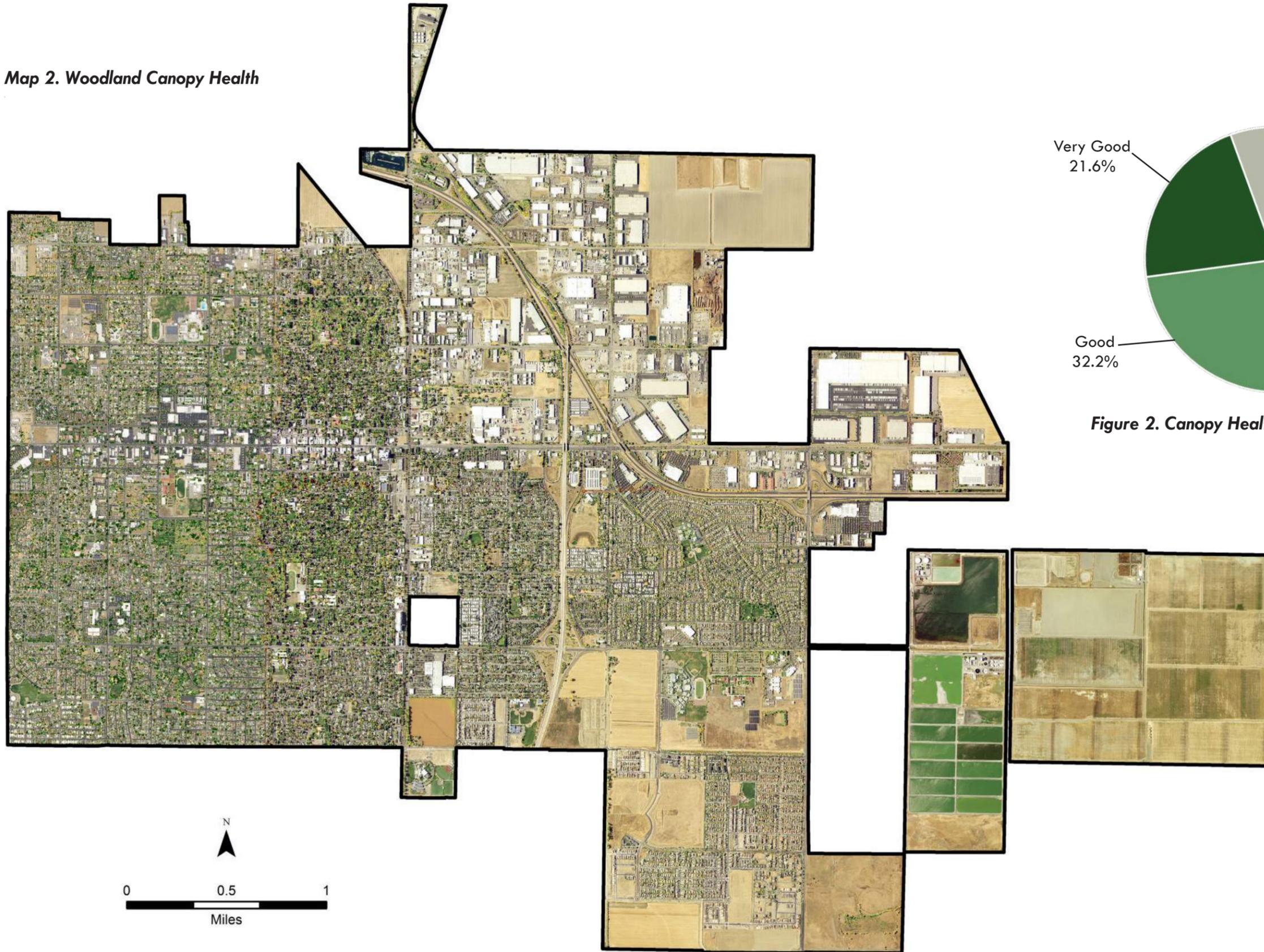
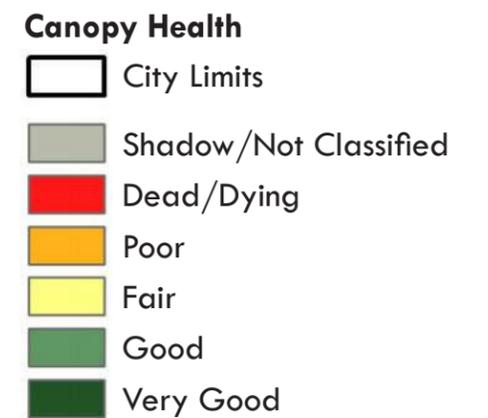


Figure 2. Canopy Health as a Percentage



TREE CANOPY BY COUNCIL DISTRICTS

Woodland is divided into five Council Districts (Map 3). Second District has the highest average canopy cover at 32%, followed by Third District (25%) and First District (25%). Each of these are in older and more established areas where most trees have reached maturity and are providing the greatest area of canopy.

Fifth District has the lowest average canopy cover at 6.1%. This District is also the largest in area (3,414 acres). Within this district, there is a great deal of undeveloped open space and younger neighborhoods. These newly developed neighborhoods have a large number of young trees that are still quite small. As they grow to maturity, the average canopy cover within this District will increase. Fourth District, which includes many industrial parcels, has an average canopy cover of 9.8%.

LANDSCAPE AND LIGHTING DISTRICTS

There are six neighborhood districts in Woodland where residents pay a fee to support a higher level of tree care along with other amenities (e.g., street lights). These areas are referred to as Landscape and Lighting Districts (LLDs) (Table 1). Spring Lake Maintenance District covers the most area (525 acres) and currently has an average canopy cover of 4.8%. This LLD is within the Fifth Council District. Spring Lake neighborhoods are fairly new (12-14 years) and while there have been a lot of trees planted, tree establishment and mortality has been an issue. Soils in the area are typically heavy clay and include high concentrations of boron. However, a change in the water supply (from well to surface water) is

helping to leach out the boron and existing trees are showing signs of improved health. As soil conditions improve and trees become better established, canopy cover is expected to increase as well.

The smallest LLD, Gateway (0.88 acres) also has issues with heavy clay and boron that have had an impact on tree establishment and mortality. However, this LLD also has a high degree of impervious surface (93%) due to business/industrial parcels. The existing canopy is 1.3% and the maximum canopy potential for this LLD is 6.7%.

Westwood LLD (4.9 acres) is also newly developed with many young trees. Currently, this area has an average canopy cover of 21.7%.

Gibson Ranch/SEA LLD (344 acres) is more established (18-20 years), however existing trees have not yet reached full maturity. Currently, average canopy cover is nearly 27% and is expected to increase slightly as existing trees continue to grow.

North Park LLD (23 acres) consists of a park and approximately 30 residential parcels in a well-established neighborhood with large trees.

Streng Pond has the highest average canopy cover at 29.4%. This very small LLD (34 acres) is in an older part of town with well established trees and a large retention pond and drainage area.

COMMUNITY COMPARISON

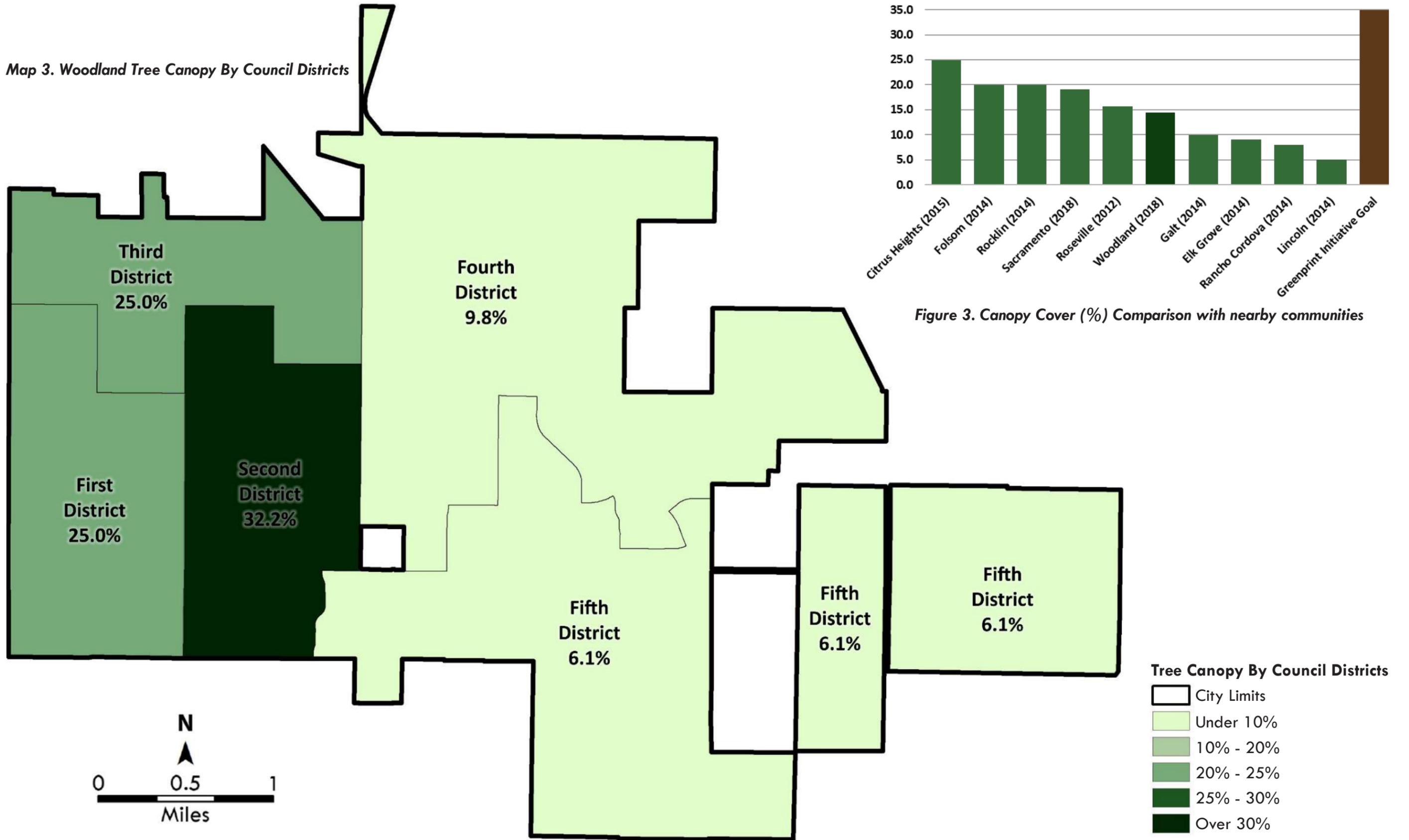
To provide a better regional context for Woodland's urban forest tree canopy, the UFMP provides the tree canopy cover for several comparison communities (Figure 3). Woodland has a 14.5% canopy cover which is approximately equal to Roseville.

It is important to note that different communities may have different canopy cover for many reasons, including land use patterns, climate, soil conditions, natural precipitation, and budgets. Every city needs to develop canopy goals that are appropriate for their own community.

Name	Acres	Canopy Acres	Canopy %	Impervious %	Grass/Low Lying Veg. %	Bare Soil %	Preferred Plantable %	Preferred Plantable Acres	Maximum UTC
Spring Lake Maintenance District	525.43	24.99	4.76	36.88	5.28	53.08	58.36	306.64	63.12
Gibson Ranch/SEA Landscaping and Lighting District	344.18	92.68	26.93	64.70	7.40	0.97	8.37	28.82	35.30
Streng Pond Landscaping and Maintenance District	34.15	10.04	29.39	47.94	16.64	4.69	21.34	7.29	50.73
North Park Landscaping and Lighting District	23.04	6.30	27.34	56.23	10.45	5.98	16.43	3.79	43.77
Westwood Landscaping and Lighting District	4.85	1.05	21.66	67.93	9.11	1.29	10.40	0.50	32.07
Gateway Landscaping and Lighting District	0.88	0.01	1.33	93.25	5.32	0.00	5.32	0.05	6.65

Table 1. Tree Canopy by Landscape and Lighting Districts

Map 3. Woodland Tree Canopy By Council Districts



TREE CANOPY BY PARKS

The City of Woodland has 32 areas designated as parks. The form and use of these areas varies from ball fields to detention ponds to open green spaces. The availability of space to plant trees is limited by these types of parks. For example, ball fields are unsuitable sites for trees. These areas are not included in the later planting priority analysis. However, they are included in this parks land cover analysis.

Of Woodland’s 32 parks, the top ten largest by acreage are summarized in Table 2. Woodland’s largest park is Woodland Community & Senior Center, which encompasses 43.4 acres

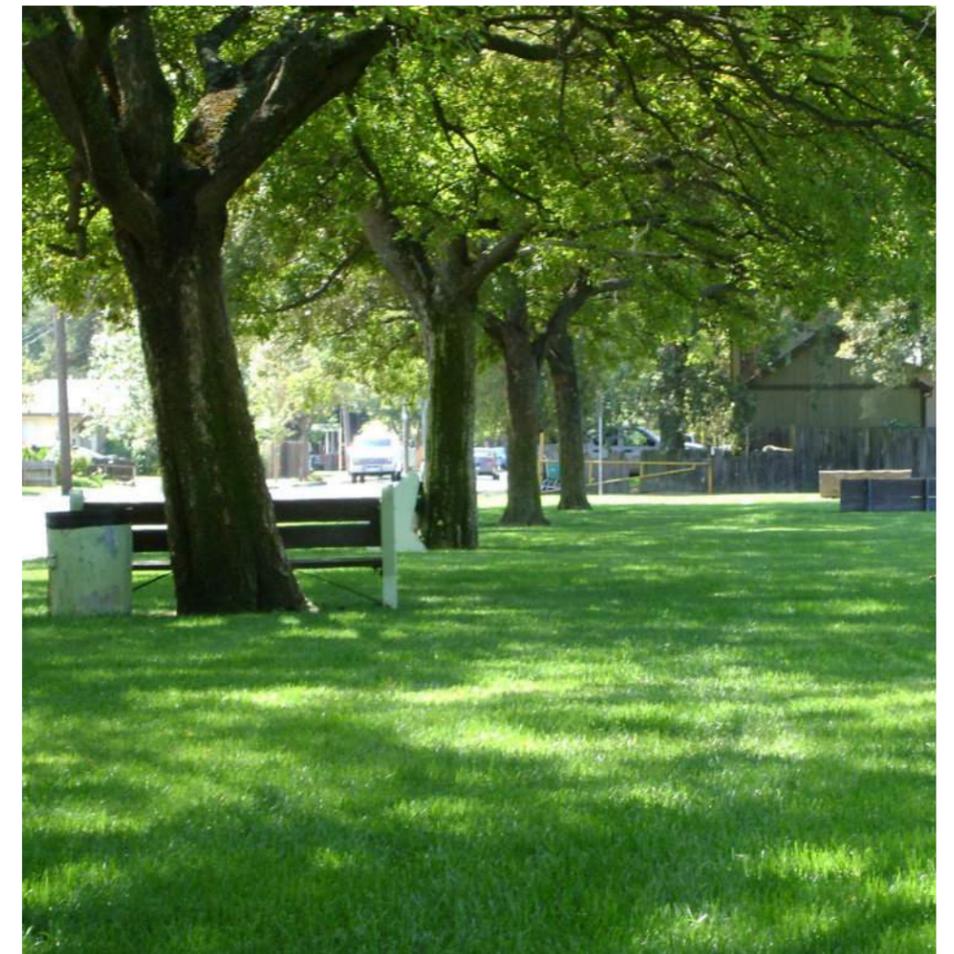
with 1.7 acres of canopy cover, or 4.0%, with a maximum UTC of 58.4%, which suggests that there is a large area suitable for planting trees. Among the top ten largest parks, John Ferns Park has the greatest percent canopy at 41.5%, with a maximum UTC of 83.4%. Other parks have lower maximum UTC percentages, possibly due to impervious surfaces or the presence of fields, which are not suitable sites for planting and were not considered in the preferred plantable acreage.

Park	Acres	Canopy Acres	Canopy %	Impervious Acres	Grass/Low Vegetation Acres	Bare Soil Acres	Water Acres	Preferred Plantable Acres	Maximum UTC
Woodland Community & Senior Center	43.39	1.74	4.02	12.63	11.07	12.51	0.00	23.58	58.37
Dave Douglass Park	12.84	0.73	5.68	2.13	8.09	1.89	0.00	9.98	83.38
Rick Gonzales, Sr. Park	10.14	0.01	0.06	0.13	0.00	10.00	0.00	10.00	98.70
Pioneer Park	10.05	2.65	26.38	1.84	5.56	0.00	0.00	5.56	81.68
John Ferns Park	9.29	3.85	41.48	1.54	3.66	0.23	0.00	3.90	83.43
Crawford Park	8.27	2.01	24.30	2.62	3.40	0.24	0.00	3.64	68.33
Woodside Park	8.21	3.25	39.62	1.24	3.00	0.60	0.12	3.60	83.44
Jack Slaven Park	7.95	0.32	4.05	1.34	5.01	1.28	0.00	6.28	83.14
Spring Lake Park	7.55	0.00	0.00	0.00	1.83	5.72	0.00	7.55	100.00
Dick Klenhard Park	7.24	1.47	20.27	1.58	3.49	0.70	0.00	4.19	78.20
All other parks	54.68	19.20	35.11	9.39	23.70	6.18	0.00	26.10	82.83
All parks total	179.6	35.24	19.62%	34.44	68.81	35.56	0.12	104.37	77.73%

Table 2. Woodland Tree Canopy By Parks

TREE CANOPY BY ZONING

Zoned areas encompass 8,032 acres of the overall area in Woodland (9,624 acres). Open space (1,735 acres) encompasses the greatest area, followed by single family residential (1,714 acres), and industrial (1,696 acres). Single family residential areas have the greatest amount of tree canopy (531 acres), but the highest canopy cover (39.8%) is found in areas with no designation followed by general commercial (37.3%)(Figure 3). The Spring Lake Specific Plan refers to a parcel in south Woodland near the freeway that will be developed into private homes. This area is represented as public space on the map (Map 3), but in the coming years will transition to residential.



Map 3. Woodland Tree Canopy By Zoning

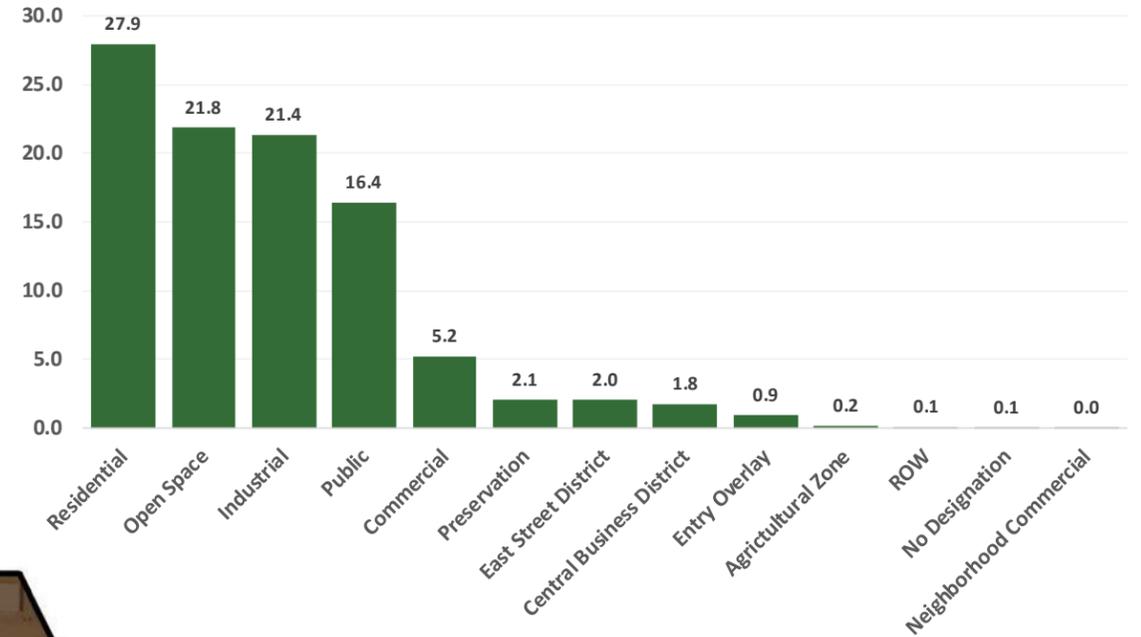
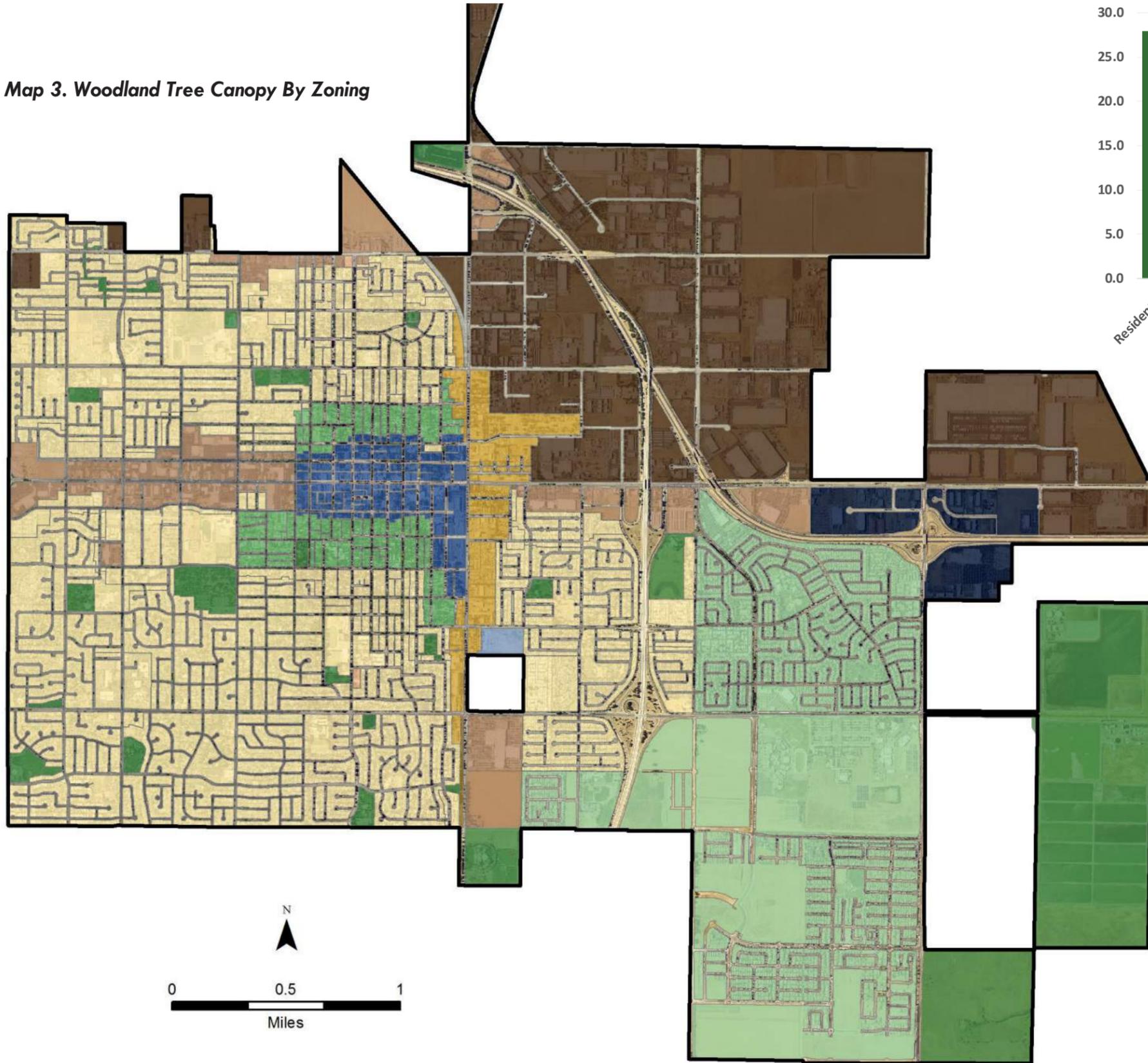
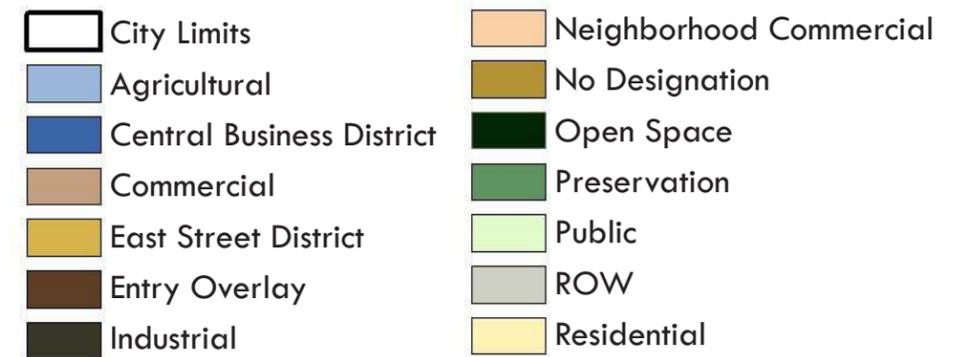


Figure 3. Canopy Cover (%) by Zoning

Tree Canopy By Zoning



HISTORIC CHANGE

Canopy data derived from 2009 NAIP imagery was used to determine change over the seven-year period. The 2009 canopy data was summarized for all features in each feature class data layer. Geospatial processing was conducted to get the acreages and percentages. These values were compared to the 2016 NAIP imagery to determine change acres, change percent, and absolute change. The accuracy of change acres and percentages were based on the accuracy of the 2009 tree canopy dataset.

Woodland encompasses 9,624 acres with a tree canopy that currently covers 1,394 acres or approximately 14.5% of the overall land cover. In 2009, tree canopy was covering 667 acres (6.9%). Since 2009, Woodland has added 727 acres of tree canopy, increasing overall tree canopy by 109% and increasing tree canopy as a percentage of all land cover from 6.9% to 14.5% (Table 3, Figure 4). Factors that have effected the increase in tree canopy include:

- 1,026 trees have been added to the community tree resource
- Tree canopy in parks has increased by 7.69 acres
- New developments have included new trees on public and private parcels
- Community members have planted new trees on private property
- Existing (2009) trees and new trees continue to increase in size and leaf surface

	Canopy Acres	Canopy %
Canopy 2009	667	6.93
Current canopy	1,394	14.49

Table 3: Historic Canopy Cover

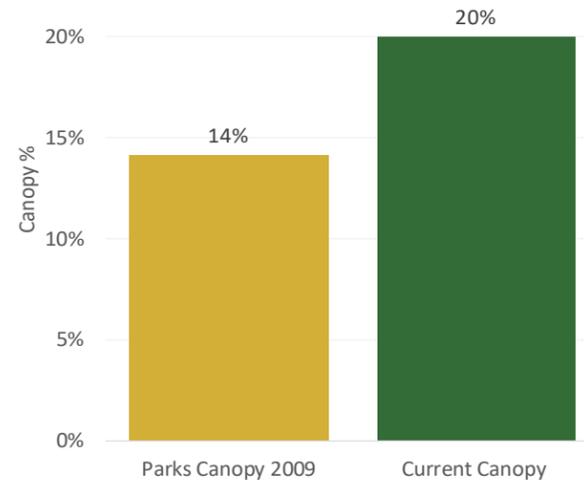


Figure 4: Parks Canopy Change from 2009 to 2018



PRIORITY PLANTING

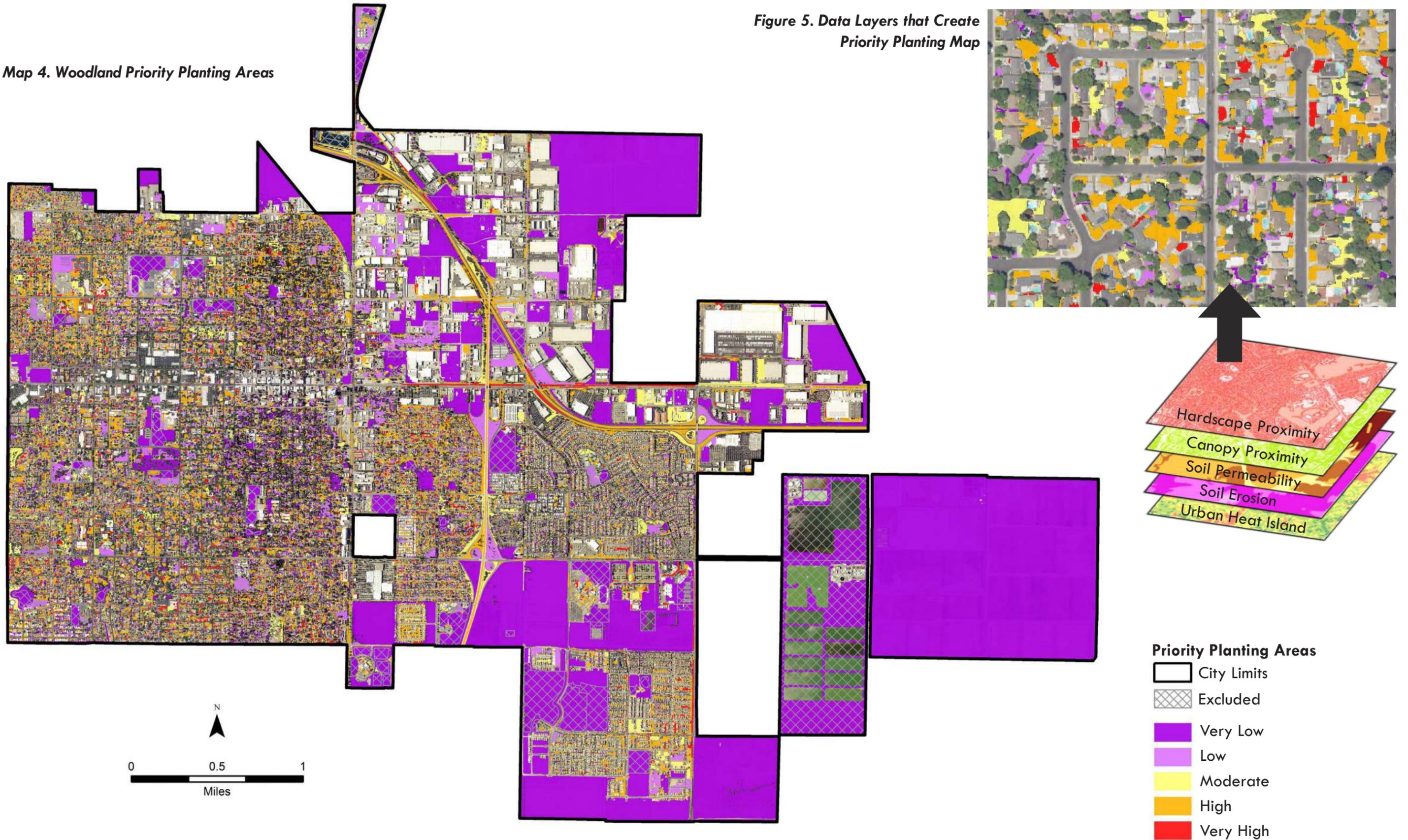
It could be assumed that all pervious areas, including grass, shrubs, low-lying vegetation, and bare soil (4,864 acres) are potential tree planting locations. Realistically, not all of these areas are suitable planting sites due to intended site uses (e.g., agricultural fields, sports fields, developments) and because some of these areas are not appropriate for tree planting.

Potential plantable areas can be determined by excluding pervious areas that are unsuitable for planting and including impervious areas where trees could feasibly be added, such as in parking lot islands, along sidewalks, and near road edges. The Urban Tree Canopy analysis considered site design and environmental factors, including proximity to hardscape, canopy fragmentation, soil permeability, slope, and soil erosion factors to prioritize planting sites on both public and private property for the greatest potential return on investment. The analysis identified 3,469 acres of potential planting areas in Woodland, where 310 of these acres are high or very high priority planting areas (Map 4). This analysis provides a snapshot of current conditions. Some existing young trees may not be fully accounted for.

The UTC analysis prioritized potential planting areas with GIS remote sensing. Site visits are necessary to determine suitability and the actual number and location of planting sites. The potential canopy cover for Woodland is estimated to be 50.5%, which considers potential planting area (3,469 acres) and existing canopy (1,394 acres).

Map 4. Woodland Priority Planting Areas

Figure 5. Data Layers that Create Priority Planting Map



COMMUNITY TREE RESOURCE

Community trees (publicly managed trees along City streets, in City parks, and on City facilities) play a vital role in the City of Woodland. They provide numerous tangible and intangible benefits to residents, visitors, and neighboring communities. Woodland recognizes that community trees are a valued resource, a vital component of the urban infrastructure, and part of the City's identity.

To support the preservation and management of public trees, the City of Woodland contracted with DRG in 2009 to conduct a complete inventory of City-managed trees. Completed in 2010, the inventory collected data on 13,140 trees on streets, in parks, and at City facilities. Data collection included species, size, condition, maintenance needs, and geographic location. Since then, the community tree resource has increased in population, individual trees have grown, new trees have been planted, and some older trees have been replaced. A follow-up inventory was completed in 2017.

DRG used this data in conjunction with i-Tree Streets benefit-cost modeling software (itreetools.org) to develop a detailed and quantified analysis of the existing structure, function, and value of the community tree resource (Urban Forest Resource Analysis, 2018).



STRUCTURE

A structural analysis is the first step towards understanding the benefits provided by these trees as well as their management needs. As of 2018, Woodland's community tree resource includes 14,166 trees and 170 unique species. Considering species composition and diversity, relative age distribution (diameter at breast height, DBH), condition, canopy coverage, and replacement value, DRG determined that the following information characterizes the community tree resource:

- Among all trees, the predominant tree species are London planetree (*Planatus x acerifolia*) (10.3%), Chinese pistache (*Pistacia chinensis*) (10.0%) and crapemyrtle (*Lagerstromia indica*) (7.3%).
- 74.6% of the population has a DBH of 12-inches or less.
- 13.9% of the population has a DBH of 18-inches or greater.
- 80.0% of trees in Woodland are broadleaf deciduous trees, while conifer evergreen trees are the second most common at 10.2%. 1.2% of the population is comprised of palms.
- It is estimated that community trees provide approximately 150 acres of canopy, 10.7% of all canopy cover in Woodland.
- Replacement with trees of similar size, species, and condition would cost nearly \$30.5 million.

SPECIES DIVERSITY

The number of unique species (170) in the community tree resource greatly exceeds the mean of 53 species reported by McPherson and Rowntree (1989) in their nationwide survey of street tree populations in 22 U.S. cities. The three most predominant species represent more than 27.6% of the overall resource (Figure 6). The prevalence of London planetree (10.3%) and Chinese pistache (10.0%) are on the verge

of exceeding the general rule that no single species should represent more than 10% of an urban forest resource (Clark et al. 1997). In light of significant pests and diseases, many cities are now opting to increase diversity to improve resilience. The 10-20-30 rule of thumb is a widely used standard that states that an urban tree population should consist of no more than 10% of any one species, 20% of any one genus, and 30% of any one family. The rule encourages greater genetic diversity, and thus, greater resilience. Only 25 of the 170 species in Woodland's community tree resource represent more than 1% of the overall population.

Dominance of any single species or genus can have detrimental consequences in the event of storms, drought, disease, pests, or other stressors that can severely affect a public tree resource and the flow of benefits and costs over time. Catastrophic pathogens, such as Dutch elm disease (*Ophiostoma ulmi*), emerald ash borer (*Agrilus planipennis*), Asian longhorned beetle (*Anoplophora glabripennis*), invasive shot hole borer (*Euwallacea* sp.), and Sudden Oak Death (*Phytophthora ramorum*) are some examples of unexpected, devastating, and costly pests and pathogens that highlight the importance of diversity and the balanced distribution of species and genera.

According to California's Fourth Climate Change Assessment, the Sacramento Valley will likely experience an increase of 10°F in average daily maximum temperatures by the end-of-century (Houlton, et. al, 2018). Extremes in precipitation (drier versus wetter) are more likely to occur. A diverse urban forest will provide greater resiliency in the face of these extremes.

Future planting should focus on increasing diversity and reducing reliance on overused species. As over-represented species are removed and replaced, new species should be introduced when possible. These new species should be resistant to known pest issues that currently pose a threat to the region. In addition, consideration should be given to species that withstand higher temperatures and periods of drought.

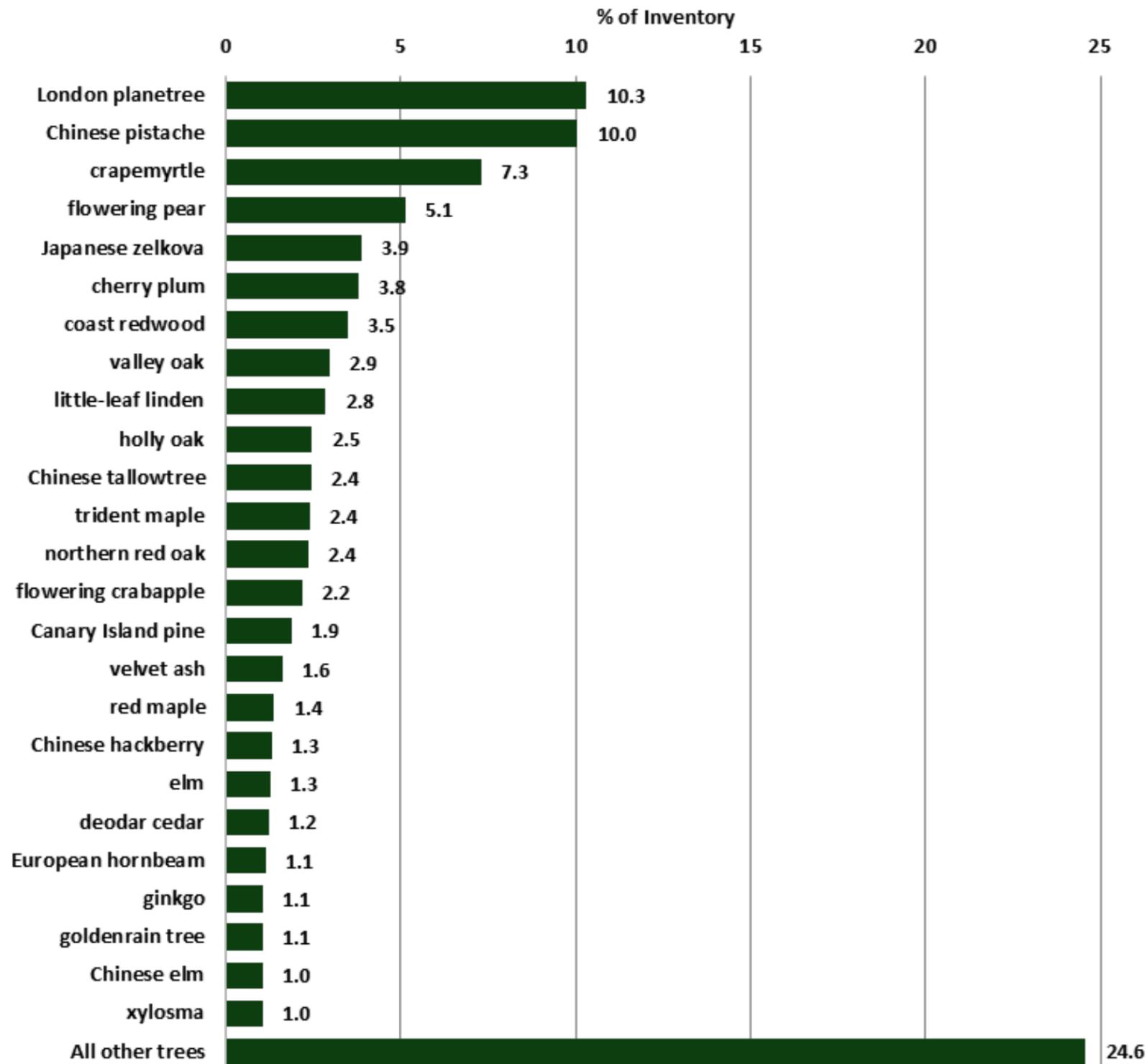
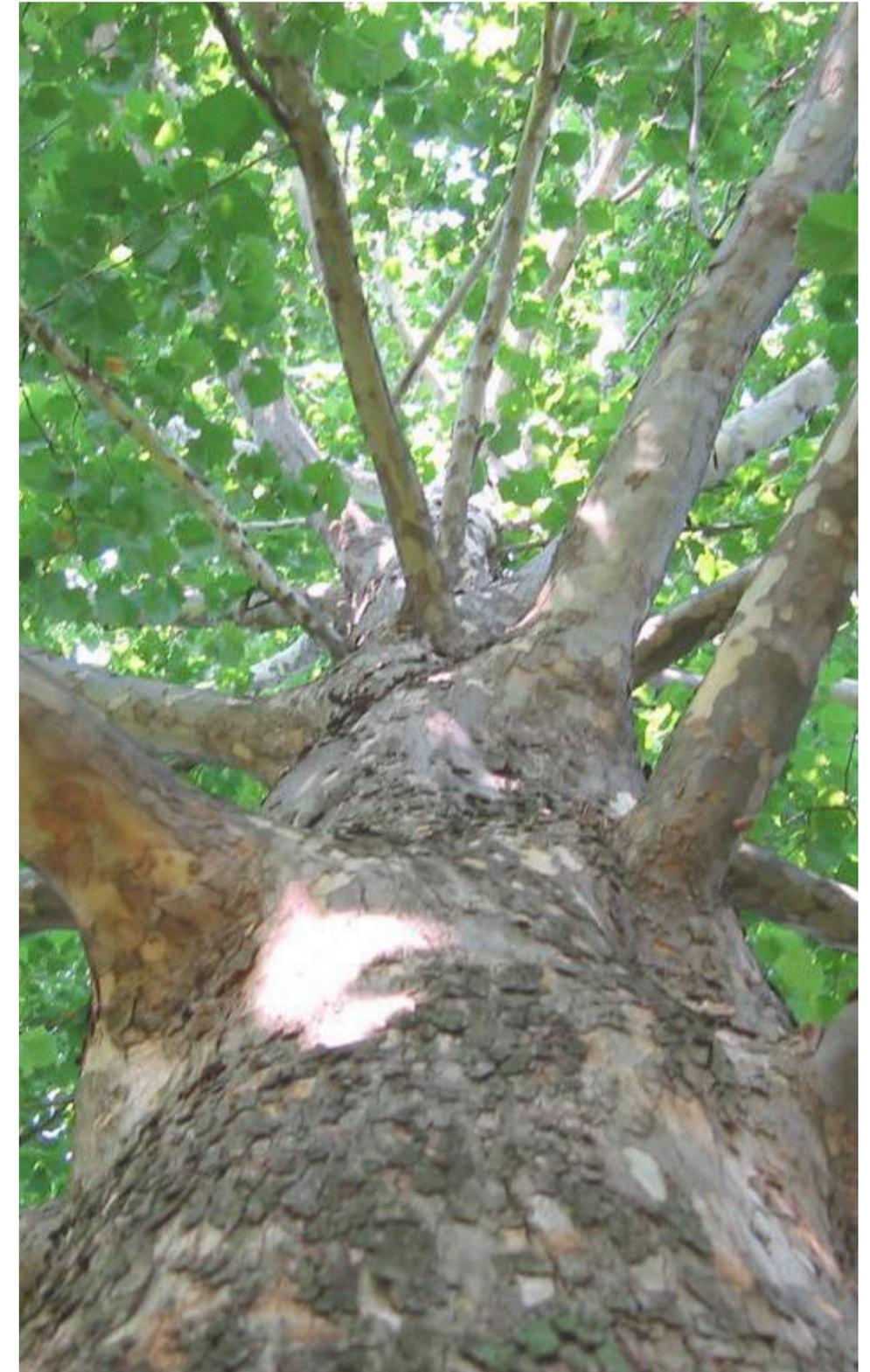


Figure 6: Most Prevalent Species (Representing >1%) in Woodland's Community Tree Inventory



AGE DISTRIBUTION

Age distribution can be approximated by considering the DBH range of the overall inventory and of individual species. Trees with smaller diameters tend to be younger. It is important to note that palms do not increase in DBH over time, so they are not considered in this analysis. In palms, height more accurately correlates to age.

The age distribution of the urban forest is a key indicator and driver of maintenance needs. The age distribution of Woodland’s community tree resource (excluding palms) reveals that 75.4% of trees are 12-inches or less DBH and 6.4% of trees larger than 24-inches DBH (Figure 7). In 2010, approximately 72.7% of the tree population had a DBH of 12-inches or less.

Trees greater than 24-inches DBH require more regular inspections and routine maintenance as they mature. Managers can gain a better understanding of the specific risks that individual mature trees pose with regular inspection and risk assessment.

5,170 trees (35.5%) in the inventory are young (<6-inches DBH) medium and large-stature tree species that still have a lot of growing to do before they reach maturity. Training, defined as the selective pruning of small branches to influence the future shape and structure of a young tree, is critical at this stage to prevent costly structural issues and branch failures as these young trees mature into their final size in the landscape. 2,918 trees (20.6%) in the inventory are of intermediate age with a DBH between 7 and 12 inches. Of these, 2,408 are medium and large-stature species that will benefit from pruning to promote good structure.

3,121 trees (22%) are small-stature tree species that generally don't exceed 25 to 30-feet in height.

A high proportion of young, large, and medium-stature tree species is a positive indicator for future benefits from the urban forest, since large shade trees typically provide more shade, pollutant uptake, carbon sequestration, and rainfall interception than small trees.

898 trees (6.3%) in the inventory are mature, with a DBH exceeding 24-inches. When trees reach mature stature, they provide the greatest benefits. However, mature trees should be regularly assessed for health and risk factors as they approach or reach the end of their natural lifespan. They may have higher maintenance needs or require removal to reduce risk and liability.

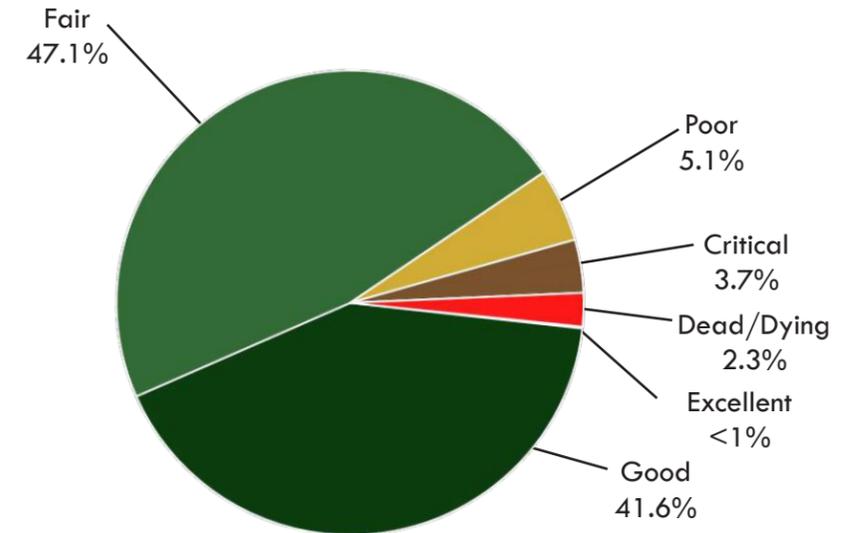


Figure 8. Tree Health as a Percentage

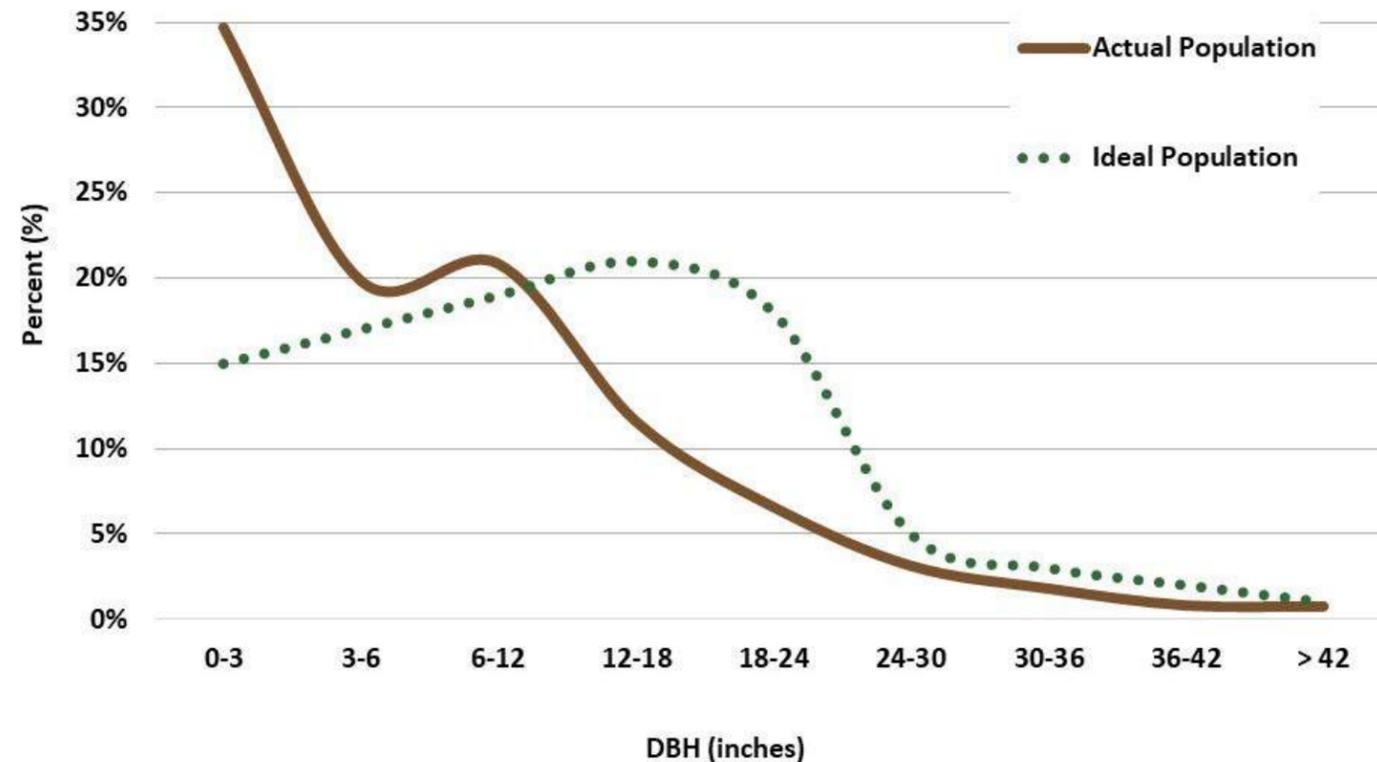


Figure 7: Most Prevalent Species (> 1%) in Woodland's Community Tree Inventory

CONDITION

Tree condition is an indication of how well trees are managed and how well they are performing in each site-specific environment (e.g., street, median, parking lot, etc.). Condition ratings can help managers anticipate maintenance and funding needs. In addition, tree condition is an important factor for the calculation of public tree resource benefits. A condition rating of good assumes that a tree has no major structural problems, no significant mechanical damage, and may have only minor aesthetic, insect, disease, or structural problems, and is in good health. When trees are performing at their peak, as those rated as good or better, the benefits they provide are maximized.

The majority of community trees (88.9%) in Woodland are in fair or better condition (Figure 8). 47.1% of trees are in fair condition, 41.6% are in good condition, and 0.1% of trees are in excellent condition. Only 6.0% of trees are in critical or worse condition (Figure 8).

While there are some older, mature trees that require structural maintenance or removal, Woodland is fortunate to have a relatively young and healthy public tree population. Proactive management (especially timely training and structural pruning) is critical to maintain the condition of this valuable forest resource.

STOCKING LEVEL

Woodland's public tree resource currently includes 85 available planting sites, including 29 vacant sites and 56 stumps. Considering the public tree inventory identified a total of 14,251 planting sites with 14,166 existing trees, the current stocking level of public trees is 99.4% (Figure 9).

CANOPY FROM PUBLIC TREES

The amount and distribution of leaf surface area is the driving force behind the public tree resource's ability to produce benefits for the community (Clark et al., 1997). As canopy cover increases, so do the benefits afforded by leaf area. The City of Woodland covers an area of 15.3 square miles. i-Tree estimates that public trees are providing approximately 0.2 square miles (149.7 acres) of canopy cover which accounts for 1.5% of total land area (Figure 10).

**"IT JUST FEELS LIKE A MORE STABLE, HAPPY, POSITIVE PLACE TO LIVE WHEN THERE ARE MATURE TREES ALL AROUND."
– SURVEY RESPONDENT, UFMP 2018**

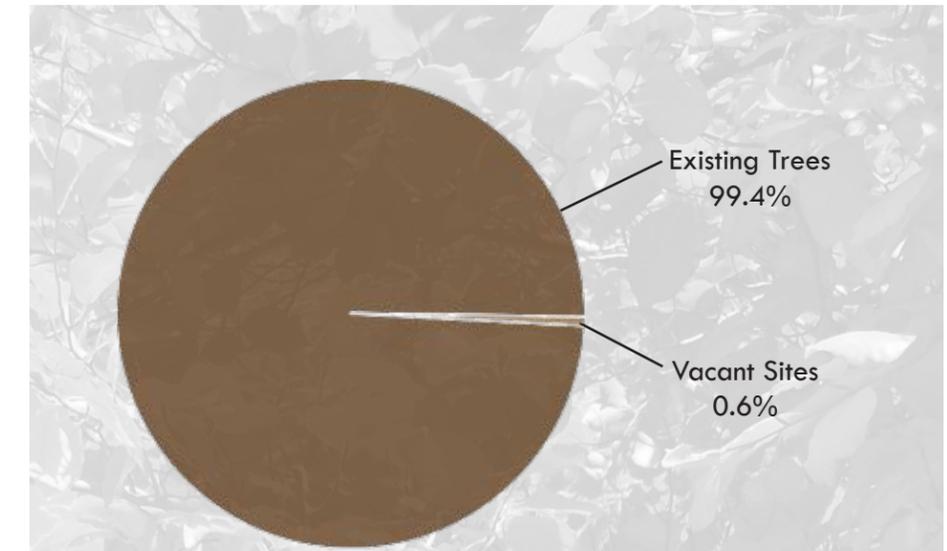


Figure 9. Stocking Level

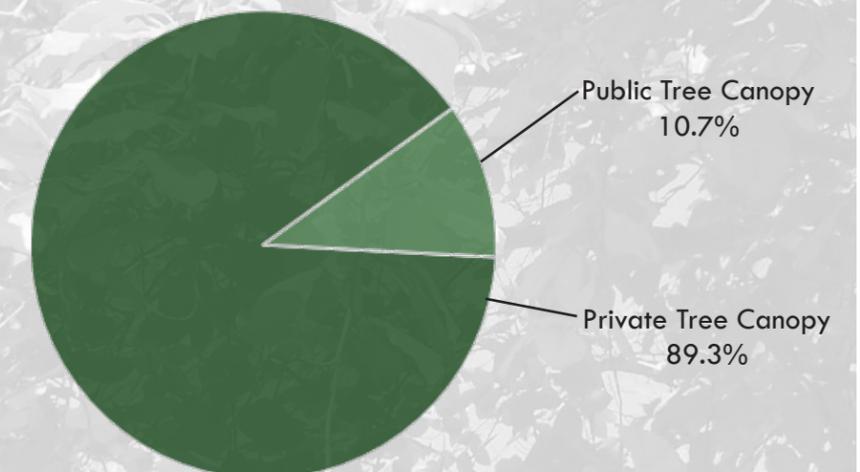


Figure 10. Tree Canopy from Total Land Area



BENEFITS

Trees in Woodland’s community resource provide an estimated 150 acres of canopy, approximately 10.7% of overall canopy cover. To date, trees in the community tree resource have sequestered 9,011 tons of carbon dioxide (CO₂), valued at \$135,158.

Annually, public trees provide nearly \$1.7 million in benefits to the community at an average value of \$117 per tree (Figure 11). These benefits include:

- \$264,269 in energy use reduction (electricity and natural gas) through shading and climate effects; an average of \$18.66 per tree.
- \$11,723 in sequestered atmospheric CO₂ (782 tons); an average of \$0.83 per tree.
- \$118,626 in air quality improvements; an average of \$8.37 per tree.
- \$56,051 in intercepted stormwater (7.2 million gallons); an average of \$3.96 per tree.
- \$1.2 million in increased property values and other socio-economic benefits; an average of \$85.14 per tree.

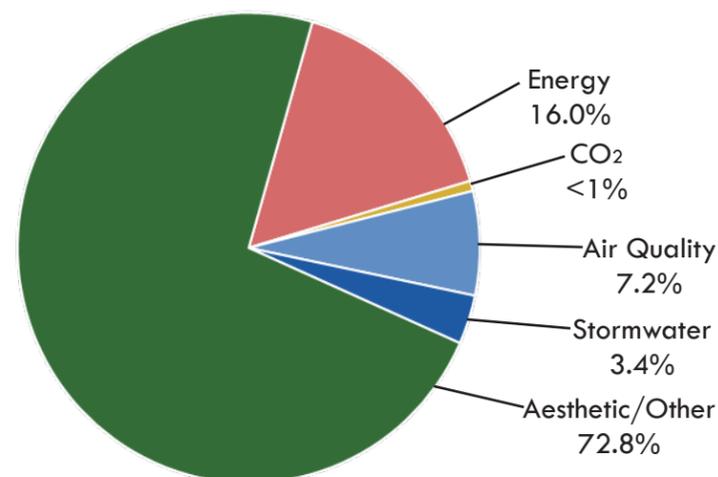


Figure 11. Community Benefits

RETURN ON INVESTMENT

Considering the estimated annual budget of \$661,140 currently invested to manage the community tree resource, the net annual benefit (benefits minus investment) to the community is \$995,595. The average net benefit for an individual tree in Woodland is \$16.70 (Table 4). In other words, for every \$1 invested in community trees, Woodland receives \$2.51 in benefits.

Benefits	Total (\$)	\$/Tree	\$/Capita
Energy	\$264,296	18.66	4.43
CO ₂	\$11,723	0.83	0.2
Air Quality	\$118,626	8.37	1.99
Stormwater	\$56,051	3.96	0.94
Aesthetic/Other	\$1,206,038	85.14	20.23
Total Benefits	\$1,656,735	\$116.95	\$27.79
Investments	Total (\$)	\$/Tree	\$/Capita
Purchasing Trees & Planting	10,449	0.74	0.18
Contract Pruning	212,872	15.05	3.57
Pest Management	2,572	0.18	0.04
Irrigation	2,443	0.17	0.04
Removal	51,211	3.62	0.86
Administration	346,623	24.51	5.81
Inspection/Service	2,354	0.17	0.04
Litter Clean-up	24,497	1.73	0.41
Liability/Claim	8,119	0.57	0.14
Total Expenditures	\$661,140	\$46.75	\$11.09
Net Benefits	\$995,595	\$70.28	\$16.70
Benefit-Investment Ratio	2.51		

Table 4. Health Benefits for Individual Trees

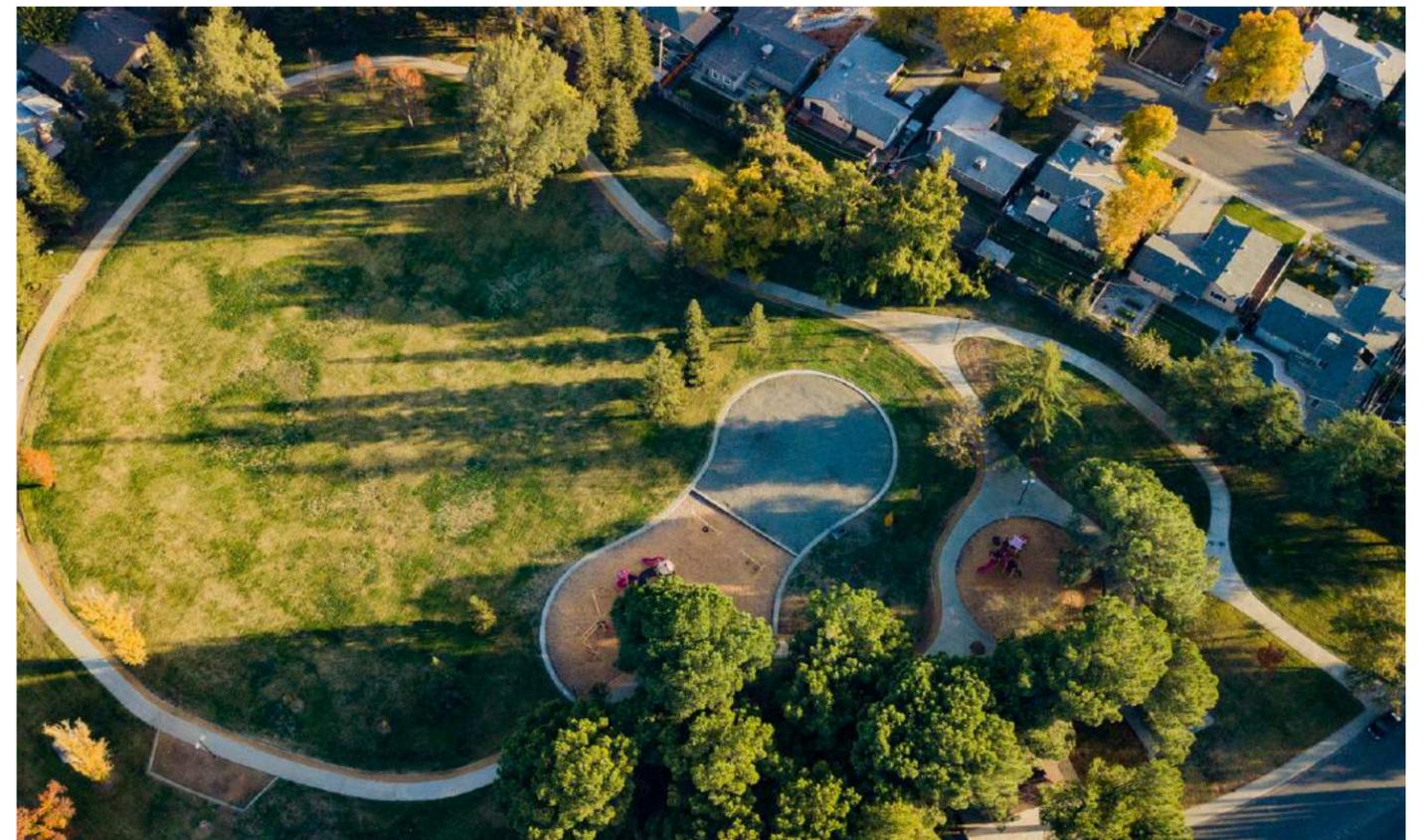
HISTORICAL CHANGE IN THE COMMUNITY TREE RESOURCE

Woodland’s community tree resource is a dynamic resource, changing over time. Since 2010:

- Since 2010, the inventory has grown by 1,026 trees (a 7.8% increase)
- The number of unique species has increased by 30 species (21.4%).
- Canopy cover from community trees has increased by 48.9 acres (11.2%).
- Annual energy benefits increased by \$142,289 (116.6%).
- Tree species exceeding 10% of the total population doubled, to a total of two species (a 100% increase).

Overall, environmental benefits from the community tree resource have increased 57.7% from 2010 to 2017. Annual energy benefits experienced the greatest increase, from \$122,007 to \$264,056. As existing young trees continue to grow, these benefits are expected to increase.







TREE CARE OPERATIONS

Several departments within the City of Woodland have influence over the management of the urban forest, including Community Development, Community Services, and Public Works.

STAFF, TRAINING, AND EQUIPMENT

Urban forestry operations are mainly led by the Park Superintendent of the Community Services department, and the Park Superintendent also serves as the Urban Forester. The Park Superintendent has authority over all City trees and handles the managerial responsibilities of urban forestry practices. One full-time senior tree trimmer supervises field work and pruning. The City provides hands-on training to any staff handling tree maintenance equipment, including chainsaw, chipper, and lift-truck safety. Field work is conducted by 5-6 temporary workers each year.

TREE MANAGEMENT

CYCLICAL TREE MAINTENANCE

It is generally beneficial to perform young tree training and specialized tree pruning of high-value and heritage trees in-house, with a greater understanding and control over the desired outcome. However, for routine and large-scale cyclical pruning operations, it is often more efficient and cost-effective to contract with a professional tree care company. Contracting high-volume, routine tree pruning also reduces the risk and liability to the City, especially on heavily trafficked arterial streets.

The City has a stated policy of providing cyclical maintenance to public trees on a 7-year cycle. In addition to timely maintenance and clearance pruning, a 7-year cycle allows for a regular assessment of the condition, structure, and overall

health of each tree. The current, approximately 10-year cycle is less than ideal and does not provide an opportunity for either identifying or resolving issues before they become critical. Trees in this maintenance cycle are pruned by contractors. The Parks Superintendent monitors and manages the pruning work from an administrative level while the Senior Tree Trimmer supervises contractors in the field.

The primary cause for delays in the maintenance cycle was the result of the economic recession in 2008. During 2008 and 2009 the forestry budget did not receive the annual \$100,000 to conduct contract pruning. Instead, they only received \$36,000 per year. Two years of reduced budget created delays in the pruning cycle. The \$100,000 for contract pruning is now a permanent component of the budget.

While there are no significant cycle buster species, some trees in core areas cost more and take more time to prune. Managing those areas can delay the regular maintenance cycle. For instance, downtown trees could potentially throw off the pruning cycle if they were contracted out, so they are currently maintained in-house every 2-years.

PRUNING PLANS

Written work plans are required for commercial contractors that identify the tree species, location, need for pruning, and the scope of pruning. When multiple reasons for pruning exist, they are prioritized from highest to lowest. A separate plan is needed for each tree. For groups of trees of the same species with similar pruning needs, one plan is sufficient.

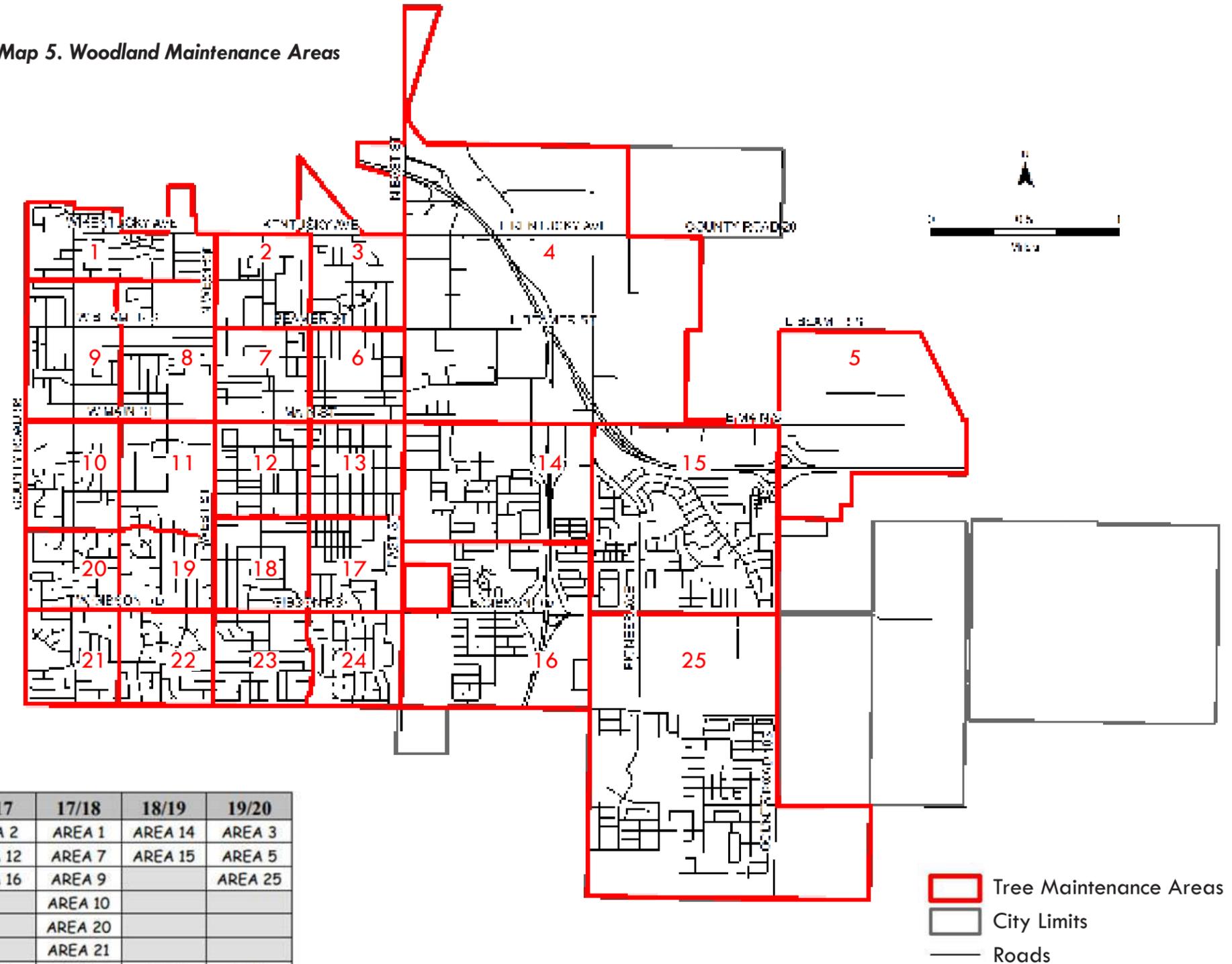
For all City departments and agencies, work plans are developed either for individual trees or for groups of trees, such as trees along streets, in parks, or on the grounds of public buildings. Plans must include species, location, need for pruning and the scope of pruning. Pruning plans must also specify the species to be pruned. Work plans are required to be available at work sites during pruning operations.

TREE CANOPY BY TREE MAINTENANCE AREAS

To address the maintenance needs of trees in Woodland, the City has developed 25 maintenance zones where pruning and other maintenance are scheduled on a 7-year cycle (Figure 12, Map 5). Maintenance requirements are impacted when different parts of the City have significantly different numbers of public trees. A balanced distribution across maintenance zones distributes the pruning and maintenance needs more equally. This helps the City forecast the budget and manage worker hours.

The City provides a Woodland Tree Pruning Schedule and a Woodland Tree Pruning Service Zone Map from the City website.

Map 5. Woodland Maintenance Areas



Fiscal Year	13/14	14/15	15/16	16/17	17/18	18/19	19/20
	AREA 6	AREA 13	AREA 17	AREA 2	AREA 1	AREA 14	AREA 3
			AREA 18	AREA 12	AREA 7	AREA 15	AREA 5
				AREA 16	AREA 9		AREA 25
					AREA 10		
					AREA 20		
					AREA 21		
Status / Date Completed	Last Completed 14/15	Last Completed 15/16	Last Completed 17/18	Last Completed 16/17/18	Last Completed 08/09	Last Completed 09/10	Last Completed 12/13

Figure 12. Urban Forestry ROW Maintenance Schedule



TREE REMOVALS

The City of Woodland removes approximately 200 trees per year, of which approximately 40 are large trees with a DBH greater than 30 inches. Large trees are generally moved by contractors while smaller trees are removed by in-house crews. The City typically performs tree removals as part of a regional tree project. As such, annual tree removals generally occur during the same stretch of the year. A few months later the stumps are removed. The projects are ordered this way so that the City can plant new trees in autumn through spring. Stump removals cannot be performed by just one person, so work can be delayed when there are staffing gaps due to employment turnover.

The City also issues a tree pruning/removal permit for homeowners who would like to have a City tree pruned or removed at the homeowner's expense. Every situation is evaluated by the urban forest group before the permit is issued.

HAZARD RESPONSE REQUESTS AND RISK INSPECTIONS

The City responds to hazardous tree emergency calls during normal operational hours from 7:30 am to 4:00 pm. Residents are urged to contact the Yolo County Communications for afterhours tree emergencies.

The City does not have a formalized Risk Management Plan, but forestry workers aim to conduct a complete risk analysis every 5-years. Priority is given to large oaks in the downtown core, which are older trees that often contain structural bracing. Currently, two staff members are Tree Risk Assessment Qualified (TRAQ) certified.

HYBRID LIFT TRUCK IMPROVES EFFICIENCY AND CONSERVATION

In 2018, The City of Woodland replaced their older, worn out lift truck with a new hybrid high-reach bucket truck. The new truck runs on both electric and diesel and promotes greater efficiency, fuel economy, and results in less impacts on the environment.

The Altec High-Reach truck, which includes a chip dump box, replaces three older model and less fuel efficient vehicles, including a bucket truck (no chip box), a chip truck, and a large dump truck.

The new truck is better for the environment and will run up to 2-hours on the battery alone. Because the truck is very quiet, it reduces noise pollution and facilitates better crew communications and a safer work environment. In addition, the new truck has greater articulation in the boom, allowing tree workers better access to the canopy and increased safety around utilities. It allows tree workers to reach limbs that are 75 feet in the air (10 feet higher than the previous lift truck) in a safe and efficient manner.

A platform that is mounted over the cab includes a railing, non-skid surface, and tie off points for fall protection. This provides an ideal working surface and allows tree workers to easily reach and perform maintenance and address clearance issues

for street and right-of-way trees, often without employing the aerial lift.

Since the new truck qualifies for California's Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP) Program, the City received credits that reduced the overall purchase price by approximately 15%. The HVIP Program is a partnership between CALSTART and the California Air Resources Board, that offsets the higher purchasing price of cleaner trucks, recognizing that "trucks and buses are responsible for 37% of California's greenhouse gas and criteria emissions." (californiahvip.org). The hybrid lift truck also furthers the goals of Woodland's Climate Action Plan (2035 CAP).





TREE PLANTING AND TREE MITIGATION

The City of Woodland partners with the Woodland Tree Foundation to improve Woodland through the planting of trees. There are two types of plantings where the Woodland Tree Foundation and the City collaborate based on whether the site is public or private.

For plantings on private properties, the Woodland Tree Foundation first contacts USA North 811 to get a map of utilities on the site. As part of this process, Woodland Tree Foundation is required to take pictures of every site to document the process. The City delivers trees to the site and provide stakes, then volunteers plant the trees. These planting projects typically plant around 40 trees over a weekend. These projects are typically planting new trees.

For plantings on public properties, the City performs more tasks. First, the City contacts USA North 811 to get a map of utilities on the site. Then the City removes any existing dead trees, pre-digs holes, buys and delivers trees, and prepares the planting sites. The trees are planted by a combination of Woodland Tree Foundation volunteers and City staff. The Woodland Tree Foundation plants trees at public sites including; parks, rights-of-way, government parcels, schools, public and nonprofit housing sites, and fairgrounds (which are owned by the state but managed locally). These projects are typically planting replacement trees.

IRRIGATION PRACTICES

For many years, the City relied on well-water to irrigate newly planted trees. Because of the high mineral content of the well-water, tree establishment was hindered. In recent years, the City has utilized water from the river to irrigate and thus far, managers have observed more success with plantings, as well as, have been able to leach the high concentrations of Boron from the soil in some parts of the City.

REDUCING CARBON AND IMPROVING SOIL CONDITIONS = WIN, WIN!

Woodland is home to one of America's leading thermochemical biomass technology development facilities. West Biofuels Woodland Development Center conducts research and pilot testing for the advancement of biomass gasification technology and the conversion of organics into higher value fuels and chemicals (westbiofuels.com). One of their processes, a rotary gasification system, converts biomass (wood chips and nut shells from forestry, agricultural, and construction operations) into heat and/or power generation. A byproduct of this process is biochar.

Biochar, a type of charcoal that is highly stable, rich in carbon, and fine grained, is generating a great deal of interest as a valuable soil amendment for urban forestry and agricultural operations. Biochar is produced through a modern pyrolysis process that facilitates thermal decomposition of plant biomass



in an anaerobic environment (absent oxygen) to prevent combustion. Research in biochar is showing many potential benefits for trees and other crops, including:

- Increased soil fertility
- Increased water retention and availability
- Increased agricultural productivity
- Protection against some foliar and soil-borne diseases
- Carbon sequestration and mitigation of climate change

Interestingly, there is evidence that some pre-Columbian Amazon tribes produced biochar by smoldering agricultural wastes and then used the biochar to enhance soil productivity.



The City of Woodland is specifying the incorporation of biochar into the soil for new planting sites. Incorporation of biochar modifies and conditions heavy clay soils, promotes better soil texture, increases holding capacity and availability of water and nutrients, and promotes better tree establishment. Unlike other gasification systems, West Biofuels does not use the biochar to filter the product gas. As a result, the biochar remains free of tars and other undesirable contaminants and the natural filtering ability remains intact.

In addition to increased soil fertility and tree health, incorporating biochar into the soil removes carbon from the atmosphere. Biochar is high in carbon and very stable, when incorporated into the soil, it can sequester (or store) carbon for hundreds of thousands of years (Lehmann/Winsley, 2007). Biochar that is produced and used in Woodland further reduces the carbon footprint by eliminating the need to transport the material long distance. Sequestering the biochar into local soils supports the City's Climate Action Plan (2035 CAP). In the future, there may be opportunities to direct some of the biomass generated by forestry operations into the local biochar production.



Image Source: BiocharNow

FUNDING

Stable and predictable funding is critical to effective and efficient management of the urban forest. Trees are living organisms, constantly growing and changing over time and in response to their environment. There are several factors that affect tree health and structure, including nutrition, available water, pests, disease, wind, and humidity. While it might seem like most changes to trees take a long time to occur, some specific maintenance is critical at certain stages of life. For instance, young trees benefit greatly from early structural pruning and training. Minor corrections that are simple can be applied with low costs when a tree is young. However, if left unattended they can evolve into very expensive structural issues and increase liability as trees mature. At which point it may be impossible to correct the issue without causing greater harm. Then again, over-mature trees often require more frequent inspection and removal of dead or dying limbs to reduce the risk of unexpected failure. A stable budget allows urban forest managers to program the necessary tree care at the appropriate life stage when it is most beneficial and cost effective.

The 2018 forestry budget is funded through the General Fund and Landscape and Lighting Districts (Table 5). The level of maintenance for public trees is highly dependent upon location. Trees in residential areas are either in the Landscape and Lighting Districts (LLDs) or General Fund areas. For LLDs, maintenance is funded through Mello-Roos funds and/or a portion of property tax. The availability of funds can vary greatly between districts and funds from one district cannot legally be used to maintain trees in another. The amount of available funding has an impact on the timing and opportunities

for tree care within those districts. Because Woodland has experienced growth, the existing LLDs no longer have an equal population of trees.

Urban forestry funding from the General Fund (\$381,355) amounts to 0.7% of the overall General Fund (\$54,720,701) (Figure 13). However, the total urban forestry budget (\$661,140) for administration, maintenance, and tree planting (Table 6) is approximately 0.4% of the overall municipal budget (\$158,244,533). This is below the national average of 0.5% for municipalities with a population between 50,000 and 99,999 (Hauer and Peterson, 2016).

2018 Urban Forestry Budget	
2018 Urban Forestry General Fund budget	\$381,355
2018 Landscape and Lighting Districts budget	\$277,430
Total Budget	\$658,785

Table 5. 2018 Urban Forestry Budget

2018 Urban Forestry Budget Allocations	
Annual Tree Planting Budget	\$10,449
Annual Pruning Cost	\$212,872
Annual Tree and Stump Removal Costs	\$51,211
Annual Pest and Disease Control	\$2,572
Annual Storm and Litter Cleanup	\$24,497
Annual Litigation and Settlements of Tree Related Claims	\$8,119
Annual Establishment	\$2,443
Annual Administration Cost	\$346,623
Total Budget	\$658,785

Table 6. 2018 Urban Forestry Budget Allocations

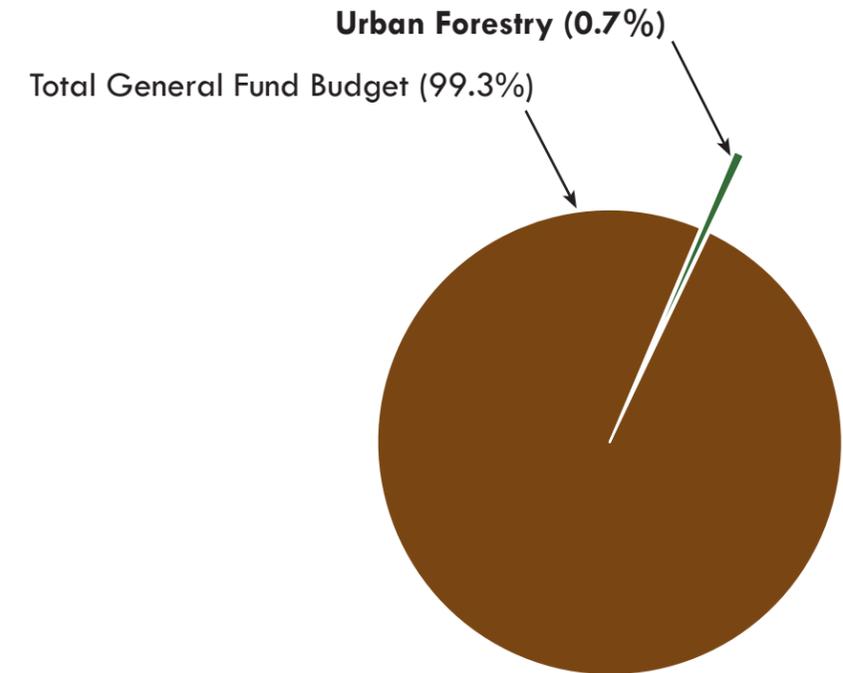


Figure 13. 2018 Urban Forestry allocation of the General Fund Annual Budget compared to the Total General Fund Budget



POLICIES AND REGULATIONS

STATE AND FEDERAL REGULATIONS

CALIFORNIA URBAN FORESTRY ACT

Section 4799.06-4799.12 of the California Public Resources Code defines a chapter known as the California Urban Forestry Act. The act defines trees as a “vital resource in the urban environment and as an important psychological link with nature for the urban dweller” The act also enumerates the many environmental, energy, economic, and health benefits that urban forests provide to communities.

The purpose of the act is to promote urban forest resources and minimize the decline of urban forests in the state of California. To this end, the act facilitates the creation of permanent jobs related to urban forestry and encourages coordination with state and local agencies to reduce or eliminate tree loss, and prevent the introduction and spread of pests. The act grants the authority to create agencies and mandates that urban forestry departments shall provide technical assistance to urban areas across many disciplines. The act also authorizes and recommends numerous funding tools to achieve these goals.

PUBLIC PARK PRESERVATION ACT

In addition to the protections provided by the California Urban Forestry Act, the Public Park Preservation Act of 1971 ensures that any public parkland converted to non-recreational uses is replaced to serve the same community.

MIGRATORY BIRD TREATY ACT

Passed by Congress in 1918, which defines that it is unlawful to pursue, hunt, take, capture, kill, possess, sell, purchase, barter, import, export, or transport any migratory bird, or any part, nest, or egg or any such bird, unless authorized under a permit issued by the Secretary of the Interior.

The Migratory Bird Treaty Act can impact forestry operations during times when birds are nesting and may delay work in order to avoid violating the MBTA.

ENDANGERED SPECIES ACT

Signed in 1973, the Endangered Species Act provides for the conservation of species that are endangered or threatened throughout all or a significant portion of their range, and the conservation of the ecosystems on which they depend.

The listing of a species as endangered makes it illegal to "take" (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to do these things) that species. Similar prohibitions usually extend to threatened species. Model Water Efficient Landscape Ordinance.

To promote the conservation and efficient use of water and to prevent the waste of water, Model Water Efficient Landscape Ordinance (MWELO) was adopted in 2009 and later revised in 2015, requiring increases in water efficiency standards for new and retrofitted landscapes through the use of more efficient irrigation systems, graywater usage, and onsite stormwater capture, and by limiting the portion of landscapes that can be covered in turf.

CALIFORNIA SENATE BILL No. 606 AND No. 1668

Approved by Governor Jerry Brown in May 31, 2018 require cities and water districts to set permanent water conservation rules, even in non-drought years. Under the bills, each urban water provider will be required to set a target water use goals that must be approved by the State Water Resource Control Board by 2022, if agencies fail to meet these goals, potential fines as high as \$10,000 a day may be issued. Standards are based on 55 gallons per person per day for indoor water use (later decreasing to 50 gallons by 2030) and regional based standards for outdoor use.

CALIFORNIA SOLAR SHADE ACT

Passed in 1978, the Solar Shade Control Act supported alternative energy devices, such as solar collectors, and required specific and limited controls on trees and shrubs. Revised in 2009, the Act restricted the placement of trees or shrubs that cast a shadow greater than 10 percent of an adjacent existing solar collector's absorption area upon the solar collector surface at any one time between the hours of 10am and 2pm.

The Act exempts trees or shrubs that were planted prior to the installation of a solar collector, trees or shrubs on land dedicated to commercial agricultural crops, replacement trees or shrubs that were planted prior to the installation of a solar collector and subsequently died or were removed (for the protection of public health, safety, and the environment) after the installation of a solar collector, and trees or shrubs subject to city and county ordinance

CITY ORDINANCE

Although City ordinance states that jurisdiction for public trees falls under Public Works, these responsibilities and powers are now the jurisdiction of Community Services.

CHAPTER 20A

References City ordinances related to trees, including: tree related definitions, role of the Director of Public Works, composition and procedural rules of the Parks and Recreation Commission, activities requiring tree permits, exempted tree activities, tree permits, appeals process for permits, tree plans for development projects, tree replacement programs, liability/responsibility, public nuisance, emergency response, stop work orders, stop work orders appeal process, and violation penalties.

The amended Chapter 20A was adopted on October 6, 2009 from Ord. No. 1510. The former Ch. 20A pertained to the same subject matter and derived from Ord. No. 1230; Ord. No. 1300; and Ord. No. 1412. The amendment updated Chapter 20A in its entirety. As such, all sections in this chapter were also updated on October 6, 2009.

SEC. 20A-1-090

States that an application for a development project shall be accompanied by a tree plan which includes a contour map, identification of protected trees, a program to preserve protected trees, a program to replace trees, and any proposed changes to existing trees.

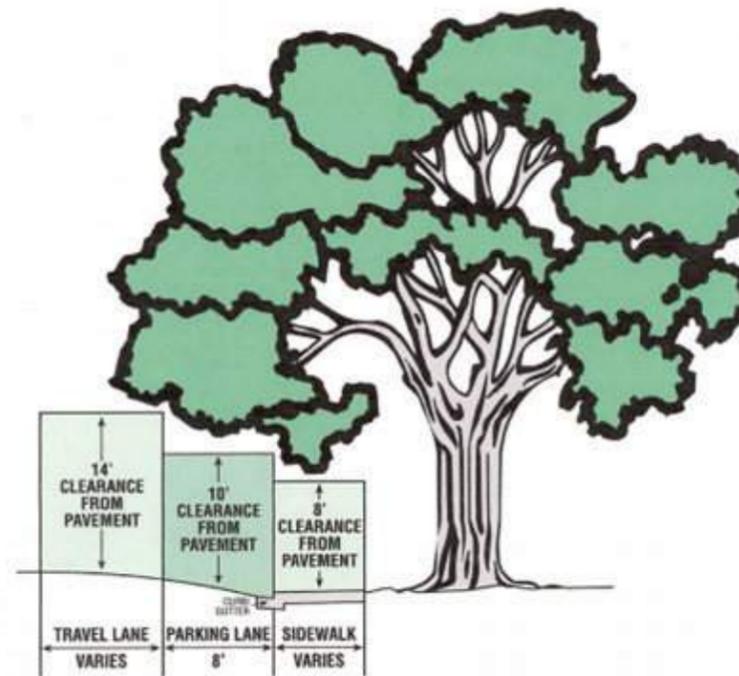
SECTION 20-3-1

Defines the required improvements in connection with new buildings or land uses. No building or use permit for the construction or improvement of any structure or the use of any land for which a permit or occupancy certificate is required shall be issued unless the permittee constructs, repairs or

provides the following improvements in accordance with the City Standard Specifications and Details or as otherwise required by the Director of Public Works. The section also defines requirements for tree plantings on lots and tree planting easements. The section was adopted from Ord. No. 1201, on November 15, 2010.

SECTION 2-7-28

Defines the authority of the Parks and Recreation Commission to also act as the tree commission. The Parks and Recreation Commission shall act as the Tree Commission in an advisory capacity in matters pertaining to the planting and maintenance of trees growing on public property, including public easements, but excluding City parks, and within tree maintenance strips as



Shrubs and groundcover shall not grow beyond the edge of the sidewalk or street, which may cause an obstruction to the public Right-of-Way.

defined in Section 20A-1-20. The section was adopted from Ord. No. 935; Ord. No. 1281, Ord. No. 1412; and Ord. No. 1467, on November 18, 2013.

SECTION 25-22-10

General provisions of landscaping require trees to be planted and existing trees to be protected. These regulations apply to all new construction except dwelling structures of three units or less on one parcel of land. Existing trees shall be protected by planters with a minimum radius of the drip line of the tree or 50-percent of drip line plus modifications to paved area allowing for aeration and water penetration. Alternative treatments will be considered. One tree must be planted at least every 35-feet along a public right-of-way. The maximum spacing between trees shall be equal to the mature spread of the trees selected. Special consideration may be given to variety and spacing of trees as they relate to proposed signing of the property. Adopted from Ord. No. 1577, on March 5, 2015.

GENERAL PLAN 2035

The 2035 General Plan is a policy document for the long-range development of the City of Woodland. It provides the direction for the future growth of the City and articulates a vision of what Woodland aspires to be. The Plan draws its aspirations and goals from the community at large: residents, business owners, and elected officials, and translates these ideas into a set of policies and actions for present and future generations. The document outlines a vision for Woodland's long-term physical and economic development and community enhancement. Several components directly relate to the management of trees:

Land Use, Community Design, and Historic Preservation Element. Describes the land use patterns and landscape ideals of specific zoning areas. All the urban form designations include large canopy trees to provide shade, environmental benefits, and beautification.

Policy 2.C.4 Resource Efficiency. Encourage and incentivize buildings to be constructed so that they consume less energy, water, and other resources; allow natural ventilation; use daylight effectively; reduce stormwater runoff; and facilitate the use of clean energy whenever possible. Use trees for cooling, energy conservation, and to improve air quality.

Policy 2.E.5 View Corridors. Create attractive view corridors that frame the streets with distinctive buildings, trees, and other landscaping complemented by well-designed and integrated signage. At community entry points, provide a clear, physical sense of arrival into the community.

Policy 2.G.4 Public Realm. Enhance the safety and character of existing neighborhoods by implementing public realm improvements, such as street lighting and utility undergrounding where needed, and encouraging upkeep and investment by private property owners.

Policy 2.I.3 Green Streets. Provide continuous shade trees along Woodland's key corridors, integrate low-impact development (LID) drainage facilities to manage stormwater runoff within the public right-of-way, and include Class I or Class II bike facilities where possible.

Policy 3.A.11 New Development. Require all new development to provide convenient bicycle and pedestrian environments and access through building orientation, site layout, traffic management, and connections to transit service and local commercial and community facilities. Development must provide appropriate pedestrian amenities such as street lighting, benches, arcades, canopies, shade trees, art, and seating areas.

Policy 3.B.1 Complete Street Requirements and Green Streets. To the extent feasible, all new street construction and reconstruction shall be designed to achieve complete streets. Designs should accommodate mobility for all users, including bicyclists, pedestrians, transit vehicles, and motorists, appropriate to the function and context of the facility. The needs of all roadway users including vulnerable populations such as young children, seniors, and people with disabilities, should be considered when determining roadway widths and other barriers to travel, especially near schools, parks, senior centers, community centers, and other activity hubs. Require street design to incorporate adequate landscaping, including street trees and landscaped medians and/or parkway strips, in order to increase shade, minimize runoff, and create a comfortable and visually attractive environment.

Policy 3.H.3 Parking Lot Design. Require that parking lots be designed to minimize heat island effects, have significant tree canopies with ample landscape areas designed to pre-treat stormwater runoff where feasible, and ensure pedestrian access.

Policy 5.C.12 Park Design. Ensure that the City's parks, open space, and recreational resources and facilities include a variety of amenities and features to meet the needs of the diverse Woodland community. Consider the following factors in the design of new and renovated parks and recreation facilities:

- Safety
- Security
- Maintenance
- Water conservation / use of recycled water
- Urban forest canopy
- Accessibility
- Travel distance of users

- Passive vs. active use areas
- Restroom facilities
- Drinking fountains
- Bike access and accommodations
- Citizen input
- Adequacy of off-street parking
- Flexibility for programming activities
- Lighting
- Small community gardens, as appropriate

Policy 5.I.4 Low Impact Development. Require new development and redevelopment projects to incorporate site design and low impact development runoff requirements, in accordance with the Municipal Code to reduce runoff rates, filter out pollutants, and facilitate groundwater infiltration. Such features include canopy trees or shrubs to absorb rainwater.

Policy 5.K.3 Undergrounding of Utilities. Require undergrounding of utility lines in new development and as areas are redeveloped.

7.4, CO 7-24 Soil Resources. Most of the soils in Woodland can be characterized as fine, poorly drained, with a high percentage of organic matter. For Development purposes, there should be considerations for changes in moisture and erosion.

Policy 7.B.8 Native and Compatible Non-Native Plant Species. Require developers to use native and compatible non-native species, especially drought-resistant species, to the extent possible in order to preserve the visual integrity of the landscape, provide benefits for native wildlife, and ensure that a variety of plants suited to the region are maintained. (EIR Mitigation Measure 4.4-2a).

Policy 7.B.9 Tree Canopy. Manage, enhance, and improve the City's tree canopy as a valuable ecological resource.

Policy 7.B.10 Urban Forest Management Plan. Establish an Urban Forest Management Plan, overseen by a licensed arborist, to guide the protection and enhancement of the urban forest. Work with agencies such as the Woodland Tree Foundation in this effort.

Policy 7.B.11 Sensitive Site Planning. Site new development to maximize the protection of native tree species and special-status plant and wildlife habitats.

Policy 7.F.4 Landscaping to Improve Air Quality. Promote the increase of community-wide tree canopy and the use of plants and trees that are efficient pollutant absorbers.

CLIMATE ACTION PLAN (CAP)

The City of Woodland 2035 Climate Action Plan is a planning document that provides community-generated strategies to guide the City, its residents, and local businesses in reducing greenhouse gas (GHG) emissions consistent with State goals for addressing California's contributions to climate change. The 2035 CAP was adopted in May 2017 and is an expanded version of the Preliminary 2020 CAP, which was adopted in July 2014.

Urban Forest and Open Space is one of six focus areas of the City's 2035 Climate Action Plan (CAP). Developing and adopting a UFMP aimed at expanding canopy cover to 25% by 2035 with objectives that include greenhouse gas reduction, air quality improvement, energy conservation, stormwater runoff management, and noninterference with utility lines is the first strategy (Strategy UF-1) under Objective I (Increase Community Tree Canopy) of the Urban Forest and Open Space section of the CAP.

The CAP encourages the UFMP to include consideration of planting mediums, planting techniques, and soil amendments that can provide multiple benefits, such as the use of biochar as a soil amendment with potential carbon sequestration capability and planting systems that intercept and store or absorb runoff. Further, the CAP encourages a sustainable funding strategy to be developed as part of the UFMP.

The CAP calls for increasing Woodland's urban forest with a net increase of 10,500 trees planted along streets, in parking lots, and in open space areas and 6,000 building shade trees by 2035. The CAP also recommends that the City adopt and implement a policy of no net loss of City-maintained trees:

Every City tree removed or lost due to disease or other cause must be replaced within 1-year, either on the basis of trunk diameter or based on offsetting the canopy area of any tree removed with the aggregate canopy area of the replacement tree(s), estimated at 2-years following planting.

Additional strategies included in the Urban Forest and Open Space section include increased tree planting, maintenance of existing trees, public education, and open space preservation.

ENVIRONMENTAL IMPACT STATEMENT/ ENVIRONMENTAL IMPACT REPORT (EIS/ EIR)

The Environmental Impact Statement/Environmental Impact Report (EIS/EIR) examines the potential environmental impacts on native species, soils, and natural areas by the Yolo Habitat Conservation Plan/Natural Community Conservation Plan (HCP/NCCP or Plan), which is a comprehensive, county-wide plan to provide for the conservation of 12 sensitive species and the natural communities and agricultural land in Woodland and other surrounding communities.

Special considerations are identified in terms of developing rural and urban land, which can result in the removal of trees, which can result in changes in aesthetics and stormwater.

SPRING LAKE SPECIFIC PLAN

Spring Lake is a community that comprises the Southeast portion of Woodland. Spring Lake comprises 1,097 acres of land located primarily south of Gibson Road between State Route 113 and County Road 102. When completely built out, the Spring Lake Specific Plan (SLSP) area will include more than 4,000 housing units, neighborhood-serving commercial uses, schools, parks, and a full array of municipal services.

The SLSP combined elements of the General Plan and Zoning Ordinance into a single document tailored to the SLSP area. The document provides applicable policy, land use regulations, and design standards, as well as identify infrastructure, phasing, and financing. The SLSP guides and controls orderly and systematic development of the area to create a desirable extension of Woodland's existing character and traditional neighborhoods. Upon adoption of the SLSP, all individual development projects (including the issuance of any discretionary land use entitlement) within the project area is subject to the requirements of the SLSP. Most relevant to the UFMP, the SLSP provides a user-friendly document which details goals, plans, and requirements related to the urban forest. Spring Lake represents an opportunity to enhance canopy cover across Woodland because the development is over 1,000 acres. The SLSP mandates that all reasonable attempts be made to preserve and protect existing trees within the area as build-out occurs and provides options for tree mitigation through project development review.

REGIONAL GREENPRINT

Founded by the Sacramento Tree Foundation, the Greenprint Initiative is a vision to enhance the quality of life in the greater Sacramento region by expanding the urban forest and maximizing the benefits of trees. The Greenprint Program provides a roadmap for mobilizing and empowering community partners and volunteers to plant 5 million trees in the Sacramento region. The program partners with elected officials, service and faith groups, businesses, youth, and individual volunteers.

Local jurisdictions invest in the Greenprint by becoming Greenprint Members and in return receive services aimed at developing partnerships with community members and local businesses. Greenprint Members commit to developing local urban forest initiatives that are specific to and appropriate for their community.

Greenprint has set a regional canopy cover goal of 35%. Currently, Woodland has a canopy cover of 14.5%. Woodland joined Sacramento Tree Foundation's Greenprint Initiative in 2001 and membership continues to the current day.

OUTDOOR CONSERVATION DROUGHT MANAGEMENT

Woodland has a tip-line to help catch and stop water waste. When residents see a water use violation, they can contact the City's Water Conservation staff in the Environmental Services Division. The Water Conservation team also provides information for the community emphasizing the importance of trees.

Woodland promotes "water-wise" landscapes that rely on native and drought tolerant plants while ensuring adequate water for existing and new trees. Water-wise landscapes draw much less water during peak water-use months, reduce the potential for discharge of pollutants into the stormwater system, and provide welcome habitat for beneficial insects and birds. The City hosts a free water-wise residential landscape tour each year that promotes creative alternatives to turf. In addition, the City's website provides planting plans for water-wise mow strips that provide guidance on plant (and tree) selection and placement.

2,400 TREES CAMPAIGN

The 2,400 Trees Campaign was a community-wide effort coordinated jointly by the City of Woodland and the Woodland Tree Foundation with funding assistance from PG&E and the John & Eunice Davidson Fund. The campaign goal of planting 2,400 trees in 24-months (July 2014 to June 2016) was achieved in March 2016 with the planting of trees in the Legacy Tree Grove on Arbor Day.

FREE TREES FOR SHADE AND ENERGY CONSERVATION

The Woodland Tree Foundation offers free shade trees to residents of Woodland. The goal of the shade tree program is to conserve energy through the shade of 200 new trees annually. Up to two medium or large size shade trees are offered per residential property. Volunteers plant the trees for private property owners. The program is currently funded through a grant from CAL FIRE. In previous years, both the Woodland Tree Foundation and the City have paid for the shade trees.

LEGACY GROVE MEMORIAL PROGRAM

Located at the Woodland Community and Senior Center, Woodland's Legacy Grove provides an opportunity for the public to honor a person, family, or group. With support from the City Council, the City of Woodland, and volunteers from the Woodland Tree Foundation worked together to plant the Legacy Grove, following a plan by design professional Jerry Stacionis.

Woodland's Legacy Grove offers supporters three ways to honor a person, family, or group:

- Dedicate a Tree
- Dedicate a Bench
- Become a Legacy Grove Founder



STORMWATER MANAGEMENT

Stormwater in Woodland is not treated, unlike the wastewater that flows through the sanitary sewer system to Woodland's Water Pollution Control Facility. Stormwater is released directly to local waterways. The stormwater is conveyed from west to east through canals and pipes to a pump station where it is pumped into a canal that flows from the Yolo Bypass to the Tule Canal. The canal in turn, feeds into the Sacramento River. The urban forest directly benefits stormwater management because trees act as miniature reservoirs during rainfall. This slows and reduces the amount of stormwater flushed into the drainage system. To minimize water pollution from tree care operations, Woodland recommends that individuals use pesticides and fertilizers sparingly and do not over-water lawns. Pouring or washing any materials that are potentially harmful to the environment into gutters and drain inlets is considered an illegal discharge.

The City follows the California Stormwater Quality Association's (CASQA) Stormwater Best Management Practices for Construction.



TREE PROTECTION

The City protects valley oak trees with a DBH greater than 30-inches in new developments. Projects must include a tree plan that includes the preservation of street trees, heritage, specimen, landmark trees and trees with aesthetic value. Heritage trees are healthy valley oak trees with a DBH of 33-inches or more. Landmark trees are trees which have been designated by the City Council as having historical or public significance. Trees with aesthetic value are healthy trees with a DBH of 9-inches or more. Street trees are public trees located within the right-of-way.

EMERGENCY RESPONSE

Private property owners can act to reduce danger from a tree in the event of an emergency that would otherwise constitute a violation of municipal regulations. When an emergency action is taken, the owner must notify the director of Community Services (or designated representative) by the next working day.

TECHNICAL TREE PLANTING GUIDELINES

Tree Planting Guidelines are established by the Municipal Engineering Standards Chapter 13.04. This section of the Engineering Standards defines minimum spacing of streetscape elements from trees. Section 13.04 also defines traffic sight distance restrictions.

INTEGRATED PEST MANAGEMENT

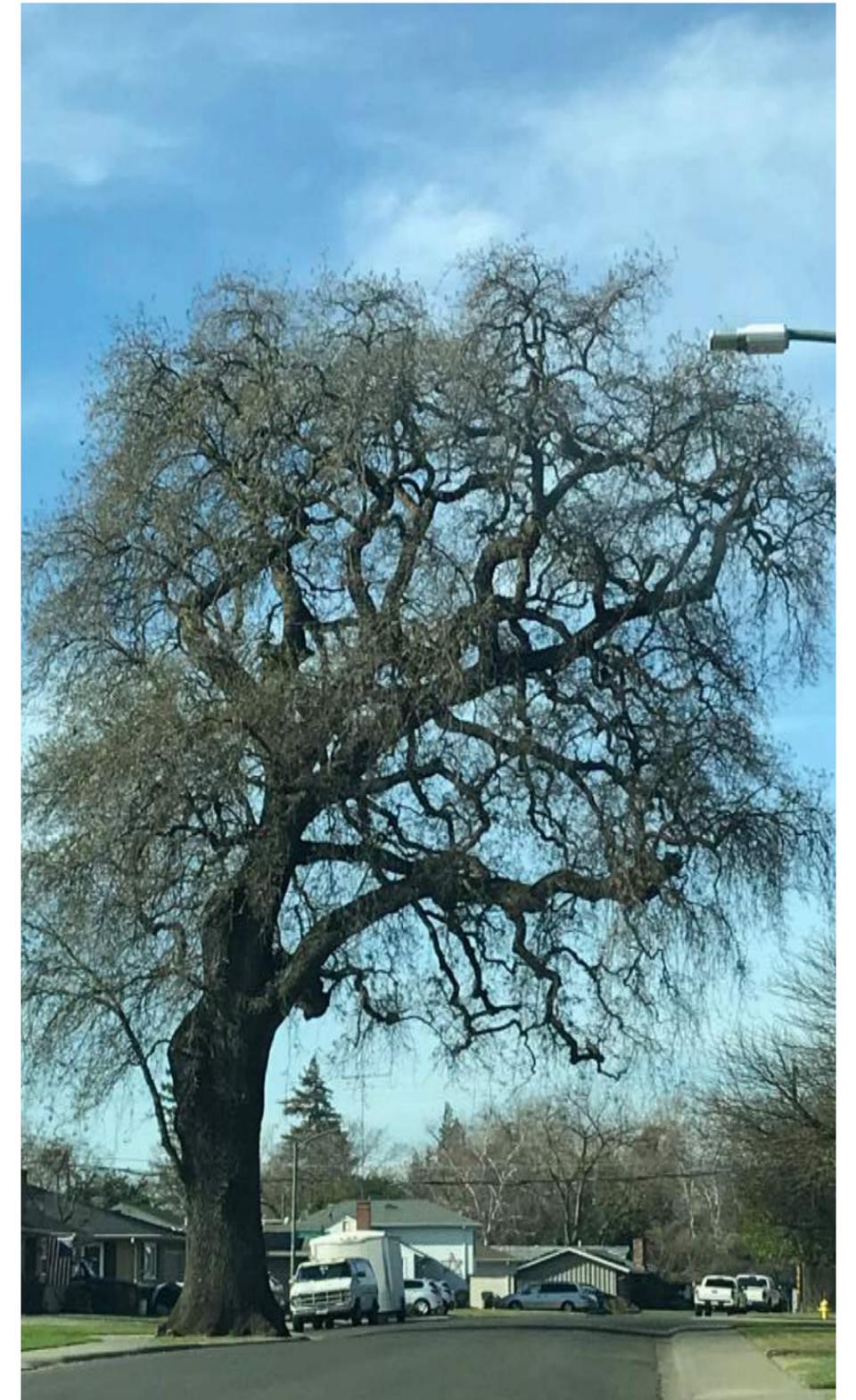
Insects, diseases, and invasive weeds threaten California's natural environments as well as homes, gardens, and agriculture. Woodland adheres to California's Statewide Pest Management Program. The program is based on sound scientific methods from collaborative research developed through the University of California's Department of Agriculture and Natural Resources.

BIOMASS DISPOSAL AND UTILIZATION

Residents can participate in backyard composting and vermicomposting and receive \$100 in rebates from the citywide collection and composting from the City. There is also citywide residential organics collection.

TREE REBATE PROGRAM

City of Woodland's Tree Rebate Program, through the City, reimburses property owners the purchase price of residential street tree(s) up to \$75 per address. Trees must be on the Master Street Tree List to qualify for the rebate.



URBAN FORESTRY PARTNERS

The urban forest has an impact on every resident, visitor, property owner, and business in Woodland. The benefits of the community's trees extend beyond City limits and the responsibility for their care and protection is shared by many individuals, volunteers, nonprofit organizations, City departments, and tree care professionals. The engagement and contribution of urban forest stakeholders was integral to the development of the Urban Forest Master Plan.

COMMUNITY SERVICES DEPARTMENT

Woodland Community Services Department creates and enhances the quality of life for Woodland residents and visitors by providing a diverse array of programs, services, and recreational facilities. The department consists of four divisions including the Parks and Urban Forestry division. As of the publication of the Plan, the Parks Superintendent also serves as the City Forester

PUBLIC WORKS

Among other duties, the Public Works Department is responsible for maintaining the City's infrastructure. Proper species selection and adequate planting space can significantly reduce conflicts between trees and other infrastructure, which is of primary concern to the Department.

PARKS AND RECREATION COMMISSION (URBAN FOREST COMMITTEE)

The Parks and Recreation Commission provides leadership in management, evaluation, and outreach efforts for the Community Services Department. The commission largely serves in an advisory role. The commission conducts hearings and acts upon matters within the tree commission's jurisdiction.

The commission also provides recommendations to the City Council regarding the planting and maintaining of trees. Within the commission, the Urban Forest Committee meets quarterly with Parks staff and/or the Urban Forester and reports to the Commission and City Council.

ENVIRONMENTAL SERVICES

Environmental Services is a division of the public works department. Environmental Services supports community stewardship of natural resources and the City's compliance with federal, state, and local environmental laws and regulations. Environmental Services educates the public about environmental regulatory compliance and promotes conservation. Environmental Services tackles issues including:

- Energy conservation
- Reductions in greenhouse gas emissions
- Air quality
- Stormwater quality
- Water conservation

COMMUNITY DEVELOPMENT DEPARTMENT

The Community Development Department is responsible for administering the City's General Plan, zoning ordinance, and California Environmental Quality Act Guidelines, as well as planning, designing, and reviewing plans for the City's infrastructure. In addition, the department manages the City's Building Code including the issuance of building permits and conducting inspections. This includes ensuring compliance with City codes.

WOODLAND FIRE DEPARTMENT

The UFMP does not have any impacts of concern on wildfire risk in Woodland.

YOLO COUNTY PUBLIC AGENCY RISK MANAGEMENT INSURANCE AUTHORITY

YCPARMIA is a special district agency formed through an exercise of joint powers by their participating members which includes counties, special districts, municipalities, libraries and agencies. YCPARMIA provides non-profit risk management, insurance, and safety services to our members within Yolo County. YCPARMIA collaborates with Woodland to develop strategies for managing community trees and mitigating municipal risk.

WOODLAND TREE FOUNDATION

The Woodland Tree Foundation (WTF) is a non-profit organization run by volunteers dedicated to improving Woodland through the planting of trees. Their motto is Building Community Through Canopy. In June 2000, a group of Woodland leaders came together to achieve a clear set of goals:

- To educate residents, local government, schools, local businesses and others in the community about the health, economic, and environmental benefits of a healthy tree canopy in Woodland.
- To plant and care for trees to beautify and cool Woodland streets and public spaces.
- To partner with the City, community groups, schools, businesses and individuals to stretch dollars and other resources on behalf of trees.

Since their formation in 2000, the WTF has worked cooperatively with the City to plant 4,761 trees in Woodland. Currently, the City purchases the trees for public spaces and WTF volunteers plant them. The City also generally pre-digs/augers holes for trees, provides tree stakes and other planting tools, and general support on the day of planting. The skill level of volunteers includes master gardeners on the

board who are expert tree pruners. In addition, the WTF was instrumental in securing grant funds from CAL FIRE's California Climate Investment Grant, which made the development of the UFMP and 1,200 tree plantings possible.

SACRAMENTO TREE FOUNDATION

Since 1982, the Sacramento Tree Foundation has been building partnerships and empowering communities to envision the best places to live and invest in their urban forest. The Sacramento Tree Foundation does this by educating, advocating and lending support for tree plantings. The Sacramento Tree Foundation's mission is to grow healthy, livable communities in the Sacramento region by empowering people to plant, protect, and learn about trees. They are leading the effort to plant 5 million trees in our region.

The Sacramento Tree Foundation relies on private-public partnerships to enable its success. Their core staff work hand-in-hand with a committed Board of Directors, an unmatched Technical Advisory Committee, and many business and civic partners.

CAL FIRE

Under the authority of the Urban Forestry Act (PRC 4799.06 - 4799.12), the California Department of Forestry and Fire Protection's (CAL FIRE) Urban & Community Forestry Program (CAL FIRE) works to expand and improve the management of trees and related vegetation in communities throughout California. The mission of CAL FIRE's Urban Forestry Program is to lead the effort to advance the development of sustainable urban and community forests in California. In support of this mission, the program administers grants, under Propositions 40 and 84, for projects, including tree planting, municipal

tree inventories, management plans, urban forest educational efforts, and other innovative urban forestry projects that advance the urban forestry efforts of California communities.

CALIFORNIA ReLEAF

California ReLeaf works statewide to promote alliances among community-based groups, individuals, industry, and government agencies, encouraging each to contribute to the livability of our cities and the protection of our environment by planting and caring for trees. California ReLeaf provides a wide range of programs including education, legislative advocacy, workshops, and grant management.

TREE DAVIS

The mission of Tree Davis is to enhance and expand the urban forest in the Davis area by teaching the community to plant and care for trees. Tree Davis partnered with WTF on the implementation of the CAL FIRE grant.

UTILITIES

Tree and utility conflicts are a common source of concern for electric providers. Trees that grow into power lines can cause electrical outages and fires. They can even conduct an electric shock to someone who touches a tree that is in contact with, or in close proximity to, a high-voltage line.

As the primary natural gas and electricity provider for Woodland, Pacific Gas & Electric (PG&E) is an important partner and stakeholder in the urban forestry program.

In California, all utility providers are subject to General Order 95; Rule 35 Vegetation Management (California Public Utilities Commission, revised 2012) and FAC-003-2 Transmission Vegetation Management (NERC), which outline

requirements for vegetation management in utility easements. These requirements include clearance tolerances for trees and other vegetation growing in proximity to overhead utilities.

Since 1995, PG&E has been recognized by the Arbor Day Foundation as a Tree Line USA. This program recognizes utilities that use best management practices to demonstrate that trees and utilities can co-exist. All PG&E line clearance and right-of-way tree care operations conform to American National Standards Institute (ANSI) A300 Integrated Vegetation Management – Part 7 and International Society of Arboriculture Best Management Practices for Utility Pruning of Trees and Integrated Vegetation Management. Because of the danger of electric shock, trees located under utility lines should be directionally pruned to provide clearance and/or reduce height only by trained, authorized line clearance personnel. Selecting small-stature tree species that are utility friendly for planting sites in utility rights-of-way can minimize the need for these maintenance activities.

City forestry staff coordinate with PG&E to facilitate vegetation management in utility corridors.

Valley Clean Energy (VCE) also provides electricity to Woodland. VCE is a joint powers authority that serves electricity to Woodland, Davis, and unincorporated areas of Yolo County. VCE purchases power with high renewable and low greenhouse gas (GHG) content. The majority of VCE energy is generated from hydro, solar, and wind.

In addition to electrical utilities, there is a potential for urban trees to conflict with water, sewer, stormwater, and natural gas lines. To avoid these potential conflicts, the City works with utility providers and managers to ensure that trees planted in proximity to utility easements are located properly to avoid conflicts and provide access for utility maintenance activities.



MAJOR AND EMERGING DISEASES AND PESTS

Staying abreast of existing and emerging pests and diseases is an important consideration for urban forest management. When outbreaks occur, treating individual trees is generally cost prohibitive and management is better focused upon the overall population of effected species. A diverse and balanced species population is the best defense to avoiding catastrophic results and increasing resilience in the urban forest. Phasing out species that are subject to chronic outbreaks is recommended. With few notable exceptions, including fireblight and aphids, there are currently no pests or diseases of concern in Woodland's urban forest. However, nationally and statewide there are some key concerns that all urban foresters should be aware of, including:

Asian Long-Horned Beetle (ALB), is an invasive insect that feeds on a wide variety of trees in the United States, eventually killing them. The beetle is native to China and the Korean Peninsula. Signs of ALB start to show about 3 to 4-years after infestation, with tree death occurring in 10 to 15-years depending on the tree's overall health and site conditions. Infested trees do not recover, nor do they regenerate.

The Polyphagous Shot Hole Borer (PSHB) is a new pest in Southern California. This boring beetle, from the group of beetles known as ambrosia beetles, drills into trees and brings with it a pathogenic fungus (*Fusarium euwallacea*), as well as other fungal species that may help establish the colonies. The PSHB attacks many species of trees, but some trees are resistant to the fungus it carries. The beetle drills into the tree, fungus infects the tree, and the beetle produces offspring in the tree. Tree species that are considered a true host of PSHB include box elder, coast live oak, and avocado (University of California, 2018).

Emerald Ash Borer (EAB) has killed hundreds of millions of ash trees in North America. The EAB is a destructive, non-native, wood-boring pest that exclusively kills both stressed and healthy ash trees 2 to 3-years after infestation (NASPF, 2005). EAB is a jewel beetle native to Northeastern Asia. EAB larvae feed on the vascular tissue of trees and populations grow exponentially. This pest has been identified as moving slowly into the Western U.S. and is considered a catastrophic pest for Ash tree populations.

Dutch Elm Disease (DED) has devastated American elm populations, one of the most important street trees in the twentieth century. Since first reported in the 1930s, it has killed over 50 percent of the native elm population in the United States (NASPF, 2005), although some elm species have shown varying degrees of resistance. While the vector for DED, elm bark beetles, do exist in Woodland, DED is not a concern and beetle populations are managed through integrated pest management (IPM) practices.

Sudden Oak Death Sudden oak death is a disease that affects oak trees. The pathogen, *Phytophthora ramorum*, causes bark cankers with bleeding sap and after an extended period of the disease presence, a rapid (2 to 4-week) browning of leaves (Alexander, 2010). The disease thrives in coastal tanoak or oak woodlands within fog belts, which encourages spore production in the pathogen. Once infected, there is no known cure.

Further information on the pests and diseases that threaten the forest ecosystems in California can be found on the USDA's Forest Service website (<https://www.fs.usda.gov/main/r5/forest-grasslandhealth/insects-diseases>).



California sycamore heavily infested with invasive shot hole borer (Source: ucnar.edu, Photo credit: Beatriz Nobua-Behrmann)



Sudden Oak Death (SOD) is a water mold pathogen (Source: aphs.usda.gov, Photo credit: Joseph O'Brien)

With an existing canopy cover of 14.5%, a relatively young community tree resource in good condition, and a Community Services Department dedicated to its stewardship, Woodland is poised to realize its vision for the urban forest:

- 25% average canopy cover
- A sustainable and resilient resource
- Providing benefits to and connection with the natural environment and a buffer against climate fluctuations
- Contributing to community aesthetics and a sustainable quality of life for existing and future generations

Through proactive management and an ongoing commitment to stewardship, Woodland's urban forest will continue to grow, remain in good condition, become more resilient, and increase in value over time.

CHALLENGES AND OPPORTUNITIES

An urban forest is a living and dynamic system, changing over time and in constant response to its environment. The health and stability of the urban forest is influenced by many factors, including pruning, irrigation, weather and climate fluctuations, pests and disease, development pressure, and ongoing tree planting. Refined over decades of practice, the tree care industry has identified best management practices (BMPs) for the maintenance of trees and urban forest systems. Furthermore, Woodland's urban forest stakeholders and managers have a long history and a vested appreciation for the community's trees. With consideration of existing conditions, BMPs, and community goals, stakeholders identified key challenges and opportunities for Woodland's urban forest that will require attention over the next 20 years:

Cyclical Maintenance

Because trees are always growing and responding to their environment, they require consistent maintenance to address structural issues. Unlike natural forests, urban forests require regular care and maintenance to ensure strong branch structure, provide clearance for visibility and travel, promote safety, and reduce the risks of tree and branch failure. Ideally, urban trees should be inspected and maintained on a 5 to 7-year cycle. Over the previous decade, as a result of reductions in funding and staff along with an expanding resource, the maintenance cycle for community trees has increased to around 10 years. Getting back on a 7-year cycle will better ensure that the community's tree resource is proactively maintained for health, safety, and a sustainable benefit stream.

Structural Pruning for Young Trees

Training young trees, especially trees that will mature to a large-stature, provides an opportunity to address structural issues when trees are small. Removing undesirable branches when they are small is better for the tree and also more cost-efficient. Smaller cuts heal more quickly, require less time and safety considerations for tree crews, and reduce the need for debris disposal. With a significant number of young, medium and large-stature trees, an investment and commitment to structural pruning will provide considerable benefits.

Tree Replacement

Preservation and expansion of existing canopy cover requires proactive and adequate replacement of new trees when trees are removed due to failing health or structure or as a result of development.

Tree Planting

To meet long-term canopy goals, ongoing planting efforts should continue to focus on ensuring that available sites in the public rights-of-way are planted with the right tree in the right place. Additional investment, support for education (e.g., tree care, species selection), and incentives for trees on private property will be integral to overall canopy growth. All tree

planting should emphasize greater species diversity, the use of native and adapted species, and planting large-canopy trees where space allows.

Sustainable Funding

Timely and proactive care will help control and reduce the overall cost of maintaining an urban forest, improve the longevity of individual trees, and preserve the existing benefits that come from mature trees. The City currently has very limited resources when it comes to urban forest programming. To ensure adequate care and maintenance cycles, the City will need to optimize funding from existing sources, explore opportunities to increase dedicated funding, and research and apply for grants and other short-term options.

Stakeholder Engagement

Ultimately, protecting and growing the urban forest requires a commitment from the entire community. Resident engagement combined with volunteer collaboration are integral to the success of the UFMP and the urban forestry program. Increasing outreach and public education will help generate support and enthusiasm for growing tree canopy and maintaining the community tree resource for maximum benefits and sustainability. It will be important to strengthen relationships with volunteer groups, including the Woodland Tree Foundation and neighborhood groups, to augment city resources and coordinate outreach efforts.

Altogether, Woodland is poised to enjoy ongoing environmental and socioeconomic benefits from its urban forest. The UFMP will help to preserve and grow these benefits and ensure that Woodland remains a vibrant, healthy, and attractive community.

At times, urban trees require management for pests and disease to preserve their value in the landscape.

WHAT DO WE WANT?

STAKEHOLDER INPUT

In the spring of 2018, Davey Resource Group met with several municipal and regional urban forest stakeholders. These stakeholder interviews occurred over 2-days and included urban planners, utility experts, Public Works staff, representatives from the Woodland Tree Foundation, Parks & Recreation Commissioners, a City Council Member, and City staff leadership. Their valuable contributions guided the framework of the UFMP.

PUBLIC OUTREACH

To facilitate community participation, engagement, and input, the plan development process included an online survey and a community open house. These activities were developed to better understand community values about trees and tree canopy and to provide an opportunity for respondents to voice their concerns and ideas about the future the urban forest and City stewardship of the public tree resource. The survey and open house were promoted through a press release.

COMMUNITY OPEN HOUSE

A community open house was held with the Community Services Department on May 23rd, 2018 at the Woodland Community and Senior Center. A total of eight people participated in this event.

The open house included a presentation summarizing the key findings from the urban tree canopy assessment and the community tree resource analysis. Attendees had the opportunity to ask questions and engage in discussion with Community Services staff and DRG. Following the presentation and discussion attendees were invited to provide input on six broad topics:

- Canopy goals
- Level of care for public trees
- Where would you like to see more trees
- What outreach works best
- Funding
- Heritage Tree protection

The small turnout for the open house limited the ability to develop conclusions on overall community values. However, the intimate setting allowed for deeper discussion and sharing that provided valuable insight and perspective.

ONLINE SURVEY

An online survey, accessible on the City's homepage, was available from May 19 through June 17, 2018. A total of 76 people responded to the online survey, which explored:

- Views about the benefits of trees
- Awareness of the urban forest program
- Expectations for public tree maintenance
- Views on tree planting
- Preferred topics and methods for education and outreach
- Support for a special assessment district

As a result of the low response rate, the survey cannot be considered to be statistically valid. However, comments and opinions received from respondents were provided consideration in the development of the UFMP.

PLAN GOALS AND ACTIONS

Based upon review of the current urban forestry program and resources (What Do We Have?) and input from the community and other stakeholders, the UFMP identifies 15 goals and 5 existing policies that are organized under four areas of focus. These goals and policies represent the Community's vision for the urban forest. The goals and actions are intended to adequately manage the City's urban forest in a timely, cost-effective, and efficient manner. This includes the proactive identification of risk and mitigation strategies to promote public safety and reduce liability. In addition, the UFMP considers goals for growing the current resource through tree planting and replacement programs that will ensure the future stability of the resource and the maximization of environmental, social, and economic benefits from trees and tree canopy. Finally, the UFMP recognizes that community engagement is integral to successfully achieving the goals, actions, and sub-actions for the future of Woodland's urban forest. Consequently, the UFMP includes well-developed goals, actions, and sub-actions for public engagement, outreach, and education.

FOCUS: TREE CANOPY

The amount and distribution of tree canopy and leaf surface have a direct correlation on the level of environmental and socioeconomic services generated by the urban forest. Preserving and increasing tree canopy, in addition to promoting species diversity and proactive maintenance practices, contributes to the health, welfare and aesthetics of Woodland's community and provides a critical buffer to better withstand impacts from weather and a changing climate.

EXISTING POLICY 1: 2035 CLIMATE ACTION PLAN

Reduce greenhouse gas emissions consistent with state goals for addressing climate change.

EXISTING POLICY 2: CALIFORNIA MODEL WATER EFFICIENT LANDSCAPE ORDINANCE (MWELo)

Executive Order EO B-29-15 (April 1, 2015) directed California's Department of Water Resources to update the State's Model Water Efficient Landscape Ordinance through expedited regulation. About half of the urban water is used for landscape irrigation in California. Large water savings can be gained by proper landscape design, installation, and maintenance. New development and retrofitted landscape water efficiency standards are governed by MWELo. Local agencies (cities and counties) had to adopt MWELo or adopt their own ordinances which must be at least as effective in conserving water as the State's Ordinance.

EXISTING POLICY 3: ORDINANCES AND STANDARDS

Engineering Standards, Section 13: Tree Planting Requirements. Defines the approved tree list for public use, permitting requirements, and planting guidelines. Engineering Standards, Part 2: Landscape and Irrigation. Includes blueprints and specifications for physical installations, which includes tree related items.

Tree Ordinances are mainly located in Chapter 20A. This includes tree replacement requirements, tree activities, permits, emergency response, and more. Chapter 2 defines the authority of the Parks and Recreation Commission to also act as the Tree Commission. Chapter 25 defines general provisions of landscaping require trees to be planted and existing trees to be protected.

GOAL 1: PRESERVE AND ENHANCE CANOPY COVER

This goal and supporting actions will ensure that active steps are taken to preserve and enhance citywide canopy cover.

GOAL 2: PLANT TREES

This goal and supporting actions is important to maintaining and growing tree canopy cover. Ongoing tree planting supports canopy growth and ensures that over-mature and failing trees and trees removed through development are replaced.

GOAL 3: PERIODICALLY REVIEW TREE ORDINANCES AND ENGINEERING STANDARDS

This goal and supporting actions will help the City to adapt to evolving circumstances by ensuring City codes and standards are updated to meet current needs.

FOCUS: COMMUNITY TREE RESOURCE

The community tree resource is a publicly-owned asset that provides critical benefits to health, economic, social, aesthetic, and quality of life for residents and visitors. The replacement value of the existing resource is nearly \$30.5 million. Annually, the community tree resource provides nearly \$1.7 million in benefits to Woodland. Proactive and considered management of this resource will ensure sustainability, safety, and a stable flow of benefits now and for future generations.

EXISTING POLICY 4: APPROVED TREE LIST (PUBLIC TREES)

City Engineering Standards contain an Approved Tree List of acceptable species for planting on public property and rights-of-way.

GOAL 4: MAINTAIN PUBLIC TREE INVENTORY DATA

This goal and supporting action focuses maintaining the public tree resource inventory and database.

GOAL 5: MAINTAIN PUBLIC TREES ON A 7-YEAR MAINTENANCE CYCLE

This goal and supporting actions ensures that public trees are maintained proactively to promote good structure, health, longevity, and safety.

GOAL 6: MANAGE THE PUBLIC TREE POPULATION FOR SPECIES DIVERSITY

This goal and supporting actions focuses on increasing and maintaining species diversity to ensure that the urban forest is more resilient to pests, disease, and climate fluctuation.

GOAL 7: PERIODICALLY CALCULATE AND REVIEW ECOSYSTEM BENEFITS

This goal and supporting actions measures and monitors change in environmental and socioeconomic benefits provided by the community tree resource, and is an indicator of the long-term success of the UFMP.



FOCUS: URBAN FORESTRY PROGRAMMING

As stewards of community trees, Woodland's urban forest managers recognize the importance of maximizing the value of available resources through efficient operations and proactive programming to provide the greatest return on the community's investment.

EXISTING POLICY 5: BEST MANAGEMENT PRACTICES

The City follows industry and state best management practices related to tree care, safety, and stormwater management.

GOAL 8: OPTIMIZED URBAN FORESTRY PROGRAMMING

This goal and supporting actions promotes effective and efficient use of available resources.

GOAL 9: ENSURE PLANNING DOCUMENTS REFERENCE THE URBAN FOREST MASTER PLAN

This goal and supporting actions ensure that the vision for the community tree resource is aligned with existing plans, community values, and other long-range policy documents.

GOAL 10: ANNUALLY REVIEW URBAN FOREST MASTER PLAN

This goal and supporting actions ensures that the UFMP remains relevant and that goals and actions are considered in annual work planning.

GOAL 11: SUSTAINABLE URBAN FORESTRY FUNDING

This goal and supporting actions focuses on sustainable funding for forestry operations. Trees are dynamic and long-living species that provide greater benefits over time. Urban trees face unique challenges that require proactive and consistent management to retain value and benefits.

FOCUS: PARTNERS

It takes a community to steward an urban forest. Engagement and collaboration with the community, nonprofit and volunteer groups, partner agencies, and advocates is vital. Establishing and nurturing these relationships promotes greater appreciation and a shared vision for trees and the urban forest and facilitates collaborative partnerships.

GOAL 12: COMMUNITY OUTREACH AND ENGAGEMENT

This goal and supporting actions promotes education and awareness of the value and benefits of trees and encourages community engagement in the ongoing care and vision for the urban forest and community tree resource.

GOAL 13: COLLABORATE WITH PARTNERS

This goal and supporting actions encourages collaboration with volunteers, nonprofits, and other stakeholders to maximize the value of efforts and resources.

GOAL 14: STATE OF THE URBAN FOREST REPORT

This goal provides an opportunity to engage with the community and update stakeholders on the condition and value of urban forest resources and the progress of the UFMP, including successes and challenges towards meeting plan goals.



How Do We Get There?

The goals and actions proposed by the Urban Forest Master Plan are organized by area of focus:

- Tree Canopy
- Community Tree Resource
- Urban Forestry Programming
- Partners

Each area of focus is supported by measurable goals and specific actions that are intended to guide Woodland's urban forest programming over the next 20 years, providing the foundation for annual work plans and budget forecasts. Many goals and actions support more than one focus area.

For each action, the UFMP identifies a priority, a suggested timeframe for accomplishing the action, an estimated cost range, and potential partners. Priority is identified as:

- High - An action that is critical to protecting existing community assets, reducing/managing risk, or requires minimal resources to accomplish
- Medium - An action that further aligns programming and resource improvements that have been identified as desirable by the community, partners, and/or urban forest managers, but that may require additional investment and financial resources over and above existing levels
- Low - An action that is visionary, represents an increase in current service levels, or requires significant investment

The estimated cost is categorized in the following ranges:

- \$ = Less than \$25,000
- \$\$ = \$25,000 - \$50,000
- \$\$\$ = \$50,000 - \$100,000
- \$\$\$\$ = Greater than \$100,000

The UFMP is intended to be a dynamic tool that can and should be adjusted in response to accomplishments, new information and changes in community expectations, and available resources. In addition to serving as a day-to-day guide for planning and policy making, the UFMP should be reviewed regularly for progress and to ensure that the actions and sub-actions are integrated into the annual work plan.

Focus	Tree Canopy	Community Tree Resource	Urban Forestry Programming	Partners
Policy	<ul style="list-style-type: none"> • 2035 Climate Action Plan • California Model Water Efficient Landscape Ordinance (MWEL0) • Ordinances and Standards 	<ul style="list-style-type: none"> • Approved Tree List (public trees) 	<ul style="list-style-type: none"> • Best Management Practices 	
Goals	<ul style="list-style-type: none"> • Preserve and enhance canopy cover • Plant trees • Periodically review Tree Ordinance and Engineering Standards 	<ul style="list-style-type: none"> • Maintain public tree inventory data • Maintain public trees on a 7-year cycle • Manage the public tree inventory for species diversity • Periodically calculate/review ecosystem benefits 	<ul style="list-style-type: none"> • Optimized urban forestry programming • Ensure planning documents reference the Urban Forest Master Plan • Annually review the Urban Forest Master Plan and revise every 10 years • Sustainable Urban Forestry Funding 	<ul style="list-style-type: none"> • Community outreach and engagement • Collaborate with Partners • State of the Urban Forest Report
Actions	<ul style="list-style-type: none"> • Increase canopy cover to 25% by 2035 • Continue to plant trees per 2035 CAP • Remain compliant with MWEL0 • Adopt policy, ordinances, standards, and practices to meet new standards imposed by California Bill no. 606 and no. 1668 • Continue to ensure tree installations and practices are compliant with standards and ordinances • Review standards and ordinances every 5-years • Conduct urban tree canopy assessment every 10 years • Review and implement tree preservation requirements in city ordinance • Evaluate incentives for tree planting on residential and private property • Monitor and ensure trees are successful in the first 3-years of planting • Evaluate feasibility of a tree planting and replacement plan as a supplement to the UFMP • For new developments, implement a replacement ratio consistent with ordinance • Continue to collaborate with nonprofit and neighborhood groups for tree planting • Ensure trees planted in developments follow best management practices • Consider that large projects may qualify for meeting CEQA requirements • Review/revise tree ordinances every 5-years • Explore community support for heritage and significant tree protection on private property • Review design and construction standards for trees and planting sites • Ensure that underground utilities are placed to avoid contact with trees (Plan review) 	<ul style="list-style-type: none"> • Maintain Approved Tree List • Ensure City trees comply with Approved Tree List • Continue to develop the public tree inventory • Standardize and create a policy guide for tree inspection protocol • Integrate inventory data into accessible software • Maintain all public trees on a 7-year pruning and maintenance cycle (dependent upon funding/resources) • Develop an annual work plan • Collect tree species information when performing tree work • Plan for ideal species diversity • Review Approved Tree List at minimum every 5 years • Complete a resource analysis every 10 years • Review changes to benefits, composition, and benefit versus investment ratio 	<ul style="list-style-type: none"> • Continue to follow best management practices • Develop a Policy and Procedures Manual for urban forestry • Develop annual work plans and goals to guide routine operations • Define quality assurance protocols for urban forestry operations • Develop a Risk Management Plan and policy for urban forestry operations • Qualify and apply for TCIA Accreditation • As existing planning documents are revised, ensure they reference the UFMP • Review and revise the UFMP every 5 to 10 years • Explore community support for a Park District overlay that would provide dedicated funding to parks and urban forestry • Reorganize tree maintenance zones to have a more balanced distribution of trees • Identify opportunities for additional sources of revenue 	<ul style="list-style-type: none"> • Continue to develop the urban forest web page • Coordinate a citywide outreach strategy • Engage the community in the analysis, alternatives, and recommendations for further urban forestry related planning processes and potential code changes • Continue to promote outreach materials that communicate information about trees and the urban forest • Continue to collaborate with City departments, nonprofits, and neighborhood groups • Maintain Tree City USA status • Qualify and apply for Society of Municipal Arborists Accreditation • Explore partnerships that can identify and support opportunities for grants and financial assistance for low-income residents • Develop and deliver State of the Urban Forest Report every 5-years

Focus: Tree Canopy

The amount and distribution of tree canopy and leaf surface have a direct correlation on the level and value of environmental and socioeconomic services generated by the urban forest. Preserving and increasing tree canopy, in addition to promoting species diversity and proactive maintenance practices, contributes to the health, welfare, and aesthetics of Woodland's community and provides a critical buffer to better withstand impacts from weather and a changing climate.

Existing Policy 1: 2035 Climate Action Plan	Cost	Priority	Partners	Timeframe
Reduce GHG emissions consistent with State goals for addressing climate change (2035 Climate Action Plan).				
Actions:				
1. Continue to increase average canopy cover to 25% by 2035	\$\$-\$\$\$	High	Nonprofits, volunteers	Ongoing
2. Develop annual planting plans to achieve desired canopy cover by 2035	\$	High	Nonprofits, volunteers	Ongoing
a. Develop annual planting plans to achieve desired canopy cover by 2035				
i. Emphasize plantings on public property due to existing canopy cover of 14.9%				
ii. Place a focus on increasing species diversity to promote resiliency to pests, disease, and climate fluctuations				
b. Preserve healthy mature and large-stature trees				
3. Continue to plant trees per the Climate Action Plan	\$\$-\$\$\$	High	Nonprofits, volunteers	Ongoing
a. Plant a net 10,500 more trees along streets, in parking lots, and in open space areas by 2035				
b. Plant a net 6,000 more trees near buildings by 2035				
i. Inventory new trees as they are planted				
Existing Policy 2: California's Model Water Efficient Landscape Ordinance				
Executive Order EO B-29-15 (April 1, 2015) directed California's Department of Water Resources to update the State's Model Water Efficient Landscape Ordinance (Ordinance) through expedited regulation. About half of the urban water is used for landscape irrigation in California. Large water savings can be gained by proper landscape design, installation, and maintenance. New development and retrofitted landscape water efficiency standards are governed by the Model Water Efficient Landscape Ordinance (MWELo). Local agencies (cities and counties) had to adopt MWELo or adopt their own ordinances which must be at least as effective in conserving water as the State's Ordinance.				
Actions:				
1. Continue to ensure policies, ordinances, standards, and practices are compliant with the California Model Water Efficient Landscape Ordinance	\$-\$\$	High	Public Works	Ongoing
2. Adapt policy, ordinances, standards, and practices to meet new standards imposed by California Bill no. 606 and no. 1668	\$-\$\$	High	Public Works	Ongoing

\$= less than \$25,000 \$\$= \$25,000-\$50,000 \$\$\$= \$50,000-\$100,000 \$\$\$\$= greater than \$100,000

*Targets are tentative and dependent upon available resources. Costs are based on general estimates

Focus: Tree Canopy

Existing Policy 3: Ordinances and Standards

Engineering Standards, Section 13: Tree Planting Requirements. Defines the approved tree list for public use, permitting requirements, and planting guidelines. Engineering Standards, Part 2: Landscape and Irrigation. Includes blueprints and specifications for physical installations, which includes tree related items.

Tree Ordinances are mainly located in Chapter 20A. This includes tree replacement requirements, tree activities, permits, emergency response, and more. Chapter 2 defines the authority of the Parks and Recreation Commission to also act as the Tree Commission. Chapter 25 defines general provisions of landscaping require trees to be planted and existing trees to be protected.

Actions:

1. Continue to ensure tree installations and practices are compliant with standards and ordinances
2. Review standards and ordinances every 5-years and update when appropriate

Goal 1: Preserve and Enhance Canopy Cover

Performance Measure: Tree Canopy Cover (% of land covered by tree canopy within city limits).

- 2035 CAP identifies action to increase Woodland's tree canopy to 25% by 2035
- The Greenprint Initiative sets an average 35% canopy goal for the region

Rationale: The current canopy is 14.5% (1,394 Acres) while the 2035 Climate Action Plan canopy goal is 25%.

Risk: Diminished canopy cover can increase the risk of flooding, urban heat island effects, and energy use. Canopy loss also negatively impacts wildlife travel corridors and decreases habitat. Diminished canopy cover can also reduce the urban forest benefits related to air quality, water quality, and asphalt longevity. Historic urban canopy assessments reveal the City has increased canopy by an average of ~0.9% annually between 2009 and 2016. Assuming the current pattern of canopy growth continues, the City is estimated to have 32.4% canopy cover by 2035.

Benefit: Greater canopy cover can increase the environmental and socioeconomic services provided by the urban forest.

Cost	Priority	Partners	Timeframe
\$	High		Ongoing
\$	Low		Every 5 Years

Focus: Tree Canopy

Goal 1: Continued

Actions:

1. Conduct urban tree canopy (UTC) assessment every 10-years
 - a. Track changes and progress towards community canopy goals
2. Review and implement tree preservation requirements in city ordinance
3. Evaluate feasibility of adding more incentives to increase tree planting on residential and other private property
 - a. Track participation in incentive programs to estimate new tree plantings
 - b. Increase outreach in the community about tree planting incentives
4. Monitor and ensure trees are successful in the first 3-years of planting

Cost	Priority	Partners	Timeframe
\$\$	Medium		Every 10 Years
\$\$\$-\$\$\$\$	Medium		1-5 Years
\$	Medium		1-5 Years
\$	Low	Nonprofits, volunteers	Ongoing

Goal 2: Plant Trees

Performance Measure: Number of Trees Planted Per Year.

Rationale: The City plants trees annually. These are replacements for trees that have been removed or are trees planted in new locations.

Risk: The number of trees in the City will decline without active planting.

Benefit: Planting trees can increase canopy cover and the ecosystem benefits provided by the urban forest.

Actions:

1. Evaluate the feasibility of a tree planting and replacement plan as a supplement to the UFMP
 - a. Use GIS mapping data to identify and prioritize planting sites and to ensure coordination with planned improvements and construction
 - b. Define the classification traits for planting sites and prioritize sites based on those traits. Possible traits include:
 - i. Space and minimum planting setbacks
 - ii. Soil characteristics
 - iii. Irrigation infrastructure
 - iv. Landscape goals and tree density
 - v. Site constraints and existing infrastructure, including hardscape, utilities (overhead and underground), bridges, and culverts
 - vi. Invasive vegetation and lack of native plants

\$	Medium		Every 1-5 Years
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Focus: Tree Canopy

Goal 2: Continued

	Cost	Priority	Partners	Timeframe
<ul style="list-style-type: none"> c. Continue to practice planting the “Right Tree in the Right Place” by matching the tree species to the conditions of the planting site. Considerations include: <ul style="list-style-type: none"> i. Hardscape and utilities ii. Soil and water conditions iii. Planter size and intended use iv. Line of sight for traffic corridors and signage v. Mature canopy spread d. Identify locations where tree planting will enhance overall canopy cover <ul style="list-style-type: none"> i. Use GIS layer "Priority Planting Map" to identify locations where new trees will provide the greatest environmental benefits ii. Identify underserved neighborhoods, with lower than average tree canopy, where increasing canopy can provide greater benefits to the health, social, and economic environment of residents iii. Parking Lots iv. Other areas e. Optimize shade and environmental benefits by planting large stature trees where feasible 				
2. For new developments, implement a replacement ratio for planting trees that is consistent with the City tree ordinance	\$	High	Community Development	1-2 Years
3. Continue to collaborate with nonprofit and neighborhood groups for tree planting	\$	Medium	Nonprofits, volunteers	Ongoing
4. Ensure trees planted in developments follow these best management practices: <ul style="list-style-type: none"> a. Plant trees in the correct location, according to site plans b. Tree installation <ul style="list-style-type: none"> i. Where practical and appropriate, amend soils with biochar (heavy clay, compacted soils, to increase cation-exchange capacity) ii. If stakes are needed, plan for stake removal or adjustment within 1-year of tree planting c. Provide a final inspection for tree plantings in developments to review location/species and record/ approve any changes from the plan d. Reference tree planting standards for construction and development projects e. Update tree inventory as trees are planted 	\$-\$-\$	High	Community Development	Ongoing
5. Consider that larger planting projects may qualify as mitigation strategies for meeting CEQA requirements	\$	Low		Ongoing

\$= less than \$25,000 \$\$= \$25,000-\$50,000 \$\$\$= \$50,000-\$100,000 \$\$\$=\$ greater than \$100,000

*Targets are tentative and dependent upon available resources. Costs are based on general estimates

Focus: Tree Canopy

Goal 3: Periodically Review Tree Ordinances and Engineering Standards

Performance Measure: Date of last review of Ordinances and Standards.

Rationale: For the City to adapt to evolving circumstances, periodic reviews and amendments to the City codes and standards are required.

Risk: Ordinances and standards must stay up to date or risk falling behind best management practices and community vision.

Benefit: Ordinances and standards are aligned with best practices and community values.

Actions:

1. Review tree ordinances at least every 5-years and revise as appropriate
 - a. Confer with the stakeholders for potential code changes
 - i. Evaluate commercial parking lot shade requirements
 - ii. Collaborate with city fire chief and county experts to evaluate and manage wildfire risk
2. Explore community support for heritage and significant tree protection on private property
3. Review design and construction standards for trees and planting sites
 - a. Ensure trees have sufficient soil volume to support healthy root growth and structure (Appendix A, Soil Volume & Tree Stature)
 - i. Maintain Approved Tree List
 1. Review every 5-years
 2. See Goals 7 and 8
 - b. Evaluate planter design standards with options for increasing soil volume, where above ground area is restricted by impervious surfaces (Appendix, Alternative Planter Designs)
 - i. Increase effective soil volume for street trees to allow greater canopy along rights-of-way
 - c. Evaluate planter and pavement design options to reduce conflicts between trees and infrastructure (Appendix, Alternative Planter Designs). Contact manufacturers to acquire specifications and best implementation practices for these technologies
 - d. Evaluate planter design standards with additional options for implementing urban trees into stormwater management (Appendix, Alternative Planter Designs)
 - i. Stormwater tree pits and drainage plans
 - ii. Interconnected tree pits
 - e. Update standards as necessary
4. Ensure, as part of development plan review, underground utilities are placed to avoid conflict with trees

Cost	Priority	Partners	Timeframe
\$	Low		Every 5 Years
\$	Medium	Nonprofits, volunteers	1-5 Years
\$-\$	Medium	Public Works	Every 5 Years
\$-\$	High	Community Development	Ongoing

\$= less than \$25,000 \$\$= \$25,000-\$50,000 \$\$\$= \$50,000-\$100,000 \$\$\$>= greater than \$100,000

*Targets are tentative and dependent upon available resources. Costs are based on general estimates

Focus: Community Tree Resource

The community tree resource is a publicly-owned asset that provides critical benefits to health, economic, social, aesthetic, and quality of life for residents and visitors. The replacement value of the existing resource is nearly \$30.5 million. Annually, the community tree resource provides nearly \$1.7 million in benefits to Woodland. Proactive and considered management of this resource will ensure sustainability, safety, and a stable flow of benefits now and for future generations.

Existing Policy 4: Approved Tree List (Public Trees)	Cost	Priority	Partners	Timeframe
<p>The City Engineering Standards contain an approved tree list of acceptable species for planting on public property and rights-of-way.</p> <p>Species diversity in an urban forest is an indicator of the overall health and stability of the resource. Greater diversity promotes greater resistance to pests, disease, and environmental stresses. The Approved Tree List found in the City’s engineering standards defines the tree species which may be planted on city properties, parks, and rights-of-way.</p> <p>Actions:</p> <ol style="list-style-type: none"> 1. Review Approved Tree List at minimum every 5-years and update as necessary, taking into account availability of species at nurseries. <ol style="list-style-type: none"> a. Select a broad palette of regionally compatible Species <ol style="list-style-type: none"> i. Species that can thrive in newer subdivisions: <ol style="list-style-type: none"> 1. Species that tolerate heavy clay soils 2. Species that tolerate elevated levels of boron 3. Species that tolerate Irrigation challenges ii. Native and well-adapted tree species that have the potential to become “legacy” tree <ol style="list-style-type: none"> 1. Species that mitigate flooding issues 2. Species with minimal leaf drop and litter creation 3. Species and varieties iii. Define sites the trees are most suitable for: <ol style="list-style-type: none"> 1. Rights-of-way 2. Parks 3. Near/Under Utilities 4. Parking Lots 5. Flood Zones 2. Ensure City trees comply with Approved Tree List 	\$-\$\$	Medium		Every 5 Years
	\$	High		Ongoing

\$= less than \$25,000 \$\$= \$25,000-\$50,000 \$\$\$= \$50,000-\$100,000 \$\$\$\$= greater than \$100,000

*Targets are tentative and dependent upon available resources. Costs are based on general estimates

Focus: Community Tree Resource

Goal 4: Maintain Public Tree Inventory Data

Performance Measure: Frequency and veracity of public tree inventory updates.

Rationale: The City has conducted public tree inventories to identify the structure, benefits, and management needs of the community tree resource. The City also conducts tree inspections to quantify tree assets, risks, or liabilities associated with its trees.

Risk: Without data on all publicly-owned trees, planning and prioritization of urban forestry activities are based on conjecture and anecdotal evidence.

Benefit: The City can plan proactive and efficient tree management.

Actions:

1. Continue to develop the public tree inventory
 - a. Record site, species, type, DBH, height, maintenance recommendations, and condition
 - b. Continue to update inventory any time a tree has maintenance performed
 - i. Establish workflows for City staff that allow for access to inventory data by supervisory staff and other departments
 - ii. Include tree inventory data collection into tree work contracts when maintenance is conducted
2. Standardize and create a policy guide for tree inspection protocol
 - a. Identify appropriate inspection cycles for all public trees
 - i. Identify and prioritize plant health care needs/requirements
 - b. Identify signs or symptoms of disease, pests, and abiotic disorders, including environmental stress (e.g., water management, soil conditions, and nutrient availability) and prioritize management needs
 - i. Identify obvious signs of decline and/or failing structure
 - ii. Identify and assess potential risks
 - iii. Identify risk factors and mitigation strategies for mature and declining trees
 - c. 5-year minimum inspection cycle (level 1) for heritage oaks and other large trees (>24" DBH) that pose a potential risk to a defined target
 - d. Identify thresholds for implementing Level 2 and Level 3 inspections
 - e. Identify thresholds for tree removal
3. Integrate inventory data into accessible software or data management systems

Cost	Priority	Partners	Timeframe
\$	Medium		Ongoing
\$	High		1-5 Years
\$	High		1-2 Years

Focus: Community Tree Resource

Goal 5: Maintain Public Trees on a 7-Year Cycle

Performance Measure: Percent of all public trees maintained within a 7-year cycle.

Rationale: Tree health improves when given timely maintenance and clearance pruning. A 7-year cycle also allows for a regular inspection of a tree’s condition, structure, and overall health. Regular maintenance and clearance pruning provide an opportunity for identifying or resolving issues before they become critical.

Risk: Inexpensive and minor tree issues can develop into expensive and high risk issues without proper and regular maintenance.

Benefit: A healthier, longer living community tree resource and increased benefits provided by the community tree resource. Decreased municipal legal liability by adhering to the 7-year pruning cycle.

Actions:

1. Maintain all public trees are on a regular 7-year pruning and maintenance cycle (dependent upon funding/resources)
 - a. Ensure pruning cycle includes:
 - i. Scheduled maintenance and inspection at reasonable intervals
 - ii. Adequate records kept of the inspection and activity
 - iii. Timely response to discovered defects (e.g., disease, rot, or decay)
 - iv. Timely response to citizen complaints and concerns
 - v. An informal inspection process where City staff would report signs of sick or dying trees/limb
 - vi. Secure a sustainable funding source
2. Develop an annual work plan
 - a. Identify 12-month goals and resources necessary for completion
 - i. Review UFMP goals, actions, and timeline
 - b. Develop annual budget and justification

Cost	Priority	Partners	Timeframe
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\$\$\$\$	High		Ongoing
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\$	High		Ongoing
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Focus: Community Tree Resource

Goal 6: Manage the Public Tree Inventory for Species Diversity

Performance Measure: Species distribution of public trees (%).

Rationale: Best management practices recommend that no species should represent more than 10% of the community tree resource, no genus should represent more than 20%, and no family should represent more than 30%.

Risk: Predominance of a few species can lead to substantial impacts from pests or diseases that tend to be species-specific, climate change, and storms that may predominantly damage certain species.

Benefit: A more resilient urban forest.

Actions:

1. Collect tree species information when performing tree work
 - a. Interpret data to understand and identify unsuitable tree species
 - i. Cease planting species that perform poorly
 - ii. Create replacement plans for the poorly-performing trees
2. Plan for ideal species diversity:
 - a. No single species represents >10% of the resource
 - b. No single genus represents >20% of the resource
 - c. No single family represents >30% of the resource

Cost	Priority	Partners	Timeframe
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\$	Low		Ongoing
\$	High		Ongoing

Focus: Community Tree Resource

Goal 7: Periodically Calculate and Review Ecosystem Benefits

Cost Priority Partners Timeframe

Performance Measure: Number and Value of Ecosystem Benefits Tracked by the City

Rationale: Aligning with the City’s General Plan elements, the City would be favorably positioned to understand and optimize the ecosystem benefits provided from trees by documenting and tracking the ecological function of publicly-owned trees.

Risk: If benefits are not tracked, the value of the asset is unknown, and preservation and maintenance are more difficult to rationalize.

Benefit: Urban forestry projects are easier to identify, finance, and secure when cost-benefit relationships can be established, and the information is shared with the public.

Actions:

1. Complete a resource analysis (using i-Tree or another model) every 10-years
 - a. Use i-Tree (or another model) to evaluate the current composition, benefits, and benefit versus investment ratio of the community tree resource
2. Review changes to benefits, composition, and benefit versus investment ratio
 - a. Consider results as they relate to UFMP goals, policies, and actions
 - b. Report changes and progress in the State of the Urban Forest Report

\$	Low		Every 10 Years
\$	Low		Every 10 Years

Focus: Urban Forestry Programming

As stewards of community trees, Woodland's urban forest managers recognize the importance of maximizing the value of available resources through efficient operations and proactive programming to provide the greatest return on the community's investment.

Existing Policy 5: Best Management Practices	Cost	Priority	Partners	Timeframe
<p>The City follows industry and state best management practices related to tree care, safety, and stormwater management.</p> <p>Actions:</p> <ol style="list-style-type: none"> 1. Continue to follow best management practices: <ol style="list-style-type: none"> a. American National Standards Institute (ANSI) A300 Series, for Tree Care Operations b. ANSI Z133.1 Safety Requirements for Arboricultural Operations c. International Society of Arboriculture (ISA) Best Management Practices for Tree Pruning, Cabling, Fertilization, Tree Planting, and Integrated Pest Management d. California Occupational Safety and Health Administration (OSHA) e. California Stormwater Quality Association (CASQA) Stormwater Best Management Practices 	\$	High		Ongoing
<p>Goal 8: Optimized Urban Forestry Programming</p> <p>Performance Measure: Development and implementation of plans and policies for public trees.</p> <p>Rationale: The success of the Urban Forest Master Plan requires the support of the community and strong leadership within the City. Developing an organizational structure that enhances tree care operations provides the framework for actualizing the community's vision.</p> <p>Risk: Reactionary programming can lead to cost-inefficient practices and ineffective tree care.</p> <p>Benefit: Tree management is more efficient and effective. Organization structure provides continuity when staff transitions occur.</p> <ol style="list-style-type: none"> 1. Develop a Policy and Procedures Manual for Urban Forestry <ol style="list-style-type: none"> a. Outline operations, official policies, and official procedures that guide day-to-day urban forestry operations <ol style="list-style-type: none"> i. Define the structure and organization of the urban forestry group to provide easy onboarding for new staff ii. Define staff responsibilities, including administrative tasks iii. Record existing Best Management Practices (BMPs) and policies for tree care operations iv. Coordinate with utility providers to resolve rights-of-way conflicts v. Ensure that urban forest policies and procedures are consistent with other City standards and master plans 	\$	High		1-5 Years

\$= less than \$25,000 \$\$= \$25,000-\$50,000 \$\$\$= \$50,000-\$100,000 \$\$\$\$= greater than \$100,000

*Targets are tentative and dependent upon available resources. Costs are based on general estimates

Focus: Urban Forestry Programming

Goal 8: Continued

	Cost	Priority	Partners	Timeframe
2. Develop annual work plans and goals to guide routine operations: <ul style="list-style-type: none"> a. Pruning schedules for maintenance contract(s) b. Tree planting and replacement plans c. Prioritize risk mitigation actions and tree removals d. Identify and prioritize trees for inspection/risk assessment 	\$	High		Ongoing
3. Define Quality Assurance protocols for urban forestry operations: <ul style="list-style-type: none"> a. Tree maintenance b. Coordinate and monitor contracted work c. Staff training d. Risk assessment/Risk management e. Tree Risk Assessment Report f. Tree inventory data collection input/update g. Tree removal h. Sidewalk repair inspections and recommendations for Public Works/Engineering i. Issuing service requests and work orders j. Volunteer coordination/Public outreach 	\$	High		1-5 Years
4. Develop a Risk Management Plan and policy for urban forestry operations <ul style="list-style-type: none"> a. Collaborate with YCPARMIA to identify policies and actions for tree risk management b. Coordinate risk management goals with a tree inspection program c. Prioritize risk mitigation measures and coordinate with work plans d. Coordinate with GIS staff for geographic analysis of specific risk factors (e.g., disease/pest factors, others) and to identify areas of high/low risk 	\$	High	YCPARMIA	1-2 Years

\$= less than \$25,000 \$\$= \$25,000-\$50,000 \$\$\$= \$50,000-\$100,000 \$\$\$\$= greater than \$100,000

*Targets are tentative and dependent upon available resources. Costs are based on general estimates

Focus: Urban Forestry Programming

Goal 8: Continued

5. Qualify and apply for Tree Care Industry Association (TCIA) Accreditation (managers/field supervisors). Requires one of the following conditions be met:
- a. Three years of technical field experience in tree care with at least one year of assumed responsibility for safety
 - b. Six months technical field experience in arboriculture and one year in a professional safety position
 - c. Two or four-year degree in Arboriculture, forestry, ornamental/environmental horticulture, natural resource, industrial hygiene, occupational safety, or other related field with an internship that provided technical experience

Cost	Priority	Partners	Timeframe
\$	Low		1-5 Years

Goal 9: Ensure Planning Documents Reference the Urban Forest Master Plan

Performance Measure: Number of planning documents that refer to the UFMP.
Rationale: A city is a complex system of utilities, open spaces, businesses, roads, and other infrastructure. Harmony between planning documents is essential to avoid mutually exclusive directions or regulations.
Risk: Failure to integrate UFMP goals with the goals of other planning documents may limit opportunities to accomplish several municipal goals simultaneously.
Benefit: Increased clarity for municipal leadership and opportunities to accomplish multiple municipal goals at the same time.
Actions:

- 1. As existing planning documents are revised, ensure they reference the UFMP
 - a. As revisions occur, recognize the value of the UFMP and the role of trees and tree canopy as implementation measures for goals identified the 2035 General Plan
 - b. Ensure that all specific plans include consideration for the establishment of public trees, including the construction of planting sites that support tree maturity

\$	High	Community Development	Ongoing
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Focus: Urban Forestry Programming

Goal 10: Annually Review Urban Forest Master Plan and Revise Every 10 Years

Cost

Priority

Partners

Timeframe

Performance Measure: Master Plan Age and Frequency of Revisions.

Rationale: For the Plan to adapt to evolving circumstances and maintain relevance to the community and City Staff, periodic reviews, and amendments are required. This high-level alignment with the community will ensure public support for urban forestry project funding.

Risk: The plan may become unused and obsolete.

Benefit: This will create pathways to stable and predictable funding.

Actions:

1. Review annually and revise the UFMP every 10-years
 - a. Annually adjust targets as necessary
 - b. Continue to incorporate City goals, policies, and actions into the annual work plan
 - c. Periodically review the UFMP for alignment with community values and expectations for the urban forest
 - d. Determine community satisfaction for realizing the Plan’s goals, policies, and actions
 - i. Measure through surveys and by public input at City meetings

\$\$

High

Parks and Recreation
Commission

10 Years

\$= less than \$25,000

\$\$= \$25,000-\$50,000

\$\$\$= \$50,000-\$100,000

\$\$\$\$= greater than \$100,000

*Targets are tentative and dependent upon available resources. Costs are based on general estimates

Focus: Urban Forestry Programming

Goal 11: Sustainable Urban Forestry Funding

Performance Measure: Dollars (\$) in Fund.

Rationale: The amount of funding impacts the timing and opportunities for tree care. Tree maintenance at most city facilities, including parks, is funded by the general fund and lighting and landscape districts.

Risk: Inadequate funding can, and has, led to inadequate care, which will compromise the health of the urban forest and possibly increase City risk liability.

Benefit: Sustainable tree funding mechanisms provide stability in economic downturns and provide the urban forest with regular care.

Actions:

1. Explore community support for Park District overlay that would provide dedicated funding to parks and urban forestry
 - a. Conduct outreach campaigns to gauge constituent support for the establishment of a Park District and the necessary Special Assessment
2. Reorganize tree maintenance zones to have a more balanced distribution of trees
 - a. Evaluate the costs and benefits of a city-wide Lighting and Landscape District
3. Identify opportunities for additional sources of revenue
 - a. Collaborate with City leadership to evaluate:
 - i. Appraisal fees for trees damaged in vehicular accidents
 - ii. Larger fines for malicious damage to public trees
 - iii. Charitable contributions and “in-memoriam” options
 - b. Identify the funding mechanism when new public trees are added through development
 - c. Create new LLDs where developments or neighborhoods desire greater enhancements and/or service levels
 - d. Research the ability to use urban forest planting and/or preservation projects to earn carbon credits and create an additional funding source
 - e. Coordinate pest management of elms with potential partners to share the cost of annual treatment

Cost Priority Partners Timeframe

\$	Low	Parks and Recreation Commission	5-10 Years
\$	Low		Every 5 Years
\$	Medium	Parks and Recreation Commission	Ongoing

Focus: Partners

It takes a community to steward an urban forest. Engagement and collaboration with the community, nonprofit and volunteer groups, partner agencies, and advocates is vital. Establishing and nurturing these relationships promotes greater appreciation and a shared vision for trees and the urban forest and facilitates collaborative partnerships.

Goal 12: Community Outreach and Engagement

Cost Priority Partners Timeframe

Performance Measure: Number of attendees at forestry events.

Rationale: The communication of programs, activities, and materials that increase community awareness and appreciation for the urban forest are necessary to actualize community participation. Providing quick and accurate tree-related information to the community also allows individuals to make educated decisions regarding their trees.

Risk: Without community outreach, participation in programs will not reach their full potential. Improper tree practices may continue and lead to unnecessary tree health deterioration.

Benefit: Increased community participation in forestry events and an even more educated community will lead to better tree care citywide.

Actions:

1. Continue to develop the Urban Forest webpage (http://www.cityofwoodland.org/gov/depts/communityserv/tree_maintenance/default.asp). Possible additions include:
 - a. State of the urban forest, community tree resource, and urban tree canopy
 - b. Volunteer and donation opportunities
 - c. Links to nonprofits and regional, state, and national tree interests:
 - i. Woodland Tree Foundation
 - ii. California Urban Forests Council
 - iii. Arbor Day Foundation
 - iv. CAL FIRE
 - d. The City’s tree protection regulations, requirements, policies, and necessary forms
 - e. Engaging articles for residents and property managers, including:
 - i. How to plant a tree
 - ii. How to prune a tree
 - iii. How to fertilize and mulch
 - iv. How to irrigate
 - v. How to hire an arborist or tree care company
 - vi. Recommended tree species for private property
 - f. Frequently asked questions

\$ Medium Ongoing

\$= less than \$25,000 \$\$= \$25,000-\$50,000 \$\$\$= \$50,000-\$100,000 \$\$\$\$= greater than \$100,000

**Targets are tentative and dependent upon available resources. Costs are based on general estimates*

Focus: Partners

Goal 12: Continued

	Cost	Priority	Partners	Timeframe
2. Coordinate a citywide outreach strategy rather than a departmental effort	\$	Medium	City-wide	Ongoing
3. Engage the community in the analysis, alternatives, and recommendations for further urban forestry related planning processes and potential code changes	\$	Medium	Community	Every 5 Years
a. Convene a group of stakeholders to review benchmarks and develop options and recommendations				
b. Hold community meetings to gauge public support for input on updates to City codes and policies				
c. Provide multiple opportunities for feedback; require a clear and transparent process with the community				
4. Continue to promote outreach materials that communicate information about trees and the urban forest	\$	Medium	Nonprofits, volunteers	Ongoing
a. Communicate basics of tree care, including planting, pruning, and irrigation				
i. Communicate water-wise information				
ii. Proper watering on private and commercial property				
iii. Proper watering for trees and plants and watering trees during drought				
iv. Recommendations for tree species for private property				
b. Research and develop different outreach media for different audiences.				
i. Audiences and partners:				
1. Elected officials				
2. Schools/Youth				
3. Development/Real estate organizations				
4. Homeowners/Community				
5. Volunteers/Service groups				
ii. Types:				
1. Social media				
2. Digital content				
3. In-Person:				
a. Community tree planting				
b. Workshops				
c. Arbor Day celebration				
d. Educational programs with schools				
e. Booths at events				
4. Rebate programs				
5. Print				

\$= less than \$25,000 \$\$= \$25,000-\$50,000 \$\$\$= \$50,000-\$100,000 \$\$\$\$= greater than \$100,000

*Targets are tentative and dependent upon available resources. Costs are based on general estimates

Focus: Partners

Goal 13: Collaborate with Partners

Cost Priority Partners Timeframe

Performance Measure: Number of partnerships with regional and national organizations, and number of volunteer hours.

Rationale: Coordination with organizations and volunteers provides valuable resources for the urban forest. Partnerships create pathways for communication of urban forestry goals, policies, and actions to the public and foster volunteerism in the community.

Risk: Failure to engage with partners and volunteers can decrease volunteer turnout and resources.

Benefit: Regional partnerships can create pathways to stable and predictable funding. Combined with volunteers, this lowers the costs associated with urban forest management.

Actions:

1. Continue to collaborate with City departments (Public Works and Community Development), nonprofits, and neighborhood groups
 - a. Seek partnerships and collaboration with other organizations to benefit from economies of scale
 - b. Continue to collaborate with nonprofit and neighborhood groups for tree planting
2. Maintain Tree City USA status
3. Qualify and apply for Society of Municipal Arborists (SMA) Accreditation, which requires:
 - a. At least one ISA Certified Arborist on staff
 - i. ISA Certified Municipal Specialist preferred
 - b. An Urban Forest Master Plan
 - c. Tree City USA status
 - d. A Tree City USA Growth Award within the past 5-years
 - e. Demonstrated preference to TCIA Accredited tree care companies when private arborists are contracted
 - f. Adherence to ANSI Z133.1 safety standards, and ANSI A300 tree care performance standards
 - g. A pledge of adherence to the SMA Code of Ethics and to promote SMA objectives
4. Explore partnerships that can identify and support opportunities for grants and financial assistance for low-income residents and non-profits to facilitate tree removal and planting or help defray costs.
 - a. Provide cost-sharing, free replacement trees, or incentives for tree plantings for low-income residents
 - b. Explore options for grants and financial assistance or a payback program for low income residents or non-profits to facilitate tree removal costs
 - c. Develop strategies to remove barriers to participation for all community members

Cost	Priority	Partners	Timeframe
\$	High	Public Works, Community Development, Nonprofits, volunteers	Ongoing
\$	High		Ongoing
\$	Low		1-5 Years
\$	Medium	Nonprofits, volunteers	Ongoing

\$= less than \$25,000 \$\$= \$25,000-\$50,000 \$\$\$= \$50,000-\$100,000 \$\$\$\$= greater than \$100,000

*Targets are tentative and dependent upon available resources. Costs are based on general estimates

Focus: Partners

Goal 14: State of the Urban Forest Report

Cost Priority Partners Timeframe

Performance Measure: Delivery of report every 5-10 years.

Rationale: Public support is critical to a successful and sustainable urban forest program. Keeping stakeholders well informed is the best way to generate support and engagement. A State of the Urban Forest Report is the perfect way to communicate progress and accomplishments toward UFMP policies and actions.

Risk: Community enthusiasm may wane if they don't see the City commitment to urban forestry.

Benefit: Increased community participation and ability to garner community support to address challenges or issues that may be holding up the Plan.

Actions:

1. Develop and deliver State of the Urban Forest Report every 5-10 years
 - a. Provide citizens with information on the overall condition of the community tree resource
 - b. Highlight services (e.g., number of trees pruned/replaced, service calls responded to, etc.)
 - c. Inform the community on progress towards canopy goals and trees planted (public and private)
 - d. Inform the community on accomplishment of UFMP policies and actions

\$ High 5-10 Years



How Are We Doing?

With appropriate care and planning, the urban forest is an asset that has the potential to increase in value over time. As young trees mature, and their leaf surface and canopy grow, so too will the overall benefits and value from the community's urban forest. The goals, policies, and actions of the UFMP are intended to support this process in an appropriate manner that encourages the sustainable stewardship of community trees with consideration for safety, cost efficiency, and community values. The UFMP includes actions for measuring the success of the Plan over time.

MONITORING AND MEASURING RESULTS

Through talking with community partners and those within the urban forestry program, a set of goals were created to meet the strong demand for protecting and enhancing the urban forest, as stated in the community vision. The success of these goals is largely dependent on creating policies and actions to meet the goals outlined in the UFMP, but also monitoring the progress of these actions. Equally important to monitoring progress is finding ways to measure progress so that success is clearly defined.

ANNUAL PLAN REVIEW

The UFMP is an active tool that will guide management and planning decisions over the next 20-years. The goals and actions will be reviewed annually for progress and integration into an internal work plan. The UFMP presents a long-range vision and target dates are intended to be flexible in response to emerging opportunities, available resources, and changes in community expectations. Therefore, each year specific areas of focus should be identified. This can inform budget and time requirements for Urban Forest Managers.

STATE OF THE URBAN FOREST REPORT

The UFMP calls for the City's Parks Superintendent to deliver a State of the Urban Forest Report every 5-years. This report, which includes updates on canopy change, numbers of trees planted and removed, and changes to the overall community urban forest (e.g., structure, benefits, and value) will serve as a performance report to stakeholders and an opportunity for engagement. The report is also an opportunity to highlight the successful attainment of UFMP goals, policies, and actions as well as to inform stakeholders about any issues or stumbling blocks.

COMMUNITY SATISFACTION

Plan results will be measurable through increased benefits and value in the community tree resource and the preservation and eventual increase in canopy cover over time. Attainment of the goals, policies, and actions will support better tree health, greater longevity, and a reduction in tree failures. However, perhaps the greatest measurement of success for the UFMP will be its level of success in meeting community expectations for the care and preservation of the community tree resource. Community satisfaction can be measured through surveys and evidenced by public support for realizing the goals, policies, and actions of the Plan. Community satisfaction can also be gauged by the level of engagement and support for forestry programs.

MASTER TREE LIST

Woodland's Engineering Design Standards Section 13: defines Tree Planting Requirements. Woodland has defined an approved list of trees for use in the City of Woodland rights-of-way, City property, and parks. The City Approved Tree

List provides the name (botanical and common) for the tree species, whether that species emits a low amount of Biogenic Volatile Organic Compounds (BVOC), the minimum required parking strip width, and the appropriate locations for planting that species (street trees, suggested trees for the Spring Lake Development, and park trees). Woodland has also created an abridged list which includes only approved street trees.

RESOURCE ANALYSIS

With up-to-date tree inventory data (TreeKeeper®7.7, Maximo, and Arbor Access), Woodland can quickly and easily complete an updated resource analysis. Woodland has a baseline against which future progress and improvements to health (condition), species diversity, annual benefits, and overall resource value can be measured. A strategy of the UFMP is to complete this analysis every 10-years to illustrate progress and success towards Plan goals. A 10-year Resource Analysis review is a viable way to monitor progress on efforts to increasing diversity through the creation of a diversified list of tree species appropriate for a variety of different spaces and landscapes.

CANOPY ASSESSMENT

With the recent UTC, Woodland has a baseline tree canopy for the entire urban forest, which allows for continued monitoring of trends in the canopy cover on private property, as well as, Woodland's goal of setting and pursuing sustainable and cost-effective canopy cover percent goals. A policy of the UFMP is to complete this assessment every 10-years to illustrate progress and success towards UFMP goals.





APPENDICES

APPENDIX A: BIBLIOGRAPHY

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APPENDIX B: DEFINITIONS

Arboriculture

The science, art, technology, and business of tree care.

Community Urban Forest

The collection of publicly owned trees within an urban area, including street trees and trees in parks and other public facilities.

Drip Line Area

The area measured from the trunk of the tree outward to a point at the perimeter of the outermost branch structure of the tree.

Heritage Tree

Any valley oak tree with a trunk diameter of 33-inches or more at breast height (54-inches) which is of good quality in terms of health, vigor, growth and conformity to generally accepted horticultural standards of shape for its species.

Integrated Pest Management (IPM)

A broad-based approach that integrates practices for economic control of pests. IPM aims to suppress pest populations below the economic injury level.

Inventoried Trees

Includes all public trees collected in the inventory as well as trees that have since been collected by city staff.

Landmark Tree

A tree or stand of trees, which is of historical or public significance as designated by the City Council upon the recommendation of both the tree commission and the historical preservation commission.

Major Maintenance

Includes major trimming or pruning or cabling, and any other similar act, which promotes the life, growth, health or beauty of trees, excepting watering and minor pruning.

Major Trimming and Pruning

The removal of branches of 3-inches in diameter or greater.

Natural Area

A defined area where native trees and vegetation are allowed to grow and reproduce naturally with little or no management except for control of undesirable and invasive species.

Private Tree

Any tree located on private property, including residential and commercial parcels.

Public Tree

Any tree located in the public ROW, city park, and/or city facility.

Right Tree Right Place

The practice of installing the optimal species for a particular planting site. Considerations include existing and planned utilities and other infrastructure, planter size, soil characteristics, water needs as well as the intended role and characteristics of the species.

Specimen Tree

Any tree of interest because of size or unusual species, other than a heritage tree, which is of good quality in terms of health, vigor or growth and conformity to generally, accepted horticultural standards of shape for its species, as designated by the City Council upon the recommendation of the tree commission.

Street Tree

Any tree growing within the tree maintenance strip whether or not planted by the City.

Structural and Training Pruning

Pruning to develop a sound and desirable scaffold branch structure in a tree and to reduce the likelihood of branch failure.

TRAQ- Tree Risk Assessment Qualification

An instructor-led credential that demonstrates professional knowledge in tree risk assessment through participation in a training course and passing its accompanying exam.

Tree

Any live woody plant having one or more well-defined perennial stems with a diameter at maturity of 6-inches or more measured at 54-inches above ground level (breast height).

Tree Canopy

The layer of leaves, branches, and stems of trees that cover the ground when viewed from above.

Tree in Proximity to Trails/Facilities

A tree that, as the result of size and location, has the potential to impact or interfere with the use, safety, and/or condition of a defined trail, structure, or facility (e.g., picnic table, bench, parking area, etc.)

Urban Forest

The collection of privately owned and publicly owned trees and woody shrubs that grow within an urban area.

Urban Canyon

A urban canyon (also known as a street canyon) is a place where the street is flanked by buildings on both sides creating a canyon-like environment. Classic examples of these human-built canyons are made when streets separate dense blocks of structures, especially skyscrapers.

Urban Forestry

The cultivation and management of native or introduced trees and related vegetation in urban areas for their present and potential contribution to the economic, physiological, sociological, and ecological well-being of urban society.

APPENDIX C: BEST MANAGEMENT PRACTICES

The Tree Care Industry Association (TCIA) and the International Society of Arboriculture (ISA) team with government agencies, tree care companies, and green industry organizations to develop and maintain comprehensive standards approved by the American National Standards Institute (ANSI). The ANSI A300 Series applies to tree care operations and ANSI Z133 safety requirements apply to employers and employees engaged in arboricultural operations. The ISA Best Management Practices Series (BMPs) compliments these standards.

The City currently applies these standards, which are based on current science, to ensure the highest level of tree care and thereby promoting health and longevity, reducing the risk of tree failure and minimizing liability.

All work must conform to the current industry standards and BMPs. The Community Services Department shall maintain a copy of these standards on file. These standards include:

- American National Standards Institute (ANSI) A300 Series, for Tree Care Operation - Standard Practices for Tree Pruning, Soil Management, Support Systems, Lightning Protection, Management of Trees on Construction Sites, Planting and Transplanting, Integrated Vegetation Management, Root Management Standard, Tree Risk Assessment, and Integrated Pest Management
- ANSI Z133.1 Safety Requirements for Arboricultural Operations
- International Society of Arboriculture (ISA) Best Management Practices for Tree Pruning, Cabling, Fertilization, Tree Planting, Integrated Pest Management
- California Occupational Safety and Health Administration (OSHA)
- California Stormwater Quality Association (CASQA) Stormwater Best Management Practices

APPENDIX D: CONDITION RATINGS

The trees were individually rated based on a classification system developed by the International Society of Arboriculture (ISA). Condition indicates the current state of a tree's health, structural soundness, overall shape, and growth rate. Symptoms of poor condition include discoloration, decay, dieback, decreased internodal length, and/or disfigured or necrotic stems or roots. To some extent, condition class is also a reflection of the life expectancy of the tree. Crown development, trunk condition, major branch structure, twig growth rate, insects/diseases, and root condition are all considered. Classes are described below:

Excellent or 100% to 90% condition class. The tree is nearly perfect in condition, vigor, and form. This rarely used category is generally applicable to small diameter trees that have been recently transplanted and are well established.

Very Good or 89% to 80% condition class. Overall, the tree is healthy and satisfactory in condition, vigor, and form. The tree has no major structural problems, no mechanical damage, and may only have insignificant aesthetic, insect, disease, or structure problems.

Good or 79% to 70% condition class. The tree has no major structural problems, no significant mechanical damage, may have only minor aesthetic insect, disease, or structure problems, and yet is in good health.

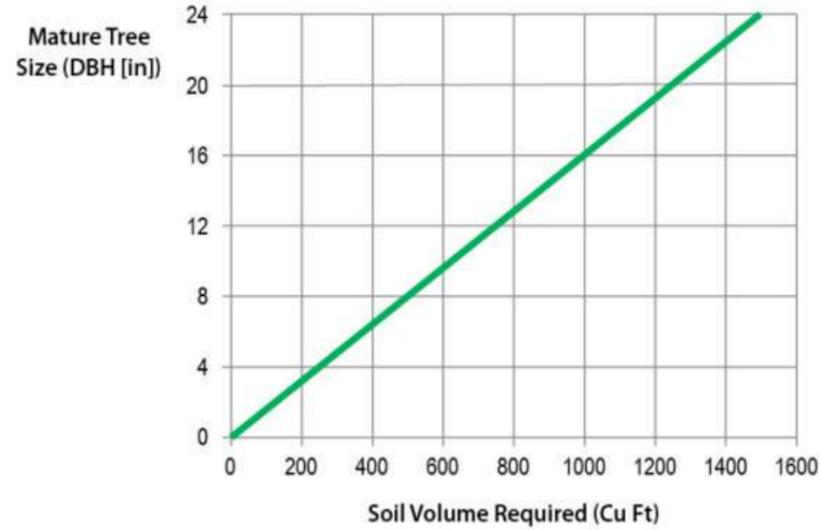
Fair or 69% to 50% condition class. The tree may exhibit the following characteristics: minor structural problems and/or mechanical damage, significant damage from non-fatal or disfiguring diseases, minor crown imbalance or thin crown, or stunted growth compared to adjacent trees. This condition also includes trees that have been topped but show reasonable vitality and show no obvious signs of decay.

Poor or 49% to 30% condition class. The tree appears unhealthy and may have structural defects such as co-dominant stems, severe included bark, or severe trunk and/or limb decay. A tree in this category may also have severe mechanical damage, crown dieback, or poor vigor threatening its ability to thrive. Trees in poor condition may respond to appropriate maintenance procedures, although these procedures may be cost-prohibitive to undertake.

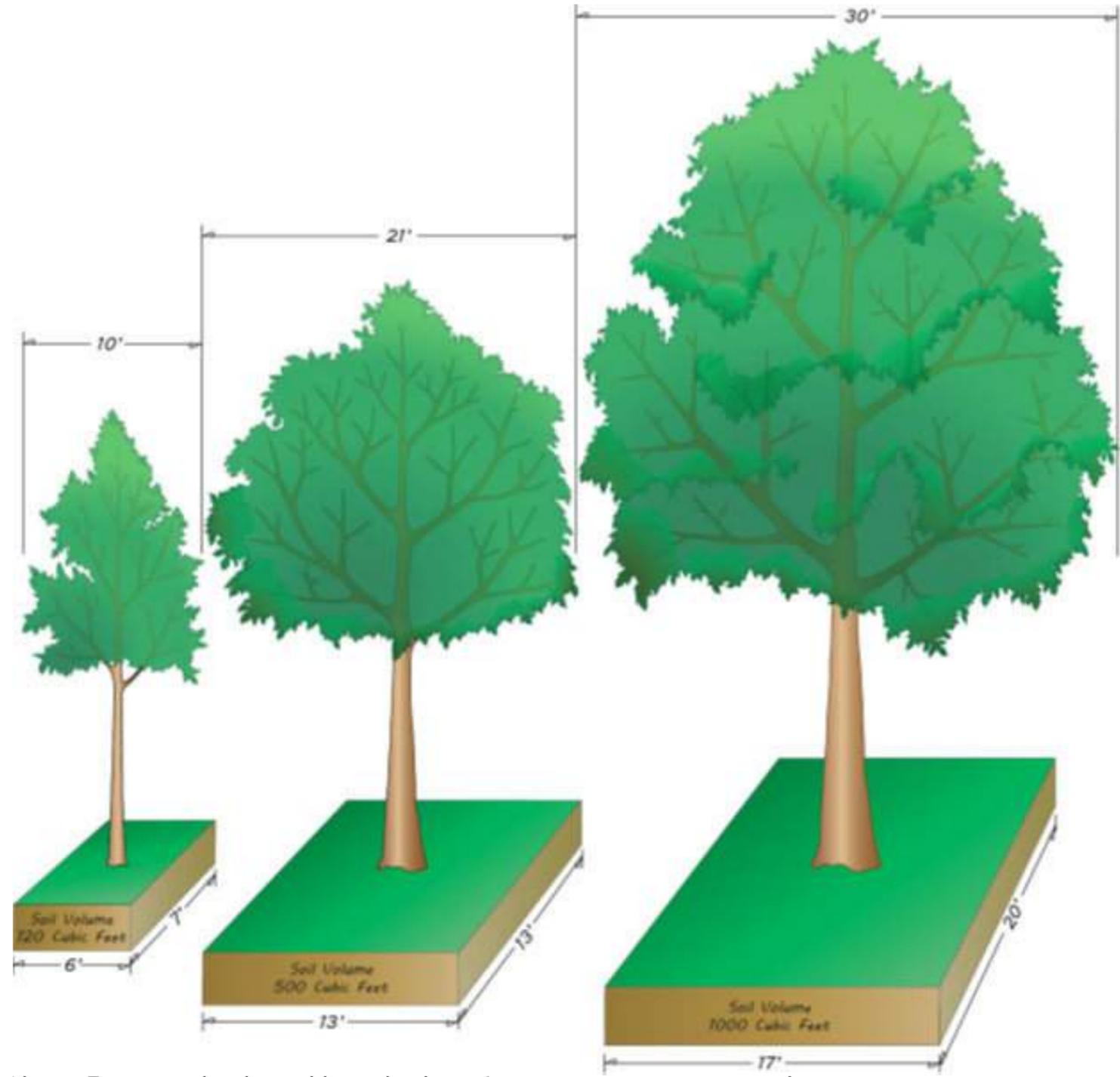
Critical or 29% to 1% condition class. The tree has a major structural problem that presents an unacceptable risk, has very little vigor, and/or has an insect or disease problem that is fatal and may threaten other trees on the property.

Dead or 0% condition class. This category refers only to dead trees.

APPENDIX E: SOIL VOLUME AND TREE STATURE

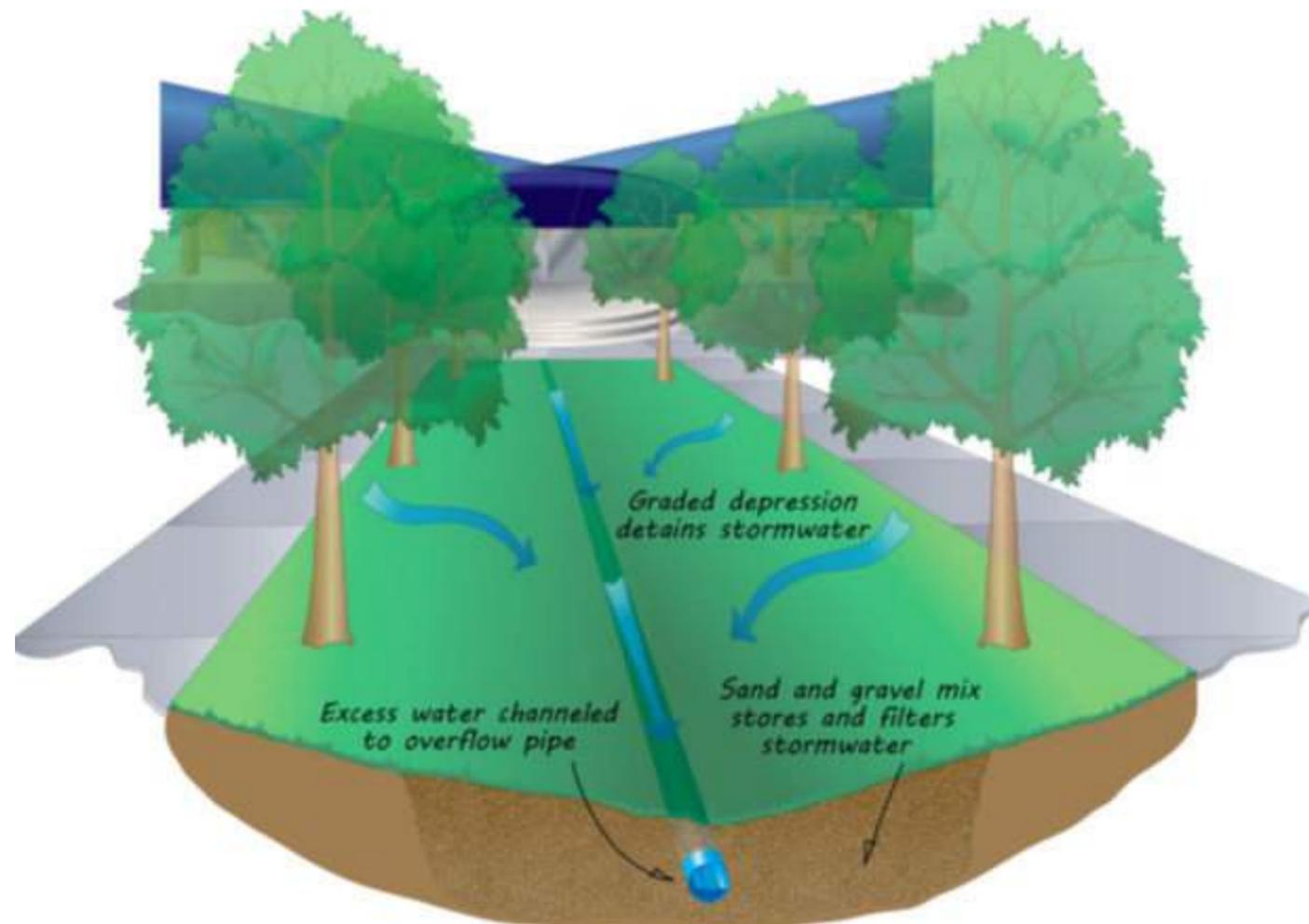


Above: General relationship between soil volume requirements and mature tree size (James Urban, various sources, 1992).



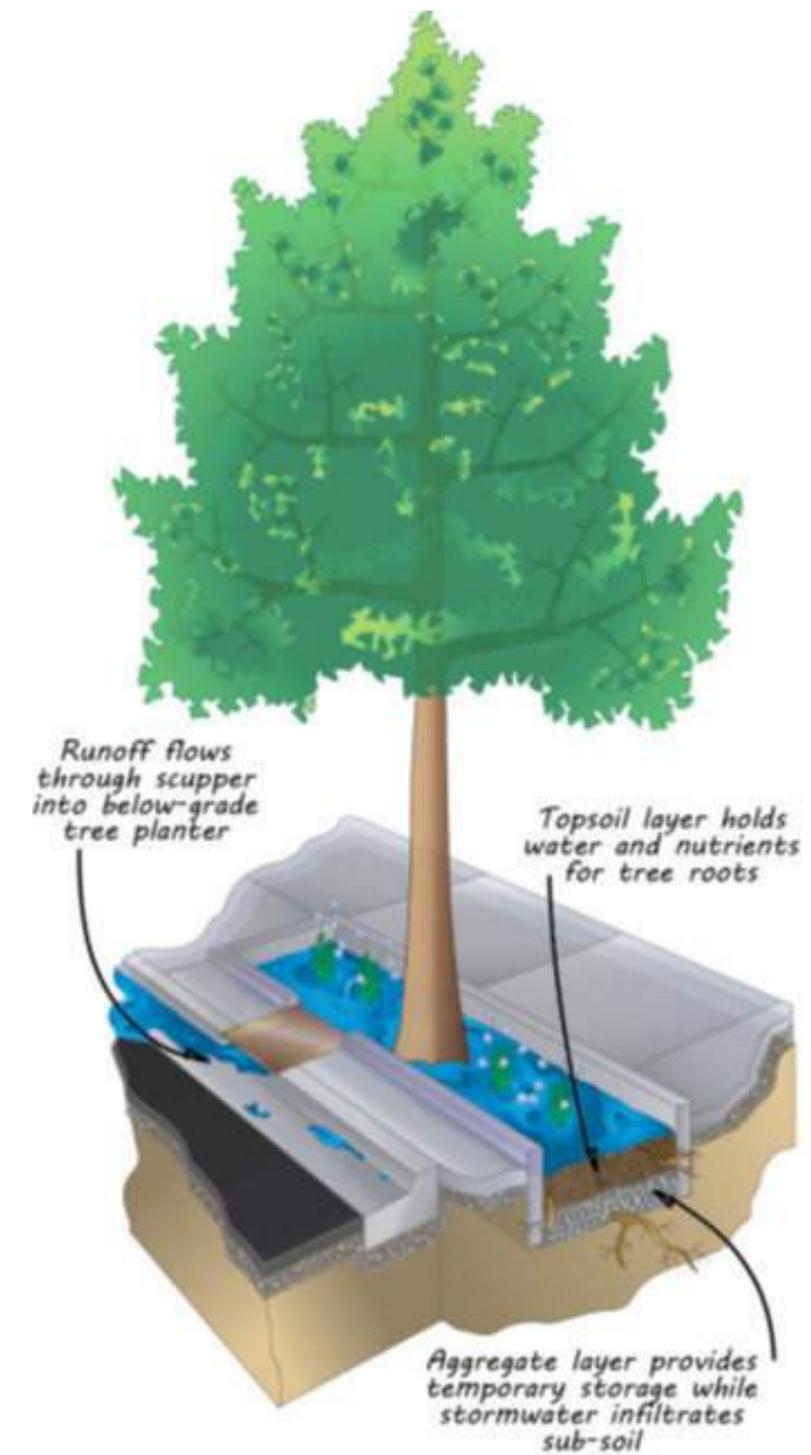
Above: Tree growth is limited by soil volume. Larger stature trees require larger volumes of uncompacted soil to reach mature size and canopy spread (Casey Trees, 2008).

APPENDIX F: ALTERNATIVE PLANTER DESIGNS

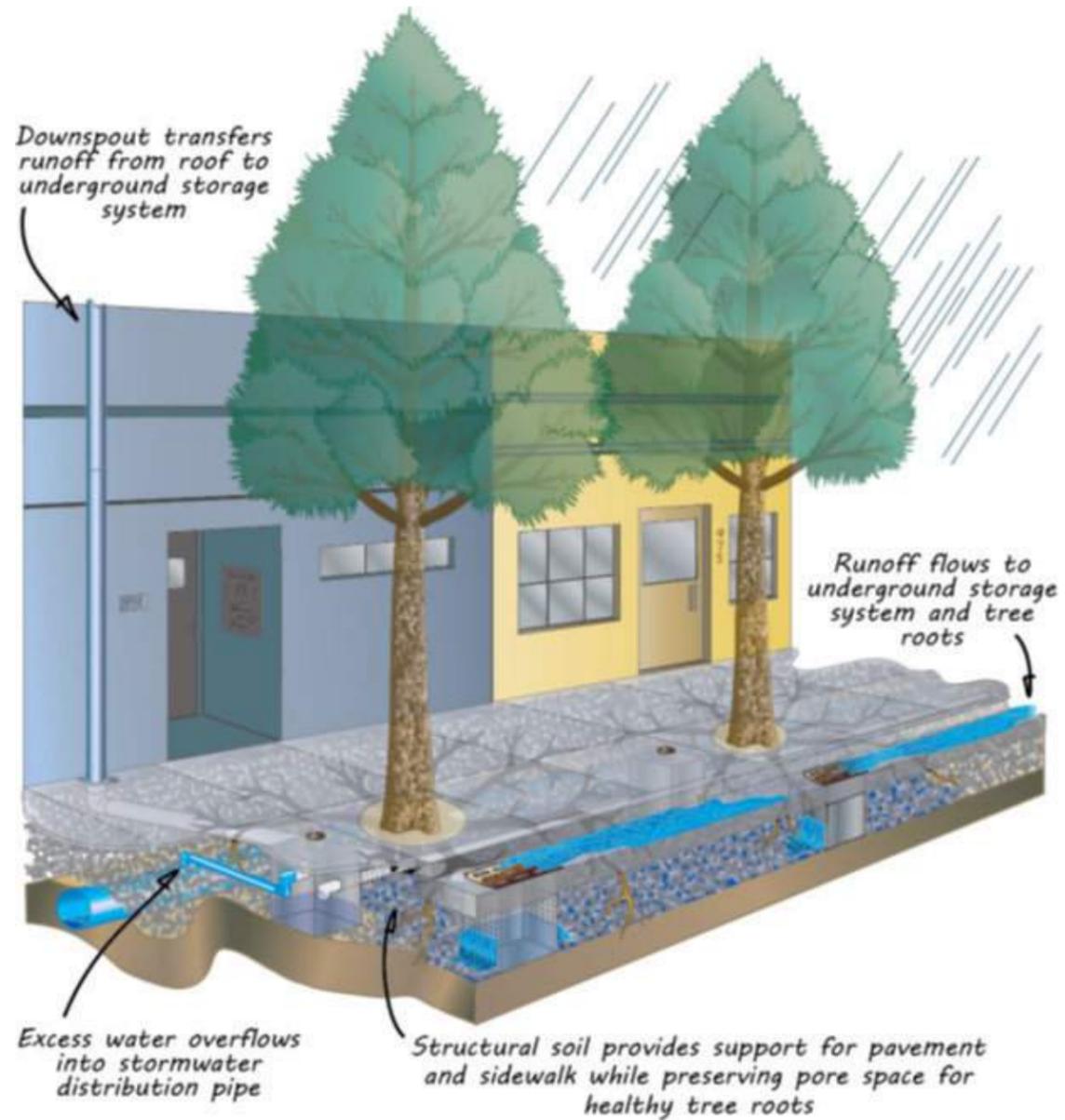


Increased soil volume and vegetation, including trees, maximizes potential for absorption, bioremediation, and phytoremediation

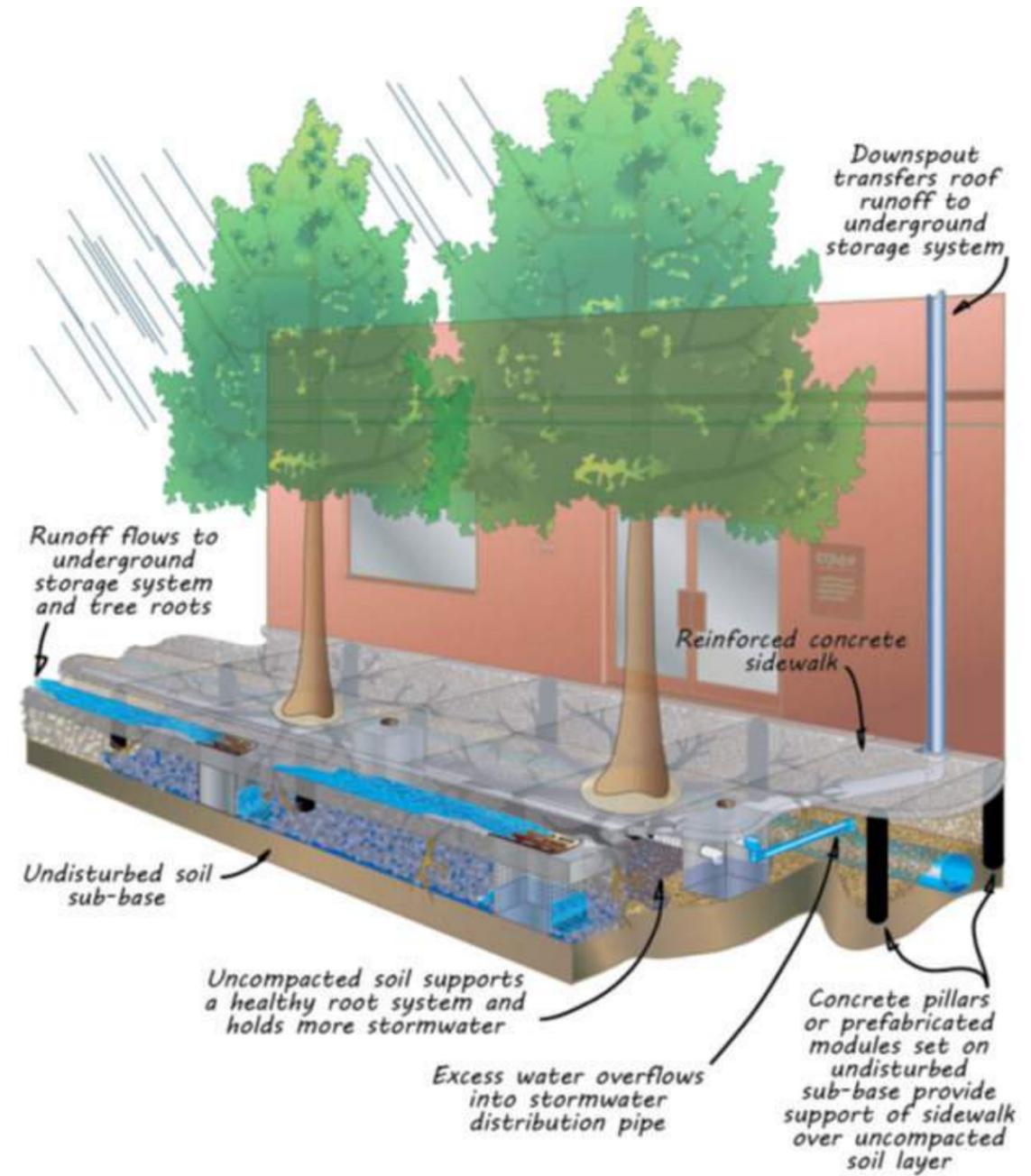
Above: Bioswales are landscaped drainage areas with gently sloped sides designed to provide temporary storage while runoff infiltrates the soil. They reduce off-site runoff and trap pollutants and silt.



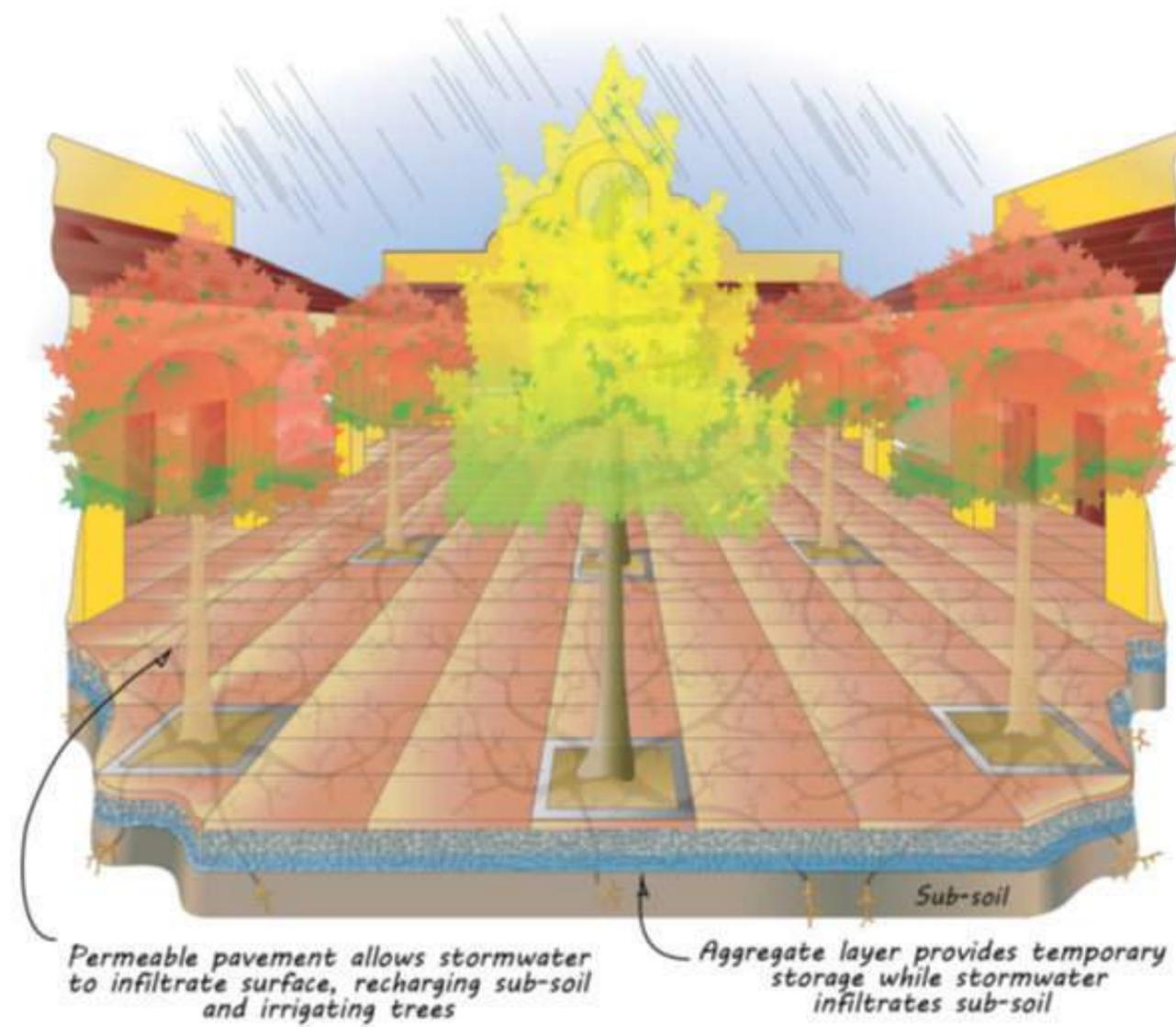
Above: Stormwater tree pits are designed to collect runoff from streets, parking lots, and other impervious areas. Stormwater is directed into scuppers that flow into below-grade planters that then allow stormwater to infiltrate soils to supplement irrigation.



Above: Structural soil is a highly porous, engineered aggregate mix, designed for use under asphalt and concrete as a load-bearing and leveling layer. The created spaces allow for water infiltration and storage, in addition to root growth



Above: Suspended sidewalks use pillars or structured cell systems to support reinforced concrete, increasing the volume of uncompact soil in subsurface planting areas and enhancing both root growth and stormwater storage.



Above: Permeable pavements allow stormwater and oxygen to infiltrate the surface, promoting tree health and groundwater recharge.

APPENDIX G: GUIDELINES FOR TREE PRESERVATION

CONSTRUCTION SITE MANAGEMENT

Preservation of existing mature trees before, during, and after new construction and redevelopment is beneficial for a number of reasons, including:

- To sustain both the function and value of existing trees and tree canopy.
- To promote public safety and reduce liability by carefully maintaining the health of preserved tree.
- To contain costs associated with site restoration.
- To reduce or avoid soil compaction and degradation and preserve soil volume.
- To avoid physical injury to existing trees.
- To avoid root injury to trees.
- To protect soils and the hydraulic integrity of the entire site.
- To protect existing irrigation, utilities and underground drainage.
- To prevent sediment-laden and/or polluted runoff from entering drainage systems and water bodies (streams, wetlands, lakes, bays).

BEST MANAGEMENT PRACTICES

PRE-CONSTRUCTION

- The Project Manager shall know and understand the development and building regulations concerning trees and vegetation in the area.

- The Project Manager shall ensure that irrigation and drainage systems are operable and adequate.
- The Project Manager shall ensure all temporary erosion sediment control measures are in place prior to groundbreaking.
- The Project Arborist will be responsible for decisions related to vegetation on site before, during, and after construction.
- The Project Arborist shall perform a site inventory of all existing trees in order to record the variety, location, size, and health of each tree. Site inventory includes determining size, species, numbers, and numbers of trees/plants on site.
- Trees that require removal or pruning to accommodate future structures and construction equipment should also be identified.
- The Project Arborist shall submit a Tree Protection Plan (TPP) that identifies all significant trees that will remain on the project site.
- The TPP will indicate the Tree Protection Zone (TPZ) for each tree as (at a minimum) the greater of: 6-feet, or by multiplying each tree's diameter at 4.5-feet above existing grade (DBH) by a factor of one to determine the diameter, in feet, of the area above and below ground to be protected.
- The TPZ may exceed the Critical Root Zone (CRZ), which is not less than half the distance between the trunk and the outer edge of the tree's canopy, or drip line, but the TPZ may not be smaller than the CRZ.
- The TPP will contain the expected tree protection techniques that will be used on the project.
- The TPP will also list a timetable for project meetings with the Project Team including a pre-construction meeting and the schedule for the Project Arborist monitoring.

- Prior to approval of the TPP, the City shall collect an assurance device in the form of a deposit equal to the tree appraisal value of all protected trees as determined under the methods established by the Council of Trees & Landscape Appraisers Guide for Plant Appraisal (9th Edition or most current).

CONSTRUCTION SITE PREPARATION

- Staging areas for equipment shall be established far enough from existing trees to ensure adequate protection of the root zone.
- Entry and exit routes shall be established and fenced off with chain link or construction fencing. When planning routes, avoid utility access corridors.
- Irrigation and drainage systems shall be protected from damage unless plans call for renovation of such systems.
- Prior to beginning construction activities, the Project Arborist will supervise and verify the following tree protection measures are in place and comply with the approved TPP:
 1. A 6-inch layer of coarse mulch or wood chips is to be installed within the TPZ of protected trees. Mulch shall be kept 12-inches away from the trunk.
 2. Trunks of trees shall be protected with a single wrap of Geocomposite. Geocomposite shall be double sided, Geonet core with non-woven covering (such as Tenax Tendrain 770/2), or equivalent. Tree trunks will be protected with wrap.
 3. Trees that have been identified in the site inventory as posing a health or safety risk may be removed or pruned by no more than one-third, subject to approval of the required permit by the Planning Division. Pruning of existing limbs and roots shall only occur under the direction of the Project Arborist

4. A protective barrier shall be installed around the Tree Protection Zone (TPZ). The Fence shall be construction of 6-foot high chain link. Posts shall be 2-inches in diameter, driven 2-feet into the ground. The distance between posts shall be not more than 10-feet. The enclosed area is the TPZ and shall have a warning sign displayed prominently at 20-foot (maximum) intervals along the fence. The warning sign shall be a minimum 8.5-inches x 11-inches and clearly state the following: "WARNING - Tree Protection Zone". Fencing may be moved within the TPZ if authorized by the Project Arborist and City Staff but not closer than the drip line from the trunk of any tree.
5. Movable barriers of chain link fencing secured to cement blocks may be substituted for "fixed" fencing if the Project Arborist and City Staff agree that the fencing will need to be moved to accommodate certain phases of construction. Moving TPZ fencing shall be prohibited without authorization from the Project Arborist and City Staff.
6. Should temporary access into the TPZ be approved, an additional layer of approved tree matting shall be placed over the Critical Root Zone (CRZ).
7. Tree Growth Regulators may be used as approved by the Project Arborist and City Staff. Paclobutrazol soil applied tree growth regulator (Cambistat® or equivalent) shall be applied to indicated trees by a qualified applicator. Applications shall follow manufacturer's label and applicable laws. TGR reduces canopy growth and increases fibrous root system growth over 2 to 3-years. This can increase tolerance to drought, stress and improve absorption of nutrients and moisture during the stress recovery period.

DURING CONSTRUCTION

During the Construction phase, the Project Arborist should inspect the site on a regular basis to ensure the TPP is being adhered and report any conflicts or deviations to the City Planner or City Representative. The Project Arborist also needs to be available at the site to monitor construction activities that require encroachment within the TPZ, such as grading or trenching. It may also be necessary to have other key project team members available to monitor these activities.

The Project Arborist shall specify to construction personnel that the following conditions shall be avoided:

- Allowing run off or spillage of damaging materials into the area below any tree canopy.
- Storing construction materials or portable toilets, stockpiling of soil, or parking or driving vehicles within the TPZ.
- Cutting, breaking, skinning, or bruising roots, branches, or trunks without first obtaining authorization from the Project Arborist.
- Allowing fires under and adjacent to trees.
- Discharging exhaust into foliage.
- Securing cable, chain, or rope to trees or shrubs.
- Trenching, digging, or otherwise excavating within the CRZ or TPZ of the tree(s) without first obtaining authorization from the Project Arborist.
- Applying soil sterilizers under pavement near existing trees.

The Project Arborist shall provide periodic inspections during construction. 4-week intervals should be sufficient to access and monitor the effectiveness of the TPP and to provide recommendations for any additional care or treatment. Inspections that are more frequent may also be required based on the approved TPP.

The following activities should be observed and inspected by the Project Arborist during the construction phase to ensure compliance with the approved TPP:

- Only excavation by hand or compressed air shall be allowed within the TPZ of trees. Machine trenching shall not be allowed.
- In order to avoid injury to tree roots, when a trenching machine is being used outside of the TPZ of trees, and roots are encountered smaller than 2-inches, the wall of the trench adjacent to the trees shall be hand-trimmed, making clear, clean cuts through the roots. All damaged, torn, and cut roots shall be given a clean cut to remove ragged edges, which promote decay. Trenches shall be filled within 24-hours; where this is not possible, the side of the trench adjacent to the trees shall be kept shaded with four layers of dampened, untreated burlap, wetted as frequently as necessary to keep the burlap wet. Roots 2-inches or larger, when encountered, shall be reported immediately to the Project Arborist, who will decide whether the Contractor may cut the root as mentioned above or shall excavate by hand or with compressed air under the root. All exposed roots are to be protected with dampened burlap.
- Where possible, route pipes outside of the TPZ of a protected tree to avoid conflict with roots.
- Where it is not possible to reroute pipes or trenches, the contractor shall bore or tunnel beneath the TPZ of the tree. The boring shall take place not less than 3-feet below the surface of the soil in order to avoid encountering "feeder" roots. All boring equipment must be staged outside of the TPZ.
- All grade changes adjacent to the TPZ of a significant tree shall be supervised by the Project Arborist. Cuts or fills of soil adjacent to the TPZ will have a retaining wall system installed as approved by the Project Arborist and City Staff.

- Any damage due to construction activities shall be reported to the Project Arborist and City Staff within 6-hours so that remedial action can be taken.
- The Project Arborist shall be responsible for the preservation of the designated trees. Should the builder fail to follow the tree protection specifications, it shall be the responsibility of the Project Arborist to report the matter to City Staff as an issue of non-compliance.

Additionally, it is the responsibility of the Project Manager to ensure compliance with the following activities:

- Construction shall be monitored regularly to ensure compliance with specifications. Work shall be stopped if construction site management BMPs are not being followed by the contractor.
- Cement washout pits and chemical holding areas shall be located away from tree protection areas, streams, and wetlands.
- Contractor parking and material storage shall be limited to already impacted areas away from tree roots.
- Site offices and equipment shall not encroach into tree protection areas.
- Refueling and maintenance areas shall be kept away from trees, native soils, water bodies and drainage systems. Fuel spills will not be tolerated on construction sites.
- To the extent possible, construction equipment shall be kept away from all on-site vegetation, especially those within designated protection areas.

POST-CONSTRUCTION

The post-construction phase does not end when the equipment leaves and the new tenants move in. Important follow-up monitoring of the protected trees will help ensure their survival and identify signs of early stress.

- The applicant shall arrange with the Project Arborist for the long-term care and monitoring of preserved trees by complying with the following conditions:
- Complete post-construction tree maintenance, including pruning, mulching, fertilization, irrigation, and soil aeration where necessary.
- Remove, by hand, all soil and root protection material such as wood chips, gravel, and plywood.
- Provide for remediation of compacted soil by methods such as aeration or vertical mulching.
- In the absence of adequate rainfall, apply at least 1-inch of water per week in the CRZ by deep watering.
- Fertilize trees with slow released phosphorus, potassium, calcium, magnesium, and other macro- and micro-nutrients as indicated by a soil test, but wait at least 1-year to apply any nitrogen.
- Fertilize lightly with slow release nitrogen after 1-year, and then make annual light nitrogen applications for the next 3 to 5-years.
- Inspect trees annually for at least 3 to 5-years after construction to look for changes in condition and signs of insects or disease and to determine maintenance needs.
- Remove trees that are badly damaged or are in irreversible decline as determined by the Project Arborist and City Staff.
- Continue to protect not only the large, established trees on the site but also those newly planted in the landscape.
- Maintain TPP during the installation of new landscaping.
- Provide annual inspection reports to the City.
- Review TPP prior to the installation of landscaping and walkways/sidewalks.

MITIGATING TREE AND INFRASTRUCTURE CONFLICTS

Conflicts may occur when tree roots grow adjacent to paving, foundations, sidewalks, or curbs (hardscape). Improper or careless extraction of these elements can cause severe injury to the roots and instability or even death of the trees. The following alternatives must first be considered before root pruning within the TPZ of a tree.

REMOVAL OF PAVEMENT OR SIDEWALK

Removal of existing pavement over tree roots shall include the following precautions: break hardscape into manageable pieces with a jackhammer or pick and hand-load the pieces onto a loader. The loader must remain outside the TPZ on undisturbed pavement or off exposed roots. Do not remove base rock that has been exploited by established absorbing roots. Apply untreated wood chips over the exposed area within 1-hour, then wet the chips and base rock and keep moist until overlay surface is applied.

REPLACEMENT OF PAVEMENT OR SIDEWALK

An alternative to the severance of roots greater than 2-inches in diameter should be considered before cutting roots. If an alternative is not feasible, remove the sidewalk, as stated above, cut roots with a sharp, clean saw, as approved by the Project Manager or Project Arborist and replace sidewalk using #3 dowels at the expansion joint if within 10-feet of a protected tree. Use wire mesh reinforcement if within 10-feet of the trunk of a tree.

ALTERNATIVE METHODS TO PREVENT ROOT CUTTING

- Grinding a raised sidewalk edge.
- Ramping the walking surface over the roots or lifted slab with pliable paving.
- Routing the sidewalk around the tree roots.
- Install boardwalk, flexible paving, or rubberized sections.

New sidewalk or driveway design should consider alternatives to conventional pavement and sidewalk materials. Substitute permeable materials for typical asphalt or concrete overlay, sub-base or footings to consider are permeable paving materials (such as ECO-Stone or RIMA pavers), interlocking pavers, flexible paving, wooden walkways, and brick or flagstone walkways on sand foundations.

Avoid tree and infrastructure conflicts and associated costs by the following planting practices:

- Plant deep rooting trees that are proven to be non- or minimally-invasive.
- Over soil that shrinks and swells, install a sidewalk with higher strength that has wire mesh and/or expansion slip joint dowel reinforcement.
- Fracture soil with an air spade and backfill with sand prior to planting to promote deep rooting and improved drainage.
- Install root barrier only along the hardscape area of the tree and allow roots to use open lawn or planter strip areas.
- Dedicate at least 10-feet of planting space for the growth of each new tree.

- Provide a dedicated irrigation system or zone for the tree so the trees do not have to compete and are not dependent on the turf and shrub irrigation.
- Avoid planting trees over underground drainage systems where root intrusion will impede function of the system.

Alternative Base Course Materials: When designing hardscape areas near trees, the project architect or engineer should consider the use of recommended base course material such as an engineered structural soil mix. An approved structural soil mix will allow a long-term, cost-effective tree and infrastructure compatibility that is particularly suited for the following types of development projects:

- Repair or replacement of sidewalk greater than 40-feet in length;
- Planting areas that are designed over structures or parking garages;
- Confined parking lot medians and islands or other specialized conditions as warranted.

TRAINING

- The Project Arborist should provide training to all construction personnel to ensure they understand all construction site BMPs
- The Construction Supervisor and Architect should have current training and education dealing with construction site management. This training should include topics regarding protecting trees and erosion control on construction sites.

APPENDIX H: METHODOLOGY

CALCULATING UTC BENEFITS

AIR QUALITY

The i-Tree Canopy v6.1 Model was used to quantify the value of ecosystem services for air quality. i-Tree Canopy was designed to give users the ability to estimate tree canopy and other land cover types within any selected geography. The model uses the estimated canopy percentage and reports air pollutant removal rates and monetary values for carbon monoxide (CO), nitrogen dioxide (NO₂), ozone (O₃), sulfur dioxide (SO₂), and particulate matter (PM) (Hirabayashi 2014).

Within the i-Tree Canopy application, the U.S. EPA's BenMAP Model estimates the incidence of adverse health effects and monetary values resulting from changes in air pollutants (Hirabayashi 2014; US EPA 2012). Different pollutant removal values were used for urban and rural areas. In i-Tree Canopy, the air pollutant amount annually removed by trees and the associated monetary value can be calculated with tree cover in areas of interest using BenMAP multipliers for each county in the United States.

To calculate ecosystem services for the study area, canopy percentage metrics from UTC land cover data performed during the assessment were transferred to i-Tree Canopy. Those canopy percentages were matched by placing random points within the i-Tree Canopy application. Benefit values were reported for each of the five listed air pollutants.

CARBON STORAGE AND SEQUESTRATION

The i-Tree Canopy v6.1 Model was used to quantify the value of ecosystem services for carbon storage and sequestration. i-Tree Canopy was designed to give users the ability to estimate tree canopy and other land cover types within any selected geography. The model uses the estimated canopy percentage and reports carbon storage and sequestration rates and monetary values. Methods on deriving storage and sequestration can be found in (Nowak et al, 2013).

To calculate ecosystem services for the study area, canopy percentage metrics from UTC land cover data performed during the assessment were transferred to i-Tree Canopy. Those canopy percentages were matched by placing random points within the i-Tree Canopy application. Benefit values were reported for carbon storage and sequestration.

STORMWATER

The i-Tree Hydro v5.0 Model was used to quantify the value of ecosystem services for stormwater runoff. i-Tree Hydro was designed for users interested in analysis of vegetation and impervious cover effects on urban hydrology. This most recent version (v5.0) allows users to report hydrologic data on the city level rather than just a watershed scale giving users more flexibility. For more information about the model, please consult the i-Tree Hydro v5.0 manual (<http://www.itreetools.org>).

To calculate ecosystem services for the study area, land cover percentages derived for the project area and all municipalities that were included in the project area were used as inputs into the model. Precipitation data from 2005-2012 was modeled within the i-Tree Hydro to best represent the average conditions over an 8-year time period. Model simulations were run under a Base Case as well as an Alternate Case. The Alternative Case set tree canopy equal to 0% and assumed that impervious and vegetation cover would increase based on

the removal of tree canopy. Impervious surface was increased 0.7% based on a percentage of the amount of impervious surface under tree canopy and the rest was added to the vegetation cover class. This process was completed to assess the runoff reduction volume associated with tree canopy since i-Tree Hydro does not directly report the volume of runoff reduced by tree canopy. The volume (in cubic meters) was converted to gallons to retrieve the overall volume of runoff avoided by having the current tree canopy.

Through model simulation, it was determined that tree canopy decreases the runoff volume in the project area by nearly 15.3 million gallons per year using precipitation data from 2005-2012. This equates to approximately 10,940 gallons per acre of tree canopy (15.3 million gals/1,394.38 acres). To place a monetary value on storm water reduction, the cost to treat a gallon of storm/waste water was taken from (McPherson et al, 1999). This value was \$0.008 per gallon. Tree canopy was estimated to contribute roughly \$122,038 to avoided runoff annually to the project area.

PRIORITY PLANTING ANALYSIS

The planting location polygons were created by taking all grass/open space and bare ground areas and combining them into one dataset. Non-feasible planting areas such as agricultural fields, recreational fields, major utility corridors, airports, etc. were removed from consideration. The remaining planting space was consolidated into a single feature and, then, exploded back out to multi-part features creating separate, distinct polygons for each location. Using zonal statistics, the priority grid raster was used to calculate an average value for each planting location polygon. The averages were binned into five classes with the higher numbers indicating higher priority for planting. These classes ranged from very low to very high.

RESOURCE ANALYSIS METHODOLOGY

In 2017, the City of Woodland provided public tree inventory data to Davey Resource Group. This inventory included details about each tree, including species, size, and condition. DRG formatted the data for use in i-Tree Streets, a STRATUM Analysis Tool (Streets v 5.1.5; i-Tree v 6.1.15). i-Tree Streets assesses tree population structure and the function of those trees, such as their role in energy use, air pollution removal, stormwater interception, carbon dioxide removal, and property value increases. To analyze the economic benefits of Woodland's public trees, i-Tree Streets calculates the dollar value of annual resource functionality. This analysis combines the results of the tree inventory with benefit modeling data to produce information regarding resource structure, function, and value for use in determining management recommendations. i-Tree Streets regionalizes the calculations of its output by incorporating detailed reference city project information for 17 climate zones across the United States. Woodland is in the Inland Valleys Climate Zone. The reference city is Modesto, California.

An annual resource unit was determined on a per tree basis for each of the modeled benefits. Resource units are measured as MWh of electricity saved per tree; MBtu of natural gas conserved per tree; pounds of atmospheric CO₂ reduced per tree; pounds of NO₂, SO₂, O₃, PM₁₀, and VOCs reduced per tree; cubic feet of stormwater runoff reduced per tree; and square feet of leaf area added per tree to increase property values. Price values assigned to each resource unit (tree) were generated based on economic indicators of society's willingness to pay for the environmental benefits trees provide. The City of Woodland provided the estimated investment costs.

Estimates of benefits are initial approximations as some benefits are difficult to quantify (e.g. impacts on psychological health, crime, and violence). In addition, limited knowledge about the physical processes at work and their interactions

makes estimates imprecise (e.g., fate of air pollutants trapped by trees and then washed to the ground by rainfall). Therefore, this method of quantification provides first-order approximations based on current research. It is intended to be a general accounting of the benefits produced by urban trees. i-Tree Streets default values from the South Climate Zone were used for all benefit prices except for the median home value, and electrical and natural gas rates. Using these rates, the magnitude of the benefits provided by the community tree resource was calculated using i-Tree Streets. Electrical and gas rates, and program investment costs were supplied by community tree resource managers for Woodland.

APPENDIX I: GANTT CHART

City of Woodland Urban Forest Master Plan											
Policies, Goals & Actions											
	Cost	2019	2020	2021	2022	2023	2024	2029	2034	Timeframe	Priority
							2028	2033	2039		
Existing Policy 1: 2035 Climate Action Plan											
Policy Action 1.1 Continue to increase average canopy cover to 25% by 2035	\$\$\$-\$\$\$\$	█	█	█	█	█	█	█	█	Ongoing	High
Policy Action 1.2 Develop annual planting plans to achieve desired canopy cover by 2035	\$	█	█	█	█	█	█	█	█	Ongoing	High
Policy Action 1.3 Continue to plant trees per the Climate Action Plan	\$\$\$-\$\$\$\$	█	█	█	█	█	█	█	█	Ongoing	High
Existing Policy 2: California's Model Water Efficient Landscape Ordinance											
Policy Action 2.1 Continue to ensure policies, ordinances, standards, and practices are compliant with the California Model Water Efficient Landscape Ordinance	\$\$-\$	█	█	█	█	█	█	█	█	Ongoing	High
Policy Action 2.2 Adapt policy, ordinances, standards, and practices to meet new standards imposed by California Bill no. 606 and no. 1668	\$\$-\$	█	█	█	█	█	█	█	█	Ongoing	High
Existing Policy 3: Ordinances and Standards											
Policy Action 3.1 Continue to ensure tree installations and practices are compliant with standards and ordinances	\$	█	█	█	█	█	█	█	█	Ongoing	High
Policy Action 3.2 Review standards and ordinances every 5-years and update when appropriate	\$	█	█	█	█	█	█	█	█	Every 5 years	Low
Existing Policy 4: Approved Tree List (Public Trees)											
Policy Action 4.1 Review Approved Tree List at minimum every 5-years	\$	█	█	█	█	█	█	█	█	Every 5 years	Medium
Policy Action 4.2 Ensure City trees comply with Approved Tree List	\$	█	█	█	█	█	█	█	█	Ongoing	High
Existing Policy 5: Best Management Practices											
Policy Action 5.1 Continue to follow best management practices	\$	█	█	█	█	█	█	█	█	Ongoing	High

\$ = less than \$25,000 \$\$ = \$25,000-\$50,000 \$\$\$ = \$50,000-\$100,000 \$\$\$\$ = greater than \$100,000

City of Woodland Urban Forest Master Plan

Policies, Goals & Actions

Cost 2019 2020 2021 2022 2023 2024 2029 2034
 2028 2033 2039 Timeframe Priority

Goal 1: Preserve and Enhance Canopy Cover

Action 1.1 Conduct urban tree canopy (UTC) assessment every 10-years	\$\$								Every 10 years	Medium
Action 1.2 Review and implement tree preservation requirements in city ordinance	\$\$\$-\$\$\$\$								1-5 years	Medium
Action 1.3 Evaluate feasibility of adding more incentives to increase tree planting on residential and other private property	\$								1-5 years	Medium
Action 1.4 Monitor and ensure trees are successful in the first 3-years of planting	\$								Ongoing	Low

Goal 2: Plant Trees

Action 2.1 Evaluate the feasibility of a tree planting and replacement plan as a supplement to the UFMP	\$								1-5 years	Medium
Action 2.2 For new developments, implement a replacement ratio for planting trees that is consistent with the City tree ordinance	\$								1-2 years	High
Action 2.3 Continue to collaborate with nonprofit and neighborhood groups for tree planting	\$								Ongoing	Medium
Action 2.4 Ensure trees planted in developments follow best management practices	\$\$-\$\$\$								Ongoing	High
Action 2.5 Consider that larger planting projects may qualify as mitigation strategies for meeting CEQA requirements	\$								Ongoing	Low

Goal 3: Periodically Review Tree Ordinances and Engineering Standards

Action 3.1 Review tree ordinances at least every 5-years and revise as appropriate	\$								Every 5 years	Low
Action 3.2 Explore community support for heritage and significant tree protection on private property	\$								1-5 years	Medium
Action 3.3 Review design and construction standards for trees and planting sites	\$\$-\$\$\$								Every 5 years	Medium
Action 3.4 Ensure, as part of development plan review, underground utilities are placed to avoid conflict with trees	\$\$-\$\$\$								Ongoing	High

Goal 4: Maintain Public Tree Inventory Data

Action 4.1 Continue to develop the public tree inventory	\$								Ongoing	Medium
Action 4.2 Standardize and create a policy guide for tree inspection protocol	\$								1-5 years	High

\$ = less than \$25,000 \$\$ = \$25,000-\$50,000 \$\$\$ = \$50,000-\$100,000 \$\$\$\$ = greater than \$100,000

City of Woodland Urban Forest Master Plan

Policies, Goals & Actions

	Cost	Year							Timeframe	Priority		
		2019	2020	2021	2022	2023	2024-2028	2029-2033			2034-2039	
Goal 4: Maintain Public Tree Inventory Data (Continued)												
Action 4.3 Integrate inventory data into accessible software or data management systems	\$	█	█	█	█	█	█	█	█	█	1-2 years	High
Goal 5: Maintain Public Trees on a 7-Year Cycle												
Action 5.1 Maintain all public trees are on a regular 7-year pruning and maintenance cycle (dependent upon funding/resources)	\$\$\$\$	█	█	█	█	█	█	█	█	█	Ongoing	High
Action 5.2 Develop an annual work plan	\$	█	█	█	█	█	█	█	█	█	Ongoing	High
Goal 6: Manage the Public Tree Inventory for Species Diversity												
Action 6.1 Collect tree species information when performing tree work	\$	█	█	█	█	█	█	█	█	█	Ongoing	Low
Action 6.2 Plan for ideal species diversity	\$	█	█	█	█	█	█	█	█	█	Ongoing	High
Goal 7: Periodically Calculate and Review Ecosystem Benefits												
Action 7.1 Complete a resource analysis (using i-Tree or another model) every 10-years	\$	█	█	█	█	█	█	█	█	█	Every 10 years	Low
Action 7.2 Review changes to benefits, composition, and benefit versus investment ratio	\$	█	█	█	█	█	█	█	█	█	Every 10 years	Low
Goal 8: Optimize Urban Forestry Programming												
Action 8.1 Develop a Policy and Procedures Manual for Urban Forestry	\$	█	█	█	█	█	█	█	█	█	1-5 years	High
Action 8.2 Develop annual work plans and goals to guide routine operations	\$	█	█	█	█	█	█	█	█	█	Ongoing	High
Action 8.3 Define Quality Assurance protocols for urban forestry operations	\$	█	█	█	█	█	█	█	█	█	1-5 years	High
Action 8.4 Develop a Risk Management Plan and policy for urban forestry operations	\$	█	█	█	█	█	█	█	█	█	1-2 years	High
Action 8.5 Qualify and apply for Tree Care Industry Association (TCIA) Accreditation (managers/field supervisors)	\$	█	█	█	█	█	█	█	█	█	1-5 years	Low
Goal 9: Ensure Planning Documents Reference the Urban Forestry Master Plan												
Action 9.1 As existing planning documents are revised, ensure they reference the UFMP	\$	█	█	█	█	█	█	█	█	█	Ongoing	High

\$ = less than \$25,000 \$\$ = \$25,000-\$50,000 \$\$\$ = \$50,000-\$100,000 \$\$\$\$ = greater than \$100,000

City of Woodland Urban Forest Master Plan

Policies, Goals & Actions

Cost 2019 2020 2021 2022 2023 2024 2029 2034
 2028 2033 2039 Timeframe Priority

Goal 10: Annually Review Urban Forest Master Plan + Revise Every 10 Years

Action 10.1 Review annually and revise the UFMP every 10-years

\$\$ [Bar chart showing cost from 2019-2039] Every 10 years High

Goal 11: Sustainable Urban Forestry Funding

Action 11.1 Explore community support for Park district overlay that would provide dedicated funding to parks and urban forestry

\$ [Bar chart showing cost from 2019-2039] 5-10 years Low

Action 11.2 Reorganize tree maintenance zones to have a more balanced distribution of trees

\$ [Bar chart showing cost from 2019-2039] Every 5 years Low

Action 11.3 Identify opportunities for additional sources of revenue

\$ [Bar chart showing cost from 2019-2039] Ongoing Medium

Goal 12: Community Outreach and Engagement

Action 12.1 Continue to develop the Urban Forest webpage

\$ [Bar chart showing cost from 2019-2039] Ongoing Medium

Action 12.2 Coordinate a citywide outreach strategy rather than a departmental effort

\$ [Bar chart showing cost from 2019-2039] Ongoing Medium

Action 12.3 Engage the community in the analysis, alternatives, and recommendations for further urban forestry related planning processes and potential code changes

\$ [Bar chart showing cost from 2019-2039] Every 5 years Medium

Action 12.4 Continue to promote outreach materials that communicate information about trees and the urban forest

\$ [Bar chart showing cost from 2019-2039] Ongoing Medium

Goal 13: Collaborate with Partners

Action 13.1 Continue to collaborate with City departments (Public Works and Community Development), nonprofits, and neighborhood groups

\$ [Bar chart showing cost from 2019-2039] Ongoing High

Action 13.2 Maintain Tree City USA status

\$ [Bar chart showing cost from 2019-2039] Ongoing High

Action 13.3 Qualify and apply for Society of Municipal Arborists (SMA) accreditation

\$ [Bar chart showing cost from 2019-2039] 1-5 years Low

Action 13.4 Explore partnerships that can identify and support opportunities for grants and financial assistance for low-income residents and non-profits to facilitate tree removal and planting or help defray costs

\$ [Bar chart showing cost from 2019-2039] Ongoing Medium

Goal 14: State of the Urban Forest Report

Action 14.1 Develop and deliver State of the Urban Forest Report every 5-10 years

\$ [Bar chart showing cost from 2019-2039] Every 5-10 years High

\$ = less than \$25,000 \$\$ = \$25,000-\$50,000 \$\$\$ = \$50,000-\$100,000 \$\$\$\$ = greater than \$100,000

