CITY OF HUGHSON
PLANNING COMMISSION MEETING
City Hall Council Chambers
7018 Pine Street, Hughson, CA

AGENDA
TUESDAY, OCTOBER 15, 2013 – 6:00 P.M.

CALL TO ORDER: Chair Julie Ann Strain

ROLL CALL: Chair Julie Ann Strain
Vice Chair Karen Minyard
Commissioner Sanjay Patel
Commissioner Mark Fontana

FLAG SALUTE: Chair Julie Ann Strain

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1. PUBLIC BUSINESS FROM THE FLOOR (No Action Can Be Taken):

Members of the Audience may address the Planning Commission on any item of interest to the public pertaining to the City and may step to the podium, State their name and City of Residence for the record (requirement of Name and City of Residence is optional) and make their presentation. Please limit presentations to five minutes. Since the Planning Commission cannot take action on matters not on the Agenda, unless the action is authorized by Section 54954.2 of the Government Code, items of concern which are not urgent in nature can be resolved more expeditiously by completing and submitting to the City Clerk a "Citizen Request Form" which may be obtained from the City Clerk.

2. PRESENTATIONS: None.

3. NEW BUSINESS:

3.1: Approval of the Minutes of the Regular scheduled meeting of September 17, 2013.

3.2: Consideration of a Recommendation to the City Council to Adopt the City of Hughson Urban Forest Plan and Resource Guide.

3.3: Continue Study Session Regarding the Floor Area Ratio, Allowable Residential Units per Acre, and Parking for the Downtown Commercial Zone.

4. PUBLIC HEARING TO CONSIDER THE FOLLOWING: None.

5. INFORMATIONAL ITEMS:

5.1: Job-Housing Fit (JHFIT) Maps and Tables.

6. CORRESPONDENCE: None.

7. COMMENTS:

7.1: Staff Reports and Comments: (Information Only – No Action)

Community Development Director:

City Clerk:

City Attorney:

7.2: Commissioner Comments: (Information Only – No Action)

ADJOURNMENT:

WAIVER WARNING

If you challenge a decision/direction of the Planning Commission in court, you may be limited to raising only those issues you or someone else raised at a public hearing(s) described in this Agenda, or in written correspondence delivered to the City of Hughson at or prior to, the public hearing(s).

UPCOMING EVENTS:

October 28	▪ City Council Meeting, City Hall Chamber Room, 7:00p.m.
October 31	▪ Trunk or Tent & Treat Event, LeBright Fields, 5:00 p.m.- 9:00 p.m.
November 5	▪ Election Day
November 11	▪ Veterans Day- Holiday- City Hall will be Closed.
November 12	▪ City Council Meeting, City Hall Chamber Room, 7:00p.m. (Tuesday)
November 14	▪ Congressman Jeff Denham's Mobile Office, City Hall, 11-12 p.m.
November 19	▪ Planning Commission Meeting, City Hall Chamber Room, 6:00p.m.
November 25	▪ City Council Meeting, City Hall Chamber Room, 7:00p.m.
November 23-24	▪ 20th Century Arts & Crafts Faire, Hughson High School, 9a.m.- 4p.m.
November 28-29	▪ Thanksgiving- Holiday- City Hall will be Closed.
November 30	▪ Downtown Christmas Festival

RULES FOR ADDRESSING PLANNING COMMISSION

Members of the audience who wish to address the Planning Commission are requested to complete one of the forms located on the table at the entrance of the Council Chambers and submit it to the City Clerk. **Filling out the card is voluntary.**

AMERICANS WITH DISABILITIES ACT/CALIFORNIA BROWN ACT NOTIFICATION FOR THE CITY OF HUGHSON

This Agenda shall be made available upon request in alternative formats to persons with a disability; as required by the Americans with Disabilities Act of 1990 (42 U.S.C. Section 12132) and the Ralph M. Brown Act (California Government Code Section 54954.2).

Disabled or Special needs Accommodation: In compliance with the Americans with Disabilities Act, persons requesting a disability related modification or accommodation in order to participate in the meeting and/or if you need assistance to attend or participate in a Planning Commission meeting, please contact the City Clerk's office at (209) 883-4054. Notification at least 48-hours prior to the meeting will assist the City Clerk in assuring that reasonable accommodations are made to provide accessibility to the meeting.

AFFIDAVIT OF POSTING

DATE: October 11, 2013 **TIME:** 6:00pm

NAME: Dominique Spinale **TITLE:** Deputy City Clerk

Notice Regarding Non-English Speakers:

Pursuant to California Constitution Article III, Section IV, establishing English as the official language for the State of California, and in accordance with California Code of Civil Procedures Section 185, which requires proceedings before any State Court to be in English, notice is hereby given that all proceedings before the City of Hughson Planning Commission shall be in English and anyone wishing to address the Council is required to have a translator present who will take an oath to make an accurate translation from any language not English into the English language.

General Information: The Hughson Planning Commission meets in the Council Chambers on the third Tuesday of each month at 6:00 p.m., unless otherwise noticed.

PC Agendas: The Planning Commission Agenda is now available for public review at the City's website at www.hughson.org and City Clerk's Office, 7018 Pine Street, Hughson, California on the Friday, prior to the scheduled meeting. Copies and/or subscriptions can be purchased for a nominal fee through the City Clerk's Office.

Questions: Contact the Deputy City Clerk at (209) 883-4054

CITY OF HUGHSON
PLANNING COMMISSION MEETING
City Hall Council Chambers
7018 Pine Street, Hughson, CA

MINUTES
TUESDAY, SEPTEMBER 17, 2013 – 6:00 P.M.

CALL TO ORDER: Chair Julie Ann Strain

ROLL CALL:

Present: Chair Julie Ann Strain
Vice Chair Karen Minyard
Commissioner Sanjay Patel
Commissioner Mark Fontana

Staff Present: Thom Clark, Community Development Director
Dominique Spinale, Deputy City Clerk

FLAG SALUTE: Chair Julie Ann Strain

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1. PUBLIC BUSINESS FROM THE FLOOR (No Action Can Be Taken):

No Public Comments.

2. PRESENTATIONS: None.

3. NEW BUSINESS:

3.1: Approval of the Minutes of the Regular scheduled meeting of August 20, 2013.

PATEL/MINYARD 4-0-0-0 motion passes to approve the Minutes.

3.2: Consideration of a Recommendation to the City Council to Adopt the City of Hughson Urban Forest Plan and Resource Guide.

Director Clark presented the Staff Report on this item and discussed it with the Planning Commission. Commissioner Fontana requested that Staff add the

distance a tree should be planted away from underground power lines. Staff will contact the Turlock Irrigation District for this requested information, update the Urban Forest Plan and Resource Guide, and bring it back to the Commission.

4. PUBLIC HEARING TO CONSIDER THE FOLLOWING: None.

5. INFORMATIONAL ITEMS:

5.1: Three Core Understandings and The Local Government Portfolio for Growth- Strong Towns Blog.

No action was taken on this item.

6. CORRESPONDENCE: None.

7. COMMENTS:

7.1: Staff Reports and Comments: (Information Only – No Action)

Community Development Director: Provided an update on the PG&E Project currently under construction in town.

City Clerk:

City Attorney:

7.2: Commissioner Comments: (Information Only – No Action)

ADJOURNMENT: This meeting adjourned at 7:10p.m.

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JULIE STRAIN, Chair

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DOMINIQUE SPINALE, Deputy City Clerk

PLANNING COMMISSION AGENDA
ITEM NO. 3.2
SECTION 3: NEW BUSINESS

Meeting Date: October 15, 2013
Subject: Consideration of a Recommendation to the City Council to Adopt the City of Hughson Urban Forest Plan and Resource Guide
Presented By: Thom Clark, Community Development Director
Desired Action: Recommend to the City Council adoption of the City of Hughson Urban Management Plan and Resource Guide

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Background and Overview:

An urban forest has many benefits to our city and its residents. Proper management of the forest is important to ensure the long term benefits and increase in value of this important asset. This Plan provides the framework to plan, maintain, and regulate the urban forest in Hughson. The Resource Guide provides detailed information on many trees appropriate to plant in this area and climate, as well as discussing tree management issues tailored to individual species. It is envisioned as a resource guide for residents to use, as well as the City of Hughson.

Additionally, certain grant opportunities require that an Urban Forest Plan is adopted by the jurisdiction before a funding application will be accepted.

The City of Hughson Urban Forest Plan and Resource Guide was developed from a model made available by the City of Waterford. The model was one of many funded by a $900,000 planning grant that the combined planning directors in the County won for a Stanislaus County Planners Toolbox project. Each city and the County are to make a model planning tool of their choosing. Our model is a Climate Action Plan, which is near completion as of this writing.

This Plan was a joint effort between me and our Planning Intern, Monet Sheikhali, who is studying architectural engineering and city and regional planning at Cal Poly, San Luis Obispo. This Plan would not have been possible to prepare without Ms. Sheikhali's expertise in mapping.

At the regularly scheduled Planning Commission meeting of September 17, 2013, the Planning Commission reviewed this document and requested an amendment to add the distance a tree should be planted away from underground power lines. Staff contacted the serving utility, Turlock Irrigation District, and was told that trees

should be planted a minimum of 10 feet away from any underground power lines. This language has been added to the plan at the last bullet on page 46.

Staff Recommendation:

Recommend to the City Council adoption of the City of Hughson Urban Management Plan and Resource Guide.

City of Hughson
Urban Forest Plan
and Resource Guide

September 2013

Table of Contents

City of Hughson Urban Forest Plan

Executive Summary

The City of Hughson, along with all nine other jurisdictions within Stanislaus County, was a co-recipient of Proposition 84 funds to prepare plans for the Stanislaus Planners' Toolbox. The City of Waterford initially prepared the Model Urban Forest Plan and Resource Guide. The City of Hughson has taken the model and customized it for our needs as was intended with the Toolbox concept. The resultant City of Hughson Urban Forest Plan consists of several chapters that describe the purpose of the Plan, Plan Goails, Setting, and overall management principles for a city's urban forest program.

This document provides an overall framework for managing City of Hughson's urban and natural forest resources. It is based on the condition of the forest in 2013 and an analysis of trends that have shaped City of Hughson's urban forest to date and will continue to influence it in the future.

A view from the Arboretum

Chapter 1: Introduction

Background and purpose-City of Hughson's Urban Forest

The range of benefits trees provide to an urban environment extend (but not limited) to energy conservation, improving air quality, benefits to social outlook on the city, as well as providing direct economic benefits and urban services.

San Joaquin Valley communities have been among the fastest growing areas in the State of California. The role of urban forests — trees in parks, yards, public spaces, and along streets — in the improvement of environmental quality, increased economic, physical and social health, and fostering of civic pride has taken on greater significance as these communities strived to preserve and improve their quality of life.

Trees make cities more livable in a variety of ways. Some of these are difficult to quantify in economic terms. For example, trees and shrubs can help muffle urban noise, and trees provide important foraging and nesting opportunities for birds and other wildlife. However, it is possible to assign a dollar value to some of the benefits that trees provide, which emphasizes the importance of the urban forest as a key element of urban infrastructure. Researchers at various institutions have been working to quantify some of the benefits provided by the urban forest. In particular, scientists at the Center for Urban Forest Research (http://cufr.ucdavis.edu/) at the University of California, Davis, have been studying the economic benefits of trees in California communities since 1992. Their results are available online as both technical reports and short summary handouts.

Expectation of Trees

Street trees serve many purposes in an urban area. The most obvious contribution trees make is the general improvement in a city's appearance and quality of living. Tree lined streets are attractive to existing and prospective residents. Tourists are also attracted to a well-landscaped city. Visitors form first impressions of a city primarily on its outward appearance. A city's outward visible aspect expresses the caliber and pride of its residents. One of the least expensive ways to improve a community's appearance is through a conscientious street tree planting and maintenance program.

Trees not only beautify the urban landscape but are also functional. In addition, trees improve the environment by screening undesirable views, reducing noise and wind, and providing food and shelter for wildlife. Above all, trees convert carbon dioxide into life-giving oxygen, while filtering dust and other harmful pollutants from the air. Trees give a community a feeling of permanence and dignity. They also play an important role in enhancing buildings and other structures by softening architectural lines and features.

Trees can add a monetary value to real property. Homes and building sites with trees usually sell more quickly and at higher prices than properties with no trees. Realty authorities have attributed increased valuation per home to neighborhoods beautified by a sound street tree program.

Street trees are an asset to any community, even though they require allocations for replacement, care, and maintenance. It should be noted that while many public expenditures involve capital investments in projects which deteriorate in value, investment in tree planting and maintenance an investment in the community which increases in value.

Along with the benefits trees provide, some negative aspects are to be expected. Certain qualities of trees can lead to conflicts with people. Tree roots, leaves,

insects, and low limbs can all impact residents and can sometimes cause a situation wherein the benefits of the trees are overlooked.

Trees help save energy

In hot climates, one of the principal economic benefits provided by trees is due to shade.

- Trees in residential yards that shade western and eastern facing windows, roofs, and walls can reduce energy needed for cooling by as much as 34% (Simpson and McPherson 1996).
- On hot summer days, temperatures within urbanized areas can be up to 10°F hotter than the surrounding countryside, known as the urban heat island effect (http://www.epa.gov/heatisland/). Buildings and pavement made of dark materials absorb the sun's rays, leading to an increase in the temperature of the surfaces and the air around them. Trees and other vegetation reduce summer temperatures through direct shading of surfaces and through the process of evapotranspiration. Evapotranspiration refers to the way that water is evaporated from within plant leaves, exiting through tiny pores in the leaf. As the water evaporates, it cools the leaf and the air around it in much the same way that swamp coolers function. By combating the urban heat island effect, trees reduce the overall summer temperature within urban areas, helping to reduce energy use.
- Trees serve as windbreaks, which helps save energy by reducing the amount of outside air that infiltrates into heated or cooled building interiors (Heisler 1986).

Trees improve air quality

- Trees improve ambient air quality by removing gaseous air pollutants and particulates from the air (Scott et al, 1998).
- Although the majority of human-caused smog precursors come from moving vehicles, parked cars also emit volatile hydrocarbons and nitrogen oxides into the atmosphere that react to form smog. Cars parked in shade are much cooler and release fewer volatile hydrocarbons and nitrogen oxides into the atmosphere (Scott et al, 1999).
- As trees reduce the urban heat island effect, they also reduce the formation of photochemical smog because the chemical reactions that form smog are favored by higher temperatures (http://eetd.lbl.gov/HeatIsland/AirQuality/).

Trees provide other important urban services

- Tree canopies intercept rainfall, moderating stormwater runoff and reducing the amount of pollutants that wash off buildings and paved surfaces into creeks and storm drains (Xiao et al, 1998, Xiao and McPherson 2003, Geiger 2003).
- Tree shade over pavement slows down pavement deterioration (McPherson etal 1999).
- Trees planted along roadways can have a traffic calming effect which reduces driving speeds by visually narrowing the road (Otak, Inc. 2002)
- Tree roots help to hold soil in place, and tree canopies shield soil from the impact of rain drops, resulting in decreased soil erosion during storms, which improves stream water quality and reduces silt deposits in reservoirs and flood control basins.

Trees provide direct economic benefits

- A variety of studies show that trees increase residential property values. People pay more for homes with attractive trees, that are in neighborhoods with attractive trees, or that are near open space areas with trees. (Anderson and Cordell 1988, Wolf 1998b).
- A study by researchers in the State of Washington found that consumers perceive business districts with trees to be higher quality than those without trees. Consumers

were willing to pay up to 10% more for goods bought in tree-lined business districts (Wolf 2003a,b).

Social benefits related to trees

A growing body of research has shown that the presence of trees in neighborhoods and views of trees and nature contribute to both physical and mental health of urban residents.

- Trees are associated with lower crime rates, and improved mental health, stronger ties between neighbors, and greater feelings of safety and well-being of City residents (Kuo 2003).
- Researchers have shown that office workers who can see nature from their desks have 23% less time off sick and report greater job satisfaction than those who cannot see any nature (Wolf 1998)
- Hospital patients with views of trees have been shown to recover significantly faster than those who cannot see any natural features (Ulrich 1985).

Other Social Benefits from urban trees are:

- Abatement of noise, by absorbing high frequency noises which are most distressing to people,
- Creation of wildlife habitat, by providing homes for many types of wildlife,
- Reduction of exposure to ultraviolet light, thereby lowering the risk of harmful health effects from skin cancer and cataracts,
- Providing pleasure, whether it be feelings of relaxation, or a connection to nature,
- Providing important settings for recreation,
- Improving individual health by creating spaces that encourage walking,
- Creating new bonds between people involved in tree planting activities,
- Providing jobs for both skilled and unskilled labor for planting and maintaining community trees,
- Providing educational opportunities for residents who want to learn about nature trough first-hand experience, and
- Increasing residential property values (studies indicate people are willing to pay 3-7% more for a house in a well-treed neighborhood versus in an area with few or no trees).

Studies by Dr. Greg McPherson and colleagues at the Center for Urban Forest Research have consistently

Figure 1.1. Corner of Chantilly Way and Dinard Court in Hughson

shown that the economically quantifiable benefits of urban trees are several times greater than their associated costs. Furthermore, their studies show that the benefit-to-cost ratio is higher for large trees than small trees (McPherson 2003). An urban forest composed primarily of trees that are small-statured at maturity provides a much lower total economic benefit to the community and has a lower benefit-to-cost ratio than an urban forest with a preponderance of large-canopied trees (Geiger et al 2004)

Specific Environmental Benefits of Urban Trees:

Energy Impacts
Rapid urbanization of cities during the past 50-years has been associated with a steady increase in downtown temperatures of about 1° F per decade. As temperature increases, energy demand for cooling increases as do carbon dioxide emissions from fossil fuel power plants, municipal water demand, unhealthy ozone levels, and human discomfort and disease.

Urban forests improve climate and conserve building energy use by:
- Shading, which reduces the amount of radiant energy absorbed and stored by built surfaces,
- Evapo-transpiration, which converts liquid water in leaves to vapor, thereby cooling the air, and
- Wind speed reduction, which reduces the infiltration of outside air into interior spaces.
- Sequestering Carbon in the atmosphere

Trees and other green-space may lower air temperatures 5-10° F. Because of the San Joaquin Valley's hot, dry summer weather, potential cooling savings from trees are among the highest in the nation. Computer simulations for an energy-efficient home in Fresno indicate that shade from two 25-foot tall trees on the west side and one on the east side are estimated to save $75 each year. Evapo-transpirational cooling from these three trees is estimated to increase savings by another $28.

Air Quality Impacts
Urban forests can reduce atmospheric carbon dioxide (CO2) in two ways. Trees directly temporarily store CO2 as woody and leafy biomass while they grow. Trees around buildings can also reduce the demand for heating and air conditioning, thereby reducing emissions associated with electric power production.

Urban trees provide direct air quality benefits by:
- Absorbing gaseous pollutants (ozone, nitrogen

Figure 1.2. Rhapsody Lane in Hughson

oxides) through leaf surfaces,
- Intercepting particulate matter (e.g., dust, ash, pollen, smoke),
- Releasing oxygen through photosynthesis, and
- Transpiring water and shading surfaces which lower local air temperatures, thereby reducing ozone levels.

By shading asphalt surfaces and parked vehicles trees reduce emission of hydrocarbons that come from leaky fuel tanks and worn hoses as gasoline evaporates. These evaporative emissions are a principal component of smog and parked vehicles are a primary source.

Water Quality Impacts

Urban stormwater runoff is a major source of pollution entering San Joaquin Valley rivers and lakes. Trees improve water quality by:
- Intercepting and storing rainfall on leaves and branch surfaces, thereby reducing runoff volumes and delaying the onset of peak flows,
- Increasing the capacity of soils to infiltrate rainfall and reduce overland flow, and
- Reducing soil erosion by diminishing the impact of raindrops on barren surfaces.

Urban forests can provide other water benefits. Irrigated tree plantations can be a safe and productive means of wastewater disposal. Reused wastewater can recharge aquifers, reduce stormwater treatment loads, and create income through sales of wood products.

Benefits vs. Costs

Urban trees clearly provide a wide variety of benefits, although it is only possible to calculate an economic

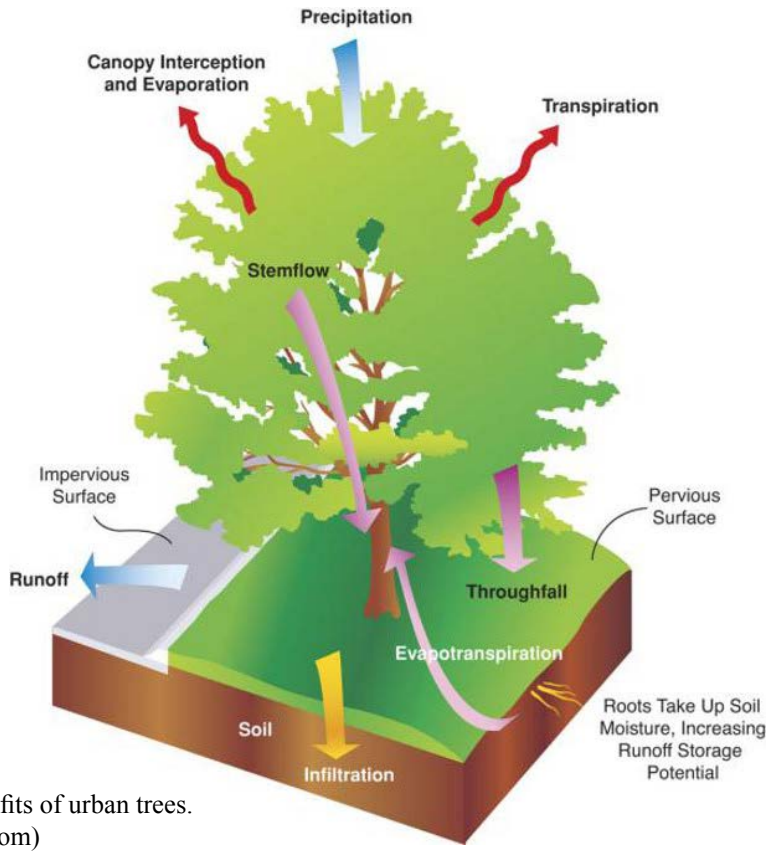

Figure 1.3. Environmental benefits of urban trees. (Source: http://www.deeproot.com)

value for some of these. There are also obvious costs associated with planting, maintaining, and removing trees in cities. In addition, indirect costs associated with trees include the costs of clearing away fallen leaves, repairing damage to nearby structures that may be damaged by tree roots in certain planting situations (e.g., large trees planted too close to curbs and sidewalks), and the administrative costs associated with maintaining a community urban forest program. Do the economic benefits of urban trees exceed their cost?

Urban Forest Costs

Of course, there area costs associated with urban trees. Costs for planting and maintaining trees vary depending on the nature of tree programs and their participants. Generally, the single largest expenditure is for tree trimming, followed by tree removal/ disposal, and tree planting. An initial analysis of data for Sacramento and other cities suggests that households typically spend about $5-10 annually per tree for pruning, removal, pest/disease control, irrigation, and other tree care costs.

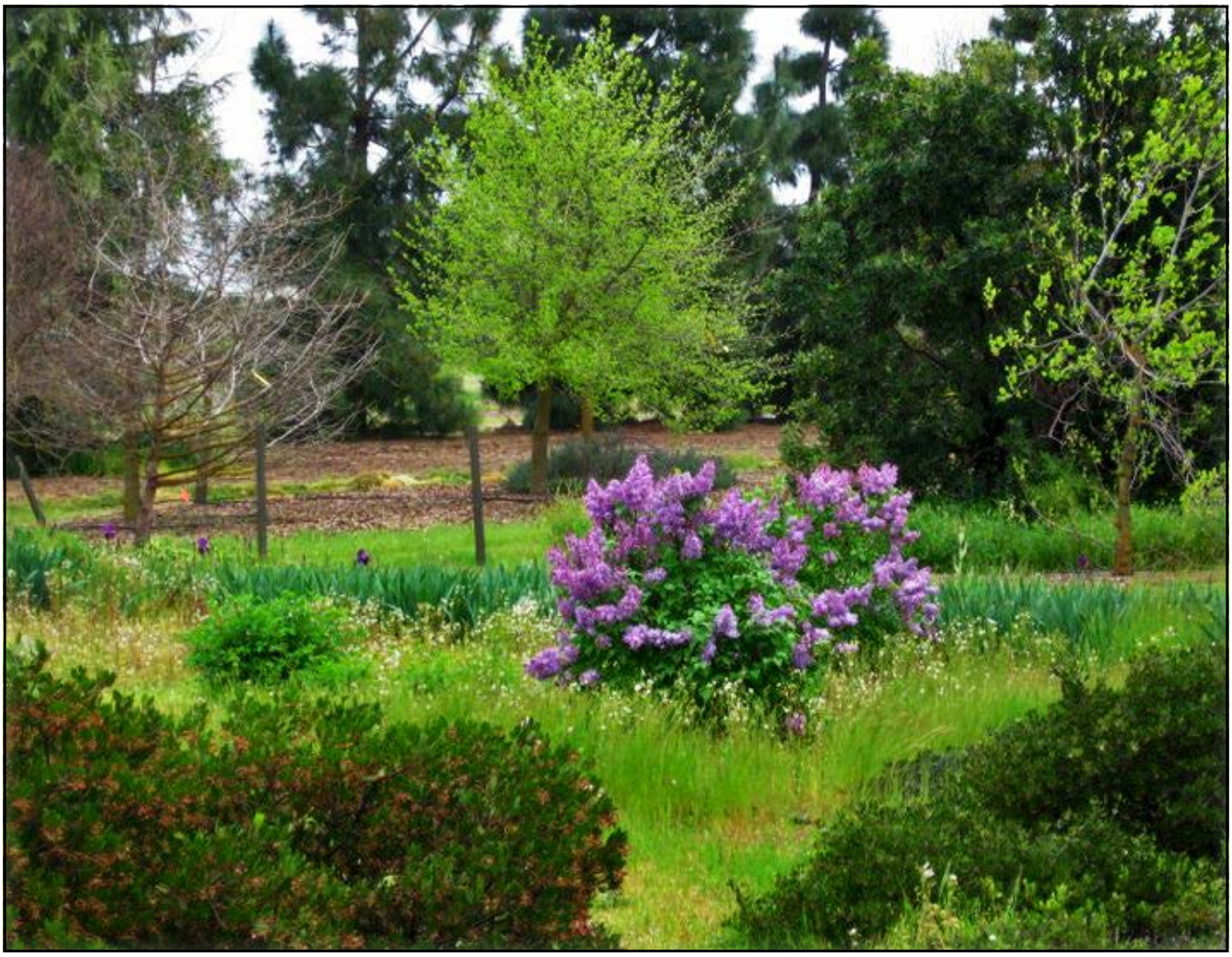

Figure 1.4. A view from the Arboretum

Other costs associated with urban trees include:

- Pavement damage caused by roots,
- Flooding caused by leaf litter clogging storm sewers,
- Green waste disposal and recycling (can be offset by avoiding dumping fees and purchases of mulch), and
- Irrigation costs.

Cost effective strategies to retain benefits from large street trees while reducing costs associated with root-sidewalk conflicts are needed.

Securing tree-related benefits

Many different city planning and management actions, especially those that occur during development, have a large impact on the character and condition of the urban forest. City of Hughson has expanded rapidly over the past decade. Urban forest planning and management actions taken over the past decade, as well as those made in the next decade, will shape the future of City of Hughson's urban forest for the next half century or more. To ensure the development of a thriving urban forest that will benefit the community, the city needs to develop a long term plan that accounts for the needs of trees in the urban environment. Both tree growth and tree decline are typically slow processes, so management actions related to these processes need to be initiated far in advance of the desired outcomes. This urban forest plan provides an overall strategy that will help the city maximize the benefits the urban forest will provide in the years to come.

Figure 1.5. Urban street with trees. (Source: http://www.city-data.com)

Chapter 2: Urban Forest Policy Setting

Existing Regulations and Plans
The City of Hughson currently has some city regulations and plans that specifically address landscaping and urban trees. The basic guidance for the development of the City of Hughson's Urban Forest Plan and Resource Guide in grounded in the Conservation and Open Space Element of the City of Hughson's 2025 General Plan. This element contains the following specific goals, policies, and actions that support the development of this Plan.

Conservation and Open Space Element
The purpose of the Conservation and Open Space Element is to ensure the comprehensive and long-range preservation and management of open space and agricultural land in and around Hughson, as well as work to improve air quality within the San Joaquin Valley Air Basin. The Conservation and Open Space Element seeks to maintain the small-town character and farming heritage of the community while providing a high quality of life for residents. This can be achieved by preserving open space and viable agricultural resource lands, protecting natural habitats for endangered and threatened species and providing recreational opportunities for city residents.

GOAL COS-1: Preserve and Protect agricultural lands in and around Hughson

POLICIES

COS-1.1 Property owners within the Sphere of Influence will be encouraged to maintain their land in agricultural production until the land is converted to urban uses.

COS-1.2 The City should endeavor to direct new growth away from areas established as Prime Farmland and/or under Williamson Act contracts, and discourage the premature conversion of agricultural land to urban uses.

COS-1.3 The City will support Stanislaus County in its efforts to maintain agricultural lands in viable farming units for those areas not currently designated for urban uses.

COS-1-4 Any County proposals within the Hughson Planning Area that involve the development of urban uses on land designated as Agriculture outside of the City's Sphere of Influence will be discouraged by the City.

COS-1.5 The City will support the application and renewal of Williamson Act contracts or other conservation easements for areas outside of the City's Sphere of Influence.

COS-1.6 The City will work cooperatively with land trusts and other non-profit organizations to preserve agricultural land in the Planning Area.

COS-1.7 The City will minimize conflicts between agriculture and urban uses.

ACTIONS

COS-1.1 Work with the County and surrounding jurisdictions to create a county-wide policy to limit urban growth to areas adjacent to existing development and preserve permanent agricultural separators between urbanized areas.

COS-1-2 Require that development projects include sufficient buffer zones within site designs, such as roads, setbacks and other physical boundaries, between agricultural uses and urban development.

Consider adopting a Right-to-Farm Ordinance to require new development adjacent to agricultural land to include deed restrictions recognizing the right to farm on neighboring parcels currently under agricultural prodwuction.

COS-1-3 Consider adopting a Right-to-Farm Ordinance to require new development adjacent to agricultural land to include deed restrictions recognizing the right to farm on neighboring parcels currently under agricultural production.

GOAL COS-2: Provide parks, open space and recreation facilities to maintain and improve the quality of life for Hughson residents.

POLICIES

COS-2-1 New development will be required to provide adequate parkland at a ratio of five acres per 1,000 residents in accordance with the Quimby Act (California Code 66477). Golf course development shall not be counted towards park acreage requirements.

COS-2-2 The City will guide park development to include a diversity of passive and active recreational amenities that are geographically distributed throughout the City and easily accessible by pedestrians and bicyclists.

COS-2-3 Where feasible, drainage basins should be built with a contoured or tiered design to optimize the potential for the dual purpose of providing additional recreational opportunities.

COS-2-4 The City will support the development of the Hughson Botanical Garden as a natural resource/habitat improvement opportunity, and as a City and regional asset.

COS-2-5 The City will support County, State and other efforts to develop and expand park and open space opportunities along the Tuolumne River, including the potential re-use of the City's waste water plant's northern ponding areas, for recreational and habitat uses.

COS-2-6 All park and recreation developments shall be designed and maintained to minimize water, energy and chemical (e.g. pesticides and fertilizer) use, preserve wildlife habitat where appropriate, and incorporate native plants and drought-resistant turf.

ACTIONS

COS-2-1 Implement the City's Parks Master Plan and update it on a regular basis.

COS -2-2 Establish a joint use agreement with the Hughson Unified School District to allow for the shared design and operation of recreation facilities to maximize use and reduce cost.

Goal Area OS-C: Open Space for Outdoor Recreation

GOALS

- High Quality Recreational Open Space
- Adequate Public Recreation Facilities
- Comprehensive Urban Trail and Bike Path System

POLICIES

C.1 Provide high-quality park and open space facilities to serve the needs of a growing population.

C.2 Maintain and expand the City's Bikeway and Trail System.

Goal Area OS-D: Open Space for Public Health and Safety

GOALS

- Safe Environment for City of Hughson's Citizens.

POLICIES

D.1 Preserve open space areas which are necessary to maintaining public health and safety.

Goal Area OS-E: Conservation of Resources

GOALS

- Conserve Water Resources
- Preserve and Protect Soil Resources

E.1 Promote water conservation throughout the planning area.

E.2 Protect soil resources from the erosive forces of wind and water.

Chapter

2

General Plan Implementation

The City of Hughson General Plan sets forth goals, policies, and actions that have been implemented by means of various adopted municipal codes, policies and standards.

Various municipal code provisions have been adopted to implement and enforce these broad General Plan goals and policies including, but not limited to, the following:

1. Title 12 Streets, Sidewalks and Public Places, Chapters:
    - 12.20 Street Trees
    - 12.30 Tree and Sidewalk Maintenance
        - 05. Parks and Recreation Facilities
        - 06. Formation of Assessment or Maintenance District for Parks and Recreation Facilities
        - 07. Improvements-L Street Trees
        - 08. Establishment of Other Special Benefit Assessment, Improvement and Maintenance Districts

2. Title 15 Buildings and Construction, Chapter 15.46 Water Efficient Landscaping Standards.

3. Title 16 Subdivision, Chapters:
    - 16.11 Required and Supplemental Improvements
    - 16.13 Dedication, Site Reservation, Districts:

4. Title 17, Zoning, Chapters:
    - 17.14 "OS" Open Space District
    - 17.18 "PS" Public and Semi-Public District
    - 17.40 General Regulations
    - 17.52 Architectural and Design Review Procedures
    - 17.54 Off-Street Parking
    - 17.62 Fencing, Walls and Hedges

Figure 2.1. Downtown Hughson

Chapter 3: Goals, Objectives and Implementation

Objectives for the management of City of Hughson's urban and natural tree forest

This section summarizes some of the important issues and trends that are likely to affect City of Hughson's urban and natural tree forest over the next 25 to 50 years and beyond. Based on these issues, local concerns and priorities, and general urban forest management principles, based on the overall City of Hughson General Plan, the city has developed goals that could be used to help guide the overall management of City of Hughson's Urban and Natural Tree Forests. The objectives associated with these goals and recommendations for attaining these objectives constitute an overall framework for the sustainable management of City of Hughson's Urban Forest resources.

These issues and related goals have been organized into three general topic areas. **Tree canopy cover** includes issues that are related to the overall amount of tree canopy in City of Hughson and its distribution within the city. **Tree and forest health** addresses the long-term health and sustainability of both individual trees and the forest as a whole. **Management of the urban forest** addresses issues that are specific to the care and maintenance of the urban forest by both the public and private sectors. These main topic areas, as well as the goals and objectives listed under them are highly interrelated. Hence, objectives listed under one goal may in fact support several other goals as well.

Figure 3.1. A view from the Arboretum

Tree canopy cover

- Mean summer temperatures will tend to rise due to the urban heat island effect and overall global warming trends. Increased tree canopy cover can help moderate these impacts.
- Regional air quality will continue to be an issue of concern. The Central Valley air basin in the vicinity of Modesto has historically exceeded national ambient air quality standards for ozone and, to a lesser degree, airborne particulates matter. Tree canopy intercepts and reduces both ozone and particulate pollutants.
- Many of City of Hughson's existing trees are young, and with proper care will continue to grow in size, increasing overall canopy cover.
- Many large commercial parking lots may never obtain even moderate levels of tree shading. Most parking lots achieve only low levels of tree shade within about 10 years and then begin to lose canopy as the result of both poor growth and trees loss.
- Due to tree placement and species selection, most existing residential tree plantings in front yards on private property are unlikely to provide significant shading of streets when trees mature.
- Native oak woodlands on City of Hughson are generally in fair to poor condition, but low levels of natural regeneration in some areas may affect long-term sustainability of some stands. Many of these trees have sustained high levels of root damage due to both construction-related activities and subsequent alteration of the root zone and are likely to decline and be removed over the next few decades.

Tree and forest health

- Greater genetic diversity within the urban forest reduces the risk of serious pest and disease epidemics. Genetic diversity can be increased by using multiple tree species and by using trees that are of seedling origin. Trees grown from seed are more genetically diverse than trees that are propagated clonally (grafted or grown from cuttings) and are consequently genetically identical. Most named tree varieties are genetically identical clones.
- A few tree species and varieties, such as flowering pear varieties, constitute a higher than optimal percentage of all publicly

Figure 3.2. Tree canopy cover.
(source: http://ordinancewatch.wordpress.com)

managed trees, but efforts are now being made to increase genetic diversity in both new and replacement public right-of-way streetscape plantings.

- Because much of City of Hughson has been developed recently over a fairly short time period, even-aged stands of trees make up large portions of City of Hughson's urban forest. Within these stands, trees with similar life spans will reach the end of their useful life as a group.
- Water conservation will continue to be a regional issue, especially during periods of drought. Currently, some of city maintained trees along parkways are drought tolerant.
- Some publicly-owned woodlands along the Tuolumne River have been invaded to varying degrees by aggressive non-native species that may displace native riparian vegetation.
- Native oak woodland stands are subject to genetic pollution from non-local oaks planted nearby. This may reduce the fitness of seedlings in the native stands and interfere with natural regeneration.
- Water management policies of the Modesto Irrigation District, along the MID main canal and City of Hughson main canals create vast strips of land without tree cover.

Management of the urban forest

- Most publicly-managed trees in City of Hughson are young and in relatively good condition. Tree care costs are likely to rise somewhat as trees become larger. The Department of Public Works maintains city owned trees.
- Currently, city goals for tree planting is addressed primarily through the actions of the Planning Department as part of the development review process. Through the city's development review process, the Planning Department implements City of Hughson's General Plan goals and policies that affect the urban forest.
- Once development is completed, responsibility for care and maintenance of planted trees and conserved oak woodlands shifts to other departments (Public Works Department), or to private individuals. Maintenance of additional public trees will require additional maintenance staff (Public Works) and/or more contracted tree care services.

Within the context of the urban setting of City of Hughson, its organizational capacity and structure and the overall guidance and direction of the City of Hughson General Plan, the following Goals, Objectives and Implementation Actions have been developed.

City of Hughson Urban Forest

GOAL 1. Establish and maintain target levels of tree canopy throughout the City.

OBJECTIVES

1-a. Establish target levels of tree canopy cover citywide and for specific land use categories.

1.b Maximize levels of successful tree establishment in new construction areas. Actions

1-c Maintain or increase tree canopy cover levels in existing developed areas.

Objective 1-a Establish target levels of tree canopy cover citywide and for specific land use categories.

Implementing Actions:

Adopt an appropriate goal and timetable for increasing overall canopy cover within the City of Hughson.

Establish canopy cover goals for open space lands, residential areas, commercial parking lots, public facilities (including parks and schools), city-maintained parkways, and other major land use categories that will contribute to attainment of the overall canopy cover goal.

Objective 1-b Maximize levels of successful tree establishment in new construction areas.

Implementing Actions:

Continue and expand policies and programs that require or encourage tree planting in new developments.

Update existing planting standards to improve tree establishment and performance. Revisions should address improving planting site preparation (including modification of the planting hole standard), staking, tree species selection, and nursery stock quality.

Increase levels of parking lot shading by adopting and implementing standards that improve design, site preparation, and short-and long-term maintenance practices.

Objective 1-c Maintain or increase tree canopy cover levels in existing developed areas.

Implementing Actions:

Continue efforts to replant trees in publicly-maintained streetscapes and developed parks as needed to maintain appropriate levels of tree canopy.

Promote appropriate tree planting on privately-owned properties by City of Hughson businesses and residents.

City of Hughson Urban Forest

GOAL 2. Promote conservation of existing tree resources.

POLICIES

2-a. Increase the level of protection provided to oaks before and during construction.

2-b Improve the management of retained oaks.

2-c Develope City of Hughson oak tree protection guidelines as needed to reduce tree damage during development and improve long term survival of retained trees.

Policy 2-a Increase the level of protection provided to oaks before and during construction.

Implementing Actions:

Promote good tree care practices by private tree owners by continuing to provide recommendations on oak tree care to interested citizens.

Continue and expand tree care training / education opportunities for City staff involved in oak tree maintenance and landscape planning.

Objective 2-b Improve the management of retained oaks.

Implementing Action:

Increase tree cover in historically-forested open space lands by planting with locally native tree species where appropriate.

Objective 2-c Review and update City of Hughson's oak tree protection guidelines as needed to reduce tree damage during development and improve long term survival of retained trees.

Implementing Actions:

Continue to implement tree protection measures and monitoring of trees designated to remain during development activities.

Continue City policies that attempt to maximize conservation of tree cover when developing in areas that contain existing tree resources. Use site planning to protect groups of trees and minimize the amount of disturbance to the roots of existing trees by expanding the protected area for root growth.

City of Hughson Urban Forest
GOAL 3. Choose and locate new trees to maximize tree-related benefits
POLICIES 3-a. Match species to sites to the greatest degree possible. 3-b Increase the use of large-canopy trees where practical to maximize tree benefits relative to costs. 3-c. Locate new tree plantings in areas that will maximize energy conservation in buildings and shading of pavement.
Policy 3-a Match species to sites to the greatest degree possible.
Implementing Actions: Provide guidelines on tree selection and placement to residents to promote planting the right tree in the right place and avoid tree/site combinations that will result in shortened tree life or excessive maintenance costs (e.g., redwoods on thin soils, big trees planted in small places, tall trees under electric distribution lines, etc.) Continue to select suitable species and place trees appropriately to minimize conflicts with infrastructure along streets (e.g., signs, traffic signals, streetlights).
Objective 3-b Increase the use of large-canopy trees where practical to maximize tree benefits relative to costs.
Implementing Actions: Include large-statured trees in planting plans for parks, streets, and other public lands where practical.
Objective 3-c . Locate new tree plantings in areas that will maximize energy conservation in buildings and shading of pavement.
Implementing Actions: Provide homeowners with information on how to place trees to maximize energy conservation. Use the planning and design review processes to encourage the use of parking lot and streetscape designs that provide greater amounts of pavement shading.

City of Hughson Urban Forest
GOAL4. Maintain trees in a healthy and safe condition.
OBJECTIVES

4-a. Follow best management practices for tree planting and care for trees on public land.

4-b Institute a program for identifying and correcting tree-related hazards on public properties.

4-c Encourage the use of best management practices (BMP) for tree planting and maintenance for trees planted on private lands.

Objective 4-a Follow best management practices for tree planting and care for trees on public land.

Implementing Actions:

Monitor tree health on public lands (parks, streets, open space areas, and public buildings) to identify developing pest and disease problems.

Develop a program for locating and evaluating potentially hazardous trees on public lands and public rights-of-way.

Objective 4-b Institute a program for identifying and correcting tree-related hazards on public properties.

Implementing Actions:

As needed, update the list of tree species potentially suitable for landscape uses in City of Hughson to reflect new pest problems that may render a tree unsuitable for continued planting.

Plant good-quality, preferably locally-grown, disease-free nursery stock to increase long-term survival. Implement the use of updated tree nursery stock standards to ensure the use of good quality stock. Continue existing pre-and post-planting inspections conducted by City staff, and implement new inspections where necessary for trees planted on public lands.

Continue use of current ANSI or other nationally-recognized pruning standards for pruning conducted by City staff and tree care contractors.

Develop and implement standards for assessing and improving (if necessary) soil conditions prior to planting to improve long term tree health and survival.

Assess and remediate site conditions prior to replanting trees which have died. Do not replant sites that are determined to be unsuitable for tree planting.

Objective 4-c Encourage the use of best management practices (BMP) for tree planting and maintenance for trees planted on private lands.

Implementing Actions:

Continue existing pre-and post-planting inspections conducted by City staff, and implement new inspections where necessary for trees planted on private lands as a condition of project approval.

Continue current City practice of accepting calls from private property owners about unusual tree pest or disease problems and, if warranted, inspecting affected trees as a way to identify new problems.

Make BMP guidelines for tree planting and maintenance available to permit applicants and the general public to encourage better tree selection, planting and care.

City of Hughson Urban Forests

GOAL 5. Develop an urban forest canopy that is stable over the long term.

OBJECTIVES

5-a. Avoid excessive use of individual tree species or varieties within large plantings and within the urban forest as a whole.

5-b Increase the percentage of drought-tolerant trees in City of Hughson's urban forest.

5-c Protect the long-term viability of conserved native oak woodlands in City of Hughson.

5-d Maximize the effective age diversity of plantings to avoid even-aged stand problems.

Objective5-a Avoid excessive use of individual tree species or varieties within large plantings and within the urban forest as a whole.

Implementing Actions:

Establish upper limits for the percentage of the tree population that a single variety or species should comprise within planning areas or citywide. This will minimize the exposure of the urban forest to damage by new diseases, pests, or problems that affect only a single species or variety. Use these percentages to aid in species selection for new and replacement tree plantings.

Reduce or eliminate the use of trees with high water use requirements in harsh sites such as street tree plantings and parking lots.

Increase the use of locally-native oaks, especially blue oak, in new landscape plantings.

Increase compliance with existing policies that emphasize the use of drought tolerant trees in new plantings.

Increase the overall percentage of drought tolerant trees in City street tree plantings and in parks and private development by using more drought tolerant species in new and replacement plantings when feasible.
Objective 5-b Increase the percentage of drought-tolerant trees in City of Hughson's urban forest.
Implementing Actions: Use only trees of local genetic stock in and near native oak stands to conserve the genetic integrity of local oak populations.
Objective 5-c Protect the long-term viability of conserved native oak woodlands in City of Hughson.
Implementing Actions: Where possible, substitute trees of different species or varieties for overused species/varieties when planting new or replacement trees. Reduce cover of invasive exotic plant species in riparian woodlands. Avoid using invasive exotic plant species in landscape situations to prevent escape of these plants into natural areas. Maintain a "do not plant" list for landscape plan review purposes.
Objective 5-d Maximize the effective age diversity of plantings to avoid even-aged stand problems.
Implementing Actions: When planting replacement trees, avoid using trees that will reach the end of their useful life at the same time as existing trees in the planting. In new plantings where even age plantings cannot be avoided, use a mix of species with different useful life spans. For example, oaks may live for well over 100-150 years whereas flowering pears may have a maximum useful life closer to 30-50 years.

City of Hughson Urban Forests
GOAL 6. Promote efficient and cost-effective management of publicly-owned urban and natural forest resources.
POLICIES

6-a. Develop a systematic approach to inspect and prune City-maintained trees in an efficient manner.

6-b Increase coordination and communication between City departments/divisions whose activities affect the urban forest.

6-c Develop basic budget information on costs associated with maintaining and caring for the community forest.

Policy 6-a Develop a systematic approach to inspect and prune City-maintained trees in an efficient manner.

Implementing Actions:

Develop appropriate criteria for inspecting and pruning trees of various species and size classes present in City-maintained landscapes.

Inspect and, as needed, prune young trees that will become medium to large-statured as needed (generally no more frequently than every 2 to 3 years) to establish good structure and avoid later remedial pruning.

Inspect and, as needed, prune mature trees on an appropriate schedule to maximize cost-efficiency (generally no more frequently than every 5 to 7 years).

When financially feasible, develop a tree inventory system to track tree care.

Objective 6-b Increase coordination and communication between City departments/ divisions whose activities affect the urban forest.

Implementing Actions:

Foster communication and feedback between Planning, Public Works, and Parks and Recreation staff who deal with tree-related planning and maintenance issues.

Formally review the City tree list at least every two years and update as necessary.

Review the management plan, tree planting and maintenance guidelines, and public information brochure portions of this document every five years and update as necessary.

Develop management plans for maintaining specific sectors of the City's urban forest (e.g., parks, street segments, riparian corridors, open space areas). Formally review these management plans every 5 years and update as needed.

Continue and expand tree care training / education opportunities for City staff involved in tree maintenance and landscape planning.

Objective 6-c Develop basic budget information on costs associated with maintaining and caring for the community forest.

Implementing Actions:

Track costs associated with maintaining parkway and park trees to ensure assessment districts will provide adequate funding as trees mature.

As part of the City's annual budget process, prioritize necessary maintenance and preservation activities to be funded through other sources (public or private). Where possible, apply for external grants to leverage City funding.

City of Hughson Urban Forests
GOAL 7. Foster community support for the local urban forestry program and encourage good tree management on privately-owned properties.
OBJECTIVE
7-a. Institute an ongoing program to educate the public about tree selection, placement and care.
Implementing Actions:
Periodically compare relative cost-efficiency of in-house versus contracted tree care for planting, young tree care, and mature tree care. Use these data to ensure that tree care tasks are allocated to contractors or City staff in a cost-efficient manner.
Provide locally-appropriate technical tree care information to residents through a variety of media to emphasize good tree selection and placement, optimal planting techniques, proper pruning of young and mature trees, and care of conserved native oaks.
Disseminate information about appropriate management of the residential/open space interface to landowners that are adjacent to public open space lands.
Encourage participation of local groups in public tree planting and tree care projects.
If local support exists, assist in the development of a tree-related non-profit / volunteer organization that can obtain grant funding for tree planting, tree care, and public education.
Provide funding, as feasible, for additional City staff time needed to carry out this objective. Alternatively, contract with a local tree non-profit to provide public outreach and volunteer coordination services.

Chapter 4: Plan Physical Setting

Setting
Like any planning effort, the location, setting and natural resources of the within, and around, the City of Hughson shape the parameters of the plan approach. City of Hughson, with climate, and soils is an excellent position to reap maximum benefit from an Urban Forest program effort.

This chapter will examine two critical setting issues that significantly impact the shape or approach of the City of Hughson Urban Forest Plan, soil resources and biological setting.

The soils of the City of Hughson area are of excellent quality and provide very few limitations to tree growth and management. At the same time, the natural biological setting of the City creates constrains to Urban Forest management practices. While the biological resources of the area create unique constrains, to the City of Hughson Urban Forest program, they also create unique opportunities and benefits that contribute to the unique quality of life enjoyed by City of Hughson residents.

Location
The City of Hughson is located in Stanislaus County, approximately 10 miles southeast of Modesto, 90 miles south of Sacramento and 100 miles southeast of San Francisco. There are no major highways through or adjacent to Hughson. State Highway 99 (SR-99) is the closest freeway, running north to south through Modesto with a linkage via Interstate-205 (I-205) to I-5, the State's major north-south interstate corridor, and I-580. Figure I-1 depicts the City's regional location. The existing incorporated area of the City of Hughson is approximately 1.5 square miles.

Soils
Soil mapping is used to help identify potential geotechnical concerns, such as erosion and expansion, that are more common with certain soils types. Identifying local soil types and understanding the associated characteristics helps cities establish appropriate engineering and construction standards for new building and remodeling. As shown in Figure 4.1, Hughson and its Sphere of Influence are underlain by Hanford and Tujunga series soils, with a little area of Greenfield series found at the intersection of Hatch and Geer Roads. Table 4.1 identifies other soil types encountered in the Hughson area. The table also summarizes each soil type's potential for erosion and expansion.

Since Hughson is relatively flat, there is a limited potential for erosion. The greatest potential for erosion is due to wind, since the Tujunga series has a moderate to high potential for wind erosion and none of the soils have a high erosion potential for water erosion. The Hanford series has a moderate potential for erosion, but only once slopes exceed eight percent, which is not common in the city. The Greenfield series only has a slight potential for erosion.

Expansive soils contain higher levels of clay and present hazards for development since expansive soils expand and shrink depending on water content, damaging structures that were not appropriately engineered. Since all of the soils in the Hughson area are mainly comprised of sand, they pose a very low risk of expansion. The Greenfield series has the highest clay content, and therefore, would pose the greatest risk to structures. However, even the Greenfield series is considered to have a low expansion potential.

Basin Lands
The soils in Hughson are fairly stable and flat, with low potentials for landslides, erosion and expansion. Liquefaction is mainly a risk along the Tuolumne

River, where no development, other than the existing wastewater treatment plant, is proposed in the 2005 General Plan.

Past and Current Biological Context:
The City of Hughson is relatively flat, far from fault lines and outside the floodplain. The majority of the area, surrounding the City of Hughson, consists of agricultural lands that support non-native annual grasses and forbes when they are not being cultivated for annual crops, orchard or irrigated pasture. The biological communities and special-status species located in the project area are described below.

Biological Communities
Six biological communities were documented in the project area; non-native annual grassland, drainage, mixed riparian woodland, agricultural field, orchard and vineyard, irrigated pasture, and developed.

Non-native Annual Grassland.
Ruderal (weedy) and non-native grassland occurs along roadway and field margins, and in the understory of orchards and vineyards. In some locations, vegetative cover has been completely stripped by equipment operation and herbicide application. The ruderal and grassland cover is composed of nonnative grasses and forbs, such as wild oat (Avena fatua), soft chess (Bromus mollis), dove weed (Eremocarpus setigerus), bindweed (Convolvulus arvensis), bur clover (Medicago polymorpha), yellow-star thistle (Centaurea solstitialis) and other non-native annuals.

The ruderal cover supports smaller mammals and reptiles, and is occasionally used by several species of birds as seed becomes available. The field margins often serve as retreat cover for smaller wildlife as crops are harvested and fields disked. Species associated with the ruderal grasslands include those found in the agricultural fields, as well as occasional use by graniverous birds such as American gold finch and several species of sparrow.

Agricultural Field
The City of Hughson is surrounded by agricultural lands. Agricultural lands provide a source of identity and employment for residents. Working and non-working agricultural lands used for row crops, orchards, grazing, dairy farms, singlefamily homes on large agricultural parcels, and agriculturally-related commercial and industrial uses are included in this category. Approximately 978 acres of agricultural lands exist in the Hughson area, 97 acres are within the city limits and 881 acres lie outside the city limits in the sphere of influence. Agricultural lands within the city limits and some in the sphere of influence are targeted for future residential, commercial and industrial development; however, the community recognizes the need to preserve agricultural lands not targeted for urban uses.

Orchard
Orchards, mostly walnut, including cherry, persimmon, and other fruits, are found on much of the land immediately adjacent to the city. The orchards include mature trees that provide nearly complete canopy cover and minimal undergrowth is present between the rows of trees. Non-native annual grassland form the under-story of the orchard habitat. The orchard trees are generally unsuitable as nesting locations for raptors because of routine disturbance as part of maintenance and harvesting.

Irrigated Pasture
Irrigated pasture is typically grazed intensively and is low in species diversity and has low potential for the occurrence of special status species. Common plant species of pasture includes, primarily, annual and perennial grasses and forbes such as tall fescue, Italian ryegrass, soft chess, and curly dock.

Developed Areas
Most of the project area components extend through

City of Hughson Area Soils Map

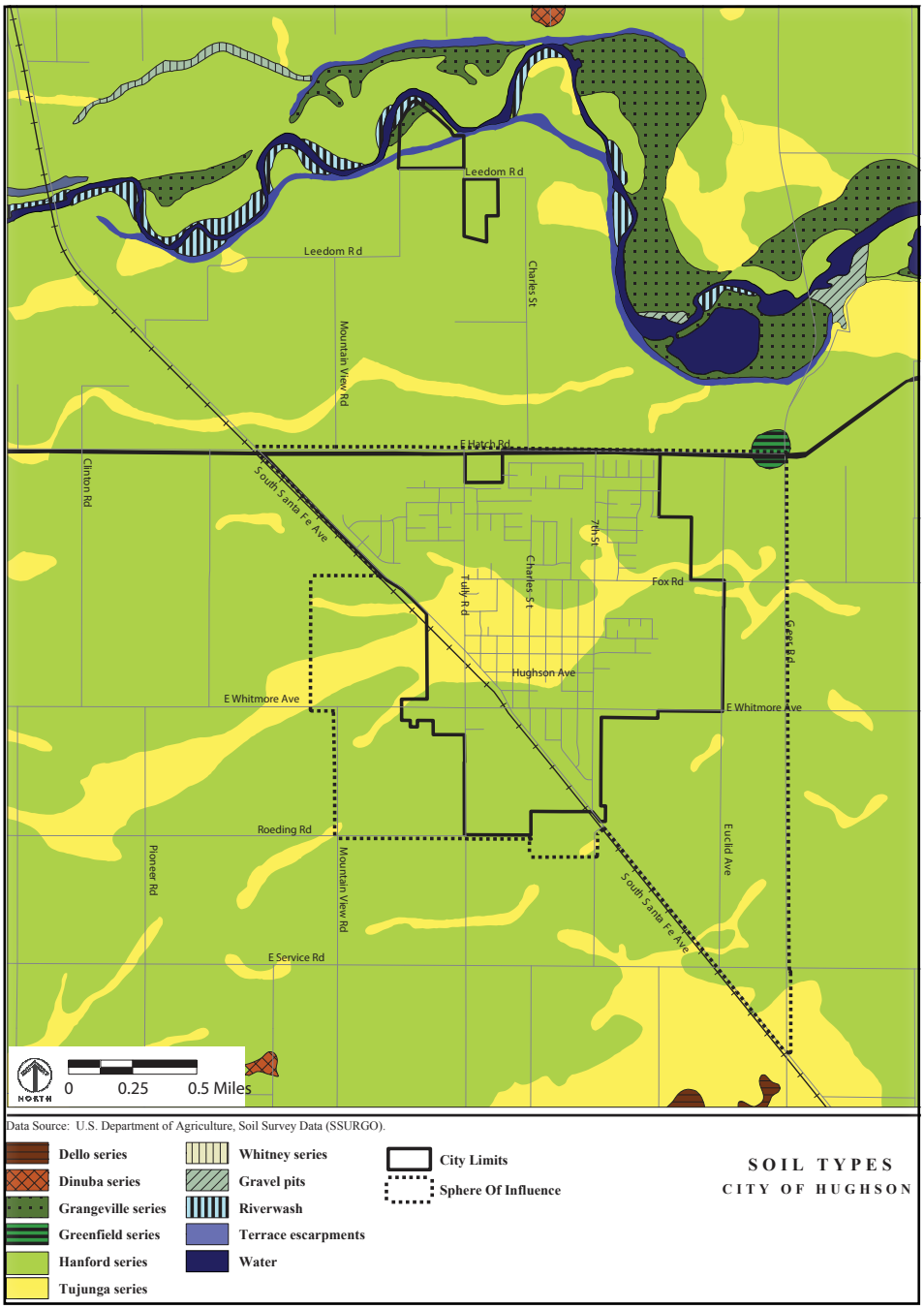

Figure 4.1. City of Hughson Area Soils Map

developed areas and do not support sensitive biological resources. These areas include roads, residential neighborhoods, commercial and industrial development and public facilities. They provide minimal habitat values for local wildlife species except where urban tree (forests) have been developed along city streets, parklands and within portions of the Tuolumne River pass through the City.

Natural Waterways and Canals

The Tuolumne River, a natural drainage channel, along with several irrigation canals, occur in the project area. The Tuolumne River is a perennial drainage corridor and contains mixed riparian woodland vegetation along their banks. The canal system is artificially created and constructed dirt and, some cases, concrete-lined to reduce seepage. These irrigation canals are typically groomed to reduce vegetation and, as a result, do not contain any wetland or riparian value.

Major Soil Types in the City of Hughson Area

Soil Series	Erosion Potential	Expansion Potential	Drainage	Permeability	Runoff	Fertility
Dello	None	None to low	Very poor	Rapid	Slow	Moderate to High
Dinuba	Slight	None to low	Poor	Moderately Rapid	Slow	Moderate to High
Grangeville Slight	Slight	None to low	Moderately good	Moderately to moderately rapid	Slow	Moderate to High
Greenfield	Slight	Low	Good	Moderately Rapid	Very slow	Moderate to High
Hanford	None to moderate	None to low	Good	Moderately rapid	Very slow	Moderate to High
Tujunga	Slight to moderate for water erosion Moderate to high for wind erosion	None to low	Excessively drained	Rapid	Very low	Moderate to High
Whitney Slight	Slight	None to low	Good	Moderate	Slow	Moderate

Table 4.1. City of Hughson Soil Data

The Tuolumne River provides important habitat for a variety of wildlife. Vegetation growing along the edges of the water course provides nesting habitat for several bird species and foraging and refuge habitat for amphibians, reptiles and mammals occupying the open water and adjacent grassland habitats.

Riparian Woodland
The banks and margin of the historic terraces along the Tuolumne River form dense stands of riparian and woodland scrub near the northern ponding areas at the City's wastewater treatment plant site, north of Hatch Road. Dominant tree and shrub species along the river banks include: valley oak, live oak (Quercus agrifolia), Fremont cottonwood (Populus fremontii), willow (Salix spp.) and elderberry (Sambucus mexicana). While most of the margins of the northern ponding area currently support a cover of ruderal grasslands, a few native oaks and elderberry occur on the site. and dense woodland and scrub occurs along the active channel bank of the river.

Although the riparian habitat associated with the Tuolumne River is technically outside the city limits and SOI, it is in proximity to the northern wastewater treatment plant ponding area. The Tuolumne River supports the last remnant of native vegetation and sensitive natural community in the Hughson vicinity, serves as an important movement corridor for fish and wildlife, and is considered to be of regional and State-wide significance both hydrologically and biologically. Species associated with the aquatic and riparian habitat of the river corridor include the anadromous chinook salmon (Oncorhynchus tshawytsha), the federally-threatened valley elderberry longhorn beetle (Desmocerus californicus dimorphus), and the State-threatened Swainson's hawk (Buteo swansoni). Areas of dense vegetation along the orridor provide important cover for numerous resident and migratory wildlife, including raccoon, grey fox, brush rabbit and numerous species of birds.

Special-Status Species

Special-Status Plants
Based on a review of existing information, species list obtained from the USFWS, and species distribution and habitat requirements data, there is a low potential for special-status plans in the City's proposed Sphere of Influence. Most of the project area is developed or heavily disturbed and does not support suitable habitat conditions for special-status plans known to occur in the region.

Special-Status Wildlife
Based on a review of existing information, species lists and species distribution and habitat requirements, 14 special-status wildlife species were determined to have potential to occur in the project region, mostly along the riparian corridors surrounding the Tuolumne River.

Public Land and Urban Forests
Public land holdings within, the City of Hughson, contain a significant part of the City's urban forest tree inventory.

Schools
The City of Hughson Unified School District is comprised of the Fox Road Elementary School, the Hughson Elementary School, the Emilie J Ross Middle School, Hughson High School, and Dickens High School. Fox Road Elementary School is located at 7668 Fox Road. Hughson Elementary School is located at 7201 Whitmore Ave. City of Hughson High School is located at 7419 E. Whitmore Ave. in the city. Dickens High School is located at 6937 Fox Road. Due to the nature of how these school lands are used, tree densities are very low in these open areas dedicated to school use.

Parks and Recreational Facilities
This section focuses on existing parks and recreational facilities in Hughson, as well as an analysis of the

potential project-related impacts to the future demand for these facilities.

Existing Setting
A discussion of the City's current efforts to plan for parkland, as well as an inventory of existing recreational facilities are provided below.

City of Hughson Parks Master Plan
The City is in the process of developing and adopting a Parks Master Plan. To address the growth pressures experienced by Hughson, the Parks Master Plan would work to implement the community's established priorities regarding the provision of parks and open space, and provide direction as to how to meet the future needs for parkland. As part of the Parks Master Plan process, the City has calculated that it currently has at least 5 acres of parkland for every 1,000 residents. The Parks Master Plan outlines the type and location of parks and open space allocations the City wishes to secure to meet its parkland goal. For each park category, the Plan provides guidelines for size, service area, location, site characteristics, design elements, lighting, restrooms, recreation facilities, utilities, site furnishings and landscaping. The Plan also identifies a planning and design process to ensure proper site selection and cost-efficient implementation. The Parks Master Plan also analyses the cost of developing and maintaining the various types of parks, and provides direction for utilizing accrued park and open space funds efficiently, without placing an undue tax burden on residents. The Plan will inform the establishment of appropriate development impact fees in order that the City might pass along land acquisition and construction costs to project proponents. However, the Parks Master Plan also recognizes that no matter how park development is initially funded, the City must consider and plan for future maintenance costs.

Existing Recreational Facilities
The City of Hughson currently provides active and passive recreational opportunities to its residents through a variety of mini, neighborhood and community parks. Additional recreational opportunities are also provided through public schools sites, which have historically been used by the community for a range of recreational activities and organized sports leagues. The privately-owned Hughson Arboretum and Gardens, located on Whitmore Avenue, is also planning for expansion and will provide additional recreational opportunities for the community. Finally, several regional parks and reservoirs also provide recreational opportunities for Hughson residents. Stanislaus County's park system includes 16 parks, ranging in size from ½ acre to 96 acres. Nearby reservoirs include the Modesto and Woodward Reservoirs in Waterford and Oakdale, respectively.

Parks
The City of Hughson park system consists of both active and passive recreational areas, including a variety of park types. As of January 2005, there is one mini-park, one neighborhood park and two community parks in Hughson, totaling approximately 17 acres. In addition, there are two turfed drainage retention basins, several public school recreation facilities and a botanical garden. The following provides a description of Hughson's tiered park system:

Mini-Parks
Small parks, typically ½ to 5 acres in size, that provide recreational activities generally used by the local neighborhood or subdivision. Although these parks are often privately-owned and maintained by the related Homeowners Association, they are usually available for use by the general public. In Hughson, the Rhapsody neighborhood includes a mini-park with a tot lot.

Neighborhood Parks
Generally, 3- to 7-acre sites that host basic

recreational activities for 1,000 to 3,000 people within a ¼- to ½-mile radius. These parks have street frontage on at least one public street, are convenient to pedestrians, are linked with bicycle routes and trail corridors
when possible, and are located adjacent to schools or other municipal facilities. Carrie Shrader Park is currently the only neighborhood park in Hughson, although there are two turfed drainage basins that could be considered in this category. Because Carrie Shrader Park contains the City's main swimming pool, it tends to draw residents from a further radius than typical to a neighborhood park.

Community Parks
Generally, 10- to 25-acre sites that provide a mix of active and passive recreational activities for 10,000 to 50,000 people within up to a 50-mile radius. These larger parks have street frontage on at least two public streets, off-street parking and convenient access for pedestrians and bicycle traffic. They should be located within close proximity to neighborhoods and adjacent to schools, or other municipal facilities if possible, while consciously preventing negative impacts from higher activity levels on surrounding communities. Starn Park and LeBright School are the two community parks in Hughson.

Dual-Use Drainage Basins
There are two dual-use neighborhood drainage basins that are turfed to provide passive recreational opportunities for Hughson residents. Although other

Figure 4.2. Andrew Fontana Memorial Park

Chapter

4

EXISTING RECREATIONAL FACILITIES IN HUGHSON

Name	Facility Type	Acres	Amenities	Owner
Starn Park	Community Park	8.2	Lighted baseball field with dugouts, jogging trail, play structures, concession/ restroom building, picnic area, BBQ grills, paved off- street parking for 50 cars, ADA accessible	City
LeBright School (former school site)	Community Park	6.32	5 baseball diamonds, bleachers, field for football and soccer practice, snack bar, portable restrooms, gravel off-street parking for 100 cars	HUSD
Hughson High School	Public School	8.52	2 baseball diamonds, 8 tennis courts, football and track venue, stadium seating, basketball courts, restrooms, concession stand, offstreet parking	HUSD
Ross Middle School and Fox Road Elementary	Public School	6.05	2 soccer fields, 2 baseball diamonds, 1 volleyball court, benches, grass areas, vending, restrooms, offstreet parking	HUSD
Hughson Elementry School	Public School	3.68	Basketball courts, tetherball, play equipment, small baseball diamond, small grass field, off-street parking	HUSD
Santa Fe Drainage Basin	Open Space	1.15	Open space grassed area that serves as drainage for heavy rains but is designed to also provide park space and dry within 1 day	City
Rhapsody Drainage Basin and Tot Lot	Open Space/ Playground	1.28	Open space as described above, with an additional playground geared towards younger children	Private
Hughson Arboretum	Arboretum	13	Undeveloped open space with established tree collection	Private
Andrew Fontana Memorial Park	Community park	2	Covered picnic areas, horseshoe, pits, web climber, and open space	City

Table 4.2. City of Hughson Existing Recreational Facilities

drainage basins exist in Hughson at this time, these two are the only ones that have been designed with recreational access in mind.

Hughson Arboretum and Gardens

In 1994, a longtime Hughson resident began to develop a small ornamental tree collection. In 2000, after visualizing the community benefit that could be provided, this citizen expanded the tree collection onto13 acres of land and established the Hughson Arboretum & Gardens non-profit organization and appointed a Board of Directors.

An interpretive planning process for the Hughson Arboretum and Gardens, geared to be a regional horticultural and educational institution, began in earnest in 2003. The Arboretum's mission was solidified during these activities: to "…plant, maintain and make available to the public, native tree and plant species, trees of historic value, or other types of plant material to promote education about and appreciation of our natural environment, to encourage the preservation of native plant species, and to provide the public with a place of peace and quiet contemplation." As part of the planning process, a master plan for the botanical garden has been prepared and the non-profit organization is working to implement the vision of the master plan.

The Board of Directors works with various community groups to improve the Arboretum. Several Eagle Scout projects have improved the signage and self-guided trail system and other improvement projects are currently in progress. This educationally oriented facility is a great asset to the City of Hughson's urban forest.

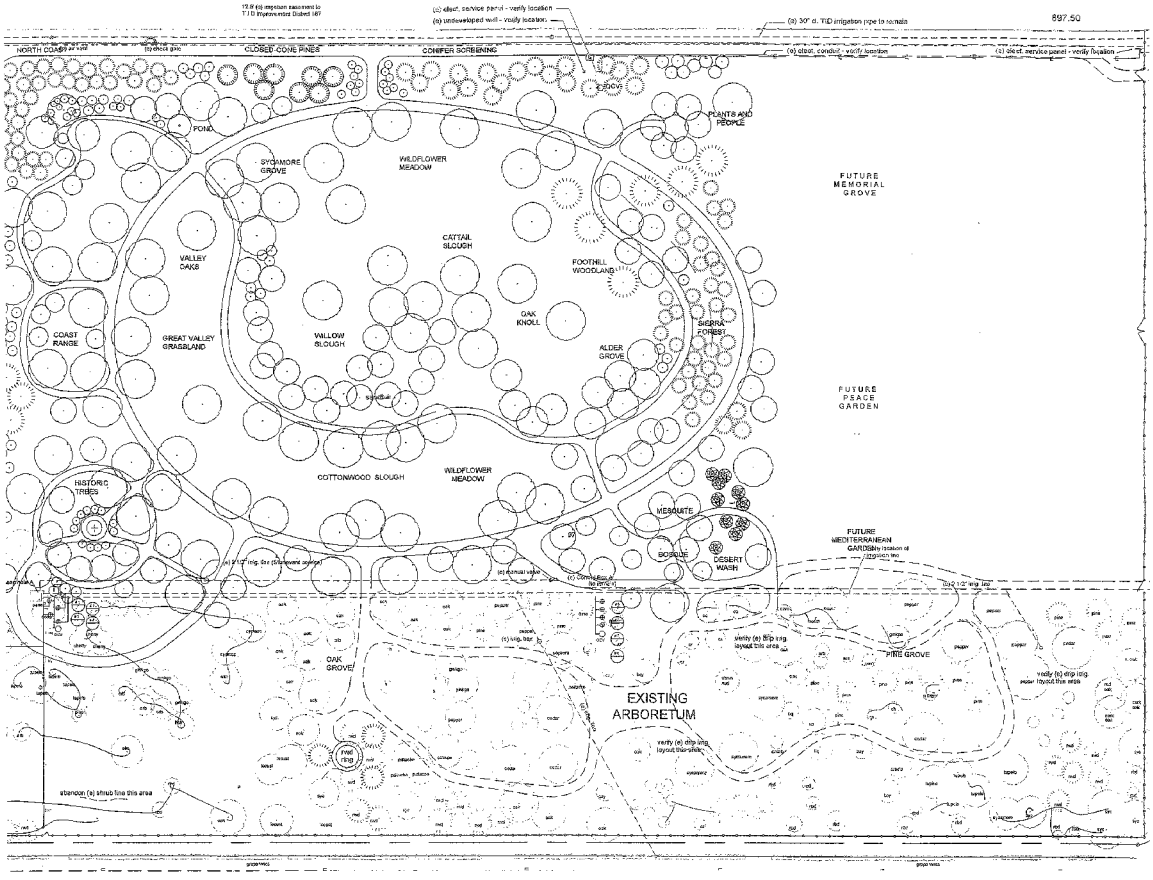

Figure 4.3. Map of the Hughson Arboretum and Gardens

Chapter 5: Urban Forest Management Principals

Introduction
Efforts to encourage tree planting in new developments is central to the City's development regulations. Other efforts, especially in areas lacking significant tree cover, should be continued and bolstered to promote expansion of City of Hughson's Urban Forests. Commercial developments, in particular, tend to have very low tree cover. Additional strategies to allow for tree planting in these areas could be considered. This situation is not unique to City of Hughson.

McPherson and Simpson (2003) found that only 6% of the trees in 21 California cities were found on commercial/industrial land uses. In contrast, 77% of the trees in these cities occurred in residential land uses. Furthermore, average tree cover in commercial/industrial areas averaged 7% compared with 24% tree cover in residential areas among cities in previously forested areas (Western Center for Urban Forest Research and Education 1997). Although the percentage of land area covered by pavement and structures in commercial sites tends to be high, increased use of trees with moderate to wide canopy spread (a minimum of 30 to 35 feet) could increase the canopy cover.

The following discussion focuses on the unique Tree Management approaches that might be applied in the development and expansion of City of Hughson's Urban Forests.

General Management Concepts
In many California cities, established trees are often subjected to poor pruning practices, particularly topping (cutting back large limbs to stubs). Topping can destroy tree structure and make trees more hazardous. In some areas of City of Hughson, that have overhead utility lines along streets, some trees have been topped to maintain utility line clearance. Although Turlock Irrigation District, the electrical utility provider in Hughson, as well as, other utilities are changing from topping to directional pruning (also known as "V" trimming) to maintain clearance, the best solution for planting under utility lines is to use species that will not grow tall enough to require clearance pruning.

Because most front yards contain at least some irrigated turf, the wide use of trees that tolerate lawn irrigation schedules, such as coast redwood and birch, is understandable. However, these and other high water use species tend to fare badly during drought periods, especially when they become large. Given City of Hughson's soil and climate, and the increasingly tight water supplies in the state, greater use of drought tolerant species should be encouraged.

In order to develop good branch structure that will reduce later maintenance needs, most young trees should be inspected, and pruned as needed, on a two to three year cycle until the permanent branch structure is developed. This is most important for hardwood trees (i.e., trees other than conifers) that will be medium to large-statured at maturity. Early training of conifers that have a typical excurrent growth pattern (like a Christmas tree) is much less critical and mainly consists of eventually removing low branches to develop clearance.

Irrigation is also a critical maintenance issue. As noted above, street tree plantings tend to be especially stressful because soil conditions are typically poor (high compaction, restricted soil volume) and summer water demand is high due to heat radiated off paved surfaces. In these sites, trees with moderate to high moisture requirements can easily become critically stressed if irrigation is inadequate. Improperly adjusted timers or malfunctioning equipment can result in water deficits that can severely damage

established trees and can kill young trees.

Maintenance needs in street tree plantings could be reduced by phasing out high water-use species in favor more drought tolerant species. In many sites, drought tolerant tree species, including locally native oaks, may be able to grow with little or no irrigation. For example, in relatively wide beds that have adequate amounts of soil that is suitable for root growth, species such as blue oak should be capable of surviving without irrigation once established. Because blue oak would grow relatively slowly in these sites, its pruning requirements would also be low. In many sites, it may be possible to establish locally native oaks from seed among existing plantings. Eventually, such oaks could replace shorter-lived, higher maintenance species that were originally present in the plantings.

A moderate percentage of the tree species in the current plantings will be small-statured at maturity. Small tree size is necessary and desirable in tight planting situations, including plantings under utility lines. However, a number of relatively large beds with dense plantings of small-statured trees such as purple leaf plum could alternatively accommodate a smaller number of large-statured trees. One consequence of the small-statured tree planting pattern is that little or no tree canopy is actually directly over pavement, so street surfaces will not receive substantial amounts of shade during the hottest periods. Many of the benefits that street trees provide are directly related to canopy size, and researchers have shown that the benefit-to-cost ratio generally increases with tree size (McPherson 2003). Overuse of small-statured trees greatly reduces many of the benefits that are associated with street tree plantings.

Age diversity within plantings is also an important factor that affects the long-term sustainability of the street tree population (Maco and McPherson 2003). Especially when genetically uniform clonal varieties are used, trees of a given species planted at a site at one time will also tend to reach the end of their useful life at the same time. In plantings that have a diversity of species and tree ages represented, only a small percentage of the trees will need to be replaced in any given year. Phased replacement of dead trees in the existing plantings following the replacement protocol outlined above will help produce a more stable mix of species and tree ages. This will also allow the city to gradually replace short lived species used in the original plantings with longer-lived, better adapted species.

Trees in parks

The City of Hughson maintains many improved parks with many acres of developed parkland to serve its resident population and visitors alike. These parkland include both planted trees and conserved native trees. These parks are a key contributor to the quality of life in City of Hughson. The trees in these parks increase the desirability and usability of the parks by providing critical shading and visual interest. They also provide habitat for wildlife species and enhance opportunities for wildlife viewing within the city. Trees in parks also provide a variety of other benefits, such as controlling soil erosion, intercepting particulate and gaseous air pollution (carbon sequestering), and reducing urban noise. Trees are a long-term asset of City parks that need to be managed in a way that maintains their utility and safety for as long as possible. Heavy human use of park lands and maintenance of turf and other park assets can also impact tree health.

Management issues

- If native oaks are planted in parks adjacent to natural oak stands, seed sources of planted material should be from the City of Hughson area.
- Site assessments should be conducted before replanting empty planting spaces so that corrective actions can be taken if necessary to

improve the planting site and/or species selection.

- City of Hughson parks contain many young trees which need to be inspected and pruned to develop good structure. Timely pruning of young trees reduces later maintenance needs.
- Many older trees are developing problems associated with poor structure or decline that will require more expensive pruning of large branches to mitigate hazardous conditions.

Trees per acre

The overall density goal of trees in city parks should range from about 15 to 50 trees per acre depending on park size and purpose. For example, parks used for active recreation purposes (ball fields, swimming, court games, etc.) would typically have lower density of tree plantings.

Tree condition and management concerns

Although tree structure and pruning concerns were common in all types of parks older parks generally have older trees, which are prone to certain problems not seen in young trees. In addition, some older parks have problems associated with certain design elements (e.g., inadequate rootzone protection and irrigation near conserved oaks) and plant materials that are no longer used.

Parks typically represent sites with sufficient space to grow trees that have large canopies at maturity. Researchers at the Forest Service Center for Urban Forest Research at UC Davis have shown that a mature large-statured tree provides an annual net benefit two to six times that of a mature small-statured tree. (http://cufr.ucdavis.edu/products/cufr_419.pdf).

Management approaches

In recently-constructed parks with uniformly young trees, the major tree maintenance issue is early structural pruning to develop good permanent branch structure. Other issues include avoiding wounding trees and replacing young trees that have died. Older parks are more likely to have trees of mature size, including both fast-growing non-native species and conserved oaks. These older and larger trees tend to have more problems related to pests and diseases and potential hazards related to poor structure and dead or declining branches.

City-maintained trees along streets and parkways

The City of Hughson Public Works Department maintains some trees in its right-of-way along City streets and parkways throughout the City. These include plantings in street medians and along street shoulders. Well-designed and properly maintained street tree plantings not only enhance the aesthetics of City streets and the community as a whole, but can provide a variety of other benefits. Shading and evaporative cooling provided by trees are obvious benefits, but street trees can also help intercept particulate and gaseous air pollutants; moderate stormwater runoff; increase traffic safety through traffic calming effects that tend to reduce vehicle speed; extend the life of asphalt paving through shading; and have positive economic impacts on businesses located along streets.

Management issues and approaches

- Irrigation is critical for maintaining the condition of most of City of Hughson's street trees. Increased use of more drought tolerant species would reduce street tree maintenance costs.
- Phased replanting of empty sites could be used to increase the percentage of drought tolerant species among city street trees and increase age diversity within the plantings.
- Soil problems have been a common cause of poor tree performance (compaction/limited surface area exposure) in street tree plantings. When dead trees are removed, the planting site should be assessed to determine whether adverse conditions need to be corrected before

the site is replanted.
- If street shading and other benefits of tree canopy are a goal of street tree plantings, greater use of large-statured trees will be needed in future plantings.
- By monitoring species composition of new plantings, the City can avoid overuse of the most common tree species.
- Because soil conditions and planter arrangements can vary widely between different roadway segments, long term management plans should be developed for specific street segments to guide tree replacement.

Canopy cover along residential streets should be an important goal along residential streets as opposed to tree plantings along commercial and industrial street and major roadways that accommodate high traffic volumes.

Much of the variation must be considered in the number of trees per street mile depending of type of street section, street level of service and neighborhood. Density can range from one (e.g., center median only) to three (median plus both shoulders). If the number of planting beds is taken into account, the average number of trees per street mile per planting bed is 160, with a range of 58 to 264. This corresponds to an average of one tree for every 40 feet of roadway per landscaped bed.

Many of the species in these city maintained street tree plantings do not have a very wide canopy spread at maturity. Assuming an overall average canopy spread of 25 to 30 feet at maturity for each tree, an average of one tree per 40 feet of roadway will generally not provide a continuous tree canopy if all trees reach mature size. Canopy spread in residential neighborhoods is of greater importance in residential neighborhoods than in some commercial and industrial districts.

Tree canopy cover over streets

The shading of paved surfaces by trees provides several important benefits. The amount of shading over streets can be quantified by evaluating Canopy Cover at the Edge of Pavement (CCEP). CCEP is reported as the percentage of pavement edge (the line defined by the junction of the street and curb) that has tree canopy directly over it. (http://www.isa-arbor.com/publications/tree-ord/ccep.aspx). Trees that provide any substantial shading at the pavement edge typically extend over the street as well.

The low level of CCEP was due to three factors:
- Trees are commonly placed well back from the sidewalk, and commonly well beyond the public utility easement along the street;
- Relatively few large-canopied trees are planted in residential front yards
- Most trees are still far below their mature canopy spread.

To account for the effect of the third factor (tree maturity), Based on these data, the number of trees with CCEP could triple to about 16% if all trees currently present attain their typical mature spread. When expressed on the basis of trees per street mile (counting both sides of the street), the number of trees providing CCEP is expected to increase from 19 trees/street mile to 62 trees/street mile as the current tree population grows to mature size. Most of these trees will only provide a few feet of CCEP at maturity. Assuming an optimistic average 8 feet of CCEP per tree on average, the 62 trees per mile will provide about 500 feet of CCEP, or about 5% CCEP on each side of the street. By comparison, a well-canopied street would typically have at least 50% CCEP.

Species composition

In general, a high level of tree species diversity is desirable to reduce the chance that a major problem that develops in one species will impact a high percentage of the total tree population. A commonly-

used guideline is that a single cultivated species should not make up more than 10% of the urban street tree population.

The number of tree species present within a given street segment tends to increase as the age of the development increases. Some of the most recently constructed neighborhoods had as few as six frontyard species, whereas older neighborhoods typically had 15 or more species. The increased diversity is the result of both tree replacement and additional plantings by homeowners. High species diversity is generally desirable for reducing risks associated with pests and diseases.

Privately-maintained trees along residential streets
These and most of the other trees in City of Hughson's urban forest are owned and maintained by City of Hughson residents. Hence, it is important to consider the status of this resource, which provides a wide variety of benefits to the City as a whole. In particular, the traffic calming effect produced by having rows of trees along roads can reduce vehicle speeds and make residential neighborhoods safer. Studies also show that trees in neighborhoods are associated with stronger ties between neighbors and lower crime rates (Kuo 2003).

Overview
- Most City of Hughson neighborhoods have at least a moderate numbers of trees in front yards.
- Most residential front yard trees are relatively young and well below mature size.

Management issues and approaches
- A few commonly used tree species may not be sustainable over the long term. Providing more information on tree species to tree planters (both homeowners and developers who plant trees in new residential developments) may help them make better species selections.
- Increased use of drought-tolerant tree species, including locally native oak species, should be encouraged where appropriate.
- Residents with conserved native oaks may need more guidance on how to effectively maintain these trees in residential landscapes.
- Educational efforts should be undertaken to ensure that residents are aware of proper tree pruning practices to keep topping and other destructive practices from gaining a foothold in City of Hughson.

Trees in commercial parking lots
Parking lots can occupy a substantial amount of a city's land area. In Sacramento for instance, 5.6% of the land area is occupied by parking lots (McPherson 2001). Trees in parking lots help mitigate some of the negative environmental impacts of parking lots while improving their appearance. Adequate numbers of appropriately placed trees can mitigate stormwater runoff and reduce the temperatures of both pavement and vehicles, thereby improving both water quality and air quality. However, parking lots can be harsh sites for tree growth, so good site design and proper tree maintenance are needed to achieve the benefits that parking lot trees can provide.

Management issues and approaches
- Changes in parking lot planning and tree maintenance practices have been made to increase levels of parking lot shading in City of Hughson.
- Lower ratios of parking spaces per tree can help increase shading, but only if coupled with proper tree placement and tree size.
- Soil conditions need to be improved in many existing parking lot tree planting sites to improve tree growth, condition, and survival. Soil problems should be avoided or corrected before the original planting and corrected as needed before replanting empty sites.

- Tree species used in parking lots should only include those that are adapted to the relatively harsh site conditions.
- Native oaks retained in parking lots can sometimes provide many years of substantial canopy cover even if the root-zone has been excessively encroached upon by construction activity. Greater levels of root-zone protection would improve the long-term health and survival prospects of most retained trees.
- Follow-up monitoring of parking lots is needed to ensure that trees are properly maintained and replacements are planted as needed.

Shading of parking spaces

Tree size, planter size, and the placement of trees in planters all influence whether trees actually shade parking spaces. Small-statured and young trees are less likely to extend over parking spaces, especially if they are in large planters, such as those that border parking lots. As a result of forecasted changes in summer temperatures, due to climate change, some older City of Hughson parking lots will become uninhabitable during mid-day summer months. This will have an adverse impact on retail and service activity for businesses that rely on these customer parking areas. The city should work with the owners of these parking facilities to improve long-term tree shading patterns and improve the parking environment.

Tree health and maintenance are factors that influence levels of shade that develop in parking lots. If growing conditions are poor, both new and older trees will remain stunted and will not attain the size anticipated in the approved landscape plan. Tree canopy size can also be restricted by improper pruning practices, such as topping.

Parking lot canopy cover is also adversely affected by premature tree decline and death. This is particularly critical along south (mid-day) and west (afternoon) facing street parameters. Tree death and removal causes an immediate loss of tree canopy. If trees are not replaced, the ratio of parking spaces per tree is increased over the long term. Even if trees are replaced, the new trees are small and typically do not provide significant shade for a number of years. Any program to develop better-shaded parking lots has to include provisions to replace lost trees and monitor the health and maintenance of existing trees.

As currently designed and constructed, parking lots are typically not good sites for tree growth. This is a recognized problem throughout the United States and ameliorating these harsh growing conditions is the focus of much urban forest research. Soils under pavement are normally compacted to levels that inhibit root growth. Compacted soils may also drain poorly, leading to long periods of soil flooding in the winter or after irrigation. Impervious pavement reduces the amount of water and oxygen in the soil, further restricting root growth. Un-shaded pavement absorbs and re-radiates heat, making summer growing conditions especially hot. Due to all of these factors, small cut outs in paved areas are very difficult environments for tree growth. Berms, mounds, and slopes, which are common in planters around the edges of parking lots, can be excessively dry sites because much of the applied irrigation runs off from the sloped areas.

These negative features can be mitigated to some degree through design and construction techniques. Increasing planter size and using linear planters can provide greater amounts of rootable soil, but only if the soil is deeply tilled to reduce soil compaction and improve drainage. Irrigation systems must be designed and operated to ensure that applied water does not simply run off. Some areas of impervious pavement can be replaced by pavers or other pervious materials within the root-zone. Structural soil mixes, which provide adequate levels of aeration and pore space

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when compacted to engineering specifications, can be also be used to increase the root-able area beneath pavement. Tree species that are more tolerant of heat and drought can be used in preference to species that do not perform well under such conditions. Some of these improvements, such as de-compacting planting beds and making use of permeable paving materials may require some additional costs at the construction phase, but these modest investments will pay off in terms of reduced maintenance, superior tree performance, and more shade-related benefits over the long term. In older lots, efforts to ensure that missing trees are replaced will be more successful if they include soil modifications to improve growing conditions.

Figure 5.1. Mexiacan Fan Palms in The Hughson Arboretum and Garden

Chapter 6: Planting Guidelines

General Qualities Desired for Trees

How an urban forest prospers, and the impact it has on a community, depends on the types and location of the trees being planted. Over the years a variety of trees have been planted in City of Hughson. Most of the trees present have done as well as can be expected in an urban setting. Certain trees have undesirable traits in an urban setting, which can overshadow their benefits. While each tree has limitations and there is no completely ideal tree, certain characteristics are important in the selection of trees, particularly trees to be planted in public spaces. Trees with the following characteristics are preferred:

- Trees that adapted to this area.
- Trees that have a longer life span than 25 years.
- Trees that do not have a history of brittleness or anchorage problems.
- Trees that are not known to have serious pest, disease, or fruiting problems.
- Trees that will not require a high level of maintenance.
- Trees that have an attractive appearance, especially with some fall color.
- Trees with root systems that are not overly aggressive.

While efforts are made to find trees with these characteristics, at times unknown problems later develop. Therefore, it is important to anticipate any possible problems that may occur later when determining the selection and placement of trees and all other issues related to planting. A list of trees found to be most compatible in the urban environment of City of Hughson is found in the City's Master Tree

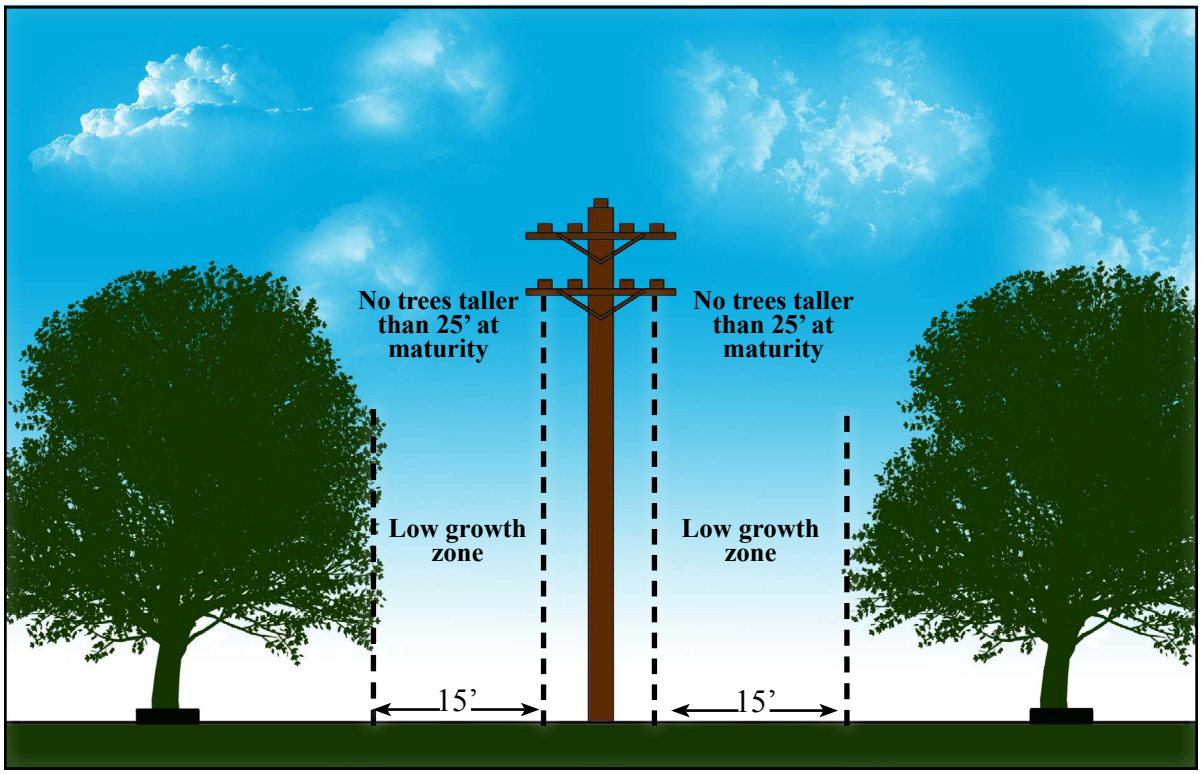

Figure 6.1. General placement of trees

List found in Appendix A. Other trees may be added to this list from time to tome as they are found to meet the objectives of the City's Urban Forest Program.

General Placement of Trees

The local utility company should contact, before planting, to locate underground water, sewer, gas, and telecommunication lines. Note the location of power lines, streetlights, and traffic signs, and select tree species that will not conflict with these aspects of the city's infrastructure. Keep trees at least 30 feet (10 m) away from street intersections to ensure visibility. Avoid planting shallow rooting species near sidewalks, curbs, and paving.

General guidelines for placement of tree in and around overhead utility lines, particularly with respect to overhead power lines, are as follows:

- Establish a 15-foot low-growth zone on both sides of all electric lines. The zone under the electric power lines should be a low growth tree planting zone as well as a shrub and flower planting zone on public and private landscape plans.
- Keep in mind that when planting under power service drops; a flower and shrub-planting zone is best.
- Do not plant tall trees (trees that are or will exceed 25-feet at maturity) under or within 15-feet of the side of overhead electric lines. In general, do not plant trees near power poles.
- Do not plant trees and shrubs near power poles. Consider safety and access for repairs.
- Do not plant trees within 10 feet of underground electrical utility lines. If you are unsure of the location of the underground electrical utility lines call Underground Service Alert (USA) at 811.

Tree roots can heave pavement if planted too close to sidewalks and patios. Generally, avoid planting within 3 feet (1 m) of pavement, use root barriers and remember that trunk flare at the base of large trees can displace soil and paving for a considerable distance. Select only small growing trees (<25 feet tall) for locations under overhead power lines, and do not plant directly above underground water and sewer lines. Avoid locating trees where they will block illumination from streetlights or views of street signs in parking lots, commercial areas, and along streets.

Maintenance requirements and public safety issues influence the type of trees selected for public places. The ideal public tree is not susceptible to wind damage and branch drop, does not require frequent pruning, produces little litter, is deep-rooted, has few serious pest and disease problems, and tolerates

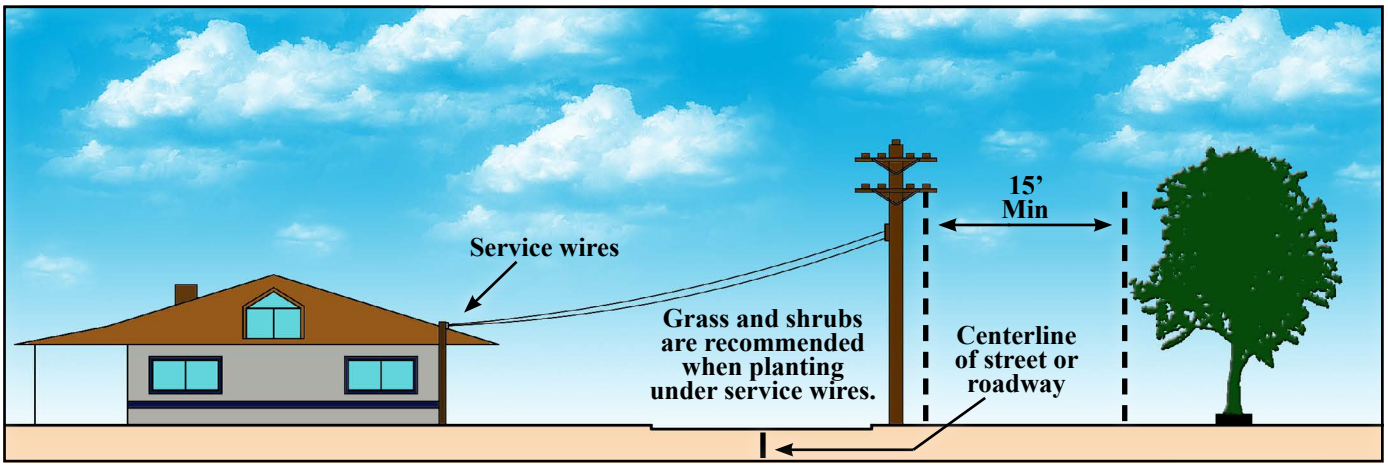

Figure 6.2. General placement of trees

a wide range of soil conditions, irrigation regimes, and air pollutants. Because relatively few trees have all these traits, it is important to match the tree species to planting site by determining what issues are most important on a case-by-case basis. For example, parking lot trees should be tolerant of hot, dry conditions, have strong branch attachments, and be resistant to attacks by pests that leave vehicles covered with sticky exudate. Consult the City's Master Tree List in Appendix "A", the Descriptions and Management information in Appendixes "B" and "C" and a local landscape professional for more horticultural information on tree traits.

Locating and Selecting Trees to Maximize Climate Benefits

Locate trees in common areas, along streets, in parking lots, and commercial areas to maximize shade on paving and parked vehicles. Shade trees reduce heat that is stored or reflected by paved surfaces. By cooling streets and parking areas, they reduce emissions of evaporative hydrocarbons from parked cars that are involved in smog formation. Large trees can shade more area than smaller trees, but should be used only where space permits.

Because trees in common areas and other public places may not shelter buildings from sun and wind, CO2 reductions are primarily due to sequestration. Fast-growing trees sequester more CO2 initially than slow-growing trees, but this advantage can be lost if the fast-growing trees die at younger ages. Large growing trees have the capacity to store more CO 2 than do smaller growing trees. To maximize CO2 sequestration, select tree species that are well suited to the site where they will be planted. Use information in Appendix "B" and "C" and consult with your local landscape professional to select the right tree for your site. Trees that are not well adapted will grow slowly, show symptoms of stress, or die at an early age. Unhealthy trees do little to reduce atmospheric CO2, and can be unsightly liabilities in the landscape.

Some of the following guidelines may help you maximize their ability to serve as CO2 sinks:

- Provide as much pervious surface as possible because soil and woody plants store CO2.
- Maximize use of woody plants, especially trees, as they store more CO2 than do herbaceous plants and grass.
- Increase tree-stocking levels where feasible, and immediately replace dead trees to compensate for CO2 lost through tree and stump removal.
- Create a diverse assemblage of habitats, with trees of different ages and species, to promote a continuous canopy cover.
- Select species that are adapted to local climate, soils, and other growing conditions. Adapted plants should thrive in the long
- Group species with similar landscape maintenance requirements together and consider how irrigation, pruning, fertilization, weed, pest, and disease control can be minimized.
- Compost litter fall, and apply it as mulch to reduce CO2 release associated with irrigation and fertilization.
- Where feasible, reduce CO2 released through landscape management by using push mowers (not gas or electric), hand saws (not chain saws), pruners (not gas/electric shears), rakes (not leaf blowers), and employing local landscape professionals who do not have to travel far to your site.
- Consider the project's life span when making species selection. Fast-growing species will sequester more CO2 initially than slow growing species, but may not live as long.
- Provide a suitable soil environment for the trees in plazas, parking lots, and other difficult sites to maximize initial CO2 sequestration and longevity.

Chapter

6

Street Trees
Street trees are planted on public rights of way or easements. This portion of the property extends inward from the street curb. Except in locations where cut outs in the concrete are present, or where planter strips exist, trees have historically been planted to within 10'' to 12'' of the edge of the right of way and/ or easement that extends into the property. Today a more practical approach to planting trees is practiced. The following are standards for tree placement.

Planting Patterns for Street Trees.
There are several ways to arrange trees in an urban area. Trees can be planted in:

a. Diverse species plantings.
b. Uniform species plantings (monoculture).
c. Semi uniform plantings.

All of the methods have been used within the city. However, this plan goal is to eliminate the uniform species plantings (monoculture).

Diverse Planting Culture
Planting a variety of species in an urban area is very beneficial from a disease prevention standpoint. Having many different kinds of trees assures that if a disease is introduced, only portions of the urban forest will be affected. Diverse species planting also prevents the problem of a general decline of all trees if only a single species is used. It is generally agreed that a city should not have more than 10% of its tree population planted to a single species. A shortcoming of this type of planting is that additional maintenance is required compared to uniform grouping because each tree species can differ greatly. In addition, diverse population does not provide the harmony that uniform planting does. However, there is some assurance that no single disease will wipe out your urban forest, and this is the recommended strategy for planting street trees in City of Hughson.

Uniform Planting Culture
At the other extreme, a uniform or mono-culture planting allows for easier maintenance, unifies the neighborhood with a common species, and provides consistency to a planting program. For example, in older portions of the City, mono-culture plantings have resulted in trees reaching maturity at the same time and may need to be replaced all at once or over a short period of time. As an another example, the Modesto Ash is susceptible to a disease called Anthracnose, which can kill the tree. In a mono-culture one disease species can kill all of the street trees in a neighborhood.

Semi-Uniform Planting Culture
The Semi-uniform planting programs are a viable option for larger cities. The City of Hughson has implemented a small version of this type of planting program by establishing uniform standards within blocks, streets and some neighborhoods.

In Residential Areas.
a. One tree per lot or two trees per corner lot, unless an extremely large lot exists.
b. Trees are to be placed where they will have the most energy benefit to residents. This usually means centering them according to the living portions of the structure.
c. Trees are not planted within 6' of driveways or sewer lines.
d. Trees are not planted within the clear vision triangle on corner lots (usually 25' to 30' from corners).
e. Trees are planted no closer than 35', nor further than 90', to one another.
f. In some situations, such as streets that end in cul-de-sac (court), trees may not be planted at every residence due to the lack of space. Trees may not be placed at each residence in subdivisions with small lots where two lots jointly have a landscaped area of less than 60'.

At these locations only one tree may be planted in a location which will provide the greatest benefit for both residents.

g. Trees are not normally planted within 12’ of street light poles. In some cases this will not allow the planting of trees at a residence.

h. Trees should not be planted within 6’ of a fire hydrant.

In Commercial/Industrial Areas and Along Walls

The planting standards are:

a. Trees are spread 35’ to 40’ on center unless obstacles exist, such as power poles.

b. Trees are kept out of clear vision zone at corner intersections and near driveways.

c. Watering systems must be provided to the area by the developer.

d. Trees should not be located within 5’ of business signs or within 6’ of sewer lines.

e. Trees should not be planted within 6’ of a fire hydrant.

Trees for Parks and Other Public Places

Trees are used in parks as design elements. These elements are complex, living, growing things, changing with each season. They’re used for their esthetic and functional qualities. Trees used in parks fall into five general categories. The categories are

Figure 6.3. Hughson Arboretum and Gardens

perimeter, accent, transitional, specimen, and screen trees.

Perimeter trees match the physical characteristics of the city street trees adjacent to the park site. These characteristics would include size, texture, density, form, and color. Perimeter trees signal the user that he/she is entering a new environment. Accent trees are those which have an outstanding showy feature. Accent trees will typically have a seasonal show, be it flowers or a bright fall leaf color. This tree will draw the user's attention to entry points or a special park feature.Transitional trees are larger in scale than both perimeter or accent trees. Transitional trees are used to define the park as a large public open space. They are literally and physically the ceiling of the park space.

Specimen trees are unique or unusual trees not commonly seen in residential landscapes. Specimen trees introduce the park user to a broader spectrum of trees that grow in our climate zone.
Screen trees are evergreen, fine textured, and medium in size. Screen trees are used to conceal objectionable views, block nuisance lighting from playing fields and game courts, and at times, focus a park users eyes on a particular vista or park feature. While the transitional trees are the ceiling of the park, screen trees represent the wall of a park.

Tree placement in a park doesn't always fit into one of the five categories defined. Sometimes overlap occurs because of existing physical conditions that exist at the park site. These conditions would include wind direction, sun angles, soil conditions, topography, adjacent property uses, building types, and types of parks (active or passive).

General Guidelines for locating and Selecting

Figure 6.4. Street tree planting in the City of Hughson

Trees

Residential Yard Trees

Maximizing energy savings from shading the right tree in the right spot saves energy. In midsummer, the sun shines on the northeast and east sides of buildings in the morning, passes over the roof near midday, then shines on the west and northwest sides in the afternoon. Air conditioners work hardest during the afternoon when temperatures are highest and incoming sunshine is greatest. Therefore, the west and northwest sides of a home are the most important sides to shade. Sun shining through windows heats the home quickly. Locate trees to shade windows so that they block incoming solar radiation, but do not block views. In San Joaquin Valley communities, the East Side is the second most important side to shade.

Trees located to shade south walls can block winter sunshine and increase heating costs, because during winter the sun is lower in the sky and shines on the south side of homes. The warmth the sun provides is an asset, so do not plant evergreen trees that will block southern exposures and solar collectors.

Use solar friendly trees to the south because the bare branches of these deciduous trees allow most sunlight to strike the building (some solar unfriendly deciduous trees can reduce sunlight striking the south side of buildings by 50%). To maximize summer shade and minimize winter shade, locate trees about 10-20 feet (3-6 m) south of the home. As trees grow taller, prune lower branches to allow more sun to reach the building if this will not weaken the tree's structure.

Although the closer a tree is to the home the more shade it provides, the roots of trees that are too close can damage the foundation. Branches that impinge on the building can make it difficult to maintain exterior walls and windows. Keep trees at least 5-10 feet (1.5-3 m) from the home to avoid these conflicts but within 30-50 feet (9-15 m) to effectively shade windows and walls. Paved patios and driveways can become heat sinks that warm the home during the day. Shade trees can make them cooler and more comfortable spaces.

Shading your air conditioner can reduce its energy use, but do not plant vegetation so close that it will obstruct the flow of air around the unit. Keep trees away from overhead power lines and do not plant directly above underground water and sewer lines. Contact your local utility company before planting to determine where underground lines are located and which tree species will not grow into power lines.

Locating Windbreaks for Heating Savings

The winter heating season is not too long in the San Joaquin Valley, but heating costs can still be several hundred dollars per year. Because of their size and porosity, trees are ideal wind filters. Even leafless trees in the city can reduce wind speeds and heating costs. In situations where lot sizes are large enough to plant windbreaks, additional savings can be obtained. Locate rows of trees perpendicular to the primary wind direction — usually along the north and west sides of the property in the San Joaquin Valley. Design the windbreak row to be longer than the building being sheltered because the wind speed increases at the edge of the windbreak. Ideally, the windbreak is planted upwind about 25-50 feet (7-15 m) from the building and consists of dense evergreens that will grow to twice the height of the building they shelter (Heisler 1986, Sand 1991).

Avoid locating windbreaks that will block sunlight to south and east walls. Trees should be spaced close enough to form a dense screen, but not so close that they will block sunlight to each other, causing lower branches to self-prune. Most conifers can be spaced about 6 feet (2 m) on center. If there is room for two or more rows, then space rows 10-12 feet (3-4 m) apart.

Selecting Yard Trees

Chapter

6

The ideal shade tree has a fairly dense, round crown with limbs broad enough to partially shade the roof. Given the same placement, a large tree will provide more building shade than a small tree. Deciduous trees allow sun to shine through leafless branches in winter. Plant small trees where nearby buildings or power lines limit aboveground space. Columnar or upright trees are appropriate in narrow side yards. Because the best location for shade trees is relatively close to the west and east sides of buildings, the most suitable trees will be strong, resisting storm damage, disease, and pests (Sand 1994). Examples of trees not to select for placement near buildings include cottonwood (Populus fremontii) because of their invasive roots, weak wood, and large size, ginkgo (Ginkgo biloba) because of their narrow form, sparse shade, and slow growth, and pine trees (Pinus spp.) because of their evergreen foliage.

When selecting trees, match the tree's water requirements with those of surrounding plants. For instance, select low water-use species for planting in areas that receive little irrigation. Also, match the tree's maintenance requirements with the amount of care different areas in the landscape receive. Tree species that drop leaves and fruit may be more easily maintained in areas where litter disappears in coarse groundcovers or in a lawn where it can be easily raked up than in areas that are more difficult to clean. Check with your local landscape professional before selecting trees, to make sure that they are well suited to the site's soil and climatic conditions.

Conifers are preferred over deciduous trees for windbreaks because they provide better wind protection. The ideal windbreak tree is fast growing, visually dense, and has stiff branches that do not self-prune. Species in the pine (Pinus spp.), cypress (Cupressus spp.) genera, and evergreen oak species (Quercus spp.) are among the best windbreak trees for San Joaquin Valley communities.

Figure 6.5. Street tree planting in the City of Hughson

Chapter 7: Tree Maintenance Guide

Introduction
The general purpose of the City of City of Hughson's tree maintenance program is to:

- To keep trees in a safe condition.
- To care for the horticultural needs of the trees.
- To preserve the trees so that maximum benefits can be realized during their life cycle.

The City of City of Hughson has been responsible for routine and emergency public tree maintenance. Full-time City employees have performed such tree maintenance activities as pruning, spraying, staking and cabling. If the City cannot meet these duties on routine or emergency tree maintenance, then private contractors can be utilized.

Responsibilities, Duties and Authority of the Public Works Director
The Public Works Director, under the general supervision of the City Manager, has the authority and responsibility to maintain City of Hughson's public (street and park) trees in accordance with City of Hughson Municipal Code.

Service Area Maintenance
Private citizens can call to report street trees needing service. If the request is compelling, needed, and approved either by the street tree service personnel, or from a member of the Public Works Department, then the tree shall be maintained to the best of the service personnel's ability. At times when requests are high due to storm damage, the public should be made aware of possible lengthy delays in storm damage repair to trees.

Mistletoe
Uncontrolled mistletoe can become a serious threat to many of our shade trees in City of Hughson. Control of this parasite can be difficult due to the fact that primarily birds spread mistletoe. Birds eat the seeds of the mistletoe plant, whereupon the seed is passed through the bird's digestive tract. The parasite is then spread by the bird's excrement onto other trees.

The only way to control mistletoe is to interrupt its life cycle and remove the plant before seeds are produced. Since seeds are produced three to four years after the mistletoe plants emerge, effective control through plant removal must occur more often than three years.

Inspections
To determine the conditions of public trees and their future needs, inspections are an ongoing part of tree maintenance. All personnel working on trees are trained to look for potential or immediate problems. In addition, certain portions of the City are targeted for special inspections annually. These inspections are usually where older trees exist, where unusual problems have occurred, such as a particular disease, or at the request of individual residents. Based on these inspections, changes in schedule maintenance may be necessary.

Tree Inventory
The City has been seeking funding to pursue an inventory of the City's street and parkland trees. This inventory is expected to lead to the development of an accurate record keeping system of maintenance for the City's street and parkland trees. The inventory program can also provide the capability of monitoring the urban forest composition an estimate the carbon sequestering characteristics of the City's urban forest. This information allows the tracking of trees for liability and planning purposes and calculating the "carbon off-set value of the City's trees in meeting state standards for reducing greenhouse gases. Maintaining current public site tree inventory records is critical in assessing the needs of the entire urban

forest.

Pests and Disease
In an urban area, pest and disease have a more direct impact on trees than in a natural environment. Pests and disease cannot only harm or alter the appearance of trees, but can become a nuisance to nearby residents. This being said, in the search for new street trees the Public Works Department and the Planning Department took this factor into account. One of the characteristics of street trees chosen was the resistance, or pest free characteristics of the tree. While no tree is completely immune to pests, fungi or disease, none of the trees on our improved list is overly susceptible to pests or disease. In the event of an oversight on our part, we will address any pests or disease associated with the new trees when the problem arises.

Tree Roots
To have a healthy tree, a root system is necessary to provide support, water, and nutrients. While necessary, tree roots in an urban area are the source of many conflicts. This places roots in areas where lawns, sidewalks, curbs, sewers, and driveways are also present. As most of a tree's root system is not visible, prevention of conflicts and monitoring of root growth is not an easy task.

Citizens frequently contact the City about tree root conflicts. Under certain conditions, tree roots can be removed or severed without seriously damaging the tree. On a request basis, a representative from the Public Works Department will respond to these situations. If tree roots can be safely severed or removed, some recommendations are given. In some cases, however, tree roots cannot be safely cut, and an explanation is given to the citizen.

If roots can be safely cut, several options exist. An authorization can be given for a private party to cut or hire someone to do the cutting. Actual removal of tree roots is left up to the individual residents. A final alternative to severe root problems is tree removal. However, this alternative is not considered until all other alternatives mentioned above have been either tried or considered.

Upon discovery of the issue, action may be taken to repair public walks or curbs damaged by tree roots by the property owner. The action could include removal and replacement of the damaged walks or curbs, patching the sidewalks, or planning of the curbs. The property owner coordinates these efforts with the Public Works Department; certain criteria for repair are used, and are available through the Public Works Department.

A common root problem that occurs often is between tree roots and sewer lines. While the City maintains the main lines, the lateral lines are the responsibility of the property owner. Tree roots can enter these lines through small cracks or openings caused by normal deterioration. Once inside, the line blockage can quickly occur. Some root cutting may be possible to minimize sewer problems; however, replacement of the damaged sections is often necessary by the property owner. Trees planted near sidewalks, driveways or other non-pervious surfaces shall be installed with root barriers.

Overhead Wires
There are trees throughout the City that grow into electrical or communication lines. The City personnel can work low voltage lines such as house type and communication lines around when proper training is given. Trees will be pruned according to good horticultural practices. The City cannot perform work on City trees within 10-feet of high-voltage electrical wires unless approved by the City Manager or Director of Public Works. If approved, only employees who have been trained in the clearance of high-voltage overhead wires may do the necessary work.

Street and Public Space Tree Protection
The following provisions will be enforced with respect to the protection of trees located on public sites including street trees:

a. No person shall remove, trim, prune, spray, or cut any above or below ground portions of any street tree in right-of-way or easement without first obtaining permission from the Public Works Director.

b. No person shall interfere or cause any person to interfere with any work being done under the provisions of this plan and the provisions of City of Hughson Municipal Code or by any employee of the city, or by any person or firm doing work for the city.

c. No person shall interfere or cause anyone to interfere with or damage any overhead wires or underground pipes or conduits while removing, trimming, pruning, spraying, or cutting any street trees in a right-of-way or easement. The owner of such facilities shall be notified when such work may interfere with or cause damage to the facilities. The cost of repair of the damage to overhead wires, round pipes or conduits shall be the responsibility of the person, firm or corporation doing or causing the work to be done. The City of Hughson and it officers and employees shall be exempt from the provisions of this subsection.

d. In accordance with this plan and City of Hughson Municipal Code it is unlawful for any person to injure or destroy by any means any tree planted or maintained by the city in rights-of-way or easements, including, but not limited to, the following:

1. Constructing a concrete sidewalk or driveway or otherwise filling up the ground around any street tree so as to shut off air or water from its roots.
2. Piling building materials, equipment, or other substances around any tree.
3. Pouring any deleterious material on any tree or on the ground near any tree.
4. Posting any sign, poster, notice, or other object on any tree, tree stake or guard, or fastening any guide wire, cable, rope, nails, screws, or other device to any tree, tree stake or guard, except as carried out or recommended by a registered arborist.
5. Causing or encouraging any fire or burning near of around any tree.
6. Using any mechanical weeding device against a tree.
7. Constructing retaining walls, fences, or other similar improvements, which prohibit the planting or maintaining of street trees or otherwise affect their growth.
8. Operating construction equipment in such a manner to cause it to contact the tree or the root system of any tree.
9. Disrupt the anchorage of the tree or change the grade around the tree.

e. No person shall plant a tree or other plant material in a planting strip or easement other than lawn or other similar planting materials, unless approved by the Public Works Director.

Planting and Maintenance

a. In new subdivisions the City will require that the subdivider supply, replace or plant approximately one tree per lot, excepting corner lots, where 2-3 trees will be planted.

b. The property owner or occupant, as the case may be, shall be responsible for watering street trees located in planting strips or easements abutting their property.

c. This section shall not prevent any person, firm or public utility from installing and maintaining any overhead wires or underground pipes or conduits lawfully on,

over or under public streets or public rights-of-way subject to the provisions and requirements of this plan and City of Hughson Municipal Code. The Public Works Director, when reviewing plans for planting, maintenance or removal of street trees shall consider the effect upon existing overhead wires or underground pipes or conduits and shall avoid unnecessary disturbance to or relocation of said facilities.

Removal and Replacement

a. The Public Works Director shall be responsible for inspection, maintenance, removal and replacement of street trees planted within rights-of-ways or easements. The Public Works Director may cause street trees or other plant material planted in a right-of-way or easement to be removed by the city if they are deemed by the Public Works Director to be unhealthy, hazardous, undesirable or causing excessive damage to existing public improvements, or street trees.

b. The Public Works Director shall have the authority to require property owners to take

Figure 7.1. Tree Maintenance in the City of Hughson

such action as is necessary to control insects, scales, parasites, fungus, and other injurious pests or plant material that would cause serious injury to street trees and other plant material within the city. The city shall notify the property owner in writing, describing the conditions and stating the control necessary to correct the condition, and establishing a reasonable time within which the corrective steps shall be taken.

c. The Public Works Director shall have the authority to require property owners to remove or prune any privately planted tree, shrub, vine, or other plant material if it is determined by the Public Works Director to be seriously interfering with the growth and health of any street tree.

d. In the event a property owner desires to remove a tree from the right-of-way or easement abutting his/her property, his/her authorized agent shall make application to the Public Works Department. The Public Works Director shall determine whether or not such tree is required to be retained in order to preserve the intent and purpose of the Street Tree Plan. In making his/her determination, the Public Works Director shall consider the inconvenience or hardship which retention of the tree would cause the property owner, and consider also the condition, age, and

Figure 7.2. Street tree planting in the City of Hughson

desirability of variety and location of the tree. If the Director finds that the tree may be moved without violating the intent and spirit of the Street Tree Plan, he/she may authorize the property owner to remove such tree at his/her own expense and liability. If a permit is granted for removal of a street tree, all removal work shall be completed within sixty (60) days from the date of issuance of the permit, and shall be under general supervision of, and in accordance with, rules established by the Public Works Director. All tree stumps shall be removed to a depth specified by the Public Works Director. All removal permits shall be void after the expiration of sixty (60) days from the date of issuance, unless extended by the Public Works Director.

Tree Trimming

Notwithstanding other provisions of this plan, it is the duty of every person owning or occupying any land or lots of land within the city to keep all private trees extending over any street or alley trimmed up to a height of not less than twelve feet (12') except that a height or not less than eight feet (8') shall be permitted over the sidewalk area, and also to keep said space clear of debris.

Cooperation with other Departments and Agencies

a. The Public Works Department shall review and approve all applications for new curb, gutter, sidewalk or driveway installation, or other improvement which might require the removal of or cause injury to any street tree.

b. Any public utility maintaining any overhead wires or underground pipes or conduits shall obtain permission from the Public Works Director before performing any maintenance to said wires, pipes, or conduits, which would cause injury to street trees. Said public utility shall in no way injure, deface, prune, or scar any street tree until the Public Works Director has approved their plans and procedures.

c. The Public Works Director shall be permitted to inspect any and all maintenance or operational work performed by public utilities, which might affect a street tree or street trees. During the performance of said work, if in the opinion of the Director, it would cause excessive or unnecessary injury to any street tree, the Director shall have the authority to stop said maintenance and operational work and arrange with said public utility another method of maintenance or operational work satisfactory to the city.

d. The provisions of subsection (b) and (c) of this section shall not apply to emergency public utility maintenance work, which is performed during non-working hours for city personnel.

Chapter 8: Tree Removal

Reasons for Tree Removal
Trees continually move through their life cycle in an urban area, just as they do in a natural forest. If the life cycle were allowed to go to completion in an urban area, ending in tree collapse and decomposition, numerous problems would arise. At some point in the life cycle, a decision must be made to remove a tree. A preservation approach exists in the City so those trees are not removed unnecessarily. When trees are removed, replacement generally occurs. Certain criteria are used to make the judgment of when a tree is removed. Five general categories are used:

A. Tree is dead, dying, or diseased
B. Tree poses a potential safety problem.
C. Tree is an undesirable species.
D. Tree is creating a hardship
E. Construction necessitates removal.
F. Tree is Dead, Dying, or Diseased
G. Conflicts with Utilities

Being a living organism, trees at some point die or become diseased, unless their life cycle is interrupted at an earlier stage.

When this occurs, the trees must be removed before the final decay processes set in and a safety problem occurs. Inspections will usually identify these trees on an annual basis.

Tree Poses a Potential Safety Problem
Trees can pose a potential safety problem, even with a good maintenance program. Growth habits and strengths of limbs and trunks are variable. It is also difficult to know what is occurring below the ground. Certain signs of decay or weakening can be detected during inspections. These signs can be such things as fungal growth, included bark, split trunks, cavities, or a poor general appearance. Even though the tree may still be functioning and producing benefits, inspections could show that a potential problem is present which poses a high risk to public safety.

If corrective steps are not feasible, removal of the tree is necessary. At times certain work, which is necessary around the root system of trees, could leave the tree with poor anchorage. Assessments are made of whether the tree must be removed. For example, if a tree is located near a sewer line and the property owner must gain access to repair the line, the tree may have to be removed because of severe root loss necessary to clear the area of roots for repair. Some trees can produce a fruit that could cause slipping problems for pedestrians, or other traffic, near it. If the fruiting habits cannot be stopped, removal of the tree may be necessary.

Tree is an Undesirable Species
Certain trees which have undesirable traits are present on rights of way or easements. Thorns, brittleness, heavy fruiting and extremely invasive root systems are some of the reasons a tree may be undesirable. Birds or citizens plant most of these trees. Occasionally a major problem may occur with an established street tree, which would make it undesirable. Some examples of undesirable trees are Willows, Poplars, and Mulberry. When an undesirable species is found, its condition and value are reviewed and removal may be necessary.

Tree is Creating a Hardship
Conflicts of some type occur with every tree. What is considered by some to be a hardship may not be to most people. For example, certain people consider leaf raking a hardship; others may feel that insect damage creates a hardship. Certain criteria have been developed to allow for consistent interpretation of a hardship.
Hardship is interpreted to mean structural problems, such as cracking or raising of a garage floor, which

could possibly be associated to tree roots. When alternatives have been attempted and the problem reappears or continues, removal may be considered.

Hardship is not extended to situations in the landscape, or with other non-structural improvements. Removal of trees due to hardship has been considered in the case of a handicapped person under special circumstances involving vehicle access.

Construction Necessitates Removal
Use of property can change, with the interest in new development. When existing trees are in conflict with improvements such as new building construction, removal is considered under permit procedures. However, if at all possible, the tree(s) will be preserved in new construction projects. If removal is the only alternative, the property owner is responsible for removal and replacement of trees. Replacement trees must be of a size as near to the size of the tree removed as possible, within practical limits, and in accordance to the Street Tree Plan.

Occasionally, in residential areas a property owner will want to widen a driveway where a tree exists. If the tree is less than six-inches (6") in diameter at a distance of four and a half feet (4 ½') above the ground, removal may be allowed under permit procedures. The property owner is again responsible for all costs and tasks necessary for removal and replacement of the tree. If a replacement is not possible, a charge equivalent to the current planting cost of a 24-inch boxed tree is assessed to the property owner.

Tree is Dead, Dying or Diseased
Where a tree is dead, dying or diseased removal is the only solution. A dead or dying tree poses a hazard with respect to fallen branches, etc. A diseased tree may infect adjacent trees and permit the spread of disease among other trees in the area.

Tree Conflicts with Utility Service
In instances where tree growth creates a conflict or potential hazard for overhead power or communication utility lines, removal of a tree may be the only solution. Preferably, trimming of the tree, in conflict, with utility service, is an adequate solution.

Figure 8.1. Street tree planting in the City of Hughson

Chapter 9: Reforestation

Introduction
A visitor driving through City of Hughson cannot help but noticing our beautiful tree lined streets and forested parkland. These trees did not spring up overnight. It was the vision of City officials many years ago to line our streets with a variety of trees and it is the aim of this document to continue that tradition well into the 21st century to keep our streets lined with beautiful trees. This will promote unity and community, as well as attracting visitors and prospective residents.

Replacement
When a tree is removed, a gap in our forest occurs. To replace these trees, a plan consistent with the total affected area must be considered. To do this, a map indicating what trees will be planted in existing neighborhoods should be developed by the Planning Department. This map will designate in general the species to be replanted on each street. Some deviation may be necessary based on how the specific site fits into the standard categories.

It is the City's practice to replace trees when they are removed, or to require homeowners to replace removed trees if they are in private property but in the Street Tree Area. Municipal Code Section 12.30.020 defines the Street Tree Area as…the street right-of-way, and five feet either side thereof. However, in some cases the trees removed may not be replaced. This occurs when there is not adequate room for replacement due to poor site selection originally or because adjacent trees exist which will fill the void quickly.

The older areas of the city that were constructed in the 1950's or 1960's have a high number of trees that have reached maturity or are declining. These neighborhoods have become accustomed to tree lined streets. In most cases, these older trees are removed on a gradual basis so that a minimal impact in the neighborhood can be felt.

Occasionally, a high number of trees may be declining at the same time in a limited area. This could result from years of severe drought, pest/disease infestation, damage caused by storms, or failure of the tree due to age. When this occurs special attention is given to minimize the impact on the neighborhood. This generally occurs when more than 50% of the trees in a neighborhood have been, or will be, removed within a five-year period. In this situation, a reforestation plan is drawn up which indicates:

1. Which trees will be removed
2. Over what time period the removal will be necessary
3. What impact the removals will have on the neighborhood
4. What type of tree will be used as a replacement, what size tree will be planted, and when planting will occur
5. What type of citizen contact will be necessary
6. The objective of this special attention is to minimize the transition problems associated with converting a tree lined street to a street with a mixed age population.

Reforestation plans may also be developed when a certain tree species develops multiple or specific problems and no practical solution to the problems are available.

Determination of Public Trees
The care of all trees on City owned properties such as parks and recreational areas are the responsibility of the City. Trees along the street that have at least the centerline of the tree at ground level within the right of way or easements are also considered to be a City responsibility.

Chapter 10: Other Considerations

New Development or Subdivision Street Tree Plans
In accordance with the development regulations of the City of Hughson, subdivision proposals and other types of new develop are, or may be, required to prepare a street tree plan. These plans are considered an amendment to the City of City of Hughson's Street Tree Plan and must be submitted to the Public Works Department and the Planning Department for review, and comment.

Damage to Trees by People
At times people damage trees intentionally or unintentionally. When the Public Works Department or Planning Department becomes aware of these situations, an evaluation is made and billing for damages is prepared if the responsible party can be located. Should damage be intentional, police action may be necessary.
The most common cause of tree damage is from vehicle accidents. Cars occasionally strike trees and other public property. Public trees are considered to have a value and an accurate assessment of tree value and/or damages to the trees can be determined.

Business Signs
Trees can cause visibility conflicts with the business signs. It is our practice not to prune trees for better visibility of signs. Some pruning may be done when scheduled maintenance is required on the tree. However, special arrangements are not made to alter the normal growth habit.

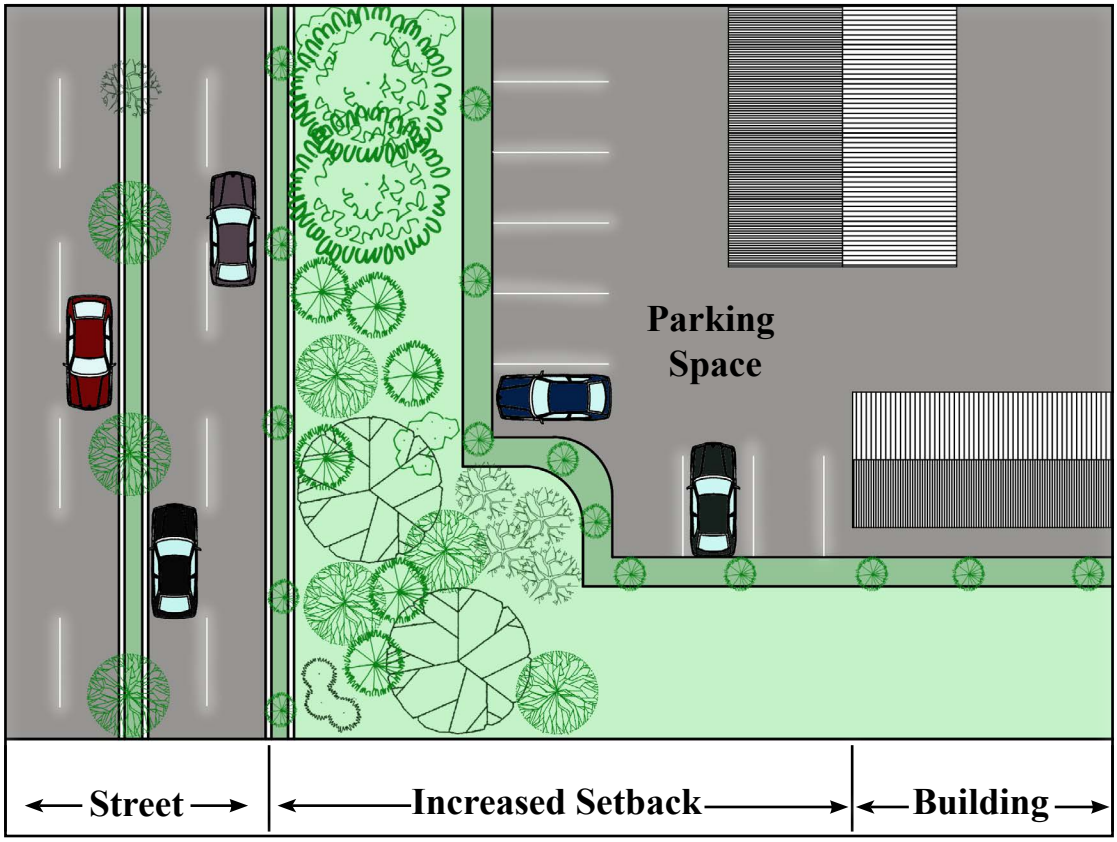

Figure 10.1. New development or subdivision street tree plan

Landscaped Sound Barriers

As part of the urban development process, large public and private landscape areas are typically set aside to buffer traffic and other noise sources from residential and commercial use areas. These buffer areas are ideal open areas for planting trees and adding other landscape elements.

Cars and trucks, and trains are the most pervasive outdoor noise sources. Several approaches can be taken to lower the impact of noise. Barriers are typically used to provide some noise attenuation. The amount of noise reduction depends upon the material and design of the barrier. Solid structures provide the most attenuation; vegetation will only abate noise a little, but psychologically can provide a more relaxed environment.

Site planning can also be used as a tool for noise reduction. Many site-planning techniques can be employed to protect sensitive uses from excessive noise. These are among others:

(1) Increasing the distance between the noise source and the receiver;

(2) Placing noise compatible land uses (parking, utility rooms, maintenance buildings, etc.) between the source and the receiver;

(3) Locating the barrier-type facility or building parallel to the noise source; and,

(4) Orienting the noise-sensitive use away from the source of noise.

All these techniques can be used to attenuate the actual noise reaching a noise-sensitive land use, without adding an excessive burden or cost to a specific proposal. At the same time, landscape, landscaped berm, and sound walls have varying degrees of effectiveness with respect to noise attenuation. Landscaping, however, is an important element in any noise attenuation plan. Trees, vines and bushes add texture to sound walls and help reduce graffiti and other vandalism.

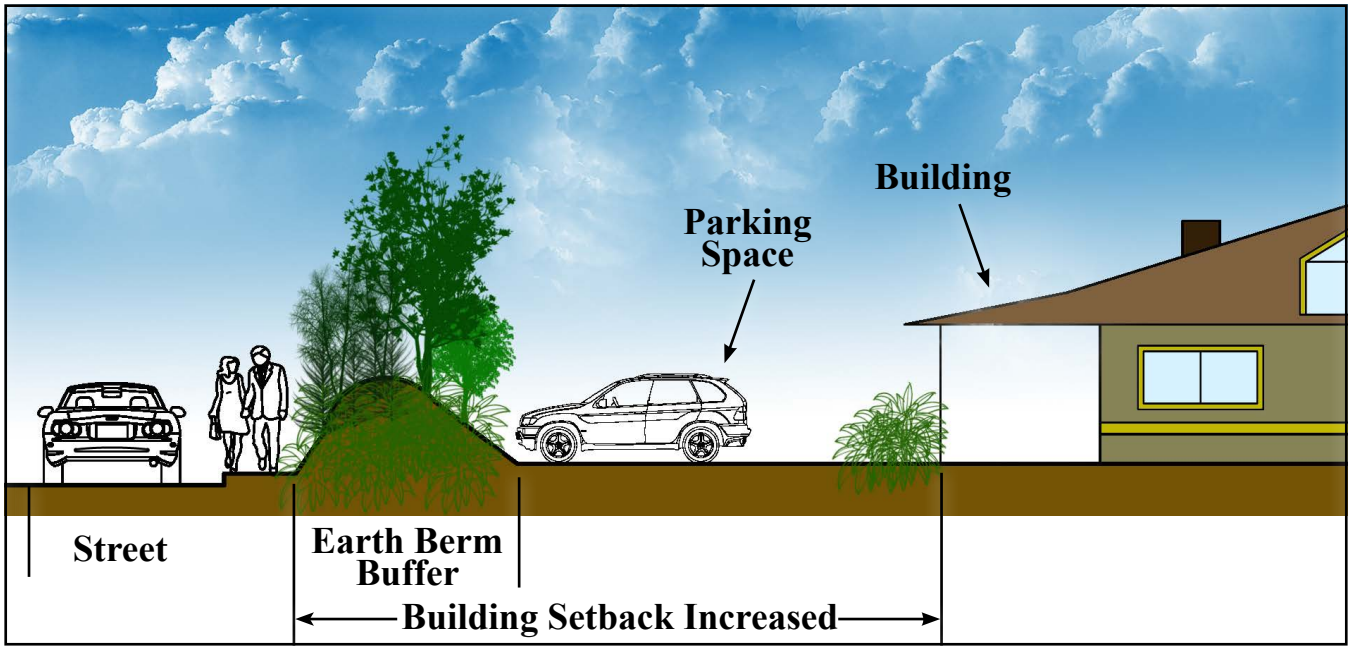

Figure 10.2. Landscape sound barriers

Chapter 11: Public Involvement

People play a major role in urban forest ecology
In City of Hughson, as in most urban areas, people are essential to the functioning of the urban forest. Urban environments can severely limit the ability of trees to become established and grow. Soil compaction, paved surfaces, buildings, and utilities can limit both below-ground rooting space and above-ground space for canopy spread. If people did not make space available, plant trees, and maintain them, trees would simply not exist in many urban areas.

Planting, maintenance, and removal
Unlike the natural forest setting, trees in urban forests require human management to be successful. In a natural forest, trees replace themselves and eventually die, fail, and decay, recycling their nutrients into the soil. These processes generally aren't allowed to proceed in the urban forest for obvious reasons.

Tree seedlings can sometimes establish in urban areas naturally from seeds dropped from existing trees or buried by animals in favorable sites such as landscape beds. However, generally trees must be planted if they are going to become established in sites where they can grow to maturity. To obtain a healthy, long-lived tree, people need to select the appropriate species for the site, adequately prepare the planting site, and select good quality planting material. Most trees in urban areas need some irrigation, at least during the establishment phase, applied in the right place, at the right times, in the right amounts. Inadequate and excessive irrigation are two common causes of tree death in urban areas, especially in new plantings

As trees become established, pruning is typically needed to ensure that trees develop a strong structure that will minimize later problems. Large, established trees need to be inspected and pruned as needed to ensure that dead or structurally weak branches do not pose a hazard to people or property within the tree's target zone. Large trees that are declining and hazardous trees typically need to be removed before they can fall, and the resulting waste typically must be disposed of actively, rather than passively decaying on the landscape.

Providers of tree care
A variety of people are necessarily involved in managing the various phases of trees' life cycles in the urban forest. Informed and trained residents can manage many of the basic aspects of tree care on their own, including planting, irrigation, and basic pruning of young trees. Even if these tasks are delegated to landscape maintenance contractors, property owners need to have enough basic knowledge about tree care to ensure the quality of tree care they are purchasing.

Because of the specialized skills and knowledge needed, trained tree care professionals are needed for most work on large mature trees. Again, property owners need to know enough to ensure that they hire a qualified professional that will protect their investment in their trees.

City of Hughson staff, manage the urban forest on city owned lands. In addition, city staff and their consultants can provide expertise needed to help manage the urban forest as a cohesive unit. The city can play a leadership role by looking at processes that extend beyond individual properties and providing strategies and technical information that will help further the community's urban forest goals. By providing locally appropriate information on tree planting and care, the city can help residents make good decisions on tree selection, planting, and care.

Partnerships between community residents and the City
The majority of City of Hughson's urban forest is, and will continue to be, managed by individual

landowners. If the city has an overall goal of maintaining and improving its urban forest, it will play a role in helping residents understand the importance of the urban forest and how to successfully manage trees on their properties. Because of limited resources, the city's support roles will be limited to providing information to individuals, groups and private land land-owners, on best management practices of preserving and maintaining the city's urban forests.

City-sponsored efforts

This document, the City of Hughson's Urban Forest Plan and Resource Guide contains many important Urban Forest management concepts that would be a valuable resource to private property owners and urban foresters in the city. Future efforts in public information will include the preparation and distribution of hand-outs and miscellaneous other available information on Urban Forestry to City of Hughson's residents.

City newsletters and utility bill inserts can also be used in the outreach effort. These avenues can be used to disseminate information directly (e.g., the handouts or excerpts from them, City tree regulations and guidelines, tree pest updates, etc.) or can be used to point residents to where the information can be accessed.

Community tree groups and volunteer projects

In the absence of a dedicated community tree group, the city can continue to partner with existing community organizations to coordinate tree planting and care projects by community volunteers. In addition to local schools, including Modesto Junior College, CSU-Stanislaus, local members of the UC Master Gardeners Program, the local California Native Plant Society chapter, the Hughson Arboretum and Gardens, the Hughson Garden Club, and similar groups could be approached to help in projects that may involve longer-term involvement than the typical one-day planting event.

A significant amount of effort is needed to establish and run a community tree group either on a fully volunteer basis or as a registered nonprofit organization. At least one highly motivated leader/organizer is needed as well as a contingent of active volunteers. Such groups also benefit from in-house expertise, such as from local tree professionals. Although the city can promote and facilitate the establishment of a community tree group, the availability and interest of community members is ultimately needed to develop a successful group.

Careful planning and concerted efforts are necessary to coordinate successful community volunteer projects. Projects need to be well-organized so that participants can feel like their time is being put to good use. Planting projects need to be followed up by necessary tree care, either by the city or by additional volunteer work, so that volunteers can see that their efforts are valued and result in a lasting legacy. Despite the effort required, successful volunteer projects provide a wide variety of long-lasting benefits. Besides the trees that are planted and cared for, community volunteer tree projects provide opportunities for residents to work together for the betterment of City of Hughson, as a community.

Chapter 12: Urban Forests Funding Resources

Internal funding sources
Currently, funding for the planting and care of trees comes from several sources. Developers are required to plant landscaping, including trees, in new city parks and public parkways constructed as part of a development plan. Subsequent maintenance of trees in these new public landscaping areas is funded through local assessment districts. In older areas that do not have assessment districts, the ongoing maintenance and eventual replacement of public trees along streets and in parks is derived from the City's General Fund, as part of the overall budget for the public works department and the parks department.

Grants provided by other agencies and organizations can serve to augment the city's existing sources of funding. However, many grant programs require that some matching funding be provided by the applicant.

External funding sources
Various grant programs administered by state and federal agencies or private foundations and organizations provide funding for a variety of projects related to urban forestry. Some grants are available directly to local governments, whereas others are only available to other entities, such as schools or non-profit community tree groups. By partnering with other groups, the city can expand its options for obtaining urban forestry grant funding.

External funding programs may change over time. Due to the current fiscal limitations experienced by the Federal and State agencies, funding for Urban Forest program efforts is extremely limited and highly competitive. Some state programs are funded by specific ballot propositions and have a limited lifespan. New programs also become available over time. The listing below includes grant programs that were in existence as of Spring 2012. Individual granting agencies and organizations should be checked for the current availability, guidelines, and deadlines for the grants listed. In addition, the website (http://www.grants.gov/) provides information on competitive grant opportunities from all Federal grant-making agencies and should be monitored for new federal grant programs. The Foundation Center website (http://www.fdncenter.org/) provides a variety of information related to grants provided by private foundations.

State and federally-funded grants

Environmental Protection Agency and Environmental Education Grants
The Grant Program sponsored by EPA's Office of Environmental Education supports environmental education projects that enhance the public's awareness, knowledge, and skills to help people make informed decisions that affect environmental quality. EPA awards grants each year based on funding appropriated by Congress. Annual funding for the program ranges between $2 and $3 million. More than 75% of the grants awarded by this program are for less than $15,000.
(http://www.epa.gov/enviroed/grants.html)

The California Resources Agency Environmental Enhancement and Mitigation Program
The Environmental Enhancement and Mitigation Program (EEMP) was established by the Legislature in 1989. It offers a total of $10 million each year for grants to local, state, and federal governmental agencies and to nonprofit organizations for projects to mitigate the environmental impacts caused by new or modified state transportation facilities. State gasoline tax monies fund the EEMP. Grants are awarded in three categories:

Highway Landscape and Urban Forestry--Projects designed to improve air quality through the planting of trees and other suitable

plants.

Resource Lands -- Projects for the acquisition, restoration, or enhancement of watersheds, wildlife habitat, wetlands, forests, or other natural areas.

Roadside Recreational -- Projects for the acquisition and/or development of roadside recreational opportunities.

(http://resources.ca.gov/eem/)

California Department of Water Resources

The Department's Urban Streams Restoration Program (USRP) provides grants for local projects that reduce flooding and erosion of urban streams, improve environmental values and promote community stewardship. Past grants have funded a variety of activities: creek cleanups; eradication of exotic or invasive plants; re-vegetation and bioengineering bank stabilization projects; channel reconfiguration to improve stream geomorphology and aquatic habitat functions; and acquisition of property critical for flood management.

A project may be eligible for a USRP grant if most of the questions below can be answered with "yes":

1. Does the proposed project address a stream-related problem?
2. Is flooding and/or erosion from the stream affecting an urban area?

(http://www.watershedrestoration.water.ca.gov/urbanstreams/)

Green Trees for the Golden State

These grants provide funds to help cities, counties, districts and non-profit 501c(3) organizations plant trees in public urban settings and provide three years of care for those trees. The goals of the grant program are to improve urban environments and to promote increased awareness in the proper planting and care needed to foster healthy community forests while incorporating community involvement, participation, education and stewardship. The original grant funding was provided by Proposition 12 in the year 2000. (http://www.ufei.org/grantinfo.lasso)

Non-governmental grants

American Forests/Global ReLeaf Urban Forests Program

American Forests is looking for quality tree-planting projects to be funded by their ReLeaf Forests. (http://www.americanforests.org/what-we-do/what-we-do-urban-forests/)

The Great Valley Center

The Great Valley Center serves the Central Valley's 19 counties by supporting innovative proposals for nonprofit work in the areas of Land Use, Economic Development, Growth, Agriculture, and Community Investment. During the past six years, grant sizes have ranged from $500 to more than $20,000, the average being $10,000. To date, about one in three applicants have received awards. (http://www.greatvalley.org/legaci/index.aspx)

The Conservation Fund/Kodak American Greenways Awards Program

The Conservation Fund supports an ecosystem restoration program. They are particularly interested in partnering with private and public sector organizations and agencies to plant trees and improve the environment in projects that would otherwise not be feasible. They support projects that plant the right trees in the right places for the right reasons. (http://www.conservationfund.org/?article=2106)

National Fish and Wildlife Foundation

The National Fish and Wildlife Foundation provides funding on a competitive basis to projects that sustain, restore, and enhance our Nation's fish, wildlife, and plants and their habitats. Their strategic plan organizes grant-making efforts into three broad areas: Keystones and Charters. All Foundation grants are awarded through one of these three areas.

(http://www.nfwf.org/programs.cfm)

ESRI-Sponsored Grants
ESRI, a leading geographic information systems (GIS) software developer, continues to seek relationships with organizations by partnering in common task initiatives. ESRI has found the best way to forge relationships is through education and grant programs. Free software, hardware, and training bundles are available under several ESRI-sponsored grant programs.
(http://www.esri.com/grants/esri/conservation.html)
(http://www.aiacc.org)

WalMart/Sam's Club Community Matching Grant Program
The Community Matching Grant Program is the largest program funded by Wal-Mart and Sam's Club. The Matching Grant program allows local nonprofit organizations to hold fundraisers at their local Wal-Mart or Sam's Club. Wal-Mart and Sam's can elect to match a portion of the funds raised up to $1,000. Events held off the premises of a Wal-Mart store or Sam's Club are also eligible for funding when a Wal-Mart or Sam's Club associate is actively involved in the event. Additionally, once the Wal-Mart or Sam's Club has met certain criteria in the Matching Grant Program each year, a second source of funding is awarded to the store / club to use in the community. These funds do not require a fundraiser to be held, instead the funds can be awarded directly to a deserving organization general matching grant and small grant programs, the Foundation administers a number of special grant programs with specific guidelines and time-lines.
(http://www.walmartfoundation.org/)

National Tree Trust Roots and Seeds Programs
The National Tree Trust believes strong organizations are key to healthy urban and community forests. Through the Seeds Program grant, established urban and community forestry organizations use funding for organizational needs, which include rent, staff salary and purchase of upgraded technology.
(http://www.nationaltreetrust.org)

The Home Depot Grants for the Environment
The Home Depot Foundation considers requests for grants to: 1) conserve forestlands and/or promote responsible forestry management, 2) encourage green building and sustainable design in affordable housing, 3) identify and help alleviate the causes of lead poisoning in children in at-risk communities, and 4) promote community recycling and clean-up.
(http://www.homedepotfoundation.org)

William Turnbull Jr. Environmental Education Grant
Ten years ago, after the passing of renowned architect William Turnbull Jr., FAIA, the Foundation Regents initiated a special environmental education grant, as a tribute to his legacy. The William Turnbull, Jr., FAIA Environmental Education Grant program, fosters the public's awareness of the relationship between the built and natural environments. This program has supported a number of community programs including the San Diego Zoological Society, the California Preservation Foundation, and the Greenspace Cambria Land Trust. In addition, they supported the Great Valley Center's efforts to help our communities think about building a livable future by sponsoring publication of Our Valley…Our Choice.
(http://aiacc.org/environmental-grants-program/)

Appendix A: Tree Descriptions

City of Hughson Urban Forest Tree Species Resource Guide
Sunset Western Garden Book
Climate Zone 8

Pistache Pistacia anacardiaceae
Deciduous or semi-evergreen trees. Divided leaves on all species. Flowers are now showy. Female trees bear fruit after several years if male trees are nearby. O species described, only P. vera bears edible fruit (nuts). Others are ornamental trees. Verticillium wilt may strike established trees. Minimize susceptibility by planting in well-drained soil, watering deeply and infrequently.

Chinese Pistache Pistacia chinensis
Moderate growth to 60 feet tall, 50 feet wide. Young trees often gawky and lopsided, but older trees become dense and shapely with reasonable care. Leaves with 10-16 paired leaflets 2-4 inches long by ¾ inches wide. Foliage colors beautifully in fall-scarlet, crimson, orange, sometimes yellow tones. Fruit on female trees bright red, turning dark blue. Not fussy as to soil or water; accepts moderately alkaline conditions, lawn watering though verticillium wilt is a danger or no summer watering at all (this only in deep soils). Resistant to oak root fungus. Stake young trees and prune for first few years to develop head high enough to walk under. Reliable tree for street or lawn, patio or garden corner planting.

Ash Fraxinus oleaceae
Deciduous trees, one almost evergreen. Trees grow fairly fast and most tolerate hot summers, cold winters and many kinds of soil (including alkaline soil). Chiefly used as street trees, shade trees, lawn trees, patio shelter trees. Fairly pest free.

In most cases leaves are divided into leaflets. Male and female flowers generally inconspicuous, in clusters) grow on separate trees in some species, on same tree in others. In latter case, flowers are often flowed by clusters of single-seeded, winged fruit, often in such abundance that they can be a litter problem. When flowers are on separate trees, you'll get fruit on female tree only if it grows near a male tree.

White Ash F. americana
Native to eastern U. S. and grows to 80-feet in height with straight trunk and oval-shaped crown. Leaves 8-15 inches long with 5-9 dark green, oval leaflets, paler beneath; turn purplish in fall. Needs some watering. Edges show burning in hot, windy areas. Male and female flowers on separate trees, but plants sold are generally seedlings, so you don't know what you're getting. With both male and female trees, you will get a heavy crop of seed; letter and seedlings a problem. Seedless selections include "Autumn Applause" and Autumn Purple", both with exceptionally good, long-lasting purple fall color; Champaign County" a dense upright oval with brown and purple fall color.

Green Ash, Red Ash F. Pennsylvania (F. lanceolata)
Deciduous, native to eastern U.S. Moderate grower to 30-40 feet in height forming compact oval crown. Gray brown bark; dense twiggy structure. Leaves 10-12 inches long, divided into 5-9 bright green, rather narrow, 4-6 inch long leaflets. Male and female flowers on separate trees. Takes wet soil and severe cold but foliage burns in hot dry winds. Seedless varieties include; Marshall, Summit, Bergeson, Emerald, Patmore, and Urbanite.

F. oxycarpa

Compact, small-leafed, fine-textured ash with delicate, lacy look. The species is not known in the West; the following selection from Australia is choice.

Raywood Ash, Claret Ash Fraxinus oxycarpa
Compact, round-headed, fast-growing tree to 25-35 feet. Produces no seeds. Purple red fall color.

F. holotricha
Deciduous tree. Native of eastern Balkan Peninsula. Upright, rather narrow tree to 40 feet in height. Leaves of 9-13 dull green, 2-3 inches long leaflets with toothed edges. Casts light, filtered shade. Leaves turn yellow in fall, dry up and sift down into lawn or ground cover, thus lessening litter problem.

F.h. Moraine Ash
Selected variety; more round headed than species, produces few seeds. Good lawn tree-neat, symmetrical, uniform bright yellow in fall.

F. velutina (Arizona Ash)
Deciduous tree. Native to Arizona. Tree withstands hot, dry conditions and cold to about –10 F. Pyramidal when young; spreading, more open when mature. Leaves divided into 3-5 narrow to oval, 3 inch long leaflets. Male and female flowers on separate streets.

F.v. Modesto Ash
Selection from tree in Westside Park, Modesto, California. Vigorous form of Arizona ash. Grows to about 50 feet, with a 30-foot spread. Medium green leaflets, glossier than those of the species, turns bright yellow in fall. In many area, Modesto Ash leaves get scorched look following a wet spring. This is caused by fungus disease called anthracnose. Control by spraying with benomyl. Prune out and dispose of infected wood; it can re-infect. Veticillium wilt is prevalent in agricultural areas; there is no control once it's started in young trees, but established trees often survive. Keep trees vigorous; if any are lost, replace with Raywood Ash. Control aphids, psyllids, and spier mites with contact spray. Resistant to oak root fungus.

Tulip Tree Liriodendron tulipifera
Deciduous tree. Fast Growth to 60-80 ft., with eventual spread to 40 ft. Straight columnar trunk, with spreading, rising branches that form tall pyramidal crown. Lyre-shaped leaves, 5-6 inches long and wide, Turn from bright yellow green to bright yellow (or yellow brown) in fall. Tulip-shaped flowers in late spring are 2 inches wide, greenish yellow, orange at base. Handsome at close range, thy are not showing on the tree being high up and well-concealed by leaves. They are not usually produced until tree is 10-12 years old.

Tree needs room, deep, rich, swell-drained neutral or slightly acid soil; plenty of summer water. Best where constant wind from one direction won't strike it. Control scale insects and aphids as necessary. Not bothered by oak rot fungus.

Good large shade, lawn, or roadside tree. Spreading root system makes it hard to garden under. Columnar variety 'Arnold' is useful in narrow planting areas; it will bloom 2-3 years after planing. 'Majestic Beauty' (L. t. 'Aureo-marginatum') has leaves edged with yellow. Moderate growth rate, size.

Autumn Gold (Maidenhair Tree) Ginkgo biloba
Deciduous tree. Graceful, hardy tree, attractive in any season, especially in fall when leathery, light green leaves of spring and summer suddenly turn gold. Fall leaves linger, then drop quickly and cleanly to make golden carpet where they fall. Related to conifers but differs in having broad (1-4 inch wide), fan-shaped leaves rather than needlelike foliage. In shape and veining, leaves resemble leaflets of maidenhair fern, hence name. Can grow to 70-80 feet, but most mature trees are 35-50 feet . May be gawky in youth, but becomes well-proportioned with age. Narrow to spreading or even umbrella shaped at maturity. Usually grows slowly, about 1-foot per year but under

ideal conditions can grow up to 3-feet per year. Plant only male trees (grafted or grown from cuttings of male plants); female trees produce messy, fleshy, ill-smelling fruit in quantity. Named varieties listed below are reliably male. Use as street tree, lawn tree. Plant in deep, loose, well-drained soil. Be sure plant is not root-bound in can. Stake young trees to keep them straight; young growth may be brittle, but wood becomes strong with age. Water through dry seasons until 10-20 feet high, then let tree become self-sufficient. In general, ginkgos are not bothered by insects or diseases. They are resistant to oak root fungus.

G. b. Autumn Gold
Upright, eventually rather broad.

G. b. Fairmount
Fast-growing, pyramidal form. Straighter main stem than; Autumn Gold', requires less staking and tying.

Oak Quercus fagceae
Deciduous or evergreen trees. Western homeowners acquire oak trees in either of 2 ways. They may plant the trees themselves, starting from a nursery plant or an acorn or they may simply have a native oak tree, left from the days when the land was wild, on their property.

The method of acquisition is quite significant. An oak tree planted in a garden will vigorously and fast (1 ½ - 4 feet per year). It probably will not experience poor health or any unusual pest attacks, whether it's a western native or not. Old wild tree, on the other hand, quite frequently cannot handle the surfeit of water and nutrients that they receive in a garden and must be given special treatment.

Special treatment for existing native oaks. If possible, do not raise or lower grade level between trunk and drip line. If you must alter grade, put a well around the base of trunk so that grade level there is not changed. Never water within 4-feet of trunk or allow water to stand within that area. Any of a number of sucking and chewing insects and mites feed upon existing native oaks. Most of the time these creatures are kept in check by other insects and mites, birds, and by insect-and-mite troubles that we don't even know about.

Occasionally, though, an outbreak of some organism-usually oak moth larvae- gets bad enough to required artificial control. When that happens, call a commercial arborist or pest control firm to diagnose and treat the problems; oak trees are too big for home owners to reach with their limited spray equipment.

Oak root fungus (Armilliaria) is often present in many California neighborhoods that once were oak forests or walnut groves. Get an arborist's advise on how to sustain infected trees. All old oaks, infected or not, can benefit from feeding and deep watering (fertilize and irrigate only out near drip line).

Old native oaks also benefit from periodic grooming to remove dead wood. However, arborists should not cut thick branches unless they have good reasons for doing so, since excessive pruning may stimulate succulent new growth that will be subject to mildew.

Q. rubra, Q. rubra maxima, Q. Borealis Red Oak, Northern Red Oak
Deciduous. Fast growth to 90 feet. Broad, spreading branches and round-topped crown. Leaves 5 – 8 inches long by 3 – 5 inches wide, with 3 – 7 pairs of sharp-pointed lobes. New leaves and leaf stalks are red in spring, turning to dark red, ruddy brown, or orange in fall. Needs fertile soil and plenty of water. Stake young plants. High-branching habit and reasonably open shade make it a good tree for big lawns, parks, broad avenues. It deep roots make it good to garden under.

Appendix

A

Q. agrifolia Coast Live Oak Evergreen Tree
Native to Coast Ranges. Round-headed, wide-spreading tree to 20 – 70 feet high, often with greater spread. Smooth, dark gray bark. Dense foliage of rounded, holly-like, 1 –3 inch long leaves, slightly glossy n upper surface. As planted tree from nursery or acorn, it can grow as high as 25 feet in ten years, 50 feet in 25-years. Attractive green all year unless hit by oak moth larvae. Has greedy roots and drops almost all its old leaves in early spring just when gardening time is most malleable. Regardless of these faults, it's a handsome and quite worthwhile shade tree or street tree. Can be sheared into a handsome 10-20 foot hedge.

Q. ilex Holly Oak Holm Oak
Evergreen. Native to Mediterranean region. Grows at a moderate rate to 40-70 feet high, with equal spread. Leaves vary in shape and size, but are usually 1 ½ - 3 inches long ½ -1 inches wide, either toothed or smooth edged, dark, rich green on upper surface, yellowish or silvery below. Tolerates wind and salt air; will grow in constant sea wind, but tends to be shrubby there. Inland, growth rate can be moderately fast but varies with soil and water conditions. Good evergreen street or lawn tree where coast live oak is difficult to maintain, but lacks open grace of coast live oak. Can take hard clipping into formal shapes or hedges.

Ornamental Pear Pyrus rosaceae
Deciduous or evergreen trees. Most ornamental species are subject to fireblight. All are best in full sun, will get along with no more than moderate summer watering once established.

P. calleryana Bradford Pear
Grows to 25-50 feet. Strong horizontal branching pattern. Leaves 1 ½ -3 inches long., broadly oval, scalloped, dark green, very glossy and leathery, Flowers clustered, pure white, ¾ -1 inch wide; very early bloom. In coldest areas, flower crop may be destroyed by late freezes in some years. Fruit very small, round, inedible. Fairly resistant to fireblight; rich purplish red fall color.

Bradford, original introduction, has strongly horizontal limbs, has reached 50-feet in height, 30-feet in width. Aristocrat is more pyramidal, with up-curving branches. Redspire is similar, with yellow to red fall color. Capital and Whitehouse are narrowly columnar. Chanticleer is narrow but not columnar, about 40 feet tall by 15 feet wide. Trinity is round-head form.

Chinese Tallow Sapium sebiferum Euphorbiaceae
Deciduous tree. To 35-feet with dense round or conical crown of equal width. Outstanding fall color. Tends toward shrubbiness, multiple trunks, suckering, but easily trained to single trunk. In colder areas, un-ripened branch tips freeze back each winter; new growth quickly covers damage, but may require thinning. Leaves are poplar-like, roundish, tapering to slender point, light green. Foliage is dense, but general effect is airy; leaves flutter in lightest breeze. If tree is in full sun and has moderate autumn chill, its foliage turns brilliant, translucent, neon red. Some trees color plum purple, yellow, orange, or mixture of colors. If possible, select your tree while it is in fall color; a few specimens have shown nondescript yellow instead of flaming red. Tiny yellowish flowers in spikes at branch tips; fruit small, clustered, grayish white; they are covered by a waxy coating.

Hardy to 10* - 15* F. Grows in most soils, but does somewhat better in mildly acid conditions. Give it ample water for fast growth and prune only to correct shape. Stake young plants securely. Good lawn or street tree, patio or terrace shade tree. Resistant to oak root fungus. Good screening against low summer sun or objectionable view. Gives light to moderate shade.

Privet Ligustrum. Oleaceae
Deciduous or evergreen shrubs or small trees. Most

widely used in hedges. Can also be clipped into formal shapes and featured n tubs or large pots. One type is a common street tree. All have abundant, showy clusters of white to creamy white flowers in late spring or early summer. (Clipped hedges bear fewer flowers because most of the flower-bearing branches get trimmed off.) Fragrance is described as "pleasant" to "unpleasant". Flowers draw bees. Small, blue black, berry-like fruit follows blossoms. Birds eat fruit, thus distributing seeds resulting in multitudes of seedlings.

Most privets are easily grown in sun or some shade, and in any soil. Give them lots of water. In some areas they are subject to lilac leaf miner, which disfigures leaves.

Confusion exists concerning identity of certain privets in nurseries. The plant sold as L. japonicum usually turns out to be the small tree L. lucidum. The true L. Japonicum is available in 2 (or more) forms. The tall, shrubby kind is the true species; the lower-growing, more densely foliaged form is typically sold as L. texanum, and probably should be called L. japonicum 'Texanum'. In a similar fashion, the smaller-leafed hardy privets used for hedging are often confused; L. amurense, L. ovalifolium, and L. vulgare look much alike and any is likely to be sold as common privet, a name that belongs to L vulgare.

L. japonicm Japanese Privet
Evergreen shrub, dense, compact growth habit to 20 – 12 feet, but can be kept lower by trimming. Roundish oval leaves 2 – 4 inches long, dark to medium green and glossy above, distinctly paler to almost whitish beneath; have thick, slightly spongy feeling. Excellent plants for hedges or screens, or for shaping into globes, pyramids, other shapes, or small standard trees. Sunburns in hot spells. In areas of caliche soil, or where Texas root rot prevails, grow it in containers.

Hackberry Celtis Ulmaceae

Deciduous trees. Related to elms and similar to them in most details, but smaller. All have virtue of deep rooting; old trees in narrow planting strips expand in trunk diameter and nearly fill strips; but without a surface rood or any sign of heaving the sidewalk or curb. Bare-root plants, especially in larger sizes, sometimes fail to leaf out. Safer to buy in containers. Or try for small bare-root trees with big root systems. Especially good in windy locations. Though young trees should be staked until well established. When established, trees will take wind, desert heat, much drought, and alkaline soil.

Street or lawn trees, even near buildings or paving; will take overhead shade. All have inconspicuous flowers. Only pest problems of note seems to be occasional aphid attack. Trees are attractive to birds.

C. occidentalis Common Hackberry Native to eastern U. S.
Grows to form rounded crown 50 feet high or more and nearly as wide. Branches are spreading and sometimes pendulous. Leaves oval, bright green, 2 – 5 inches long, finely toothed on edges. Tree does not leaf out until April or later. Resistant to oak root fungus. Tolerates high-plains heat, wind, alkaline soil, urban pollution.

C. sinesis Chinese Hackberry, Yunnan Hackberry
Similar in growth habit to common hackberry, but smaller. Leaves to 4 inches long, smoother and glossier than those of other hackberries, with scallop-toothed edges.

Australian Willow, Wilga Geijera parviflora. Rutaceae
Graceful, fine textured, to 25 30 feet high, 20 foot wide. Main branches sweep up and out, little branches hang down, Distant citrus relative; called Australian willow because its 3 – 6 inch long, narrow, medium green, drooping leaves give a kind of weeping willow effect. With age, produces loose clusters of

unimportant small, creamy white flowers in early spring, early fall. Well-drained soil and full sun; plant tolerates light shade but tends to be thin in foliage. Established three resists drought but responds to ample water with faster growth. Needs pruning only to correct from (much less pruning than willow). Quite pest free.

Has much of the willow's grace and the eucalyptus's toughness. Moderate growth rate; deep, noninvasive roots. Casts light shade. Plant singly as patio or street tree. Or in colonies for attractive grove effect.

Linden Tilia. Tiliaceae
Deciduous trees. Dense, compact crowns. Much used for street and park planting in Europe. All have small, quite fragrant, yellowish white flowers in drooping clusters. All respond well to deep rich soil and plenty of water. All grow at slow to moderate rate. Young trees need staking and shaping. Older trees need only corrective pruning. Under certain circumstances, aphids cause disagreeable drip of honeydew and accompanying sooty mildew.

T. americana American Linden
Growth to 40-60 feet with 20 – 25 foot spread. Straight trunk; dense, compact narrow crown Heart-shaped, dull dark green leaves to 4-6 inches long, 3-4 inches wide (some times longer). Lose clusters of fragrant, yellowish white flowers in June-July. "Redmond" is a pyramidal form with glossy foliage.

T. cordata Little-Leaf Linden
Growth to 30-50 feet with 15 – 30 foot spread. Form densely pyramidal. Leaves 1 ½ - 3 inches long, equally broad or broader, dark green above, silvery beneath. Flowers in July. Excellent medium-sized lawn or street tree. Given space to develop its symmetrical crown, it can be a fine patio shade tree (but expect bees in flowering season). It is the hardiest linden. Chancellor, Glenleven, Greenspire, June Bride, and Olympic are selected forms. June Bride has an especially heavy show of flowers.

Japanese or Sawleaf Zelkova Zelkova serrata Ulmaceae
Deciduous tree. A good shade tree, it grows at moderate to fast rate, eventually to 60 feet or higher and equally wide. Smooth, gray bark like that of beech. Leaves similar to those of elm (2 – 3 ½ inches long by 1 ½ inches wide) but rougher textured, with saw-tooth margins. Carefully train young trees to develop strong framework – head back excessively long pendulous branches to force side growth, thin competing branches to permit full development of the strongest. Water deeply to encourage deep rooting. Pest resistant, but elm leaf beetles are a problem in local elms died.

Fall foliage color varies from yellow to dark red to dull reddish brown. Three grafted selections are sold; Halka, the fastest growing , resembles American elm more than do Green Vase and Village Green. All are good substitutes for elm.

Locust Robinia Leguminosae
Deciduous trees or shrubs. Leaves divided like feathers into many roundish leaflets; clusters of sweet pea-shaped, white or pink flowers mid-spring to early summer. They are hardy everywhere, fairly fast growing, and sell adapted to dry hot regions. Will take poor soil, much drought when established. Drawbacks: wood is brittle, roots aggressive, plants often spread by suckers.

R. pseudoacacia Black or Sunburst Locust Tree
Fast growth to 75 feet, with rather open, sparse-branching habit. Deeply furrowed brown bark. Thorny branchlets. Leaves divided into 7 – 19 leaflets 1 – 2 inches long. Flowers are white, fragrant, ½ - ¾ inches long, in dense, hanging clusters 4 –8 inches long. Bean-like, 4-inch long pods turn brown and hang on tree all winter.

Emigrants brought seeds with tem from eastern U. S., and black locust is now common everywhere in West. In California's Gold Country it has gone native. Very drought tolerant. With pruning and training in its early years, it is a truly handsome flowering tree – but it is so common, and so commonly neglected, that it's often overlooked.

Has been used as street tree, but not good in narrow parking strips or under power lines. Wood is extremely hard, tough; trees difficult to prune out where not wanted. Varieties include:

Frisia
Leaves yellow; new growth nearly orange. Thorns; new wood red.

Pyramidalis (Fastigiata)
Very narrow, columnar tree.

Tortuosa
Slow growing, with twisted branches. Few-flowered blossom clusters.

Umbraculifera
Dense, round headed. Usually grafted 6 – 8 feet high on another locust. Very few flowers.

Redbud Cercis. Leguminosae
Deciduous shrubs or trees. Five redbuds are grown in the West; 2 western natives, one eastern native, one from Europe, one from China. Early spring flowers are sweet pea-shaped, small, in clusters; where tree is adapted, blossoms are borne in great profusion on bare twigs, branches, sometimes even on main trunk. Flowers are followed by clusters of flat pods. Attractive broad, rounded leaves are heart shaped at base. All give fall color with first frosts. Average water needs (except for drought-tolerant C. occidentalis)

C. canadensis Eastern Redbud Native of eastern U. S. Largest and fastest growing of available species where adapted. To 25 – 35 feet tall. Most apt to take tree form. Round headed but with horizontally tiered branches in age. Rich green, 3 – 6 inches long leaves have pointed tips. Small (1/2 inch long), rosy pink flowers clothe bare brown branches in early spring. Valuable for filling the gap between the early-flowering fruit trees (flowering peach, flowering plum), and the crabapples and late-flowering cherries. Varieties are Alba (white flowers), Forest Pansy (purple foliage, needs some shade in hot climates), Oklahoma (wine red flowers, thick, glossy, heat resistant leaves), Plena (double flowers), and Rubye Atkinson (pure pink flowers).

Plane Tree, Sycamore. Platanus. platanaceae
Deciduous trees. All grow large, have lobed, maple-like leaves. Older bark sheds in patches to reveal pale, smooth, new park beneath. Brown, ball-like seed clusters hang from branches on long stalks through winter; prized for winter arrangements. Somewhat drought tolerant but better with some deep watering in summer. Subject to blight (anthracnose) which causes early, continued leave fall; p. racemosa especially susceptible. Rake up and dispose of dead leaves, since fungus spores can over-winter on them.

P. acerifolia (P. orientalis) London Plane Tree
Fast growth to 40 – 80 feet, with 30 – 40 foot spread. Smooth, cream-colored upper trunk and limbs. Leaves are 3 – 5- lobed, 4- 5 inches wide. Tolerates most soils, stands up beautifully under city smog, soot, dust, reflected heat. Can be pollarded to create dense, low canopy.

Watch for spider mites and scale. Boot street, park, or lawn tree. Used on lines and blocks for formal plantings; avenues, screens masses. Powdery mildew can cause premature leave drop in some seasons. The scarce variety Yarwood is somewhat resistant. Bloodgood has some resistance to anthracnose.

Appendix

A

Sumac Rhus. Anacardiaceae
Evergreen or deciduous shrubs or trees. Of the ornamental sumacs, deciduous kinds are hardy anywhere and thrive in poor soils. They tend to produce suckers, especially if their roots are disturbed by soil cultivation. They need some water. Evergreen sumacs are not as hardy as the deciduous kinds, but they will grow in almost any soil as long as it is well drained (soggy soils may kill them). They are fire retardant if fairly well watered.

R. lancea African Sumac
Evergreen tree. Slow growing to 25-feet. Open, spreading habit; graceful weeping outer branchlets. Leaves divided into 3-willow-like, dark green leaflets 4-5 inches long. Pea-sized, berry-like, yellow or red fruit grows in clusters on female tree, can be messy on pavement.

African Sumac can tolerate high summer heat. Established plants are drought resistant, but will also thrive in lawns. Hardy to 12* F. Stake and prune to establish form you want. Makes attractive, airy tree with interesting branch pattern and effective dark red, rough bark. You can train it to a single trunk or let it grow as multi-trunked tree that looks somewhat like olive. Also useful as screens, clipped hedges, or background plantings. Old plants easy to transplant if grown under dry conditions.

Elm Ulmus Ulmaceae
Deciduous or partially evergreen trees. Easy to grow in any fairly good soil; will survive in most poor ones. Best with normal watering, but will tolerate low moisture conditions at expense of good growth, plant health. Root systems are aggressive and close to surface; you will have trouble growing other plants under these trees. Branch crotches often narrow, easily split. Many of the larger elms are tasty to leaf beetles, bark beetles, leafhoppers, aphids, and scale, making them either time-consuming to care for or messy (or both). Dutch elm disease, formerly a problem in the East and Midwest, has reached western states.

U. parvifolia (often sold a PU. p. Sempervirens) Chinese Elm, Chinese Evergreen Elm.
Evergreen or deciduous according to winter temperatures and tree's individual heredity. So-called evergreen elm usually sold as 'Sempervirens'; this may be evergreen most winters, lose its leaves in unusual cold snap (new leaves come on fast). Very fast growth to 40- 60 feet, with 50 – 70 foot spread. Often reaches 30 feet in 5 years. Extremely variable in form, but generally spreading, with long, arching, eventually weeping branchlets. Trunks of older trees have bark, which sheds in patches somewhat like sycamore. Leaves leathery, ¾ - 2 ½ inches long, 1/3 – 1 1/3 inches wide, oval, evenly toothed. Round fruit forms in fall while leaves are still on tree.

Stake young trees until trunks can carry weight of branches. Stake and head leading shoot higher than other shade trees to compensate for weeping. Rub or cut out small branches along trunk for first few years. Shorten overlong branches or strongly weeping branches to strengthen tree scaffolding. Older trees may need thinning to lessen chance of storm damage. Bothered very little by pests or diseases.

Good for patio shade in milder portions of West. Useful for sun screening. With careful pruning, useful as a street tree.

Varieties are Brea, with larger leaves, more upright habit; and Drake, with small leaves, weeping habit. Both are more or less evergreen. True Green has small deep green leaves, is round headed, more evergreen than others.

Sweet Gum

Liquidambar Hamamelidaceae
Deciduous trees. Valuable for form, foliage, and fall color, easy culture. Moderate growth rate; young and

middle-aged trees generally upright, somewhat cone shaped, spreading in age. Lobed, apple-like leaves. Flowers inconspicuous; fruits are spiny balls which ornament trees in winter, need raking in spring.

Requires neutral or slightly acid soils; cholorosis is strongly alkaline soils is hard to correct. Prune only to shape. Trees branch from ground up and look most natural that way; can be pruned high for easier foot traffic.

Good street trees. Form surface roots which can be nuisance in lawns or parking strips. Effective in tall screens or groves, planted 6-10 ft. apart. Brilliant fall foliage. Leaves color best when trees are in full sun and well-drained soil; fall color less effective in mildest climates or in mild, late autumns. For best appearance, should be watered deeply once a month in heavy soils, twice a month in sandy soils through dry season.

L. formosana (Chinese Sweet Gum)
To 40-60 ft. tall, 24ft. wide. Free-form outline; sometimes pyramidal, especially when young. Leaves 3-5 lobed, 3-4 ½ inches across, violet red when expanding, then deep green.

L. orientalis (Oriental Sweet Gum)
Native to Turkey. To 20-30 feet; spreading or round headed. Leaves 2-3 inches wide, deeply lobed, each lobe again lobed in lacy effect. Resistant to oak root fungus.

L. styraciflua (American Sweet Gum)
Growth to 6- feet. Narrow and erect in youth, with lower limbs eventually spreading to 20-25 feet. Tolerates damp soil; resistant to oak root fungus. In winter, branching pattern, furrowed bark, corky wings on twigs, and hanging fruit give interest; in spring and summer, leaves are deep green; in fall, leaves turn purple, yellow or red. Even seedling trees give good color (which may vary somewhat from year to year), but for uniformity, match trees while they are in fall color or buy budded trees of a named variety, which as the following:

Burgundy
Leaves turn deep purple red, hang late into winter or even early spring if storms are not heavy.

Festival
Narrow, columnar. Light green foliage turns to yellow, peach, pink, orange, and red.

Palo Alto
Turns orange red to bright red in fall.

Kentucky Coffee Tree Gymnocladus Dioica
Deciduous tree, native to eastern U. S. Saplings grow very fast, but slow down at 8-10 feet. Trees ultimately reach 50 feet in height. Narrowish habit in youth. Older trees broader, with fairly few heavy, contorted branches. These, together with stout winter twigs, make bare tree picturesque. Leaves (1 ½ - 3 feet long) come out late in spring; they are pinkish when expanding, deep green in summer, yellow in autumn. Inconspicuous flowers are followed by 6-10 inch long flat reddish brown pods containing hard black seeds. Average soil and routine watering. Established trees will take some drought, much heat and cold, poor soil. Effective for form in any cold-winter garden.

Lilac Syringa Oleaceae
Deciduous shrubs, rarely small trees. Best where winter brings pronounced chill, but some bloom well with light chilling. Sun, light shade in hottest areas. All like alkaline soil.

Japanese Tree Lilac. S. reticulata (s. japanica, S. amurensis japonica)
Large shrub easily trained as single-stemmed 30-ft. tree. Bark is smooth, something like cherry in its gloss. Large leaves (to 5 inches long). White flower clusters to 1 ft. appear in late spring, early summer. Flowers showy, but not fragrant; they smell like privet flowers. Useful small shade or street tree in difficult climates.

Appendix

A

Crape Myrtle Lagerstroemia indica Lythraceae
Deciduous shrub or tree. Root hardy and sometimes treated as perennial. Flower freely. Native of China. Dwarf shrubby forms and shrub-tree forms, 6-30 feet tall. Slow growing as shrub, spreads as wide as high; trained as tree, becomes vase shaped with very attractive trunk and branch pattern. Spring foliage is light green tinged bronze red; mature leaves 1-2 inches long, oval deep glossy green. Fall foliage is yellow, more rarely orange to red. Crinkled, crepe-like, 1 ½ inch flowers in rounded, slightly conical clusters, 6-12 inches long, at ends of branches. Colors in shapes of red, rose, deep or soft pink, rosy orchid, purple, white. Long flowering period from July to September.

Subject to mildew. Selections called Indian Tribes have heavy foliage with considerable resistance to mildew. (Catawba, Cherokee, Potomac, Seminole, Powhata). Hybrids between L. indica and the species L. fauriei have even greater resistance to mildew than Indian Tribes.

Maple Acer Aceraceae
Deciduous or evergreen trees or large shrubs. Larger maples have extensive fibrous root systems that take water and nutrients form the topsoil. The great canopy of leaves calls for a steady, constant supply of water not necessarily frequent watering, but constantly available water throughout the root zone. Ample deep watering and periodic feeding will help keep roots down.

Trident Maple A. buergeranum
Native of China and Japan. Grows 20-25 feet high. Lobed leaves that are pale beneath. Fall color usually red, varies to orange or yellow. Low, spreading growth; A decorative, useful patio tree and favorite bonsai subject.

Japanese Maple A. palmatum
Native to Japan and Korea. Slow rowing to 20-feet; normally many stemmed. Most airy and delicate of all maples. Leaves 2-4 inches long, deeply cut into 5-9 toothed lobes. All-year interest; young spring growth is flowing red; summer's leaves are soft green; fall foliage scarlet, orange, or yellow. Slender leafless branches in greens and reds provide winter pattern. Resistant to oak root fungus.

Date Palm Phoenix Palmae
Mostly large feather palms, but one a dwarf. Trunks patterned with bases of old leaf stalks. Small yellowish flowers in large, hanging sprays followed by clusters of often edible fruit (P. dactylifera bears dates of commerce). These palms hybridize freely, so buy from reliable nurseryman who knows his seed or plant source.

P. canariensis Canary Island Date Palm
Big, heavy-trunked plant to 60-feet tall with 50-foot spread composed of a great many gracefully arching fronds. Grows slowly until it forms trunk, then speeds up a little. Young plants do well in pots for many years, looking something like pineapples. Grow on slopes, in parks, big spaces along wide streets; not for small city lots. Hardy to 20* F. Slow to develop new head of foliage after hard-frost damage.

Appendix B: City of Hughson Tree Management Descriptions

Name	Habit	Positive	Negative	Best Application
Chinese Pistache ***Pistacia chinensis***	Moderate growth to 60 feet tall, 50 feet wide. Young trees often gawky and lopsided, but older trees become dense and shapely with reasonable care. Leaves with 10-16 paired leaflets 2-4 inches long by ¾ inches wide. Foliage colors beautifully in fall-scarlet, crimson, orange, sometimes yellow tones. Fruit on female trees bright red, turning dark blue. Not fussy as to soil or water; accepts moderately alkaline conditions, lawn watering though verticillium wilt is a danger or no summer watering at all (this only in deep soils). Resistant to oak root fungus. Stake young trees and prune for first few years to develop head high enough to walk under.	One of the best all-around street tree species; relatively pest free; excellent fall color; relatively drought-tolerant.	Spindly growth when young, so must be properly trained; sometimes attacked by Verticillium wilt, a soil-borne fungus disease; female trees bear large crops of nuisance fruits, so budded male sterile trees should be planted – these are not always easy to find in the trade.	Reliable tree for street or lawn, patio or garden corner planting
Raywood Ash ***Fraxinus oxycarpa***	Deciduous trees, one almost evergreen. Trees grow fairly fast and most tolerate hot summers, cold winters and many kinds of soil (including alkaline soil). Fairly pest free. In most cases leaves are divided into leaflets. Male and female flowers generally inconspicuous, in clusters) grow on separate trees in some species, on same tree in others. In latter case, flowers are often flowed by clusters of single-seeded, winged fruit, often in such abundance that they can be a litter problem. When flowers are on separate trees, you'll get fruit on female tree only if it grows near a male tree. Compact, round-headed, fast-growing tree to 25-35 feet. Produces no seeds. Purple red fall color.	Relatively good street tree; fast growing.	Attacked by woolly ash aphids which produce large amounts of honeydew; suffers from an unknown branch dieback disorder (examples of this problem can be found in City of Hughson).	Chiefly used as street trees, shade trees, lawn trees, patio shelter trees.

Appendix

B

Moraine Ash ***Fraxinus moranous***	Deciduous tree. Native of eastern Balkan Peninsula. Upright, rather narrow tree to 40 feet in height. Leaves of 9-13 dull green, 2-3 inches long leaflets with toothed edges. Casts light, filtered shade. Leaves turn yellow in fall, dry up and sift down into lawn or ground cover, thus lessening litter problem. More round headed than species, produces few seeds.	Fast growth; grows relatively well under lawn irrigation.	Becomes very seedy with age – large numbers of brown, winged seeds may become as numerous as the leaves; susceptible to mistletoe.	Good lawn tree-neat, symmetrical, uniform bright yellow in fall.
White Ash ***F. americana***.	Grows to 80-feet in height with straight trunk and oval-shaped crown. Leaves 8-15 inches long with 5-9 dark green, oval leaflets, paler beneath; turn purplish in fall. Needs some watering. Seedless selections include Autumn Applause and Autumn Purple, both with exceptionally good, long-lasting purple fall color; Champaign County a dense upright oval with brown and purple fall color.	Trees grow fairly fast and most tolerate hot summers, cold winters and many kinds of soil (including alkaline soil). Fairly pest free.	With both male and female trees, you will get a heavy crop of seed; letter and seedlings a problem. Leaf edges show burning in hot, windy areas.	Chiefly used as street trees, shade trees, lawn trees, patio shelter trees.
Green Ash, Red Ash *F. pennsylvanica (F. lanceolata)*.	Deciduous, native to eastern U.S. Moderate grower to 30-40 feet in height forming compact oval crown. Gray brown bark; dense twiggy structure. Leaves 10-12 inches long, divided into 5-9 bright green, rather narrow, 4-6 inch long leaflets.	Takes wet soil and severe cold but foliage burns in hot dry winds	Male and female flowers on separate trees. Seedless varieties include; Marshall, Summit, Bergeson, Emerald, Patmore, and Urbanite.	Chiefly used as shade trees, lawn trees, patio shelter trees. Little growth experience in City of Hughson

Tulip Tree ***Liriode-noron tulip-ifera***	Deciduous tree. Fast Growth to 60-80 ft., with eventual spread to 40 ft. Straight columnar trunk, with spreading, rising branches that form tall pyramidal crown. Lyre-shaped leaves, 5-6 inches long and wide, Turn from bright yellow green to bright yellow (or yellow brown) in fall. Tulip-shaped flowers in late spring are 2 inches wide, greenish yellow, orange at base. Handsome at close range, thy are not showing on the tree being high up and well-concealed by leaves. They are not usually produced until tree is 10-12 years old. Tree needs room, deep, rich, swell-drained neutral or slightly acid soil; plenty of summer water. Control scale insects and aphids as necessary. Not bothered by oak rot fungus.		Not recommend for City of Hughson. It develops iron chlorosis in alkaline soils, which City of Hughson has. It is also consistently and heavily attacked by the tulip tree aphid.	Good large shade, lawn, or roadside tree. Spreading root system makes it hard to garden under.
Autumn Gold (Maid-enhair Tree) ***Ginkgo biloba***	Deciduous tree. Graceful, hardy tree, attractive in any season, especially in fall when leathery, light green leaves of spring and summer suddenly turn gold. Fall leaves linger, then drop quickly and cleanly to make golden carpet where they fall. Related to conifers but differs in having broad (1-4 inch wide), fan-shaped leaves rather than needlelike foliage. In shape and veining, leaves resemble leaflets of maindenhair fern, hence name. Can grow to 70-80 feet, but most mature trees are 35-50 feet. May be gawky in youth, but becomes well-proportioned with age. Narrow to spreading or even umbrella shaped at maturity. Usually grows slowly, about 1-foot per year but under ideal conditions can grow up to 3-feet per year. Plant only male trees (grafted or grown from cuttings of male plants); female trees produce messy, fleshy, ill-smelling fruit in quantity. Named varieties listed below are reliably male. Plant in deep, loose, well-drained soil. Be sure plant is not root-bound in can. Stake young trees to keep tem straight; young growth may be brittle, but wood becomes strong with age. Water through dry seasons until 10-20 feet high, then let tree become self-sufficient. In general, ginkgos are not bothered by insects or diseases. They are resistant to oak root fungus.	A very good street tree; almost pest free; relatively easy to train; excellent fall color.	Very slow growing; female trees produce very objectionable nuisance fruits – only guaranteed male sterile trees should be planted.	Use as street tree, lawn tree.

Appendix

B

Red Oak ***Quercus rubra***	Deciduous. Fast growth to 90 feet. Broad, spreading branches and round-topped crown. Leaves 5 – 8 inches long by 3 – 5 inches wide, with 3 – 7 pairs of sharp-pointed lobes. New leaves and leaf stalks are red in spring, turning to dark red, ruddy brown, or orange in fall. Needs fertile soil and plenty of water. Stake young plants.	Good fall color.	Develops iron chlorosis in alkaline soil; has a serious aphid pest problem; probably best to keep the numbers of this species low in City of Hughson.	High-branching habit and reasonably open shade make it a good tree for big lawns, parks, broad avenues. It deep roots make it good to garden under.
Live Oak ***Quercus agriflia***	Evergreen tree. Native to Coast Ranges. Round-headed, wide-spreading tree to 20 – 70 feet high, often with greater spread. Smooth, dark gray bark. Dense foliage of rounded, holly-like, 1 –3 inch long leaves, slightly glossy n upper surface. As planted tree from nursery or acorn, it can grow as high as 25 feet in ten years, 50 feet in 25-years. Attractive green all year unless hit by oak moth larvae. Has greedy roots and drops almost all its old leaves in early spring just when gardening time is most malleable.	In time a very large tree; best in a park where there is plenty of room.	Because of its ultimate size, not a good choice for a street tree; produces acorns, which may become a nuisance and slipping hazard when they fall to the sidewalk.	A handsome and quite worthwhile shade tree or street tree. Can be sheared into a handsome 10-20 foot hedge.

Holly Oak ***Quercus ilex***	Evergreen. Native to Mediterranean region. Grows at a moderate rate to 40-70 feet high, with equal spread. Leaves vary in shape and size, but are usually 1 ½ - 3 inches long ½ -1 inches wide, either toothed or smooth edged, dark, rich green on upper surface, yellowish or silvery below. Tolerates wind and salt air; will grow in constant sea wind, but tends to be shrubby there. Inland, growth rate can be moderately fast but varies with soil and water conditions.	Medium size; naturally well-shaped.	Often produces large crops of acorns; evergreen, so winter sun is blocked.	Good evergreen street or lawn tree where coast live oak is difficult to maintain, but lacks open grace of coast live oak. Can take hard clipping into formal shapes or hedges.
Bradford Pear ***Pyrus calleryana***	Deciduous or evergreen trees. All are best in full sun, will get along with no more than moderate summer watering once established. Grows to 25-50 feet. Strong horizontal branching pattern. Leaves 1 ½ -3 inches long, broadly oval, scalloped, dark green, very glossy and leathery, Flowers clustered, pure white, ¾ -1 inch wide; very early bloom. In coldest areas, flower crop may be destroyed by late freezes in some years. Fruit very small, round, inedible. Fairly resistant to fireblight; rich purplish red fall color. Bradford, original introduction, has strongly horizontal limbs, has reached 50-feet in height, 30-feet in width. Aristocrat is more pyramidal, with up-curving branches. Redspire is similar, with yellow to red fall color. Capital and Whitehouse are narrowly columnar. Chanticleer is narrow but not columnar, about 40 feet tall by 15 feet wide. Trinity is round-head form.	The best of the Callery flowering pears; good, medium size; used throughout City of Hughson; attractive spring bloom and fall color; fast growth.	Vigorous, upright growth habit; needs careful early training to develop strong framework; susceptible to iron chlorosis in wet, poorly-drained soils; nuisance fruits (small, brown fleshy berries) are often a problem.	A handsome and quite worthwhile street tree with bright fall colors.

Appendix

B

Chinese Tallow ***Sapium sebiferum***	Deciduous tree. To 35-feet with dense round or conical crown of equal width. Outstanding fall color. Tends toward shrubbiness, multiple trunks, suckering, but easily trained to single trunk. In colder areas, un-ripened branch tips freeze back each winter; new growth quickly covers damage, but may require thinning. Leaves are poplar-like, roundish, tapering to slender point, light green. Foliage is dense, but general effect is airy; leaves flutter in lightest breeze. If tree is in full sun and has moderate autumn chill, its foliage turns brilliant, translucent, neon red. Some trees color plum purple, yellow, orange, or mixture of colors. If possible, select your tree while it is in fall color; a few specimens have shown nondescript yellow instead of flaming red. Tiny yellowish flowers in spikes at branch tips; fruit small, clustered, grayish white; they are covered by a waxy coating.Hardy to 10* - 15* F. Grows in most soils, but does somewhat better in mildly acid conditions. Give it ample water for fast growth and prune only to correct shape. Stake young plants securely.	Medium size; fast growth; beautiful fall color; good lawn tree.	Produces small nuisance fruits (small, gray-white berries in clusters); small twigs throughout tree freeze and die back.	Good lawn or street tree, patio or terrace shade tree. Resistant to oak root fungus. Good screening against low summer sun or objectionable view. Gives light to moderate shade.
Japanese Privet ***Ligustrum japonica***	Evergreen shrub. Dense, compact growth habit to 20 – 12 feet, but can be kept lower by trimming. Roundish oval leaves 2 – 4 inches long, dark to medium green and glossy above, distinctly paler to almost whitish beneath; have thick, slightly spongy feeling. Sunburns in hot spells. In areas of caliche soil, or where Texas root rot prevails, grow it in containers.		Not recommend as a street tree. It produces heavy crops of nuisance fruits (small, black berries); the City of City of Hughson pulled out several dozen privets in the downtown area several years ago, and replaced them with Bradford pears.	Excellent plants for hedges or screens, or for shaping into globes, pyramids, other shapes, or small standard trees.

Chinese Hackberry, Yunnan Hackberry ***Celtis occidentalis, sineisis***	Deciduous trees. Related to elms and similar to them in most details, but smaller (to 50–feet). All have virtue of deep rooting; old trees in narrow planting strips expand in trunk diameter and nearly fill strips; but without a surface rood or any sign of heaving the sidewalk or curb. Bare-root plants, especially in larger sizes, sometimes fail to leaf out. Safer to buy in containers. Or try for small bare-root trees with big root systems. Especially good in windy locations. Though young trees should be staked until well established. When established, trees will take wind, desert heat, much drought, and alkaline soil. Similar in growth habit to common hackberry, but smaller. Leaves to 4 inches long, smoother and glossier than those of other hackberries, with scallop-toothed edges.	Relatively large tree; tolerates drought; fast growth; strong branches.	Produces nuisance fruits (small, purple berries).	Street or lawn trees, even near buildings or paving; will take overhead shade. All have incon-spicuous flowers. Only pest problems of note seems to be occa-sional aphid attack.
Australian Willow, Wilga ***Geijera parviflora. Rutaceae***	Graceful, fine textured, to 25 30 feet high, 20 foot wide. Main branches sweep up and out, little branches hang down, Distant citrus relative; called Australian willow because its 3 – 6 inch long, narrow, medium green, drooping leaves give a kind of weeping willow effect. With age, produces loose clusters of unimportant small, creamy white flowers in early spring, early fall. Well-drained soil and full sun; plant tolerates light shade but tends to be thin in foliage. Established three resists drought but responds to ample water with faster growth. Needs pruning only to correct from (much less pruning than willow). Quite pest free.	Very attractive, weeping habit.	Frost sensitive – will be seriously injured at temperatures below 32 degrees F; evergreen, so winter sun is blocked; often sheds many leaves in spring.	Has much of the willow's grace and the eucalyptus's toughness. Moderate growth rate; deep, noninvasive roots. Casts light shade. Plant singly as patio.

Appendix

B

American Linden ***Tilia americana***	To 40-60 feet with 20 – 25 foot spread. Straight trunk; dense, compact narrow crown Heart-shaped, dull dark green leaves to 4-6 inches long, 3-4 inches wide (some times longer). Lose clusters of fragrant, yellowish white flowers in June-July. Redmond is a pyramidal form with glossy foliage.	Respond well to deep rich soil and plenty of water. All grow at slow to moderate rate. Young trees need staking and shaping. Older trees need only corrective pruning	Like all Linden, under certain circumstances, aphids cause disagreeable drip of honeydew and accompanying sooty mildew.	Potential Street Tree. Little experience with this tree in City of Hughson.
Greenshire Little Leaf Linden ***Tilia cordata***	Deciduous trees. Dense, compact crowns. Much used for street and park planting in Europe. All have small, quite fragrant, yellowish white flowers in drooping clusters. All respond well to deep rich soil and plenty of water. All grow at slow to moderate rate. Young trees need staking and shaping. Older trees need only corrective pruning. Under certain circumstances, aphids cause disagreeable drip of honeydew and accompanying sooty mildew.To 30-50 feet with 15 – 30 foot spread. Form densely pyramidal. Leaves 1 ½ - 3 inches long, equally broad or broader, dark green above, silvery beneath. Flowers in July. It is the hardiest linden. Chancellor, Glenleven, Greenspire, June Bride, and Olympic are selected forms. June Bride has an especially heavy show of flowers.	Relatively good lawn tree.	Attacked by aphids; upright form does not provide as much shade as spreading species.	Excellent medium-sized lawn or street tree. Given space to develop its symmetrical crown, it can be a fine patio shade tree (but expect bees in flowering season).

Japanese Zelkova ***Zelkova serrata***	Deciduous tree. A good shade tree, it grows at moderate to fast rate, eventually to 60 feet or higher and equally wide. Smooth, gray bark like that of beech. Leaves similar to those of elm (2 – 3 ½ inches long by 1 ½ inches wide) but rougher textured, with saw-tooth margins. Carefully train young trees to develop strong framework – head back excessively long pendulous branches to force side growth, thin competing branches to permit full development of the strongest. Water deeply to encourage deep rooting. Pest resistant, but elm leaf beetles are a problem in local elms died. Fall foliage color varies from yellow to dark red to dull reddish brown.	Relatively good street tree species, but needs lots of space; large, spreading tree; tolerates drought; fast growth.	Susceptible to elm leaf beetle; gangly and somewhat unattractive when young.	Three grafted selections are sold; Halka, the fastest growing , resembles American elm more than do Green Vase and Village Green. All are good substitutes for elm.
Black or Sun Burst Locust ***Robinia pseudoaca-cia***	Deciduous trees or shrubs. Leaves divided like feathers into many roundish leaflets; clusters of sweet pea-shaped, white or pink flowers mid-spring to early summer. They are hardy everywhere, fairly fast growing, and sell adapted to dry hot regions. Will take poor soil, much drought when established. Drawbacks: wood is brittle, roots aggressive, plants often spread by suckers. Fast growth to 75 feet, with rather open, sparse-branching habit. Deeply furrowed brown bark. Thorny branchlets. Leaves divided into 7 – 19 leaflets 1 – 2 inches long. Flowers are white, fragrant, ½ - ¾ inches long, in dense, hanging clusters 4 –8 inches long. Bean-like, 4-inch long pods turn brown and hang on tree all winter.	Very drought tolerant. With pruning and training in its early years, it is a truly handsome flowering tree – but it is so common, and so commonly neglected, that it's often overlooked	Not recommend; either black or honey locusts as street trees; root systems are very invasive, and sprout freely; foliage is thin and unattractive; black locust is very susceptible to aphids.	Can be used as a park or garden tree.

Appendix

B

Eastern Redbud ***Cercis candensis***	Deciduous shrubs or trees. Early spring flowers are sweet pea-shaped, small, in clusters; where tree is adapted, blossoms are borne in great profusion on bare twigs, branches, sometimes even on main trunk. Flowers are followed by clusters of flat pods. Attractive broad, rounded leaves are heart shaped at base. All give fall color with first frosts. Average water needs (except for drought-tolerant *C. occidentalis*). Native of eastern U. S. Largest and fastest growing of available species where adapted. To 25 – 35 feet tall. Most apt to take tree form. Round headed but with horizontally tiered branches in age. Rich green, 3 – 6 inches long leaves have pointed tips. Small (1/2 inch long), rosy pink flowers clothe bare brown branches in early spring. Varieties are Alba (white flowers), Forest Pansy (purple foliage, needs some shade in hot climates), Oklahoma (wine red flowers, thick, glossy, heat resistant leaves), Plena (double flowers), and Rubye Atkinson (pure pink flowers).	Very nice small tree; mostly planted for its blossoms and attractive fruit.	Small size does not make it a very effective street tree.	Valuable for filling the gap between the early-flowering fruit trees (flowering peach, flowering plum), and the crabapples and late-flowering cherries.
London Plane Tree, Sycamore. ***Platanus acerifolia***	Deciduous trees. All grow large, have lobed, maple-like leaves. Older park sheds in patches to reveal pale, smooth, new park beneath. Brown, ball-like seed clusters hang from branches on long stalks through winter; prized for winter arrangements. Somewhat drought tolerant but better with some deep watering in summer. Subject to blight (anthracnose) which causes early, continued leave fall; *p. racemosa* especially susceptible. Rake up and dispose of dead leaves, since fungus spores can over-winter on them. Fast growth to 40 – 80 feet, with 30 – 40 foot spread. Smooth, cream-colored upper trunk and limbs. Leaves are 3 – 5- lobed, 4- 5 inches wide. Watch for spider mites and scale. Boot street, park, or lawn tree. Used on lines and blocks for formal plantings; avenues, screens masses. Powdery mildew can cause premature leave drop in some seasons. The scarce variety Yarwood is somewhat resistant. Bloodgood has some resistance to anthracnose.	Still one of the best, hardiest, problem-free large street trees; good near sidewalks; tolerates lawn water; excellent branch structure with little pruning.	Some people have allergic reactions to the hairs on the bottom of the leaves.	Tolerates most soils, stands up beautifully under city smog, soot, dust, reflected heat. Can be pollarded to create dense, low canopy.

African Sumac *Rhus* (Male Only)	Evergreen or deciduous shrubs or trees. Of the ornamental sumacs, deciduous kinds are hardy anywhere and thrive in poor soils. They tend to produce suckers, especially if their roots are disturbed by soil cultivation. They need some water. Evergreen sumacs are not as hardy as the deciduous kinds, but they will grow in almost any soil as long as it is well drained (soggy soils may kill them). They are fire retardant if fairly well watered. Evergreen tree. Slow growing to 25-feet. Open, spreading habit; graceful weeping outer branchlets. Leaves divided into 3-willow-like, dark green leaflets 4-5 inches long. Pea-sized, berry-like, yellow or red fruit grows in clusters on female tree, can be messy on pavement. African Sumac can tolerate high summer heat. Established plants are drought resistant, but will also thrive in lawns. Hardy to 12* F. Stake and prune to establish form you want.	Tough tree; tolerates heat and drought; good lawn tree.	Evergreen, so blocks winter sun; very messy leaf drop in spring and summer; produces nuisance fruits (red berries); requires careful training when young to prevent blowing over, especially in shallow or poorly-drained soils; frost sensitive.	Makes attractive, airy tree with interesting branch pattern and effective dark red, rough bark. You can train it to a single trunk or let it grow as multi-trunked tree that looks somewhat like olive. Also useful as screens, clipped hedges, or background plantings.

Appendix

B

Chinese Elm, Chinese Evergreen Elm ***Ulmus Ulmaceae parvifolia*** **(often sold a *U. p.* 'Sempervirens')**	Deciduous or partially evergreen trees. Best with normal watering, but will tolerate low moisture conditions at expense of good growth, plant health. Branch crotches often narrow, easily split. Evergreen or deciduous according to winter temperatures and tree's individual heredity. So-called evergreen elm usually sold as Sempervirens; this may be evergreen most winters, lose its leaves in unusual cold snap (new leaves come on fast). Very fast growth to 40- 60 feet, with 50 – 70 foot spread. Often reaches 30 feet in 5 years. Extremely variable in form, but generally spreading, with long, arching, eventually weeping branchlets. Trunks of older trees have bark which sheds in patches somewhat like sycamore. Leaves leathery, ¾ - 2 ½ inches long, 1/3 – 1 1/3 inches wide, oval, evenly toothed. Round fruit forms in fall while leaves are still on tree. Stake young trees until trunks can carry weight of branches. Stake and head leading shoot higher than other shade trees to compensate for weeping. Rub or cut out small branches along trunk for first few years. Shorten overlong branches or strongly weeping branches to strengthen tree scaffolding. Older trees may need thinning to lessen chance of storm damage. Very little bothered by pests or diseases. Varieties are Brea, with larger leaves, more upright habit; and Drake, with small leaves, weeping habit. Both are more or less evergreen. True Green has small deep green leaves, is round headed, more evergreen than others.	Very beautiful spreading tree; attractive bark; tolerates drought; fast growth. Easy to grow in any fairly good soil; will survive in most poor ones.	Partially evergreen – drops more leaves in cold weather; susceptible to European elm scale.	Good for patio shade in milder portions of West. Useful for sun screening. With careful pruning, useful as a street tree. Root systems are aggressive and close to surface; you will have trouble growing other plants under these trees. Many of the larger elms are tasty to leaf beetles, bark beetles, leafhoppers, aphids, and scale, making them either time-consuming to care for or messy (or both).

Liquidambar *Hamamelidiaceae*	Deciduous trees to 60 feet in height; some low growth ornamental species to 30-feet. Valuable for form, foliage, and fall color, easy culture. Moderate growth rate; young and middle-aged trees generally upright, somewhat cone shaped, spreading in age. Lobed, apple-like leaves. Flowers inconspicuous; fruits are spiny balls which ornament trees in winter, need raking in spring. Requires neutral or slightly acid soils; cholorosis is strongly alkaline soils is hard to correct. Prune only to shape. Trees branch from ground up and look most natural that way; can be pruned high for easier foot traffic. Brilliant fall foliage. Leaves color best when trees are in full sun and well-drained soil; fall color less effective in mildest climates or in mild, late autumns. For best appearance, should be watered deeply once a month in heavy soils, twice a month in sandy soils through dry season	Fast, upright growth that needs little or no pruning; beautiful fall colors.	Bears large crops of nuisance fruits (large, spiny balls); subject to limb breakage; shallow, invasive roots in lawns.	Good street trees along parkways and parking lots. Form surface roots which can be nuisance in lawns or parking strips. Effective in tall screens or groves, planted 6-10 ft. apart.
Kentucky Coffee Tree *Gymnocladus dioica*	Deciduous tree, native to eastern U. S. Saplings grow very fast, but slow down at 8-10 feet. Trees ultimately reach 50 feet in height. Narrowish habit in youth. Older trees broader, with fairly few heavy, contorted branches. These, together with stout winter twigs, make bare tree picturesque. Leaves (1 ½ - 3 feet long) come out late in spring; they are pinkish when expanding, deep green in summer, yellow in autumn. Inconspicuous flowers are followed by 6-10 inch long flat reddish brown pods containing hard black seeds. Average soil and routine watering. Established trees will take some drought, much heat and cold, poor soil. Effective for form in any cold-winter garden.	Colorful and hardy.	Nuisance seed pods	No experience with this tree in City of Hughson.

Appendix

B

Japanese Tree Lilac. *S. reticulata (s. japanica, S. amurensis japonica).*	Large shrub easily trained as single-stemmed 30-ft. tree. Bark is smooth, something like cherry in its gloss. Large leaves (to 5 inches long). White flower clusters to 1 ft. appear in late spring, early summer. Flowers showy, but not fragrant; they smell like privet flowers. Useful small shade or street tree in difficult climates.	Colorful flowers; like alkaline soil.		Can be used as a street tree under power lines or in areas requiring low shrubbery.
Crape Myrtle *Lagerstroemia indica Lythraceae*.	Deciduous shrub or tree. Native of China. Dwarf shrubby forms and shrub-tree forms, 6-30 feet tall. Slow growing as shrub, spreads as wide as high; trained as tree, becomes vase shaped with very attractive trunk and branch pattern. Spring foliage is light green tinged bronze red; mature leaves 1-2 inches long, oval deep glossy green. Fall foliage is yellow, more rarely orange to red. Crinkled, crepe-like, 1 ½ inch flowers in rounded, slightly conical clusters, 6-12 inches long, at ends of branches. Colors in shapes of red, rose, deep or soft pink, rosy orchid, purple, white. Long flowering period from July to September.	Root hardy and sometimes treated as perennial. Flower freely.	Subject to mildew. Selections called Indian Tribes have heavy foliage with considerable resistance to mildew. (Catawba, Cherokee, Potomac, Seminole, Powhata). Hybrids between *L. indica* and the species *L. fauriei* have even greater resistance to mildew than Indian Tribes.	Small yard or street tree.
Trident Maple *A. buergeranum*	Native of China and Japan. Grows 20-25 feet high. Lobed leaves that are pale beneath. Fall color usually red, varies to orange or yellow. Low, spreading growth;	Attractive small leaves and colorful.	Extensive fibrous root systems that take water and nutrients form the topsoil.	Small yard or street tree A decorative, useful patio tree and favorite bonsai subject.

Japanese Maple *A. palmatum*	Native to Japan and Korea. Slow growing to 20-feet; normally many stemmed. Most airy and delicate of all maples. Leaves 2-4 inches long deeply cut into 5-9 toothed lobes. All-year interest; young spring growth is flowing red; summer's leaves are soft green; fall foliage scarlet, orange, or yellow. Slender leafless branches in greens and reds provide winter pattern.	Attractive all year. Resistant to oak root fungus.	Extensive fibrous root systems that take water and nutrients form the topsoil. Ample deep watering and periodic feeding will help keep roots down.	Small yard or street tree
Canary Island Date Palm ***Phoenix canariensis***	Mostly large feather palms, but one a dwarf. Trunks patterned with bases of old leafstalks. Small yellowish flowers in large, hanging sprays followed by clusters of often-edible fruit (*P. dactylifera* bears dates of commerce). Big, heavy-trunked plant to 60-feet tall with 50-foot spread composed of a great many gracefully arching fronds. Grows slowly until it forms trunk, then speeds up a little. Hardy to 20* F. Slow to develop new head of foliage after hard-frost damage.		Not a good street tree in residential areas, as it does not produce shade; should be planted along wide avenues (like Las Palmas), or in parks to be enjoyed at a distance.	Young plants do well in pots for many years, looking something like pineapples. Grow on slopes, in parks, big spaces along wide streets; not for small city lots

Appendix C: Relevance to Blueprint Principles

As the Central Valley Blue Print has become an adopted policy guide for cities and counties in the Central Valley, the following provides a description of the linkages of the Urban Forest Plan and Resource Guide to the 12 adopted Blue Print Principals.

Urban Forests are basic to our perceptions of "livability" within our communities. The also play a critical role in supporting a community's effort to comply with State Law with respect to "sequestering" and/or reducing Greenhouse Gas emission within a local jurisdiction. Other non-regulatory benefits are obvious. The following table has been developed to demonstrate the linkage between the Urban Forest Plan/Resource Guide and the 12 Blue Print Principals.

Blue Print Principle	Supports	Indirectly Related	Limited or No Support
Create a range of housing opportunities and choices			x
Create walkable neighborhoods	X		
Encourage community and stakeholder collaboration	X		
Foster distinctive, attractive communities with a strong sense of place	X		
Make development decisions predictable, fair, and cost-effective		X	
Mix land uses		X	
Preserve open space, farmland, natural beauty, critical environmental areas	X		
Provide a variety of transportation choices			X
Strengthen and direct development towards existing communities		X	
Take advantage of compact building design		X	
Enhance the economic vitality of the region		X	
Support actions that encourage environmental resource management	X		

Table 1. Project Linkage to Blue Print Principles

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PLANNING COMMISSION AGENDA
ITEM NO. 3.3
SECTION 3: NEW BUSINESS

Presented By:	Thom Clark, Community Development Director
Meeting Date:	October 15, 2013
Subject:	Continued Study Session Regarding the Floor Area Ratio, Allowable Residential Units per Acre, and Parking for the Downtown Commercial Zone
Enclosures:	1. Definition of Floor Area Ratio 2. Patterson Parking Exemption 3. Hughson Parking Regulations 4. Scottsdale, Arizona Shared Parking Regulations
Desired Action:	Review and Provide Direction to Staff as Needed

BACKGROUND AND OVERVIEW:

At its regularly scheduled meeting of August 20, 2013, the Planning Commission directed staff to return with a draft Title 17 Municipal Code Amendment which would increase the floor area ration (FAR) and residential units per acre in the Downtown C-2 Zoning District, as well as to modify the parking exemption in the zone to require parking for buildings over two stories.

At the August 20, 2013 Planning Commission meeting, the Planning Commission analyzed mixed-use provisions of the Zoning Code to see what the code would allow and how the provisions worked in a real-world scenario.

BACKGROUND ON MIXED USE ZONING

Mixed Use Development has many advantages over typical Euclidean Zoning (see discussion of Euclidean Zoning on Page 5, Background, of the Blueprint Integration Tool whitepaper). Euclidean Zoning segregates land into different zones according to their use. For example, an R-1 Single Family Zone does not allow a corner store to be built in the neighborhood, nor does it allow work-live buildings where a downstairs could be an office for the family living upstairs. This is counterintuitive to placemaking and modern urban design principles, yet it is what the majority of jurisdictions in California use as their land use development code.

Mixed Use however, as the name implies, allows different uses to be combined into single buildings or over large development footprints. One of the biggest advantages this creates is the reduced reliance on automobiles and all the benefits that reduced reliance provides.

California has enacted two bills which directly address this issue: Senate Bill (SB) 375 and Assembly Bill (AB) 32. SB 375 is also known as the Sustainable Communities Strategy (SCS). It was enacted to reduce greenhouse gas emissions from automobiles by integrating transportation plans, land use, and environmental planning. In Stanislaus County the SCS process is called the Valley Visioning Stanislaus. StanCOG is responsible for incorporating the SCS into the Regional Transportation Plan (RTP).

AB 32 is called the Global Worming Solutions Act. It requires a reduction in greenhouse gases (GHG) to 1990 levels by 2020. The California Air Resources Board (ARB) is charged with the development of a scoping plan to identify how best to reach the 2020 limit. The ARB scoping plan identifies reduction measures and reporting requirements for compliance at the local level.

The actual impact of these two bills at the local level is still unknown. However, SB 375 may end up allocating much of the transportation funding we currently receive to larger jurisdictions, like Modesto, that have or can have transit systems available to cluster high rise housing around.

AB 32 can affect new developments in Hughson by requiring them to prove the development will reduce GHG emissions. To protect our economic development potential, staff is currently putting the finishing touches on a Climate Action Plan (CAP), developed using Proposition 84 grant funding. The CAP has used our 2005 baseline GHG emissions and determined that with specific reduction measures, as well as reduction measures we have already completed, new development can merely go down a checklist to ensure compliance and not have to develop their own emission reduction plan. The CAP, as we see it, is therefore an economic development tool.

Mixed Use Development reduces vehicle trips, thereby lowering GHG emissions from more traditional development patterns. As such, this type of development is tailor made for compliance with both of these bills. As you will see, most Mixed Use Development is built in urban environments. In a suburban environment like ours, a smaller form of Mixed Use Development called two-story live-work units are much more feasible and have a better chance of being built. Since the densities in live-work units are not high, they could lend themselves to either commercial or residential zoning using the proper zoning code sections of the Municipal Code.

HUGHSON ZONING CODE

Interestingly, our zoning code allows mixed uses without actually using the name. The R-3 High Density Residential Zoning District allows many different uses as follows:

R-3 High Density Residential.

1. Purpose. The purpose of the R-3 high density residential zone is to provide residential areas which can accommodate a suitable mixture of more intensive land uses, including multiple-family dwellings, community facilities, retail

establishments, medical facilities, and offices, compatible with the surrounding area and consistent with the general plan.

Please note that the residential densities required in the R-3 Zone must be maintained, even if other uses are included in the zone. Residential densities in the R-3 Zone are a minimum of 10.1 and maximum of 27 units per net acre.

Conversely, the Downtown Commercial Zoning District allows high density residential. This is consistent with another tenet of urban design, to put people in your downtown. The following is a partial table from our code that shows this allowance:

Table 17.02.012

Commercial and Industrial Development Standards

Development Standards	Requirements by Zoning District				Related Regulations
	C-1	C-2[a]	C-3	I	
Density (dwelling units per net acre)	0	Downtown 30.0 Non-Downtown 0	0	0	Except where higher densities are permitted subject to the requirements of HMC 17.03.016 or 17.02.028
Intensity for nonresidential uses (floor area ratio)	0.6	Downtown 1.8 Non-Downtown 0.5	0.5	0.6	–
Setbacks (feet)	Minimum setbacks required. See HMC 17.03.020 (C) and (D) for exceptions.				
Front	Same as adjacent residential zone; most restrictive applies if adjacent to more than one residential zone.	8[b, c]	8	8	
Side(s)		None, except same as adjacent residential zone if applicable	None, except same as adjacent residential zone if applicable	None, except same as adjacent residential zone if applicable	
Street side of corner lot		Same as front	Same as front	Same as front	Subject to cross-visibility area in HMC 17.03.048
Rear		None, except 10 when adjacent to residential use	None, except 10 when adjacent to residential use	None, except 10 when adjacent to residential use	
Maximum height (feet)	30	75	65	75; additional height may be allowed with a conditional use permit	See HMC 17.02.016(D) and 17.03.020(B) for exceptions

One of the issues talked about in the enclosed Blueprint Integration Tool report and not addressed in our zoning code is that of compatibility of different uses. No all uses should be mixed, just as not all uses should be segregated pursuant to Euclidean Zoning methods. See Attachment 1, starting on page 20 of the report. Our zoning code really does not address this issue at all.

Our zoning code does however provide other avenues to allow Mixed Use Zoning without a comprehensive amendment to our land use map. The first is through a Specific Plan. The code specifies that development in the Urban Reserve Zone must be done with a Specific Plan. With a Specific Plan, we can create any zone or

combination of uses we desire. The language in the zoning code pertaining to preparation of Specific Plan is as follows:

The second is through the use of a PD Zone. Section 17.02.028 of the zoning code contains provisions for a Planned Development Overlay Zone. This zone provides for flexibility within other existing zones to allow uses which may not have been allowed under that specific zone. Mixed Use can be accommodated through the use of this tool.

MUNICIPAL CODE AMENDMENT

At the aforementioned August 20, 2013 Planning Commission meeting, the Planning Commission analyzed trial scenarios to see what affect the mixed-use provisions in the Downtown C-2 Zone would have on an actual proposed building. What was found was that we could not build certain sized mixed-use buildings in that zoning district. Specifically, the code will not allow a two story or three-story commercial or mixed use building built with zero setbacks on all sides. At that time, the Planning Commission directed staff to return with a proposed ordinance amendment to modify the FAR and allowable residential units per acre in the Downtown Commercial Zone.

It appeared that the reasons why these types of building couldn't be built were because the dwelling units allowed in the zone, as well as the FAR, was too restrictive. However, after further analysis of parking requirements, it is now apparent that parking will be the critical path for developing buildings in the Downtown Commercial Zone. Parking is an extremely complicated issue. One doesn't want requirements to be overly restrictive, but at the same time, requirements should not be so lax that parking becomes a problem. For these reasons, staff does not yet have a proposed amendment to the Municipal Code that will solve the issues we are trying to solve.

PARKING ANALYSIS

When Title 17 was amended to require buildings to be built to the front property line in the Downtown Commercial District, an analysis of parking was also completed. It was determined at that time that there was sufficient parking in the Downtown Core area, which is basically Hughson Avenue. The survey and analysis did not however contemplate multi-story buildings. At the minimum, our parking exemption in the Downtown Commercial Zone should be amended to clarify that the exemption only applies to the first floor of buildings.

Parking does not count when calculating the FAR of a building. Realistically, a developer would probably want to have some parking on-site. We will look at a scenario that includes parking below.

The parking regulations in the Municipal Code are quite lengthy and sometimes complex. I will try to distill out what we will need for this scenario. There are many options for configuring parking. Here is an excerpt from the code showing allowable sizes of parking stalls based on the angle of parking.

E. Minimum Dimensions – Off-Street Parking Areas.

1. All off-street parking facilities provided under the terms of this section shall comply with the following minimum dimensions for off-street parking and maneuvering space:

a. Ninety-Degree Angle Parking. Each parking space shall be not less than nine feet wide nor less than 19 feet in length. Maneuvering space shall be not less than 24 feet in width. Total minimum width of parking area: 43 feet.

b. Sixty-Degree Angle Parking. Each parking space shall be not less than nine feet wide perpendicular to the parking angle nor less than 21 feet in length; measured at right angles to the building, curb or bumper line. Maneuvering space shall be not less than 18 feet in width perpendicular to the building or parking line. Total minimum width of parking area: 39 feet.

c. Forty-Five-Degree Angle Parking. Each parking space shall be not less than nine feet wide perpendicular to the parking angle nor less than 19 feet 10 inches in length when measured at right angles to the building, curb or bumper line. Maneuvering space shall be not less than 13 feet in width perpendicular to the building or parking line. Total minimum width of parking area: 32 feet 10 inches.

d. Thirty-Degree Angle Parking. Each parking space shall be not less than nine feet wide perpendicular to the parking angle nor less than 17 feet four inches in length when measured at right angles to the building, curb or bumper line. Maneuvering space shall be not less than 11 feet in width perpendicular to the building or parking line. Total minimum width of parking area: 28 feet four inches.

Additionally, at least one handicap parking space is required with a width of 14 ft. Both bicycle parking and landscaping are also required in parking lots. For ease of calculation, we will use ninety-degree parking in this scenario. It is also the most space efficient method of parking. We may also assume that required bicycle parking will be satisfied in the front of the building.

The 75 ft. lot width divided by a 9 ft. parking space = 8.33.

So if we look at the vacant site on Hughson Avenue that we looked at in August and assume some parking on-site, the scenario could look like this:

<u>Scenario 1</u>

Given:

Lot Size: 9,375 sq. ft.
Lot Dimensions: 75 ft. wide and 125 ft. deep
Allowable Height: 75 ft.
Allowable Residential Density: 30 units/net acre
Allowable FAR: 1.8
Alley Access Available

Assume:

5,000 sq. ft. building footprint
4.375 sq. ft. parking (remainder of lot)
Two Stories = FAR of 1.07
All Commercial Use – Office on Second Floor
3 Foot Wide Landscape Strip in Parking Lot (.33 of a parking space)

Parking:
First Floor Exempt (use street parking)
Second Floor requires 17 parking spaces @ 1 per 300 sq. ft. (Note – these spaces are what is required in other commercial zones. There is currently no requirement for parking in the Downtown Core Commercial Zone)
Available On-site: 7.

This scenario does not work because of lack of sufficient parking, just because of the second floor. We have already exempted 17 parking spaces on the first floor.

Scenario 2

All Assumptions and Givens in Scenario 1 apply except for parking. For parking, assume 50% of the requirement, similar to what the Downtown Transition Area has.

Now required parking is 8 spaces (1 per 600 sq. ft.). We are still one short because of the additional 5 foot width of the handicap stall. With the exemption for parking on the ground floor, it is probably not a good idea to reduce parking for the second floor.

This scenario doesn't work either, based on lack of sufficient parking, even when the second floor parking requirement was cut in half.

Scenario 3

Assume a limit of 80% lot coverage for the building footprint, leaving the rest of the lot available for parking.

Building footprint = 7,500 sq. ft.
First floor parking exempted = 25
7 parking spaces are available on-site. They could be used for second floor office space of 2,100 sq ft., or used to offset some of the first floor parking burden. It still doesn't look like we have enough parking though.

Scenario 4

Same as Scenario 3 except assume second floor residential and use Scottsdale's Shared Parking Program. First we will look at the entire building using this tool, to get an idea of what a sophisticated parking program would require for this building. This scenario does not exempt first floor parking. The table below shows that using the Scottsdale tool, one parking space was eliminated. The tool is probably more effective with larger buildings.

With this same scenario but exempting first floor parking, as the ordinance reads now, we would still have 7 spaces on-site which would more than cover the upstairs residential unit, as well as somewhat reducing the parking burden from the exempted 25 first floor spaces.

		Mixed Use Shared Parking				
3	700 sq ft one-bedroom residential units					
25	spaces for office					
Office	5%	100%	5%	0%	60%	10%
Spaces	1.25	25	1.25	0	15	2.5
Residential	100%	55%	85%	100%	65%	75%
Spaces	3	1.65	2.55	3	1.95	2.25
Totals	4.25	26.65	3.8	3	16.95	4.75
Use highest total parking, rounding fractions up =					27 parking spaces required	
					(saved one space)	

Conclusion: parking is the critical path to designing buildings in the Downtown Commercial Zone, not FAR or residential units per acre.

DWELLING UNITS PER ACRE

As was found during analysis of the real life building scenarios at the August 20, 2013 Planning Commission meeting, a mixed-use building, two stories in height, with the upper two floors residential, would require 60 residential units per net acre. However, with the parking analysis showing that a zero lot line building will not work for multi-story buildings, we may not need to raise the dwelling units per acre limit in the code.

FLOOR AREA RATIO

The same issue applies to the FAR; a zero lot-line multi-story building will not work.

CONCLUSION

The issue of parking in the Downtown Commercial Zone needs further study. So far, no satisfactory building scenario has worked with the three regulations we have studied in this report.

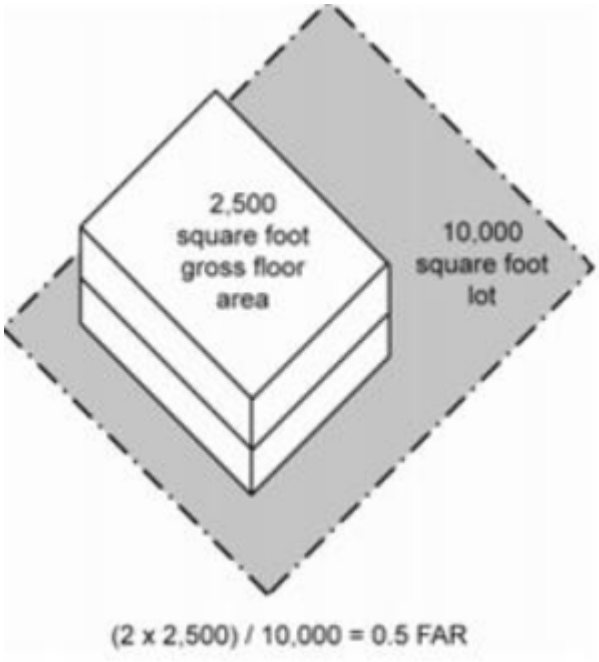
RECOMMENDATION:

Review and provide direction to staff as needed.

Floor Area Ratio (FAR)

“Floor area ratio” is the ratio of the total gross floor area of all buildings on a lot, excluding structured parking areas, divided by the total lot area. For example, as shown in Figure 17.01.090.1, if a 10,000 square foot lot has one two-story building, and the gross floor area of each story is 2,500 square feet, the lot has a total gross floor area of 5,000 square feet and an FAR of 0.5.

Figure 17.01.090.1. Floor Area Ratio



Patterson parking exemption

18.72.040 Required parking spaces.

In all districts except the DC, downtown core district contained within the exempt area, there shall be provided at the time of erection of any building or structure, or at the time of any building or structure is enlarged or increased in capacity, off-street parking spaces for vehicles in accordance with the design standards adopted by the planning commission and city council, and the parking schedule set forth in Section 18.72.120. The exempt area boundary shall be: I Street to the north, Fifth Street to the west, E Street to the south, and Second Street (State Highway 33) to the east. At the time of any proposed new development within the exempt area the planning director may refer off-street parking requirement issues to the planning commission for its review. The planning commission may withdraw the exempt status of any new development within the exempt area. (Ord. 501 § 2 (part), 1993).

17.03.060 Parking.

A. Purpose. The purpose of this section is to provide accessible off-street parking facilities for the parking of self-propelled motor vehicles and bicycles on public or private property in connection with the erection or major alteration, extension or change of use of any building or structure, unless otherwise stipulated, in the amounts as specified in this section.

B. General provisions.

1. Parking requirements for new development. New development shall comply with the off-street parking requirements identified in subsection (C) of this section.

2. Parking requirements for changes to existing development. Whenever a building is increased in size, whether by units or dimensions, or is moved from one lot to another, the following shall apply:

a. Parking based on square feet of building. Any building that is remodeled, altered, or enlarged, thereby increasing its gross floor area so that it equals or exceeds any minimum areas established for off-street facilities, shall provide off-street facilities as required in subsection (C) of this section for the entire building. For projects adding 15 percent or less of the original gross floor area, no additional parking facilities shall be required provided that the applicant demonstrates to the Planning Officer's satisfaction that the additional floor area will not generate additional demand for on-site parking.

b. Parking based on units. Any building that is remodeled, altered or enlarged so as to provide more units, shall be required to provide and maintain off-street parking facilities for the additional units, as required in subsection (C) of this section, unless said units constitute 15 percent or less of the original total units in which case no additional parking facilities shall be required.

c. Parking requirement for buildings or structures moved from one lot to another. Any building or structure which is moved from one lot to another shall provide parking in the amount required by this section for a new building or structure.

3. Changes in use for existing buildings. The Planning Commission (or, for buildings existing on January 1, 1983, the Planning Officer) may waive or modify any of the provisions of this section, provided the following findings are made:

a. That such action would not be detrimental to any surrounding property or use;

b. That adequate on-street legal parking exists to accommodate the proposed use of the site;

c. That such action would not create a traffic hazard;

d. That such action applies to a proposed use in an existing building; and

e. In situations where a new building or an addition to an existing building of over 15 percent of the floor area of the building is proposed, the Planning Commission may waive or modify the parking space requirements if such required spaces are provided on another parcel within 200 feet of the proposed building. ~~In lieu of providing spaces, the property owner may pay a fee for each space, as determined by the City Council by resolution or ordinance, with the fee to be placed in a fund for use by the City for providing parking in the area.~~

4. Existing facilities.

a. Existing off-street parking facilities shall not be eliminated nor reduced to an amount less than that required for new buildings.

b. Where a parking plan includes access driveways or curb cuts that would cause one or more existing marked, on-street parking spaces or bicycle parking spaces to be eliminated, the off-street parking requirement shall be increased by the number of on-street parking spaces that are to be eliminated.

5. Loading spaces. Loading space, exclusive of driveways and/or corridors leading thereto, shall not be considered as supplying off-street parking space, nor shall anything in this section prevent the provision of parking space in excess of the amount specified.

6. Historic buildings. As provided by Hughson Municipal Code Section 17.03.040, exceptions to the requirements of this section for historic buildings may be granted by the Planning Commission.

C. Parking requirements by use.

1. Minimum parking requirements.

a. The vehicular parking requirements in Table 17.03.060.1 shall be considered minimum requirements in all districts, except as provided otherwise by this section. Parking requirements shall be cumulative whenever more than one use is present on the site, except as otherwise provided by this section.

b. Where the application of these standards would result in a fractional number of spaces, any fraction less than one-half shall be disregarded, and fractions of one-half or greater shall require one parking space.

c. For uses that are allowed but are not specified in Table 17.03.060.1 and must be approved by the Planning Commission, the parking requirement shall be determined by the Planning Commission; in all other cases, the parking requirement shall be determined by the Planning Officer.

d. For the purposes of interpreting these requirements, each 1.5 linear feet of a bench shall be counted as one seat.

Table 17.03.060.1
Minimum Vehicular Parking Requirements

Land Use	Minimum Vehicular Parking Requirements
Residential	
Single-family dwellings	2 garage spaces for each dwelling unit
Duplexes	2 garage spaces for each dwelling unit
Multiple family dwellings	a. Studio or one bedroom: 1 space for each dwelling unit b. Two or more bedrooms: 2 spaces for each dwelling unit c. Plus, 1 additional space for each 4 dwelling units
Secondary dwelling unit	1 space for each dwelling unit
Guest houses	None beyond requirement for main dwelling unit
Boarding and rooming houses	1 space for each bedroom
Home day care, small	None beyond requirement for dwelling unit
Home day care, large	2 spaces in addition to those required for the dwelling unit
Residential care homes	a. If six units or fewer: same as requirements for applicable type of dwelling unit b. If six units or more: 1 space for each 3 beds
Nursing and convalescent homes	1 space for each 3 beds
Home occupations	None beyond requirement for dwelling unit
Mobile home parks	2 spaces for each dwelling unit; may be tandem
Mobile home supplemental housing	1 space for each dwelling unit
Temporary real estate office	2 temporary spaces, preferably constructed of compacted gravel or similar pervious surface
Public Assembly	
Commercial recreational facility—indoor	a. Arcade or amusement center: 1 space for each 300 square feet of floor area b. Bowling alley: 2 spaces for each lane c. Skating rink: 1 space for each 300 square feet of rink area d. Theater: 1 space for each 5 fixed seats, or 1 space for each 100 square feet of floor area if no fixed seats; exceptions may be provided for theaters with more than 500 seats, subject to a Conditional Use Permit
Commercial recreational facility—outdoor	Determined by Conditional Use Permit
Gym	1 space for each 200 square feet of floor area
Instructional or production studio	1 space for each 300 square feet of floor area
Library or museum	1 space for each 300 square feet of floor area
Meeting facility—10,000 square feet or less of gross floor area	1 space for each 5 fixed seats, or 1 space for each 100 square feet of floor area if no fixed seats
Meeting facility—more than 10,000 square feet of gross floor area	Determined by Conditional Use Permit

Table 17.03.060.1
Minimum Vehicular Parking Requirements

Land Use	Minimum Vehicular Parking Requirements
Restaurant or café	1 space for each 100 square feet of floor area
School – elementary or middle	a. Private: 1.25 space for each classroom b. Public: to be determined by school district
School – high school	a. Private: 7 spaces for each classroom b. Public: to be determined by school district
Retail	
Adult-oriented business	1 space for each 100 square feet of floor area
Alcoholic beverage sales	a. Off-site consumption: 1 space for each 300 square feet of floor area b. On-site consumption: 1 space for each 100 square feet of floor area
Building supply	1 space for each 2,000 square feet of storage space, plus 1 space for each 300 square feet of other floor area
Carnivals, circuses, fairs, races, concerts, bazaars, farmer's markets and similar events, for a maximum of five days in any 30-day period.	1 space for each 5 fixed seats, or 1 space for each 5 persons expected as average attenance. Previous attendance records shall be provided as required for documentation
Drive-through establishment	1 space for each 250 square feet of floor area
Equipment and machinery sales or rental	1 space for each 2,000 square feet of storage space, plus 1 space for each 300 square feet of other retail/office floor area.
Food and beverage sales	1 space for each 300 square feet of floor area
Home and garden supply	1 space for each 300 square feet of floor area
General retail	1 space for each 300 square feet of floor area
Seasonal holiday products	Determined by Administrative Permit
Service station	1 space for each 200 square feet of retail floor area, and 1 space for each service bay
Shopping center	To be determined as part of the Conditional Use Permit process. Parking requirements may be less than what would be required for each individual use combined if it can be shown that due to the parking operation of the various uses that parking spaces can be shared
Vehicle sales	1 space for each 2,000 square feet of site area to be dedicated for customer and employee parking; this does not include the parking necessary for inventory storage
Services	
Animal keeping	To be determined as part of the Administrative or Conditional Use Permit
Bank or financial service	1 space for each 250 square feet of floor area
Bed and breakfast	1 space for each guest room plus 1 extra space for any resident manager
Business support service	1 space for each 300 square feet of floor area
Car wash	a. Self-wash: 2 spaces in addition to the parking space provided in the wash bays b. Hand-wash: ½ space per employee
Catering service	1 space for each 300 square feet of floor area
Child day care	1.25 spaces per employee based on the maximum permitted number of children and State staffing requirements
Hospital	To be determined as part of the Conditional Use Permit process
Hotel or motel	1 space for each guest room
Mortuary	To be determined as part of the Conditional Use Permit process
Office	1 space for each 300 square feet of floor area
Personal services	1 space for each 300 square feet of floor area

Table 17.03.060.1
Minimum Vehicular Parking Requirements

Land Use	Minimum Vehicular Parking Requirements
Manufacturing, Wholesale, Repair and Storage	
Manufacturing	1 space for each 1,000 square feet of floor area; minimum of 2 spaces
Metalwork	1 space for each 1,000 square feet of floor area; minimum of 2 spaces
Research laboratories	1 space for each 300 square feet of floor area
Warehousing	1 space for each 2,000 square feet of storage space, plus one space for each 300 square feet of other floor area
Wholesaling and distribution	1 space for each 1,000 square feet of floor area; minimum of 2 spaces
Transportation and Infrastructure	
Cemetery	To be determined by Conditional Use Permit
Government facility	To be determined by public agency
Public safety facility	To be determined by public agency
Utility building or substation	To be determined by public agency
Public Vehicle depot	To be determined by public agency

e. Truck loading spaces and bicycle parking shall be provided as required by subsections (H) and (I) of this section.

2. Maximum vehicular parking.

a. The maximum number of off-street vehicular parking spaces allowed as of right shall be 200 percent of the minimum number specified in this subsection.

b. An administrative permit may be granted to set the maximum number of off-street vehicular parking spaces at up to 300 percent of the minimum specified in this section. The exact percentage shall be specified in the administrative permit, which shall be processed in accordance with the requirements of Hughson Municipal Code Section 17.04.008. The Planning Officer shall grant the administrative permit subject to the following findings:

i. The proposed use will endanger the public health, safety or welfare or create significant conflicts with surrounding uses unless the maximum parking requirement is increased.

ii. The proposed increase in parking is no greater than necessary to avoid these conflicts and protect the public health, safety or welfare.

D. Location of off-site parking facilities.

1. Off-site parking facilities may be permitted with Planning Commission approval of a Conditional Use Permit subject to the following conditions:

a. If any portion of the off-site parking area is established to meet the minimum amounts specified for any major land use under this section, the off-site parking area shall be provided and maintained in the same ownership as that of the property on which the major land use is located, or if under different ownership, the applicant shall enter into a legally binding contract, approved by the Planning Officer, committing to the owner of the parking area to retain that property as parking as long as needed to maintain the minimum parking requirement for the major land use.

b. The required parking space(s) must be located on an adjacent parcel or site that is readily accessible to the site containing the building, structure, improvement, or use requiring the parking space(s).

E. Minimum dimensions – Off-street parking areas.

1. All off-street parking facilities provided under the terms of this section shall comply with the following minimum dimensions for off-street parking and maneuvering space:

a. Ninety-degree angle parking. Each parking space shall be not less than nine feet wide nor less than 19 feet in length. Maneuvering space shall be not less than 24 feet in width. Total minimum width of parking area: 43 feet.

b. Sixty-degree angle parking. Each parking space shall be not less than nine feet wide perpendicular to the parking angle nor less than 21 feet in length; measured at right angles to the building, curb or bumper line. Maneuvering space shall be not less than 18 feet in width perpendicular to the building or parking line. Total minimum width of parking area: 39 feet.

c. Forty-five-degree angle parking. Each parking space shall be not less than nine feet wide perpendicular to the parking angle nor less than 19 feet 10 inches in length when measured at right angles to the building, curb or bumper line. Maneuvering space shall be not less than 13 feet in width perpendicular to the building or parking line. Total minimum width of parking area: 32 feet 10 inches.

d. Thirty-degree angle parking. Each parking space shall be not less than nine feet wide perpendicular to the parking angle nor less than 17 feet four inches in length when measured at right angles to the building, curb or bumper line. Maneuvering space shall be not less than 11 feet in width perpendicular to the building or parking line. Total minimum width of parking area: 28 feet four inches.

2. The Planning Commission shall have the authority to establish and/or approve parking stall and maneuvering area dimensions for parking angles other than those specified herein.

3. When off-street parking facilities are located adjacent to a public alley, the width of said alley may be assumed to be a portion of the maneuvering space requirement.

4. A walkway, if provided, shall be in addition to the minimum requirement for parking and maneuvering space herein required.

5. Where off-street parking facilities are provided in excess of the amounts herein specified, or when off-street parking facilities are provided, but not required by this section, the off-street parking facilities shall comply with the minimum requirements for parking and maneuvering space herein specified.

F. Development and maintenance of off-street parking areas. Every parcel of land hereafter used as a public or private off-street parking area, as required by this section, shall be developed and maintained as follows:

1. Every parking area shall be paved and maintained so as to eliminate dust or mud. All parking areas shall be graded and drained to provide for the on-site disposal of all surface water where no city storm drains are available. In no case shall such drainage be allowed to cross sidewalks. Best Management Practices (BMPs) shall be incorporated to manage the water quality of runoff from parking lots.

2. Every parking area not separated by a fence from any street or alley property line upon which it abuts shall be provided with a suitable concrete curb or timber barrier not less than six inches in height located not less than two feet from such street or alley line. Such curb or barrier shall be securely installed and maintained. No such curb or barrier shall be required across any driveway or entrance to the parking area.

3. Every non-residential parking area abutting property zoned for residential use shall be separated from such property by a solid wall, view-obstructing fence or hedge of not less than six feet, except within front setback areas where the fence shall be reduced to three and one-half feet.

4. The Planning Commission may grant a reduction in the total number of required parking spaces when the application of these standards and regulations to an existing parking area would result in a number of parking spaces less than that required in Table 17.03.060.1.

5. Parking areas shall be used for automobile parking only. Other activities, including but not limited sales, dead storage, repair work, dismantling or servicing of any kind, shall not be permitted within parking areas;

6. If lighting is provided it shall be arranged to reflect away from the residential area, also from any public street or highway;

7. Within required front yard setback areas vehicles shall be parked only in paved parking areas which meet the parking area development standards outlined in this subsection. Vehicles may be parked in non-paved areas outside of the front setback with Planning Official determination that such a parking arrangement will not conflict with the purpose of this subsection.

8. Parking areas shall not be located in the front of buildings in downtown Hughson, as designated in the Hughson General Plan as Downtown Commercial. Parking shall be located either to the side or to the rear of the building.

9. Parking lots in front yard areas shall be separated from the sidewalk by screen planting or as provided in landscaping regulations.

10. If desired, up to 20 percent of the parking spaces provided may be designated as compact car spaces measuring a minimum of seven feet by 13 feet. The small car spaces shall be identified by painting “compact” on the pavement of said spaces.

11. Handicapped Parking. Parking spaces shall be provided in all parking areas for use by handicapped persons only, as required by Hughson Municipal Code Title 15.

G. Landscaping in parking lots. The following requirements shall apply to all open off-street parking areas:

1. At least 2 trees shall be provided for every ten parking spaces. The trees shall be planted in tree wells measuring at least six feet by six feet and shall be evenly dispersed throughout the parking lot.

2. At least 60 percent of the paved surface of a parking lot shall be shaded by tree canopies at high noon within 15 years after acquiring building permits for the parking lot. The trees to be planted to develop such a canopy shall be in accordance with Hughson Municipal Code Section 17.03.092 and the City’s Street Tree Plan. Plans submitted for development review shall show the estimated tree canopies after 15 years of growth and the total area in square feet of the area shaded by tree canopies. To determine the area shaded by canopies, the following method shall be used:

a. Determine the total area of the parking lot, deducting any areas covered by structures;

b. Measure the shaded area as the area projected to be directly under each tree canopy after 15 years, including both paved areas and landscape planters; and

c. All landscaping shall be protected by front wheel retention strips.

H. Truck loading and unloading space. Requirements for truck loading and unloading spaces shall be as provided in Hughson Municipal Code Section 17.03.096.

I. Bicycle parking.

1. All non-residential uses and multiple-family residential uses shall provide at least two bicycle parking spaces, or one bicycle parking space for every 20 required motor vehicle parking spaces, whichever is greater.

2. In addition to any requirements in the City Construction Specifications, each bicycle parking space shall provide a securely-anchored, stationary parking device that is adequate to lock and secure a six foot long bicycle.

3. All bicycle parking spaces shall be conveniently located to the buildings that they serve, and pedestrian walkways shall be provided between the bicycle parking spaces and the nearest building entrance.

4. For multi-family residential uses that are required to provide bicycle parking, all required bicycle parking spaces shall be located in permanently covered areas, either inside or outdoors, that are designed to protect the bicycle from rainfall.

J. Off-street parking reduction opportunities.

1. On-street parking. In non-residential districts where on-street parking is available, where the entirety of a marked, on-street parking space or bicycle parking space is adjacent to a particular site, the on-street parking space may be counted towards any off-street parking requirement for that site.

2. Shared parking.

a. ~~Downtown. For development within the Hughson Downtown, as designated in the Hughson General Plan as Downtown Commercial, the off-street parking requirements may be reduced or waived by the Planning Commission if there is an adopted Downtown Parking Plan and the developer pays the fee set by the City Council for participating in the Downtown Parking Plan.~~

~~b. Non-downtown areas.~~

~~i.~~ Where vehicular parking spaces are shared and cooperatively operated by more than one use ~~and there is a parking plan~~, the parking requirement for those uses may be eligible for reduction if either of the following circumstances apply:

~~a~~i. The uses attract vehicular traffic at different hours of the day or on different days of the week. Table 17.03.060.2 shows a number of uses that can effectively share parking based on this criteria (sic).

Table 17.03.060.2
Peak Parking Demand for Example Land Uses

Weekday Daytime Peaks	Evening Peaks	Weekend Peaks
Banks	Auditoriums	Churches and other places for worship
Schools	Bars and dance halls	Parks
Wholesaling and distribution	Meeting facilities	Shopping malls/large centers
Factories	Restaurants	Residential
Medical clinics	Theaters	
Offices/Retail	Residential	
Professional services		

~~b~~ii. Visitors to the site are likely to park their cars once and visit more than one of the uses.

~~I~~ia.. Any person seeking a shared parking reduction shall apply for ~~an administrative permit, in accordance with the requirements of Hughson Municipal Code Section 17.04.008,~~ apply for the reduction during development review or site plan review and which shall be granted by the Planning ~~Officer~~ Commission subject to the following findings:

~~a~~i. The applicant has shown the times that each use will make peak demand upon the parking lot.

ii~~b~~. The applicant has demonstrated that the parking requirements of the uses do not conflict with one another.

~~c~~iii. The applicant and any other parties with an interest in the parking lot have signed and recorded a legally-binding agreement approved by the Planning Officer governing the shared use of the parking lot.

~~iii~~a. In no case shall a shared parking reduction be granted such that the number of shared parking spaces to be provided is less than the largest number of spaces required for any one of the individual uses that will share the parking spaces.

Scottsdale AZ Shared Parking

E.

Mixed-use shared parking programs.

1. Purpose. A mixed-use shared parking program is presented as an option to reduce the total required parking in large mixed-use commercial centers and mixed-use developments in which the uses operate at different times from one another throughout the day. The city recognizes that strict application of the required parking ratios may result in the provision of excessive numbers of parking spaces. This results in excessive pavement and impermeable surfaces and discourages the use of alternate transportation modes. A mixed-use shared parking program allows the property developer to use parking spaces more efficiently by allowing the same spaces to be "shared" by various land uses.

2. Applicability. The mixed-use shared parking program may be applied for where mixed-uses are proposed. The applicant may choose this option or may opt to prepare a parking master plan pursuant to Section 9.104.F., Parking master plan.

3. Procedure.

   a. When a parking plan is required as part of any site plan review or permitting procedure, a mixed-use shared parking program may be requested by the applicant at the same time.

   b. The mixed-use shared parking program may also be requested exclusive of any other site plan review or permitting procedure.

   c. Mixed-use shared parking plans shall be reviewed by, and are subject to the approval of, the Zoning Administrator.

   d. Alternatively, the applicant may elect to have the shared parking plan reviewed by, and subject to the approval of, the City Council in a public hearing.

   e. For changes of use in mixed-use projects the applicant must demonstrate that parking necessary for the new mix of uses does not exceed the amount which was required by the previous mix of uses.

4. Limitations on mixed-use shared parking.

   a. The total number parking spaces required by Table 9.103.B. and the total number of parking spaces required for a mixed-use commercial center and mixed-use development indicated in Table 9.103.A. shall not be used to reduce the required parking in the Downtown Area or a development that is defined as mixed-use development or mixed- use commercial center not in the Downtown Area.

   b. The total number of parking spaces required by Table 9.103.A. shall not be reduced by more than twenty (20) percent.

5. Performance standards. The Zoning Administrator may authorize a reduction in the total number of required parking spaces for two (2) or more uses jointly providing on-site parking subject to the following criteria:

a. The respective hours of operation of the uses do not overlap, as demonstrated by the application on Table 9.104.A., Schedule of Shared Parking Calculations. If one (1) or all of the land uses proposing to use joint parking facilities do not conform to one (1) of the general land use classifications in Table 9.104.A., Schedule of Shared Parking Calculations, the applicant shall submit sufficient data to indicate that there is not substantial conflict in the principal operating hours of the uses. Such data may include information from a professional publication such as those published by the Institute of Transportation Engineers (ITE) or the Urban Land Institute (ULI), or by a professionally prepared parking study.

b. A parking plan shall be submitted for approval which shall show the layout of proposed parking.

c. The property owners involved in the joint use of on-site parking facilities shall submit a written agreement subject to City approval requiring that the parking spaces shall be maintained as long as the uses requiring parking exist or unless the required parking is provided elsewhere in accordance with the provisions of this Article. Such written agreement shall be recorded by the property owner with the Maricopa County Recorder's Office prior to the issuance of a building permit, and a copy filed in the project review file.

Table 9.104.A Schedule of Shared Parking Calculations

General Land Use Classification	Weekdays			Weekends		
	12:00 a.m.— 7:00 a.m.	7:00 a.m.— 6:00 p.m.	6:00 p.m.— 12:00 a.m.	12:00 a.m.— 7:00 a.m.	7:00 a.m.— 6:00 p.m.	6:00 p.m.— 12:00 a.m.
Office and industrial	5%	100%	5%	0%	60%	10%
Retail	0%	100%	80%	0%	100%	60%
Residential	100%	55%	85%	100%	65%	75%
Restaurant and bars	50%	70%	100%	45%	70%	100%
Hotel	100%	65%	90%	100%	65%	80%
Churches and places of worship	0%	10%	30%	0%	100%	30%
Cinema/theater, and live entertainment	0%	70%	100%	5%	70%	100%

How to use the schedule of shared parking. Calculate the number of parking spaces required by Table 9.103.A. for each use as if that use were free-standing (the total number of parking spaces required by Table 9.103.B. and the total number of parking spaces required for a mixed-use commercial center and mixed-use development indicated in Table 9.103.A. shall not be used to reduce the required parking in the Downtown Area, or a development that is defined as mixed-use development or mixed-use commercial center not in Downtown Area.)

Applying the applicable general land use category to each proposed use, use the percentages to calculate the number of spaces required for each time period, (six (6) time periods per use). Add the number of spaces required for all applicable land uses to obtain a total parking requirement for each time period. Select the time period with the highest total parking requirement and use that total as your shared parking requirement.

Table 9.103.A. Schedule of Parking Requirements	
Amusement parks	Three (3) spaces per hole for any miniature golf course, plus one (1) space per three thousand (3,000) square feet of outdoor active recreation space, plus any additional spaces required for ancillary uses such as but not limited to game centers and pool halls.
Arts festivals, seasonal	A. One (1) space for each two hundred (200) square feet of indoor public floor area, other than public restaurant space. B. Restaurant at seasonal arts festivals shall be provided parking in accordance with table 9.103.a.
Banks/financial institutions	One (1) space per two hundred fifty (250) square feet gross floor area.
Bars, cocktail lounges, taverns, afterhours or micro-brewery/distillery with live entertainment	A. One (1) space per sixty (60) square feet of gross floor area; and B. One (1) space per two hundred (200) gross square feet of outdoor patio area, excluding the first two hundred (200) gross square feet.
Bars, cocktail lounges, taverns, afterhours or micro-brewery/distillery	A. One (1) space per eighty (80) square feet of gross floor area; and B. One (1) space per two hundred (200) gross square feet of outdoor patio area, excluding the first two hundred (200) gross square feet.
Boardinghouses, lodging houses, and other such uses	One (1) parking space for each one (1) guest room or dwelling unit.
Bowling alleys	Four (4) parking spaces for each lane, plus two (2) for any pool table, plus one (1) space for each five (5) seats in any visitors gallery.
Carwash	Four (4) spaces per bay or stall plus one (1) space per employee plus ten (10) stacking spaces.
Churches and places of worship	A. With fixed seating. One (1) space per four (4) seats in main sanctuary, or auditorium, and c below; or B. Without fixed seating. One (1) space for each thirty (30) square feet of gross floor area in main sanctuary and c below. C. One (1) space per each three hundred (300) square feet gross floor area of classrooms and other meeting areas.
Club/lodge, civic and social organizations	One (1) space per two hundred fifty (250) square feet gross floor area.
College/university	One (1) space per two (2) employees plus one (1) space per four (4) students, based on projected maximum enrollment.
Community or recreation buildings	One (1) parking space for each two hundred (200) square feet of gross floor area.
Conference and meeting facilities, or similar facilities	A. One (1) parking space for every five (5) seats, if seats are fixed, and/or B. One (1) parking space for fifty (50) square feet of gross floor area of conference/meeting area.
Cultural institutions and museums	One (1) space per three hundred (300) square feet gross floor

	area.
Dance halls, skating rinks, and similar indoor recreational uses	One (1) parking space for each three hundred (300) square feet of gross floor area in the building.
Dance/music/and professional schools	One (1) space per two hundred (200) square feet of gross floor area classroom area.
Day care center	One (1) parking space for each employee; plus one (1) space for every fifteen (15) students, plus one (1) space for each company vehicle as per Section 9.103.H., additional requirements for company vehicles.
Dry cleaners	One (1) space per two hundred fifty (250) square feet gross floor area.
Dwellings, multiple family	Parking spaces per dwelling unit at the rate of: efficiency units 1.25 one-bedroom 1.3 two-bedrooms 1.7 three (3) or more bedrooms 1.9
Dwellings, single- and two-family and townhouses	Two (2) spaces per unit.
Elementary schools	One (1) parking space for each classroom plus one (1) parking space for each two hundred (200) square feet of gross floor area in office areas.
Funeral homes and funeral services	A. One (1) parking space for every two (2) persons for which permanent seating is provided in the main auditorium; and B. One (1) parking space for every thirty (30) square feet of gross floor area public assembly area.
Furniture, home improvement, and appliance stores	A. Uses up to fifteen thousand (15,000) square feet of gross floor area. One (1)space per five hundred (500) square feet gross floor area; or B. Uses over fifteen thousand (15,000) square feet of gross floor area. One (1) space per five hundred (500) square feet for the first fifteen thousand (15,000) square feet of gross floor area, and one (1) space per eight hundred (800) square feet area over the first fifteen thousand (15,000) square feet of gross floor area
Galleries	One (1) space per four hundred (400) square feet indoor gross public floor area, one (1) space per two hundred twenty-five (225) square feet of gross floor area of office or work area, and one (1) space per eight hundred (800) square feet gross floor area storage space.
Game centers	One (1) space per one hundred (100) square feet gross floor area.
Gas station	Three (3) spaces per service bay and one (1) space per 250 square feet of accessory retail sales gross floor area. Each service bay counts for one (1) of the required parking spaces.
Golf course	One (1) parking space for each two hundred (200) square feet of gross floor area in any main building plus one (1) space for every two (2) practice tees in the driving range, plus four (4) parking spaces for each green in the playing area.
Grocery or supermarket	One (1) space per three hundred (300) square feet gross floor

	area.
Health or fitness studio, and indoor recreational uses	A. Building area less than, or equal to, 3,000 square feet of gross floor area: one space per 250 square feet of gross floor area. B. Building area greater than 3,000 square feet of gross floor area, and less than 10,000 square feet of gross floor area: one space per 150 square feet of gross floor area. C. Building areas equal to, or greater than, 10,000 square feet of gross floor area, and less than 20,000 square feet of gross floor area: one space per 200 square feet of gross floor area. D. Building areas equal to, or greater than, 20,000 square feet of gross floor area: one space per 250 square feet of gross floor area.
High schools	One (1) parking space for each employee plus one (1) space for every six (6) students, based on projected maximum enrollment.
Hospitals	One and one half (1.5) parking spaces for each one (1) bed.
Internalized community storage	One (1) parking space for each two thousand five hundred (2,500) square feet of gross floor area.
Library	One (1) space per three hundred (300) square feet gross floor area.
Live entertainment (not including bars, restaurants, and performing arts theaters)	A. With fixed seating. One (1) parking space for two and one-half (2.5) seats. B. Without fixed seating. One (1) parking space for every sixty (60) square feet of gross floor area of an establishment that does not contain fixed seating.
Manufactured home park	One and one-half parking spaces per manufactured home space.
Manufacturing and industrial uses	One (1) parking space for each five hundred (500) square feet of gross floor area.
Mixed-use commercial centers In mixed-use commercial centers with less than 20,000 square feet of gross floor area, land uses (with parking requirements of one space per 250 square feet or fewer spaces) shall occupy at least 60 percent of gross floor area. Limited to mixed-use commercial centers where land uses (with parking requirements of one space per 250 square feet or fewer spaces) occupy at least 60 percent of gross floor area.	One space per 300 square feet of gross floor area.
Mixed-use developments	A. One (1) space per three hundred twenty-five (325) square feet of gross floor area of non-residential area; B. Multiple family residential uses shall be parked at the ratios of the dwellings, multi-family in other districts requirements, herein.
Office, all other	One (1) space per three hundred (300) square feet gross floor

	area.
Offices (government, medical/dental and clinics)	One (1) space per two hundred fifty (250) square feet of gross floor area.
Parks	Three (3) parking spaces for each acre of park area.
Personal services/personal care services	One (1) space per two hundred fifty (250) square feet gross floor area.
Plant nurseries, building materials yards, equipment rental or sales yards and similar uses	One (1) parking space for each three hundred (300) square feet gross site area of sales and display area.
Pool hall	Two (2) spaces per pool table.
Postal station(s)	One (1) parking space for each two hundred (200) square feet of gross floor area.
Radio/TV/studio	One (1) space per five hundred (500) square feet gross floor area, plus one (1) space per company vehicle, as per Section 9.103.H., additional requirements for company vehicles.
Ranches	One (1) space per every two (2) horse stalls.
Residential health care facilities	A. Specialized care facilities—0.7 parking space for each bed. B. Minimal care facilities—1.25 parking spaces for each dwelling unit.
Restaurants with live entertainment	A. When live entertainment limited to the hours that a full menu is available, and the area of live entertainment is less than fifteen (15) percent of the gross floor area, one (1) parking space per one hundred twenty (120) square feet of gross floor area; and B. One (1) parking space for each three hundred fifty (350) gross square feet of outdoor public floor area, excluding the first three hundred fifty (350) gross square feet of outdoor patio area, unless the space is located next to and oriented toward a publicly owned walkway or street, in which case the first five hundred (500) gross square feet of outdoor patio area is excluded. C. When live entertainment is not limited to the hours that a full menu is available, and/or the area of live entertainment is less than fifteen (15) percent of the gross floor area, one (1) parking space per sixty (60) square feet of gross floor area, plus patio requirements above.
Restaurants	A. One (1) parking space per one hundred twenty (120) square feet of gross floor area; and B. One (1) parking space for each three hundred fifty (350) gross square feet of outdoor patio area, excluding the first three hundred fifty (350) gross square feet of outdoor patio area, unless the space is located next to and oriented toward a publicly owned walkway or street, in which case the first five hundred (500) square gross feet of outdoor patio area is excluded.
Retail	One (1) space per two hundred fifty (250) square feet of gross floor area.
Retail, in a PCoC zoning district without arterial street frontage	One (1) space per three hundred (300) square feet gross floor area.

Stables, commercial	Adequate parking for daily activities shall be provided as determined by the Zoning Administrator. Additional parking, improved as determined by the Zoning Administrator, shall be provided for shows or other special events pursuant to Section 7.900, Special Events.
Swimming pool or natatorium	One (1) space per one thousand (1,000) square feet gross floor area.
Tennis clubs	One (1) parking space per each two hundred (200) square feet of gross floor area, excluding court area, plus three (3) parking spaces per each court. The applicant shall be responsible for reserving space for parking that may be required in order to obtain permission for tournaments, shows and other activities.
Theaters, cinemas, auditoriums, gymnasiums and similar places of public assembly in PNC, PCC, PCP, PRC, or PUD zoning districts	One (1) space per ten (10) seats.
Theaters, cinemas, auditoriums, gymnasiums and similar places of public assembly in other districts	One (1) parking space per four (4) seats.
Trailhead - gateway	Five hundred (500) to six hundred (600) spaces, including those for tour buses and horse trailers.
Trailhead - local	None required.
Trailhead - major community	Two hundred (200) to three hundred (300) spaces, including those for horse trailers.
Trailhead - minor community	Fifty (50) to one hundred (100) spaces.
Transportation facilities	Required parking shall be determined by the Zoning Administrator per Section 9.103.E., Calculating required parking for transportation facilities.
Transportation uses	Parking spaces required shall be determined by the Zoning Administrator.
Travel accommodations	One (1.25) parking spaces for each one (1) guest room or dwelling unit.
Travel accommodations with conference and meeting facilities, or similar facilities	The travel accommodation requirements above. A. Travel accommodations with auxiliary commercial uses (free standing buildings) requirements above. B. One (1) parking space for every five (5) seats, if seats are fixed, and/or C. One (1) parking space for fifty (50) square feet of gross floor area of conference/meeting area.
Travel accommodations, with auxiliary commercial uses (free standing buildings)	A. The travel accommodation requirements above. B. Bar, cocktail lounge, tavern, after hours, restaurants, and live entertainment uses shall provide parking in accordance uses parking requirements herein this table. C. All other free standing commercial uses. One (1) parking space for every four hundred (400) square feet of gross floor area.
Vehicle leasing, rental, or sales (parking plans submitted for vehicle	A. One employee parking space per 200 square feet of gross floor area,

sales shall illustrate the parking spaces allocated for each of A, B, and C.)	B. One employee parking space per 20 outdoor vehicular display spaces, and C. One customer parking space per 20 outdoor vehicular display spaces.
Veterinary services	One (1) space per three hundred (300) square feet gross floor area.
Warehouses, mini	One (1) space per three hundred (300) square feet of gross floor area of administrative office space, plus one (1) space per each fifty (50) storage spaces.
Warehousing, wholesaling establishments, or separate storage buildings.	One (1) parking space for each eight hundred (800) square feet of gross floor area.
Western theme park	Total of all spaces required for the various uses of the theme park, may apply for a reduction in required parking per Section 9.104, Programs and incentives to reduce parking requirements

Table 9.103.B. Schedule of Parking Requirements in the Downtown Area	
Bars, cocktail lounges, taverns, afterhours or micro-brewery/distillery with live entertainment	A. One (1) space per eighty (80) square feet of gross floor area; and B. One (1) space per two hundred (200) gross square feet of outdoor patio area, excluding the first two hundred (200) gross square feet.
Bars, cocktail lounges, taverns, afterhours or micro-brewery/distillery	A. One (1) space per one-hundred twenty (120) square feet of gross floor area; and B. One (1) space per two hundred (200) gross square feet of outdoor patio area, excluding the first two hundred (200) gross square feet.
Dwellings, multi-family	A. One parking space per dwelling unit for units with one bedroom or less. B. Two parking spaces per dwelling unit, for units with more than one bedroom.
Financial intuitions	A. In a Type 1 area, one (1) space per five hundred (500) square feet of gross floor area; or B. In a Type 2 area, all other lot widths, one (1) space per three hundred (300) square feet of gross floor area.
Fitness studio (no larger than 3,000 gross square feet)	A. One (1) space per three hundred (300) square feet of gross floor area. B. A fitness studio larger than 3,000 gross square feet shall comply with Table 9.103.a.
Galleries	One (1) space per three hundred (500) square feet of gross floor area.
Live entertainment (not including bars, restaurants, and performing arts theaters)	A. With fixed seating. One (1) parking space for two and one-half (2.5) seats. B. Without fixed seating. One (1) parking space for every eighty (80) square feet of gross floor area of an establishment that does not contain fixed seating.
Medical and diagnostic laboratories	One (1) space per three hundred (300) square feet of gross floor area.

Mixed-use commercial center	One (1) space per three hundred fifty (350) square feet gross floor area.
Mixed-use developments	A. One space per 350 square feet of gross floor area of non-residential area; plus B. Parking spaces required for multi-family dwellings as shown in this table, except as provided in Section 9.104.H.3.d.
Office, including government and medical/dental offices and clinics	A. In a Type 1 area, one (1) space per five hundred (500) square feet of gross floor area; or B. In a Type 2 area, all other lot widths, one (1) space per three hundred (300) square feet of gross floor area.
Performing arts theaters	One (1) parking space per ten (10) seats.
Restaurants that serve breakfast and/or lunch only, or the primary business is desserts, bakeries, and/or coffee/tea or non-alcoholic beverage	A. One (1) parking space for each four hundred (400) square feet of gross floor area; and B. One (1) space for each three hundred fifty (350) gross square feet of outdoor public floor area. Excluding the first three hundred fifty (350) gross square feet of outdoor public floor area, unless the space is located next to and oriented toward a publicly owned walkway or street, in which case the first five hundred (500) gross square feet of outdoor public floor area is excluded.
Restaurants, including restaurants with a micro-brewery/distillery as an accessory use.	A. One (1) parking space per three hundred (300) square feet of gross floor area; and B. One (1) parking space for each three hundred fifty (350) gross square feet of outdoor patio area. Excluding the first three hundred fifty (350) gross square feet of outdoor patio area, unless the space is located next to and oriented toward a publicly owned walkway or street, in which case the first five hundred (500) gross square feet of outdoor public floor area is excluded.
Restaurants, including restaurants with a micro-brewery/distillery as an accessory use, and with live entertainment	A. When live entertainment limited to the hours that a full menu is available, and the area of live entertainment is less than fifteen (15) percent of the gross floor area, one (1) parking space per three hundred (300) square feet of gross floor area; and B. One (1) parking space for each three hundred fifty (350) gross square feet of outdoor public floor area. Excluding the first three hundred fifty (350) gross square feet of outdoor patio, unless the space is located next to and oriented toward a publicly owned walkway or street, in which case the first five hundred (500) gross square feet of outdoor patio area is excluded. C. When live entertainment is not limited to the hours that a full menu is available, and/or the area of live entertainment is greater than fifteen (15) percent of the gross floor area, one (1) parking space per one hundred twenty (120) square feet of gross floor area, plus patio requirements above at all times.
Retail, personal care services, dry cleaners, and tattoo parlors	A. In a Type 1 area, one (1) space per five hundred (500) square feet of gross floor area; or B. In a Type 2 area, all other lot widths, one (1) space per three hundred (300) square feet of gross floor area.
Work/live	A. The required parking shall be based on the area of commercial uses, per Table 9.103.B and when applicable, Table 9.103.A.

	B. In addition to the parking requirement for the commercial area, parking shall be provide in accordance with the dwellings, multi-family and co-housing parking requirement for developments containing more than one (1) dwelling unit, excluding the first unit (except as provided in Section 9.104.H.3.d).
All other uses	As specified Table 9.103.A.

Note: 1. Type 1 and Type 2 Areas are locations of the Downtown Area described by the Downtown Plan.

(Ord. No. 2736, § 1, 3-7-95; Ord. No. 3048, § 2, 10-7-97; Ord. No. 3225, § 1, 5-4-99; Ord. No. 3879, § 1(Exh. § 26), 3-2-10; Ord. No. 3896, § 1(Exh. § 6), 6-8-10; Ord. No. 3899, § 1(Res. No. 8342, Exh. A, §§ 18, 19), 8-30-10; Ord. No. 3920, § 1(Exh. §§ 104—109), 11-9-10; Ord. No. 3926, § 1(Exh. § 13), 2-15-11; Ord. No. 3980, § 1(Res. 8895, § 1, Exh. A, § 46), 12-6-11; Ord. No. 3992, § 1(Res. No. 8922, Exh. A, § 17), 1-24-12; Ord. No. 4099, § 1(Res. No. 9439, Exh. A, §§ 17—23), 6-18-13)

Sec. 9.104. Programs and incentives to reduce parking requirements.

The following programs and incentives are provided to permit reduced parking requirements in the locations and situations outlined herein where the basic parking requirements of this ordinance would be excessive or detrimental to goals and policies of the city relating to mass transit and other alternative modes of transportation.

A. *Administration of parking reductions.* Programs and incentives which reduce parking requirements may be applied individually or jointly to properties and developments. Where reductions are allowed, the number of required parking spaces which are eliminated shall be accounted for both in total and by the individual program, incentive or credit which is applied. The record of such reductions shall be kept on the site plan within the project review file. Additionally, the reductions and manner in which they were applied shall be transmitted in writing to the property owner.

B. *Credit for on-street parking.* Wherever on-street angle parking is provided in the improvement of a street, credit toward on-site parking requirements shall be granted at the rate of one (1) on-site space per every twenty-five (25) feet of frontage, excluding the following:

1. Frontage on an arterial, major arterial or expressway as designated in the Transportation Master Plan.
2. Frontage on a street that is planned to be less than fifty-five (55) feet wide curb-to-curb.
3. Frontage within twenty (20) feet of a corner.
4. Frontage within ten (10) feet of each side of a driveway or alley.
5. Frontage within a fire hydrant zone or other emergency access zone.
6. Locations within the Downtown Area.

C. *Credit for bicycle parking facilities.*

1. *Purpose.* The City of Scottsdale, in keeping with the federal and Maricopa County Clean Air Acts, wishes to encourage the use of alternative transportation

modes such as the bicycle instead of the private vehicle. Reducing the number of vehicular parking spaces in favor of bicycle parking spaces helps to attain the standards of the Clean Air Act, to reduce impervious surfaces, and to save on land and development costs.

2. *Performance standards.* The Zoning Administrator may authorize credit towards on-site parking requirements for all uses except residential uses, for the provision of bicycle facilities beyond those required by this ordinance, subject to the following guidelines:

a. Wherever bicycle parking is provided beyond the amount required per Section 9.103.C., required bicycle parking, credit toward required on-site vehicular parking may be granted pursuant to the following:

i. Downtown Area: one (1) vehicular space per eight (8) bicycle spaces.

ii. All other zoning districts: one (1) vehicular space per ten (10) bicycle spaces.

b. Wherever bicycle parking facilities exceed the minimum security level required per Section 9.103.D., required bicycle parking, credit towards required onsite vehicular parking may be granted at a rate of one (1) vehicular space per every four (4) high-security bicycle spaces.

High-security bicycle spaces shall include those which protect against the theft of the entire bicycle and of its components and accessories by enclosure through the use of bicycle lockers, check-in facilities, monitored parking areas, or other means which provide the above level of security as approved by the Zoning Administrator.

c. Wherever shower and changing facilities for bicyclists are provided, credit towards required on-site vehicular parking may be granted at the rate of two (2) vehicular spaces per one (1) shower.

d. The number of vehicular spaces required Table 9.103.A., or when applicable Table 9.103.B., shall not be reduced by more than five (5) percent or ten (10) spaces, whichever is less.

D. *Credit for participation in a joint parking improvement project.* After April 7, 1995, no new joint parking improvement projects shall be designated in the City of Scottsdale. Existing joint parking improvement projects may continue to exist, subject to the standards under which they were established.

The joint parking improvement project was a program through which a group of owners with mixed land uses including an area of more than three (3) blocks and at least six (6) separate ownerships could join together on a voluntary basis to form a parking improvement district, providing parking spaces equal to a minimum of thirty (30) percent of their combined requirements according to the ordinance under which they were established. Each participant property could have received credit for one and one-half (1½) times his proportioned share of the parking spaces provided. The project required that a statement be filed with the

superintendent of buildings stating the number of spaces assigned to each participating property. No adjustments were to be permitted subsequent to the filing of this statement.

UCDA
CENTER FC

Background:

Future Work

Contact:

Data Navigation:

Data Sources:

Definitions:

Methodology:

Margins of Error:

of regional planning and development.
An imbalance in low-wage jobs and affordable housing is of concern not only for those low-wage workers who face challenges in finding affordable
housing near work, but is of concern for regions as a whole, since it makes it more difficult to reduce overall vehicle miles travelled and potentially
contributes to an excess fiscal burden on those jurisdictions with higher proportions of affordable apartments and houses.

cities have control over land use and zoning,
and thus need to be centrally involved in addressing imbalances. It is also important to be aware, however, that city-level analysis can be incomplete:
commute patterns frequently cross city boundaries, even when there is an appropriate fit of jobs and housing, and an imbalances in one city
might be balanced by opportunities in an adjacent city. Furthermore, within larger cities there is very substantial

Development, Center for Regional Change, UC Davis
email: ccbenner@ucdavis.edu, phone: 530-754-8799, website: http://mappingregionalchange.ucdavis.edu

Please contact us if you discover any errors in the data, as we would like to correct any errors immediately.

on this cell, you'll see a small black arrow.
If you click on this arrow, you will see a drop-down menu with a list of all counties in California. Select your county of interest, and the table will be

Statistics Dataset (LODES), Workplace Area
Characteristics file, published by the U.S. Census and available for download here:
http://lehd.ces.census.gov/data/
It includes all employment covered by the Unemployment Insurance system, along with Federal Government employment. It excludes self-employed workers.
Since its reference point is essentially jobs held on April 1st each year, it undercounts seasonable employment in other times of the year, which is especially relevant for the San Joaquin
Valley, which has high levels of seasonal farm work that is not well captured in this dataset.

Low-wage jobs are defined as those jobs with earnings of $1250/month or less;
Affordable rental units are defined as rental units with less than $750/month rent;
Affordable Owned Units are defined as those owner-occupied or vacant for sale housing units valued at less than $150,000.

The definition for low-wage jobs of $1250/month or less of earnings is pre-determined by the LODES dataset, which only reports on job earnings in three categories:
earnings $1250/month or less; earnings $1251/month to $3333/month; and earnings greater than $3333/month.

In determining housing affordability, it was important for use to develop a threshold that was based on a multiple of this $1250 income threshold, rather than
a measure of area median income (which is often used in affordable housing programs). This was because we want to be able to easily update the analysis
on an annual basis and compare trends over time, and thus need a consistent measure of housing affordability that corresponds with the (unchanging)
measure of low-wage jobs.

$750/month corresponds to the equivalent of 30% of household income if 2 income earners in a household were both earning $1250/month.
($750 * 2 * 30% = $750). This is probably a generous estimate of affordability, since the average household in California has approximately 1.4 income earners.

The thresholds of $150,000 for an affordable owned home is based on a calculation of monthly principal and interest payments on a 30-year 4% fixed-rate

of Error (MOE) that corresponds to a 95% confidence interval.
We have calculated appropriate Margins of Error for our Jobs-Housing Fit Ratio, based on the formula for calculating MOEs for derived ratios as published in:
U.S. Census Bureau (2008) *A Compass for Understanding and Using American Community Survey Data: What*

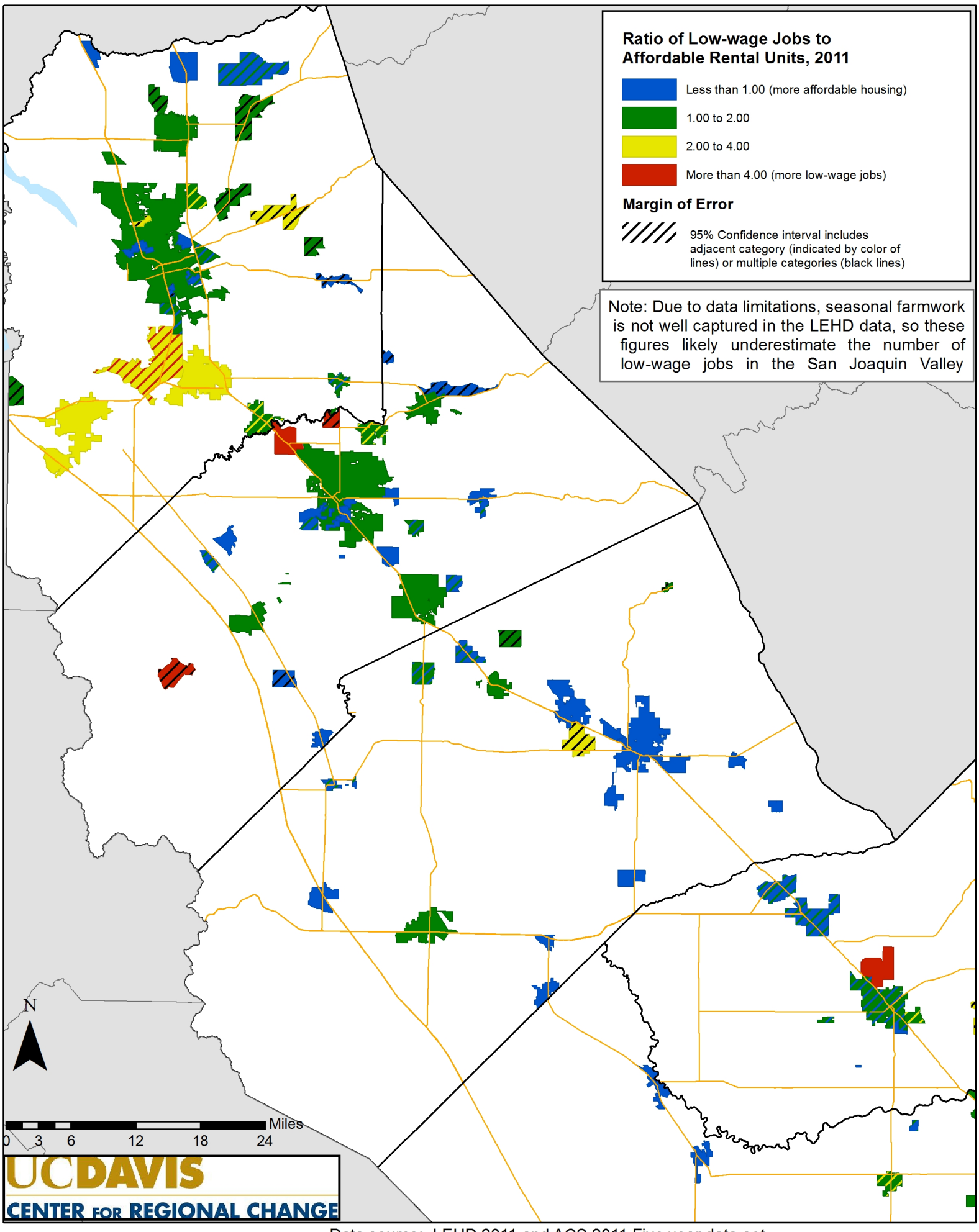
SELECT COUNTY NAME: Alameda

1	2	3	4	5
County Name	**Place Name**	**Low-Wage Jobs-Housing Fit Ratio**	**95%CI Margin of Error JHFIT Ratio**	**Affordable Rental (Deficit) or Surplus (to reach JHFIT Ratio of 2.00)**
Alameda	Alameda city	2.14	0.28	(178)
Alameda	Albany city	5.60	3.43	(375)
Alameda	Ashland CDP	1.07	0.23	376
Alameda	Berkeley city	1.95	0.18	161
Alameda	Castro Valley CDP	3.04	0.50	(513)
Alameda	Cherryland CDP	0.85	0.31	267
Alameda	Dublin city	14.93	5.34	(1,926)
Alameda	Emeryville city	7.80	2.92	(1,158)
Alameda	Fairview CDP	2.52	1.80	(25)
Alameda	Fremont city	8.67	0.85	(5,659)
Alameda	Hayward city	5.05	0.34	(3,629)
Alameda	Livermore city	5.78	0.87	(2,015)
Alameda	Newark city	9.40	2.70	(1,640)
Alameda	Oakland city	1.38	0.05	8,627
Alameda	Piedmont city	12.15	17.42	(234)
Alameda	Pleasanton city	21.08	4.55	(4,760)
Alameda	San Leandro city	4.46	0.46	(2,354)
Alameda	San Lorenzo CDP	2.75	0.77	(135)
Alameda	Sunol CDP	3.74	16.40	(24)
Alameda	Union City city	3.64	0.48	(972)

6	7	8	9	10	11	12
Total Jobs Housing Balance Ratio	**Total Jobs**	**Low-wage Jobs (<$1250/mo)**	**Affordable Rental Units (<$750/mo)**	**Affordable Owned Units (<$150,000)**	**All Affordable Units**	**All Housing Units**
0.78	23,561	5,521	2,583	275	2,858	30,160
0.51	3,834	1,165	208	56	264	7,530
0.35	2,619	866	809	301	1,110	7,483
1.07	49,459	11,391	5,856	389	6,245	46,418
0.60	13,476	3,001	988	625	1,613	22,492
0.27	1,301	392	463	129	592	4,734
1.11	16,421	4,448	298	247	545	14,786
3.04	18,165	3,113	399	198	597	5,981
0.23	770	239	95	109	204	3,343
1.21	87,368	14,711	1,697	1,716	3,413	71,936
1.38	64,932	12,022	2,382	2,796	5,178	47,099
1.05	30,955	6,160	1,065	720	1,785	29,619
1.20	15,924	4,165	443	221	664	13,217
1.20	197,708	38,225	27,739	4,587	32,326	164,278
0.45	1,658	559	46	52	98	3,684
2.12	52,358	10,518	499	371	870	24,703
1.28	38,742	8,538	1,915	1,291	3,206	30,364
0.52	3,923	983	357	289	646	7,473
1.58	529	101	27	4	31	335
0.97	20,206	4,307	1,182	1,013	2,195	20,917

Percent Affordable Housing
9.5%
3.5%
14.8%
13.5%
7.2%
12.5%
3.7%
10.0%
6.1%
4.7%
11.0%
6.0%
5.0%
19.7%
2.7%
3.5%
10.6%
8.6%
9.3%
10.5%

Northern San Joaquin Valley Jobs-Housing Fit, 2011



Data source: LEHD 2011 and ACS 2011 Five year data-set

Table 1

City County Census Data and Jobs-Housing Summary 2010

Jurisdiction	2010 Population	2010 Total Dwellings	2010 Occupied DU	2010 People/ DU	2010 (1) Jobs/DU Ratio
Ceres	45,417	13,673	12,962	3.55	0.57
Hughson	6,640	2,234	2,069	3.20	0.28
Modesto	201,165	75,044	69,107	2.87	0.76
Newman	10,224	3,357	3,006	3.38	0.33
Oakdale	20,675	7,822	7,288	2.81	0.65
Patterson	20,413	6,328	5,630	3.63	0.33
Riverbank	22,678	7,069	6,579	3.42	0.33
Turlock	68,549	24,627	22,772	2.96	0.86
Waterford	8,456	2,665	2,458	3.43	0.14
Total Stanislaus Co. Cities	404,217	142,819	131,871	3.03	0.69
Total Stanislaus CDPs	60,651	18,914	17,043	3.21	0.49
Rural Stanislaus County	49,585	17,770	16,266	3.05	3.90
Total County	514,453	179,503	165,180	3.08	0.98

Source: U.S. 2010 Census

Note 1. U. S. 2010 Census of Employment-Employee/Occupied Dwelling Unit Calculation.

Table 2

City County Census Data Jobs and Population Summary 2010

Jurisdiction	Percent of Total Co. Jobs	Percent of Total Population
Ceres	4.46%	8.83%
Hughson	0.28%	1.29%
Modesto	32.24%	39.10%
Newman	0.85%	1.99%
Oakdale	2.88%	4.02%
Patterson	0.75%	3.97%
Riverbank	1.31%	4.41%
Turlock	11.91%	13.32%
Waterford	0.19%	1.64%
Total Stanislaus Co. Cities	54.87%	78.57%
Total Stanislaus CDPs	3.91%	11.79%
Rural Stanislaus County	41.23%	9.64%
Total County	100.00%	100.00%

Table 3

Summary 2010

Job Classification	Percent of Total Co. Jobs in Cities	Percent of Total Co. Jobs In CDPs	Percent Of Total Co. Jobs in Rural Areas	Total Co. Jobs
Non-Farm Agriculture	20.53%	8.00%	71.47%	100.00%
Construction	49.39%	8.70%	41.91%	100.00%
Manufacturing	37.79%	3.36%	58.85%	100.00%
Wholesale	44.58%	12.21%	43.22%	100.00%
Retail	70.47%	1.61%	27.92%	100.00%
Transportation/Warehousing	21.40%	1.66%	76.95%	100.00%
information	51.01%	0.00%	48.99%	100.00%
Finance/Insurance	70.91%	0.50%	28.59%	100.00%
Real Estate	49.46%	5.45%	45.09%	100.00%
Prof. Tech. Science	71.87%	9.49%	18.64%	100.00%
Management	25.44%	0.00%	74.56%	100.00%
Administration	50.63%	5.26%	44.11%	100.00%
Education Services	64.36%	0.00%	35.64%	100.00%
Health	75.78%	0.64%	23.58%	100.00%
Art, Entertainment, Recreation	46.06%	0.00%	53.94%	100.00%
Hospitality Services	79.93%	1.65%	25.42%	100.00%
Other Services	67.87%	3.04%	29.09%	100.00%
Government	62.06%	4.72%	33.32%	100.00%
2010 Population	78.57%	11.79%	9.64%	100.00%