NOTICE OF REGULAR MEETING

Pursuant to Section 54954.2 of the Government Code of the State of California, a regular meeting of the **ENVIRONMENTAL SUSTAINABILITY COMMISSION** is hereby called for:

Date/Time: **October 24, 2024, at 7:00 p.m.**
(or as soon thereafter as possible)

Location: **City Hall Council Chambers**
333 Civic Center Plaza,
Tracy

THIS MEETING WILL BE OPEN TO THE PUBLIC FOR IN-PERSON PARTICIPATION PURSUANT TO GOVERNMENT CODE SECTION 54954.3 WHICH STATES THAT EVERY PUBLIC MEETING SHALL PROVIDE AN OPPORTUNITY FOR THE PUBLIC TO ADDRESS THE COMMISSION ON ANY ITEM, BEFORE OR DURING CONSIDERATION OF THE ITEM, HOWEVER, NO ACTION SHALL BE TAKEN ON ANY ITEM NOT ON THE AGENDA.

MEETING AGENDA

1. Call to Order
2. Roll Call
3. Pledge of Allegiance
4. Items from the Audience - In accordance with Council Meeting Protocols and Rules of Procedure, adopted by Resolution No. 2019-240, and last amended by Resolution No. 2021-049, a five-minute maximum time limit per speaker will apply to all individuals speaking during "Items from the Audience/Public Comment". For non- agendized items, the Commission may briefly respond to statements made or questions posed by individuals during public comment; ask questions for clarification; direct the individual to the appropriate staff member; or request that the matter be placed on a future agenda or that staff provide additional information to Commission.
5. Consent Items
   5.A APPROVE MEETING MINUTES FOR SEPTEMBER 26, 2024
6. Informational Items - **NONE**
7. Actionable Items
   7.A THE SUSTAINABILITY ACTION PLAN AD HOC COMMITTEE REQUESTS THAT THE ENVIRONMENTAL SUSTAINABILITY COMMISSION ACCEPT AN INFORMATIONAL REPORT ON: 1) SECTION 2 EXISTING CONDITIONS – B. ENERGY; 2) THE CITY OF TRACY URBAN FOREST MANAGEMENT PLAN; AND 3) REQUEST AN INFORMATION UPDATE ON THE IDENTIFIED GOALS, TARGETS AND MEASURES UNDER THOSE PLANS TO INCLUDE ACHIEVEMENTS AND DEFICIENCIES WITH EXPECTED COMPLIANCE DATES, IF ANY.

   7.B REVIEW AND APPROVE AN UPDATE TO THE ESC 2024 WORKPLAN
8. Staff items (Verbal Report)
9. Items from the Commission – In accordance with Parliamentary Procedures, a commissioner who wishes to introduce an item to be considered must make a motion, obtain a second, and the Chair must call the vote. A majority

vote is required for the motion to pass.

10. Adjournment

AGENDA POSTED: October 21, 2024

The City of Tracy complies with the Americans with Disabilities Act and makes all reasonable accommodations for the disabled to participate in public meetings. Persons requiring assistance or auxiliary aids in order to participate should call City Hall at (209) 831-6000 at least 24 hours prior to the meeting.

Any materials distributed to the Environmental Sustainability Commission regarding any item on this agenda will be made available for public inspection at City Hall located at 333 Civic Center Plaza, Tracy, during normal business hours.

Full copy of the agenda can be found at the Tracy Library as well on the City's Website:
Environmental Sustainability Commission | City of Tracy, CA

ENVIRONMENTAL SUSTAINABILITY COMMISSION
REGULAR MEETING MINUTES

SEPTEMBER 26, 2024
7:00 PM

1. CALL TO ORDER:

a. The meeting was called to order by Chair Wood at 7:04 pm.

2. ROLL CALL:

a. Present: Acosta, Damasco, Kahlon, Wood

b. Absent: Sese (prior notification)

c. Staff Present: Stephanie Reyna-Hiestand, Assistant Director of Utilities
Carla Sorich, Executive Assistant
Scott Claar, Senior Planner
Connie Lopes, Management Analyst
Samantha Huber, Administrative Technician

d. Recorded by: Carla Sorich, Executive Assistant

3. PLEDGE OF ALLEGIANCE

Led by Commissioner Kahlon.

4. ITEMS FROM THE AUDIENCE

None.

5. CONSENT ITEMS

5.A APPROVE MEETING MINUTES FOR JUNE 27, 2024

ACTION: Motion was made to accept the meeting minutes without any amendments by Chairperson Woods and seconded by Commissioner Kahlon. All in favor, passed, and so ordered. (4,0,0)

Approve – Wood, Kahlon, Acosta, Damasco
Oppose - None
Abstain – None

6. INFORMATIONAL ITEMS

6.A ACCEPT AN UPDATED INFORMATIONAL REPORT ON SENATE BILL (SB)1383

Connie Lopes, Management Analyst, provided the report.

Public Comment: None

Commissioner questions and comments followed.

7. ACTIONABLE ITEMS

7.A CONDUCT A PUBLIC MEETING TO SOLICIT COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT REPORT FOR THE SCHULTE WAREHOUSE ANNEXATION PROJECT

The presentation was given by Josh Smith with DeNovo Planning.

Commissioner comments and questions followed.

A motion was made by Chairperson Woods to discuss and provide comments on the EIR from the Commission but received no second so it was withdrawn.

7.B ACCEPT AN INFORMATIONAL REPORT BY THE SUSTAINABILITY ACTION PLAN AD HOC COMMITTEE ON SECTION 3 TRANSPORTATION AND LAND USE; AND REQUEST AN INFORMATION UPDATE ON THE IDENTIFIED TARGETS AND MEASURES UNDER THAT SECTION TO INCLUDE ACHIEVEMENTS AND DEFICIENCIES WITH EXPECTED COMPLIANCE DATES, IF ANY.

Report was presented by Chair Wood.

ACTION: Motion was made by Chairperson Wood and seconded by Commissioner Kahlon to accept the report from the Ad Hoc Committee. (3,1,0)

Approve - Wood, Kahlon, Acosta
Oppose - Damasco
Abstain – None

ACTION: Motion was made by Chairperson Wood and seconded by Commissioner Kahlon to add to the workplan a request for an informational update on the Sustainability Action Plan Section 3 Transportation and Land Use Sections Targets 4-1, Measures 5-7 through 5-16 that includes achievements and/or deficiencies with expected compliance dates, if any. (4,0,0)

Approve - Wood, Kahlon, Acosta, Damasco
Oppose - None
Abstain – None

ITEMS 7.C – 9 ON THE AGENDA WERE NOT DISCUSSED DUE TO LACK OF QUORUM

10. ADJOURNMENT – Time: 9:12 PM.

ACTION: Motion was made by Chair Wood and seconded Commissioner Acosta to adjourn. (4,0,0)

Approve- Wood, Acosta, Damasco, Kahlon
Oppose- None
Abstain - None

CITY OF TRACY
ENVIRONMENTAL SUSTAINABILITY COMMISSION MEETING
October 24, 2024

AGENDA ITEM 7.A

REQUEST

THE SUSTAINABILITY ACTION PLAN AD HOC COMMITTEE REQUESTS THAT THE ENVIRONMENTAL SUSTAINABILITY COMMISSION ACCEPT AN INFORMATIONAL REPORT ON:

1. **SECTION 2 EXISTING CONDITIONS – B. ENERGY.**
2. **THE CITY OF TRACY URBAN FOREST MANAGEMENT PLAN; AND**
3. **REQUEST AN INFORMATION UPDATE ON THE IDENTIFIED GOALS, TARGETS AND MEASURES UNDER THOSE PLANS TO INCLUDE ACHIEVEMENTS AND DEFICIENCIES WITH EXPECTED COMPLIANCE DATES, IF ANY.**

EXECUTIVE SUMMARY

The Environmental Sustainability Commission, by motion, approved a monthly report by the Sustainability Action Plan (SAP) Ad Hoc Committee (AHC) to update the ESC on the committee's actions and findings since their previous meeting. The AHC reviewed the SAP Section 2 Existing Conditions, B. Energy; and the City of Tracy Urban Forest Management Plan (UFMP); and recommends that the Commission request an updated status on achieving the following:

- Goals identified in the UFMP on pages 3, 4, 30, and 42-58, and
- Sustainability targets and measures identified under the SAP Section 2 Existing Conditions, B. Energy found on pages 4-1, and 5-1 through 5-7

RECOMMENDATION

The Environmental Sustainability Commission accept the informational report and request an informational update on the identified goals, targets and measures under Section 2 Existing Conditions – B. Energy, and the UFMP, to include achievements and deficiencies with expected compliance dates, if any.

Prepared by: Jenny Wood, Chair – Environmental Sustainability Commission

Reviewed by: Stephanie Reyna-Hiestand, Assistant Director of Utilities
Carla Sorich, Executive Assistant, Public Works Department

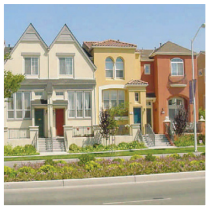
ATTACHMENTS:

A – 2008 Sustainability Action Plan
B – 2024 Urban Forestry Management Plan

Type text here

Attachment A

FEBRUARY 1, 2011



SUSTAINABILITY ACTION PLAN

CITY OF TRACY

CITY OF TRACY | DESIGN, COMMUNITY & ENVIRONMENT | TOWN GREEN

in consultation with: *ICF International* | *Fehr & Peers* | *Strategic Economics*

FEBRUARY 1, 2011

SUSTAINABILITY ACTION PLAN

CITY OF TRACY

Prepared By:

CITY OF TRACY

Town Green

DESIGN, COMMUNITY & ENVIRONMENT

1625 SHATTUCK AVENUE, SUITE 300

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in consultation with:

ICF International | Fehr & Peers | Strategic Economics

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1 INTRODUCTION

The City of Tracy recognizes that a healthy and prosperous community strategically balances economic, environmental, and social sectors of community planning. The Sustainability Action Plan is a detailed, long-range strategy to achieve sustainability in the sectors of greenhouse gas (GHG) emissions, energy, transportation and land use, solid waste, water, agriculture and open space, biological resources, air quality, public health, and economic development. Collectively, addressing community development through these lenses will strengthen Tracy as a place that is attractive, prosperous, and adaptive to social, political, and environmental changes.

Strategically planning for economic, environmental, and social sustainability is a challenge for many California communities. The Sustainability Action Plan provides Tracy with a guide to reduce GHG emissions, reduce consumption of non-renewable resources, improve public health, promote economic vitality, implement the General Plan, and engage residents. These efforts will also assist Tracy in balancing local economic development objectives with the State of California's required emission reduction targets and other environmental goals.

Through this strategy, Tracy positions itself to be economically attractive and competitive to like-minded entrepreneurs and companies. State regulations now require new development to account for its impact to the environment, specifically in terms of GHG emissions and impact on ecosystems. Mitigating impacts in these areas on a project by project basis is often difficult, costly, and time-consuming. The Sustainability Action Plan considers impacts of future development on a citywide level and provides a framework for addressing mitigation of such impacts. This strategy effectively streamlines the development process by relieving individual projects of the task to develop their own impacts analyses and mitigation measures.

Implementation of the Sustainability Action Plan places Tracy at a competitive advantage in attracting new job industries. The Sustainability Action Plan identifies opportunities for Tracy to be a destination of local employment centers and green jobs, an emerging field that diversifies Tracy's economic base and attracts complementary industries. Strengthening Tracy's employment base is likely to result in an increase of higher education opportunities and retail development.

The Sustainability Action Plan provides opportunities to strengthen Tracy's adaptability to emerging economic, environmental, and social climates without adding barriers or overregulation to successful growth and community development. The Sustainability Action Plan lays the foundation for a healthy, prosperous, and sustainable future for Tracy.

This Sustainability Action Plan establishes targets related to a variety of sustainability topics, and sets forth measures that will assist the City of Tracy in reaching those goals. This chapter provides background information about environmental challenges, existing sustainability efforts in Tracy, and public participation in the City's sustainability planning processes.

A. Environmental Regulations and Challenges

Although not unique to Tracy, the City of Tracy faces a number of environmental challenges. This section describes climate change and regulatory actions, as well as other environmental challenges related to sustainability in Tracy. The City of Tracy sees environmental regulatory compliance as responsible leadership and a wise business decision when considering the alternatives.

1. Regulatory Action on Climate Change

As climate change gains increasing attention, agencies and organizations from the international level to the local level are working to develop and implement solutions to control greenhouse gas (GHG) emissions and slow their effects on natural ecosystems. The major efforts are described in this section.

i. International Action

The United Nations Framework Convention on Climate Change (UNFCCC), an international treaty that has been ratified by 192 countries, leads international efforts to address the threats of climate change. The Convention encourages industrialized countries to reduce their GHG emissions.

The Kyoto Protocol, an addition to the treaty adopted in 2007, sets legally binding measures requiring countries to reduce emissions. The Kyoto Protocol sets binding emission reductions targets for 37 industrialized countries and Europe to reduce collective emissions about 5 percent below 1990 levels over the five year period between 2008 and 2012. The Kyoto Protocol has been ratified by 189 countries as of late 2009. Although the United States is responsible for a large potion of the emissions and signed the Protocol, Congress did not ratify it.

The Copenhagen Accord, adopted at the United Nations Climate Change Conference in Copenhagen in December 2009, is a non-binding agreement to keep maximum temperature rise to below 2 degrees Celsius (°C) and to raise funds to enable developing countries to take action on climate change.

ii. Federal Laws and Regulations

The United States does not have any federal regulations or policies related to GHG emissions. However, in December 2009, Environmental Protection Agency (EPA) Administrator Lisa Jackson signed findings that elevated concentrations of the six key GHGs in the atmosphere endanger public health and welfare of current and future generations, and that the combined emissions of GHGs from new motor vehicles contribute to the GHG air pollution that endangers public health and welfare.[1] While the final endangerment finding does not automatically impose any requirements, it allows EPA to finalize proposed GHG emission standards for light-duty vehicles, which were proposed in conjunction with the Department of Transportation's Corporate Average Fuel Economy (CAFE) standards earlier in 2009.[2]

iii. State Laws and Regulations

California has been a leader among states in passing legislation to reduce GHG emissions and slow climate change. Major laws and regulations are described below.

a) Energy Efficiency Standards (1978)

Title 24, Part 6 of the California Code of Regulations, Energy Efficiency Standards for Residential and Nonresidential Buildings, was established in 1978 to address a legislative mandate to reduce the State's energy consumption. The standards are updated roughly every three years to incorporate new energy efficiency goals, methods, and technologies. The

[1] U.S. Environmental Protection Agency website, "EPA's Endangerment Finding," http://www.epa.gov/climatechange/endangerment/downloads/EndangermentFinding_LegalBasis.pdf, accessed on January 13, 2010.

[2] U.S. Environmental Protection Agency website, http://epa.gov/climatechange/endangerment.html, accessed on January 14, 2010.

2008 standards went into effect on January 1, 2010, and require buildings to be 15 percent more energy efficient compared to the 2005 standards.

b) Clean Car Regulations (Assembly Bill 1493, 2002)

Assembly Bill (AB) 1493, Clean Car Regulations (commonly known as the "Pavley law"), directed the California Air Resources Board (CARB) to adopt regulations to decrease GHG emissions from new passenger vehicles and light duty trucks beginning with the 2009 model year. Implementation of these fuel efficiency standards, known as the "Pavley standards," was uncertain for years due to EPA's denial of California's request for a waiver of Clean Air Act Section 209(a), which was necessary to implement the Pavley standards. However, in June 2009, the EPA granted California the authority to implement the standards.[3] These standards are anticipated to reduce GHG emissions from California passenger vehicles by 30 percent by 2016, and are estimated to result in an 18 percent GHG emissions reduction across the passenger fleet.[4]

c) Executive Order S-3-05 (2005)

In 2005, Governor Schwarzenegger signed Executive Order S-3-05, which established the goals of reducing emissions to 2000 levels by 2010, to 1990 levels by 2020, and to 80 percent below 1990 levels by 2050. The Executive Order identified the California Environmental Protection Agency (Cal/EPA) as the lead coordinating State agency for establishing climate change emission reduction targets in California, and designated a "Climate Action Team," a multi-agency group of State agencies, to implement Executive Order S-3-05. GHG emission reduction strategies and measures to reduce global warming were identified by the California Climate Action Team in 2006.

d) Global Warming Solutions Act (AB 32, 2006)

In 2006, California Governor Schwarzenegger signed AB 32, the Global Warming Solutions Act, into law. The Act requires that California cap its GHG emissions at 1990 levels by 2020. AB 32 also requires that CARB identify discrete early actions to reduce emissions that could be implemented immediately and develop a statewide scoping plan to identify how to meet the emissions reduction targets.

CARB identified a list of nine early actions, including landfill CH_4 capture, the Low Carbon Fuel Standard (LCFS) that is discussed further in the section below, and a tire pressure program. CARB's Climate Change Scoping Plan, adopted in December 2008, outlines regulations, market mechanisms, and other actions to achieve the maximum technologically-feasible and cost-effective reductions in GHG emissions by 2020.[5] The Scoping Plan recommends achieving a statewide energy mix with 33 percent from renewable energy sources, developing a California cap-and-trade program that will be part of a regional carbon market through the Western Climate Initiative, and expanding and strengthening existing energy efficiency programs and building and appliance standards.

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[3] California Air Resources Board website, www.arb.ca.gov, accessed on January 14, 2010.

[4] California Clean Cars Campaign, 2006, Factsheet: *California's Vehicle Global Warming Pollution Reduction Regulation: How it Works.* (http://www.calcleancars.org/factsheets/staffproposal.pdf).

[5] California Air Resources Board website, www.arb.ca.gov, accessed on January 14, 2010.

e) Executive Order S-01-07 (2007)

Executive Order S-01-07, signed by Governor Schwarzenegger in 2007, establishes a LCFS for transportation fuels sold in California. This standard will reduce the carbon content of passenger vehicle fuels in California by at least 10 percent by 2020.

f) Regional Transportation and Land Use Planning Efforts (SB 375, 2008)

In 2008, California enacted Senate Bill (SB) 375 to augment AB 32 by promoting efficient land use patterns and curbing sprawl. SB 375 establishes emissions-reduction goals for which regions can plan; encourages metropolitan planning organizations (MPOs) to integrate their housing, transportation, and regional land use plans with GHG reduction goals; and provides incentives for governments and developers to implement compact and efficient growth patterns. Under SB 375, the 18 MPOs in California must prepare a "sustainable communities strategy" to reduce the vehicle miles traveled (VMT) in their regions and demonstrate their ability to reach the CARB targets. SB 375 also includes incentives to create walkable and attractive communities and to revitalize existing communities. The legislation also allows developers to bypass certain environmental reviews under the California Environmental Quality Act (CEQA) if they build projects consistent with the new sustainable community strategies. SB 375 enhances CARB's ability to reach the AB 32 goals by directing the agency in developing regional GHG emission reduction targets to be achieved from the transportation sector for 2020 and 2035.

g) Heavy Duty Vehicle GHG Emissions Reduction Measure (2008)

In December 2008, CARB adopted the Heavy Duty Vehicle GHG Emission Reduction Measure, which requires long-haul truckers to retrofit their trailers with fuel efficient tires and aerodynamic devices. This requirement will improve the fuel economy of heavy duty vehicles, reducing GHG emissions.

iv. Regional and City Policies and Measures

The San Joaquin Valley Air Pollution Control District (Valley Air District) adopted the Climate Change Action Plan in August 2008. The Plan has been developed to assist local land use agencies and businesses to comply with State requirements.

In December 2009, the Valley Air District adopted standards that require projects to reduce their GHG emissions by at least 29 percent from business-as-usual levels, through application of best performance standards or through other measures, to achieve a less than cumulatively significant impact under CEQA.

2. Energy

Energy production is a major economic, security, and environmental challenge at the local, national, and global levels. The City of Tracy acknowledges the bottom-line benefits of the SAP because it lowers the community's demand and costs for fossil fuels. Although Tracy receives its energy from PG&E, which provides an energy mix that is much cleaner than what most other U.S. utilities provide, it still relies on fossil fuels – coal, oil, and natural gas – for about half of its energy.[6]

[6] Pacific Gas and Electric website, http://www.pge.com/myhome/environment/pge/cleanenergy/, accessed on March 1, 2010.

The U.S. imports approximately 60 percent of its petroleum and 15 percent of its natural gas from foreign countries, a dependence that makes the U.S.'s economy and security vulnerable to political and resource instability in other parts of the world.

The combustion of fossil fuels to produce heat or electricity, or to power internal combustion engines, is a main contributor to greenhouse gas emissions and other environmental problems. At the local level, fossil fuel combustion has been linked to poor air quality in the San Joaquin Valley, respiratory-related illnesses and negative impacts on crops. Because fossil fuels are found deep in the ground, they must be extracted and transported to provide energy. Surface and groundwater pollution can occur during extraction, storage, and transportation. Land subsidence can result when oil and gas are removed from below ground with nothing left to support the land above. There is also the potential for storage tank leakage and oil spills during transportation, causing widespread pollution and requiring costly cleanup efforts.[7]

There are numerous strategies to reduce fossil fuel dependence, which generally fall into three main categories:

- **Energy Conservation**. This is a quick and cost-effective strategy to reduce GHG emissions and decrease dependence on non-renewable sources of energy. Strategies include land use patterns that increase walking and bicycling, reducing electricity consumption, and efficient technologies such as ENERGY STAR products that use less electricity, natural gas, and water.
- **Renewable and Alternative Energy Sources**. These sources include solar, wind, geothermal, biomass, and alternative vehicle fuels, which are produced with minimal or no pollution. In recent years, increased research and development has been devoted to expanding the supply and increasing the deployment of these sources.
- **Carbon Capture and Storage**. Carbon capture and storage includes technological strategies to sequester carbon emissions from large pollution sources so that they don't enter the atmosphere.

3. Transportation and Land Use

Land use patterns and transportation systems in the last 60 years have consumed resources at unsustainable rates, creating a range of environmental and economic problems. Between 1950 and 1990, land in the U.S. urbanized 2.5 times faster than urban population increased. Compared to smart growth patterns, sprawl development consumes 45 percent more land, greatly reducing the land available for open space, agriculture, and habitat. Sprawl is also more expensive than compact growth, imposing costs that are 25 percent more for roads, 15 percent more for utilities, and 5 percent more for schools.[8]

With increases in urbanized land, VMT has grown dramatically. Between 1980 and 2005, Tracy's population increased by 85 percent, while VMT increased by 202 percent. Much of this increase is due to the way new communities are designed. Because this type of development generally results in segregated land uses with large distances between them, driving is often the only viable mode of transportation. Consequently, residents have fewer opportunities for physical

[7] Renewable Energy Trust website, http://www.masstech.org/cleanenergy/important/envother.htm, accessed on March 1, 2010.

[8] Burchell, Robert W. and David Listokin, 1995, *Land, Infrastructure, Housing Costs and Fiscal Impacts Associated With Growth: The literature on the Impacts of Sprawl v. Managed Growth,* Cambridge, Massachusetts: Lincoln Institute of Land Policy.

activity, and those who cannot drive, including children, seniors, and disabled people, can have trouble accessing services.

4. Solid Waste

The production and transport of consumer products creates large amounts of GHGs. A large percentage of these products are disposed of after only one use, requiring more raw materials to be extracted to replace these products. Making new products from raw materials generally requires more energy, uses more water, and creates more air and water pollution than reusing materials or making the same product from recycled materials, thereby increasing GHG emissions and contributing to climate change.

Once in the landfill, solid waste continues to emit GHGs, most notably methane (CH_4,) which is approximately 21 times more potent than carbon dioxide (CO_2) in terms of its global warming impacts.[9] Landfills also release harmful contaminants such as vinyl chloride and benzene. In addition, the combination of rainwater and other liquids with layers of solid waste at landfills produces leachate, a harmful substance that contains contaminants such as benzene and volatile halocarbons.[10] Leachate causes soil, surface water, and groundwater contamination. Poor management of solid waste operations can increase disease vectors and creates nuisances related to odor, litter, and dust.[11]

The GHG emissions and other environmental problems associated with solid waste can be reduced through increased diversion from landfills by reducing consumption and reusing or increasing recycling.

5. Water

The year 2009 marked the third consecutive year of drought in California, with the driest spring and summer on record, low water content in the Sierra snowpack, and a historic low in the State's reservoir levels. In 2008, the Sacramento and San Joaquin River systems that provide a large portion of the State's reservoir inflow were classified as Critically Dry. As of early 2009, the drought had damaged crops and prevented farmers from planting or replanting 100,000 acres of agricultural land, causing agricultural revenue losses of more than $300 million.[12] These drought conditions also threaten aquatic ecosystems, increase the risk of wildfires, increase food prices, and harm livelihoods dependent on agriculture, natural resources, and tourism. Responding to these wide-ranging impacts, Governor Arnold Schwarzenegger proclaimed a State of Emergency in February 2009. Governor Schwarzenegger called for an immediate 20 percent reduction in water use by urban water users and the use of efficient water management practices by agricultural users.[13]

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[9] U.S. Environmental Protection Agency website, http://www.epa.gov/outreach/scientific.html, accessed on March 1, 2010.

[10] U.S. Environmental Protection Agency website, http://www.epa.gov/waste/nonhaz/municipal/landfill/bioreactors.htm, accessed on March 1, 2010.

[11] City of San Diego Solid Waste Local Enforcement Agency website, http://www.sandiego.gov/development-services/leaconcerns.shtml, accessed on March 1, 2010.

[12] Office of the Governor, State of California, February 27, 2009, Press Release, "Gov. Schwarzenegger Takes Action to Address California's Water Shortage."

[13] Office of the Governor, State of California, February 27, 2009, Press Release, "Gov. Schwarzenegger Takes Action to Address California's Water Shortage."

Along with water shortages, water pollution is another major problem resulting from population growth and development. Inefficient development patterns increase impervious surfaces, reducing infiltration into the soil, causing erosion, and degrading water quality of streams, rivers, and wetlands.

In Tracy, water is supplied by a combination of surface and groundwater sources. Surface water generally comprises greater than 85 percent of Tracy's total water supply and is provided by the South San Joaquin Irrigation District (SSJID) and the United States Bureau of Reclamation (USBR). SSJID and the USBR act as water wholesalers to the City. Because the groundwater supply is a heavily mineralized source of water, the City would like to reduce daily use of groundwater and reserve its use for emergency situations and droughts. As a result, the City is trying to secure additional sources of surface water to meet its daily water demands.

6. Agriculture and Open Space

Located in San Joaquin Valley, one of the most productive agricultural regions in the world, Tracy is in a location with high quality farmland. Development pressures in Tracy and San Joaquin County, particularly over the past 20 years, have resulted in the loss of large amounts of Prime Farmland and Farmland of Statewide Importance, as defined by the State's Farmland Mapping and Monitoring Program.

In addition to consuming productive farmland, growth in Tracy and San Joaquin County has also occurred at a relatively low density. One impact of this land use pattern is the spread of ranchettes, which are residences on large rural parcels. Ranchettes can have negative impacts on agricultural production because they require agricultural practices to be modified to protect the health and security of neighboring residences. They also increase the market value for land above levels that are economically viable for commercial agriculture.[14]

The conversion of agricultural land to urban uses reduces agricultural production and has major repercussions for the regional and State economies. The San Joaquin Valley is responsible for 55 percent of the State's total agricultural sales.[15] In addition to agricultural productivity benefits, farmland and other forms of open space sequester vast amounts of CO_2 emitted through human activities; the conversion of land to agricultural and open space reduces these carbon "sinks."

7. Biological Resources

Natural habitats recharge aquifers, maintain water quality, and help to stabilize the climate. The disappearance of species from these systems alters and undermines the value of the habitat, causing related impacts to human health and the economy. As Tracy expands to accommodate additional population, biological resources are increasingly threatened.

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[14] American Farmland Trust, 2007, *Paving Paradise: A New Perspective on California Farmland Conservation*, pages 6-7. (http://www.farmland.org/programs/states/ca/Feature/Stories/documents/PavingParadise_AmericanFarmlandTrust_Nov07.pdf).

[15] American Farmland Trust, 2007, *Paving Paradise: A New Perspective on California Farmland Conservation*, pages 6-7. (http://www.farmland.org/programs/states/ca/Feature/Stories/documents/PavingParadise_AmericanFarmlandTrust_Nov07.pdf).

For an estimated 85 percent of imperiled plant and animal species in the U.S., the loss or degradation of their habitats is the main threat to their continued existence.[16] The development of green spaces into surburban and urban uses is the fastest-growing threat to vulnerable species in the U.S. By converting large undeveloped areas to roads, homes, offices, and stores, inefficient development patterns eliminate and fragment habitats, reducing the biological productivity and habitat value of the land. According to the report *Endangered by Sprawl: How Runaway Development Threatens America's Wildlife*, sprawl development could threaten the survival of nearly one out of every three threatened or endangered species in the U.S.[17] This risk is more severe in California, where growth rates and the number of threatened and endangered species are among the highest in the nation.

8. Air Quality

Air quality in the San Joaquin Valley is among the worst in the nation. The San Joaquin Valley Air Basin is particularly prone to air pollution due to its combination of geography, topography, and meteorology. High temperatures promote the formation of ground-level ozone (i.e. smog), and mountain ranges trap pollutants near the surface. During the summer, the potential for severe air pollution is particularly strong because of the combination of high temperatures, stable air, and intense sunshine. In winter, the low amount of rainfall, weak winds, and strong inversions allow emissions to build up to high levels.

Air pollution has major impacts on human health. Ozone and particulate matter, both fine and coarse, are among the pollutants with the most severe health implications.

Ozone is not emitted directly by specific sources, but is created through the reaction of sunlight on nitrogen oxide and volatile organic compound emissions, which are themselves emitted through a variety of sources. Ozone exposure is harmful for people with respiratory illnesses such as asthma, but also for healthy individuals. Prolonged exposure even at low concentrations can significantly reduce lung function and trigger respiratory inflammation in healthy individuals, causing symptoms such as nausea, coughing, chest pain, and pulmonary congestion.[18]

Particulate matter is emitted through many activities, including fuel combustion, crude oil refinement, and chemical manufacturing. Particulate matter is associated with respiratory illnesses, lung tissue damage, and premature death.

9. Public Health

As indicated in Section A.3, conventional development patterns in Tracy and surrounding areas have resulted in land development patterns that require most residents to rely on driving a vehicle in order to get to work, school, shopping, and services. As a result of these patterns that prioritize vehicle travel over other rather than more active forms of transportation like transit, walking, and bicycling, residents get less physical activity than they would in a more compact,

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[16] Ewing, Reid, and John Kostyack, 2005, *Endangered by Sprawl: How Runaway Development Threatens America's Wildlife*, National Wildlife Federation, Smart Growth America, and Nature Serve, page vii. (http://www.natureserve.org/publications/endangered_by_sprawl.pdf).

[17] Ewing, Reid, and John Kostyack, 2005, *Endangered by Sprawl: How Runaway Development Threatens America's Wildlife,* National Wildlife Federation, Smart Growth America, and Nature Serve, page vi. (http://www.natureserve.org/publications/endangered_by_sprawl.pdf).

[18] San Joaquin Valley Air Pollution Control District website, http://www.valleyair.org/newsed/pollutants.htm, accessed on February 26, 2010.

mixed-use urban setting. Physical inactivity is a major contributor to obesity, diabetes, hypertension, and cardiovascular diseases.

Limited access to healthy food is another key contributor to disease that is closely tied to development patterns. Many neighborhoods don't have grocery stores within a short walking or transit distance. Encouraging new grocery stores to be integrated into underserved neighborhoods is critical to addressing healthy food access. Providing opportunities for farmers' markets and community gardens can also help to fill the gap.

10. Economic Development

While Tracy provides a range of housing options at more affordable levels than other areas within Northern California, many Tracy residents commute long distances to surrounding communities with stronger office and industrial economic bases and higher wage jobs.

In addition, some of Tracy's residents shop, dine, or seek entertainment opportunities in other cities. A diverse local economy, with expanded high wage job opportunities, a complete array of shopping and dining options, and a range of entertainment venues would enhance residents' overall quality of life. This enhanced level of economic development, particularly with substantial attraction of higher wage jobs, would also better balance the jobs to housing ratio in Tracy and reduce VMT.

B. Existing Sustainability Efforts in Tracy

1. Tracy General Plan

The Tracy General Plan has a strong emphasis on sustainability. The Land Use Element emphasizes efficient growth patterns, the orderly expansion of new residential areas to maximize existing public services and infrastructure, and the balance of residential development with jobs, retail development, and provision of public services. The Community Character Element has policies to design neighborhoods to encourage pedestrian activity, and to emphasize the important role of the downtown by facilitating a mix of uses and the development of vibrant public spaces. The Circulation Element includes policies supporting street connectivity, extensive bicycle and pedestrian facilities, and a high degree of connectivity between all modes of transportation in Tracy. Policies in the Open Space and Conservation Element emphasize the preservation of agricultural lands, the development of a regional parkway system, resource conservation, and energy efficiency. The Public Facilities and Services Element includes policies to reduce the city's solid waste production and to increase the use of recycled water where possible. In the Air Quality Element, policies support land use patterns that reduce VMT, the development of a range of transportation choices to reduce reliance on single-occupancy vehicles, and local and regional air quality improvement efforts.

The General Plan was amended concurrently with the development of the Sustainability Action Plan in 2011 with many sustainability-oriented policies. Added in the Land Use Element were policies that encourage Downtown sites to be developed at the highest densities possible, consistent with environmental protection and land use compatibility goals, and require the creation of new specific plans to guide efficient and orderly development within Tracy's Secondary Residential Growth Areas. In the Community Character Element, policies were added to encourage the development of urban green spaces, promote the incorporation of pedestrian and bicycle access into site design, and discourage new strip commercial development. The Economic Development Element includes policies encouraging green businesses,

local procurement of green products, and employment opportunities that reduce the need for vehicle trips. The Circulation Element provides additional policies to encourage the use of non-motorized transportation, transit, and low-emission vehicles; to avoid disrupting sensitive environmental resources during transportation projects; and to use sustainable materials in road construction and repair projects. Policies have been added to the Open Space and Conservation Element to incorporate resource conservation through construction and development practices, expand the urban forest, and use water-efficient landscaping techniques. The City's Public Facilities Element incorporated policies that call for rehabilitating and reusing municipal buildings whenever feasible, and that require standards to reduce water and wastewater treatment demand in new development and redevelopment. In the Air Quality Element, policies have been added to develop a green building standard for new development, encourage solar panels on new development, encourage use of light emitting diodes (LED) for outdoor lighting, and reduce GHG emissions from municipal operations and new development.

2. Local Programs

In 2008, Tracy enrolled as one of two pilot cities in the Emerald Cities Pilot Program, a public-private partnership sponsored by the California Natural Resources Agency (CNRA) that was previously administered by the State Department of Conservation (DOC). Through this program, the City of Tracy worked closely with the DOC to accelerate progress toward the State's environmental goals, including those indicated in AB 32 and SB 375. In November 2008, the City Council adopted Resolution No. 2008-241, committing the City to pursue sustainable development practices to achieve specific goals identified by the State of California to be reflective of sustainable communities. The DOC was involved throughout the development of the Sustainability Action Plan. The City's activities under this program are presented on the Emerald Tracy website, www.emeraldtracy.org.

Tracy also has existing incentive programs that reduce energy consumption and GHG emissions. Through its Washing Machine Voucher Program, the City offers $50 rebates for ENERGY STAR-rated high-efficiency washing machines. Such washers use one-third less water and one-fourth less energy than conventional machines, which account for a considerable amount of water consumption in average households. This rebate can be used jointly with PG&E's rebate programs. The City has almost completed the installation of LED fixtures at all traffic signals in Tracy, which use significantly less energy and last far longer than conventional fixtures. The Tracy Wastewater Treatment Plant (WWTP) is installing variable-frequency drives for the Patterson Pass booster station that are expected to save the City 123,000 kilowatt hours (kWh) and $14,700 per year and to generate a rebate through PG&E of approximately $11,000. The WWTP has also initiated a CH_4 capture project for heating boilers. The City also retrofitted light fixtures (e.g. re-lamping, re-ballasting, and/or adding sensors) throughout City facilities. The annual energy savings from this project are approximately 190,800 kwh.

C. Public Outreach and Participation

The City has used online and in-person strategies to incorporate public participation in the development of the Sustainability Action Plan as described in this section.

1. Emerald Tracy Website

The City's Emerald Tracy website, www.emeraldtracy.org, provides information on the City's sustainability goals and targets, as well as the process it is undertaking to achieve them. The website invites visitors to submit feedback to shape

the Emerald Cities process through a survey. Survey respondents have submitted a range of ideas for how to reduce Tracy's environmental impacts, including following the strategies:

- Additional jobs in Tracy to reduce commuting.
- Improved transit connectivity.
- Water-conserving landscaping guidelines.
- Expanded recycling and composting.
- Incentives for energy-efficient retrofits.
- Expanded bicycle and pedestrian paths.

The survey also asks for feedback on the desired outcomes of the Emerald Tracy process. Desired outcomes submitted by respondents include clean air, cost savings for the City and residents, a more dynamic downtown, and Tracy becoming a model of sustainability for other cities. The feedback collected through the Emerald Tracy website has shaped the development of the measures included in the Sustainability Action Plan.

2. Community Workshop

The City held a Community Workshop on Wednesday, February 17, 2010 to discuss draft sustainability targets and measures for the Sustainability Action Plan as well as priorities for future funding opportunities.

During this workshop, participants brainstormed other projects and measures that could be included in the Sustainability Action Plan, or that the City could pursue through future funding opportunities. The workshop also featured an interactive exercise in which participants used dots to identify their preferred measures among the draft sustainability measures and the new measures that were suggested during the brainstorming session. The results of the brainstorming session and dot exercise are provided in Appendix A.

2 EXISTING CONDITIONS

This chapter summarizes existing sustainability conditions for the City of Tracy related to greenhouse gas (GHG) emissions, energy, transportation and land use, solid waste, water, agriculture and open space, biological resources, air quality, public health, and economic development. The GHG emissions, energy, transportation and land use, and solid waste sections below include quantified emission information. Quantified emissions data is not available for the water, agriculture and open space, biological resources, air quality, public health, and economic development sectors; these sections include a qualitative discussion of existing conditions and how they relate to sustainability. Information about the GHG emissions is based on the Emissions Inventory and Business As Usual (BAU) forecast for Tracy, which is provided as Appendix B.

A. Greenhouse Gas Emissions

Tracy's GHG inventory for the baseline year 2006 was compiled using the International Council for Local Environmental Initiatives' (ICLEI) Clean Air and Climate Protection (CACP) software, and is shown in Tables 2-1 and 2-2. GHG emissions in Tracy are a function of the energy, transportation and land use, solid waste, and water sectors, which are discussed in Sections B through E below. Additional information on these and other sources of GHG emissions is provided in Appendix B.

In 2006, Tracy's total GHG emissions were 1,350,321 metric tons of carbon dioxide equivalent (CO_2e). The GHG inventory includes a separate community-wide and municipal analysis. Tracy's 2006 community emissions were 1,338,872 metric tons CO2e from the residential, commercial, industrial, transportation, waste, and water sectors, as well as from fugitive and refrigerant emissions.

Tracy's municipal emissions inventory for 2006 was 11,449 metric tons of CO_2e, comprising less than 1 percent of the City's total emissions. The community and municipal inventories are discussed in greater detail below for each subsector.

TABLE 2-1 **COMMUNITY-WIDE EMISSIONS INVENTORY**

Sources	Metric Tons of CO_2e	Percentage of Total
Residential energy use	220,036	16.4%
Commercial and industrial energy use	160,740	12.0%
Fugitive emissions and refrigerants	90,233	6.7%
Transportation	849,673	63.5%
Waste	18,190	1.4%
Total	**1,338,872**	**100%**

Source: CACP model

TABLE 2-2 **MUNICIPAL EMISSIONS INVENTORY**

Sources	Metric Tons of CO_2e	Percentage of Total
Buildings and facilities	247	2.2%
Streetlights and traffic signals	1,798	15.7%
Fugitive emissions and refrigerants	323	2.8%
Vehicle and transit fleet	958	8.4%
Employee commute	3,650	31.9%
Airport facilities	28	.2%
Solid waste	2,211	19.3%
Wastewater	1,512	13.2%
Water delivery	722	6.3%
Total	**11,449**	**100%**

Source: CACP model.

In total, per capita GHG emissions in 2006 were 11.6 metric tons CO_2e.[1] This per capita emission rate is similar to many Bay Area cities, as indicated below; however, it should be noted that different jurisdictions use different methodologies, which makes comparison difficult.

- Menlo Park, with 16.5 metric tons CO_2e per capita.
- Martinez, with 14.5 metric tons CO_2e per capita.
- Palo Alto, with 13.9 metric tons CO_2e, per capita.
- Hayward, with 9.1 metric tons CO_2e per capita.
- San Mateo, with 6.9 metric tons CO_2e per capita.

B. Energy

1. Community Emissions Inventory

Community-wide stationary energy consumption includes electricity and natural gas use for residential, commercial, and industrial sectors. Community-wide energy consumption for 2006 was approximately 3,200,000 million metric British thermal units (MMBtu), resulting in 380,776 metric tons of CO_2e, or approximately 28 percent of total community-wide emissions.

[1] Based on the total population and employment in Tracy in 2006, which was approximately 116,500 residents and workers. From: Watten, Mackenzie and Mike Wallace. Fehr & Peers. Personal communication with Tanya Sundberg, DC&E. January 29, 2010.

Of this total, residential energy consumption is responsible for the largest share. Tracy residences consumed approximately 227 million kWh of electricity and 11 million therms of natural gas, resulting in the release of 220,036 metric tons of CO_2e. Major residential energy uses include refrigeration, lighting, and water heating. Commercial and industrial buildings consumed 168,310,545 kWh of electricity and 7,808,664 therms of natural gas, emitting 160,740 metric tons of CO_2e.

2. Municipal Operations Emissions Inventory

The energy sector of the municipal inventory includes electricity and natural gas use for the operations of municipal buildings and facilities, streetlights and traffic signals. Municipal operations consumed approximately 11 million kWh of electricity and 41,000 therms of natural gas, or approximately 42,000 MMBtu. Buildings and facilities were responsible for 247 metric tons of CO_2e, or 2 percent of municipal emissions, and streetlights and traffic signals accounted for 1,798 metric tons of CO_2e, or 16 percent of municipal emissions.

C. Transportation and Land Use

In 2006, the total daily VMT in Tracy was 3.3 million VMT. The transportation sector is responsible for the majority of GHG emission in Tracy.

1. Community Emissions Inventory

The "Citywide Travel Demand Model" used to analyze Tracy's transportation emissions from vehicle fuel combustion includes all of the VMT associated with trips completed within Tracy and half of the VMT generated by jobs and residences located in Tracy that result in travel to or from external destinations. The model does not include vehicles that pass through Tracy without either a point of origin or a destination within the city.

The community transportation sector includes travel on State highways, local roads, and the commuter train, as well as aviation and jet fuel from the Tracy Municipal Airport and off-road vehicles and equipment. These activities were responsible for 849,673 metric tons of CO_2e emissions in 2006, representing approximately 64 percent of Tracy's community-wide GHG emissions.

2. Municipal Operations Emissions Inventory

Transportation-related activities within the municipal inventory include commuting by City employees and the City's vehicle fleet. Commuting was responsible for 3,650 metric tons of CO_2e and 32 percent of municipal emissions. Tracy's fleet includes all vehicles owned and operated by the City, including Tracer, the public bus system, and contractor vehicles performing City functions. The vehicle and transit fleet emitted approximately 958 metric tons of CO_2e, or 8.75 percent of municipal emissions. Together, these activities are responsible for approximately 40 percent of the municipal inventory.

D. Solid Waste

Solid waste emits GHGs when placed in a landfill. Decomposition of organic materials in landfills produces methane, a GHG.

1. Community Emissions Inventory

Tracy sent approximately 92,202 tons of solid waste to the San Joaquin County Foothill Landfill, resulting in 18,190 metric tons of CO_2e, which represents 1 percent of total community-wide emissions.

2. Municipal Operations Emissions Inventory

In 2006, the City's solid waste facilities emitted 2,211 metric tons of CO_2e emissions.

Because Tracy Delta Solid Waste Management does not distinguish between municipal- and community-generated waste, the solid waste generated by municipal operations is included in the community-wide figure of 92,206 tons of waste sent to the landfill.

E. Water

According to the 2005 *City of Tracy Urban Water Management Plan*, Tracy's annual water demand in 2005 was 18,500 acre-feet.[2]

1. Community Emissions Inventory

The City manages water delivery for community consumption; therefore, emissions associated with water delivery are included in the municipal inventory, below. Emissions from water delivery are a negligible percentage of the community emissions inventory.

2. Municipal Operations Emissions Inventory

Water delivery generated 722 metric tons of CO_2e in 2006, accounting for 6 percent of Tracy's municipal inventory. Nearly all of the water supply is devoted to community water consumption; only 1 percent of the total water demand is from municipal uses. Emissions from water distribution result from energy use for facilities and pumping within Tracy's boundaries, as well as for transporting imported water from the Delta Mendota Canal and the Stanislaus River to Tracy.

F. Agriculture and Open Space

Agriculture is a major activity within the undeveloped portions of the Tracy area. Agricultural uses include: field crops, tree crops, nurseries, greenhouses, agricultural-related residences and structures, oil and gas exploration, livestock ranges, animal husbandry, public parks and recreation areas, farm employee residences, agricultural offices, truck farming, and roadside stands. There are approximately 4,000 acres of Prime Farmland, Farmland of Statewide Importance, and Farmland of Local Importance within the Tracy area. In addition, there are approximately 1,400 acres of land within the city that hold active Williamson Act contracts. These contracts preserve land in agricultural use for ten years and are adopted by land owners on a voluntary basis in exchange for tax benefits.

In addition, Tracy has 70 parks, totaling about 255 acres, which fall into three classifications:

[2] Erler & Kalinowski, Inc., 2005, *City of Tracy Urban Water Management Plan*, pages 13-15.

- **Mini-Parks.** Small parks, typically 1 to 3 acres in size that provide recreational activities for a specific neighborhood or subdivision. There are 48 mini parks in Tracy.
- **Neighborhood Parks.** Generally, parks 4 to 12 acres in size that provide basic recreational activities for a specific neighborhood area. Tracy has 15 neighborhood parks.
- **Community Parks.** Large parks, generally 12 to 50 acres or more, which include an equal mix of passive and active recreation areas that serve the entire city or a substantial portion of the city. Tracy has seven community parks.[3]

The City also operates approximately 14 acres of recreational corridors, mainly consisting of Class I bikeways. These facilities provide recreational and transportation amenities to Tracy residents.

G. Biological Resources

This section describes the vegetation, wildlife, special-status species, threatened and endangered species, and sensitive habitat found in Tracy and is based on information in the 2005 Draft Environmental Impact Report for the City of Tracy General Plan and the 1993 Final Environmental Impact Report for the City of Tracy Urban Management Plan/General Plan.

1. Vegetation and Wildlife Habitat

Tracy supports diverse native and non-native plant communities and wildlife habitat areas.

The Tracy area was historically dominated by perennial native grasslands, broad riparian zones and freshwater marsh wetlands, but these areas were largely converted to agriculture and grazing land during the 1800s. Remnant perennial grasslands continue to exist in outlying areas, primarily along the western slope of the Sierra Nevada Mountain Range and in isolated valleys in the Coast Range complex, where land use conversion pressures have been less severe.[4]

Historically, large grazing herbivores such as pronghorn antelope (*Antilocarpa americana*) and mule deer (*Odocoilues hemionus*) inhabited the northern San Joaquin Valley. The disappearance of large grazing herbivore populations coincided with the conversion of native habitat to agricultural and urban land uses. Populations of other mammalian and avian species also declined or disappeared with land use changes and were replaced by highly adaptive, opportunistic species.

Tracy's sensitive vegetation communities include non-native grasslands, riparian woodlands, seasonal wetlands, and farmed wetlands, which host a range of wildlife and plant species. These vegetation communities and habitat areas are described below.

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[3] Open Space and Conservation Element, City of Tracy General Plan Amendment proposed December 2010, Table 6-4. City of Tracy website, http://www.ci.tracy.ca.us/maps/parks/, accessed on February 22, 2010.

[4] City of Tracy, *Final Environmental Impact Report for the City of Tracy Urban Management Plan/General Plan*, July 19, 1993, page 101.

- **Non-Native Grasslands.** Non-native grasslands mainly occur in the southern portion of Tracy. This vegetation community supports a variety of birds and mammals and a small number of reptiles and amphibians. In addition, this community is identified as sensitive habitat for its value as a habitat area for the San Joaquin kit fox, a federally endangered and State threatened species.
- **Great Valley Riparian Woodland**. Riparian woodland communities occur in the northern area of Tracy along the Old River and Tom Paine Slough riparian zones, and along the Corral Hollow system, which flows northeast. The canopy and understory provide suitable habitat for birds and mammals. Riparian systems are also used by amphibians and reptiles. The Corral Hollow riparian area is identified as sensitive for its scenic value and habitat value. In addition, the great valley oak riparian woodland is identified as ecologically sensitive and as a desirable visual and recreational resource to San Joaquin County, and the great valley cottonwood riparian forest is identified as an important habitat area.
- **Desert Scrub Plant Community.** This community is identified as ecologically significant because it is the northernmost extension of this association in California. Desert scrub plant community is marked by sparse vegetation and bare soil between plants.
- **Seasonal Wetlands.** Seasonal wetlands occur throughout the Tracy area. These areas typically fill with water during the wet winter months and then drain enough to become ideal plant habitats throughout the spring and summer.
- **Farmed Wetlands.** Farmed wetlands are wetland areas that are currently in agricultural uses, and occur in the northern portion of the Tracy area.
- **Tidal Salt Ponds and Brackish Marsh.** Brackish marshes are areas affected by irregular tidal flooding with generally poor drainage and standing water. There are minimal occurrences along some of the larger river channels in the northern area of Tracy.
- **Old River, Paradise Cut and Tom Paine Slough.** The Old River, Paradise Cut and Tom Paine Slough are identified as sensitive for their scenic value and habitat value.

2. Protected Species

Numerous special-status animal species are known to be located in the Tracy area. Special-status species include plants and animals that are legally protected under State and federal Endangered Species Acts or other regulations, as well as species considered sufficiently rare by the scientific community to qualify for such listing. The following sensitive biological species are known to occur or potentially occur in the Tracy area:

- Mammals
  - San Joaquin kit fox
  - Riparian (San Joaquin Valley) woodrat
  - San Joaquin pocket mouse
  - Western mastiff bat
- Birds
  - Swainson's hawk
  - Burrowing owl

- Western yellow-billed cuckoo
- California horned lark

♦ Reptiles
- Coast (California) horned lizard
- San Joaquin whipsnake
- Silvery legless lizard
- Western pond turtle
- Giant garter snake
- Blunt-nosed leopard lizard

♦ Amphibians
- California red-legged frog
- California tiger salamander
- Western spadefoot

♦ Invertebrates
- Valley elderberry longhorn beetle

♦ Plants
- California tiger salamander
- Western spadefoot
- Delta button-celery
- Diamond-petaled California poppy
- Large-flowered fiddleneck
- Lemmon's jewelflower
- Mason's Lilaeopsis
- Rose-mallow
- Round-leaved filaree
- Showy madia

♦ Habitat Areas
- Great Valley Oak Riparian Forest
- Northern Calypan Vernal Pool

Several other threatened or endangered species may occur in the Tracy area, but they have not been definitively identified to occur in Tracy.

H. Air Quality

Tracy is located in the San Joaquin Valley air basin. Surrounded by mountain ranges, the air basin drains to the north, with an opening at the Carquinez Strait leading into San Francisco Bay and then the Pacific Ocean.

Wet winters and dry summers characterize the Tracy region's inland Mediterranean-type climate. Climate is temperate, with an average annual high of 75 degrees and an average low of 47 degrees. Rainfall totals can vary widely over a short

distance with windward mountain areas west of Tracy averaging over 24 inches of rain annually, and shadow areas, such as the city proper, averaging about 10 inches annually. During stormy periods, horizontal and vertical air movement ensures rapid pollutant dispersal. Rain also washes out particulate and other pollutants. Conversely, during calm periods, pollutant levels can build up to unhealthy levels.

Normally, air temperatures decrease with increasing elevations. This normal pattern is often inverted in the San Joaquin Valley, with warm air aloft, and cooler air trapped near the Earth's surface. This atmospheric condition occurs in all seasons. In summer, especially when wind speeds are very low, a strong inversion will trap air emissions near the surface, allowing high levels of ozone smog to develop. In winter, persistent inversions can trap emissions of particulate (e.g. woodsmoke) and carbon monoxide near the surface, resulting in unhealthy air quality.

Areas that do not violate ambient air quality standards set by federal and State agencies are considered to have attained the standard. Violations of ambient air quality standards are based on air pollutant monitoring data and are judged for each air pollutant. The San Joaquin Valley as a whole does not meet State or federal ambient air quality standards for ground level ozone and fine particulate matter. The region recently attained the federal coarse particulate matter standard, but still does not meet the State fine particulate matter standard.

I. Public Health

Public health is a primary measure of the overall quality of life for Tracy residents, and by extension, the sustainability of the city. The provision of open space, active modes of transportation, and access to healthy foods encourage healthy behaviors among residents and can also provide environmental benefits, for example, by reducing air pollution and GHG emissions.

The obesity epidemic is one of the most pressing public health challenges of the past decade. Nationwide, the proportion of the population nationwide that is overweight has doubled over the past 20 years. In California, one-third of children, one-quarter of adolescents, and over 60 percent of all adults are overweight or obese.[5]

In addition to reduced mobility and activity levels, obesity has serious health consequences, including an increased likelihood of diabetes, heart disease, stroke, and a number of different cancers. Obesity was estimated to cost California $28 billion during 2005 for medical care, worker's compensation, and lost productivity.[6]

J. Economic Development

This section provides a discussion of Tracy's current economic context, including an evaluation of the growth of the City's industrial and employment base and Tracy's role in the regional economy.

[5] California Department of Public Health website, http://www.cdph.ca.gov, accessed on February 24, 2010.
[6] California Center for Public Health Advocacy website, www.publichealthadvocacy.org, accessed on February 23, 2010.

Tracy's industries are related deeply to San Joaquin County – the city's transportation, warehousing, and food manufacturing sectors are reliant on the raw goods produced in the agricultural lands of the county and nearly half of the city's workforce lives in the county. However, Tracy's economy is also highly reliant on the Bay Area, where nearly half of the city's residents are employed, and from which much of the demand for Tracy's goods and services originates.

1. Employment Data and Distribution in Tracy

Tracy has experienced rapid job growth in the last decade. In fact, Tracy's employment base is growing at a significantly higher rate than that of San Joaquin County. Between 2002 and 2008, Tracy added 5,338 jobs, a growth rate of 24 percent, for a total of 27,829 jobs. The county's employment grew by less than 7 percent in that same time period. By 2008, Tracy represented a major employment center in San Joaquin County, with approximately 15 percent of the total jobs in the county.[7] These jobs came from within a variety of industrial sectors. In 2008, the top four sectors in Tracy were government, retail trade, transportation, and warehousing and manufacturing, which account for more than 16 percent, 13 percent, 11 percent, and 9 percent of the jobs in Tracy, respectively. Other key, growing sectors were the accommodation and food services sector and the wholesale trade sector.

In keeping with this industrial base, the largest employers in Tracy are those in the government and transportation and warehousing sectors. Manufacturing, especially of food products, is also represented by a large number of firms with at least 150 employees. The Safeway Distribution Center is the City's leading employer, with 2,000 jobs.

2. Commute Patterns of Workers

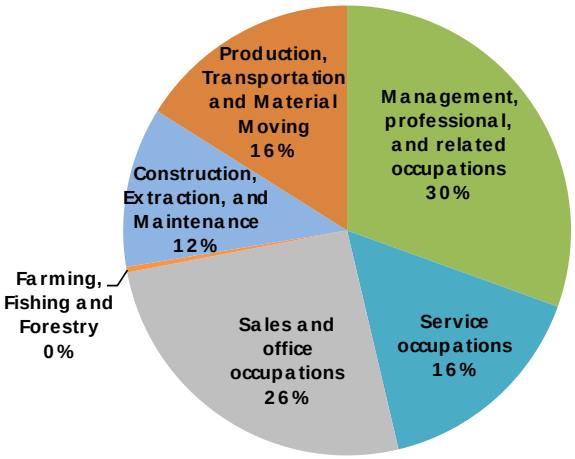
Although the labor shed for jobs in Tracy is expansive, a relatively high share of workers commute from within a short distance. Nearly 45 percent of workers based in Tracy are San Joaquin County residents, including 21 percent who are Tracy residents. Roughly 19 percent of workers travel from elsewhere in the Central Valley, while 25 percent are Bay Area residents making the reverse commute, suggesting a strong match between Tracy jobs and San Joaquin County residents.

3. Resident Workforce

From 2000 to 2008, Tracy's resident workforce grew by 50 percent, a faster growth rate than that of San Joaquin County. Despite this rapid growth, however, the occupations of new workers were similar in distribution to those of existing workers. In 2000, 61 percent of the resident workforce was employed in white collar occupations (i.e. management, professional and related occupations, and sales and office jobs); by 2008, this had only declined slightly to 57 percent. The share of residents in blue collar occupations (i.e. construction, extraction and maintenance, and production, transportation, and material moving jobs) was steady at 28 percent.

[7] California Economic Development Department, Labor Market Information Division, March 2009, "Monthly Labor Force Data for Cities and Census Designated Places (CDP) Annual Average 2008 – Revised." (http://www.labormarketinfo.edd.ca.gov/?pageid=133).

FIGURE 2-1 **OCCUPATIONS OF TRACY RESIDENTS, 2006-2008**



Source: 2006-2008 American Communities Survey, Strategic Economics 2009.

4. Commute Patterns of Residents

Only 35 percent of Tracy's resident workforce is employed in San Joaquin County, including 20 percent that work in Tracy. A far greater share of residents, 46 percent, commutes across the Altamont Pass to jobs in the Bay Area, including 27 percent that work in Alameda County. Only 9 percent of residents work elsewhere in the Central Valley.

5. Jobs-Housing Balance

Jobs-housing balance is often used as a metric of a city's sustainability. The rationale behind this is that if the number of housing units is roughly equivalent to the number of jobs, there will be less in- and out-commuting; to the extent that there is intercity travel, a strong balance will ensure bi-directional traffic flows, reducing rush-hour congestion in a single direction.

While the City of Tracy has experienced strong employment growth over the last several years, the city's population has grown at a faster pace than its employment. Much of this residential growth is attributable to households with workers employed in the Bay Area, especially Alameda County. Concomitantly, Tracy's housing prices are such that many of the predominantly low-wage workers of jobs based in Tracy must commute in from elsewhere in San Joaquin County and the Central Valley. The City's jobs-housing balance has declined in recent years such that in 2008, there were roughly 0.73 jobs for every employed resident. However, this ratio significantly understates the imbalance that currently exists for commute flows of residents and workers. As noted above, 20 percent Tracy's resident workforce is employed within the city, significantly less than the 73 percent that would be predicted if spatial match were the only factor determining where residents work. Some combination of job quality, accessibility, and occupation/skills requirements drives a higher proportion of Tracy workers to commute than would be necessary if the jobs located in Tracy were better matched to the skills and needs of residents.

3 FUTURE TRENDS

This chapter discusses future trends related to greenhouse gas (GHG) emissions, energy, transportation and land use, solid waste, water, agriculture and open space, biological resources, air quality, public health, and economic development. The future emissions forecast for GHG emissions is based on the Emissions Inventory and Business As Usual (BAU) forecast for Tracy, which is provided as Appendix B.

A. Greenhouse Gas Emissions

The community and municipal emissions inventories developed for the baseline year 2006 were used to project future emissions for the year 2020 under BAU conditions. The 2020 BAU forecast for community-wide emissions is 1,735,022 metric tons of carbon dioxide equivalent (CO_2e), an increase of approximately 30 percent over the 2006 baseline inventory. For municipal emissions, the 2020 BAU forecast is 13,948 metric tons of CO_2e, an increase of approximately 22 percent over the baseline. In total, Tracy's per capita GHG emissions in 2020 under BAU conditions are projected to be 11.5 metric tons CO_2e,[1] a slight decrease from the 2006 per capita emissions. These projections are based on the assumption that GHG emissions will increase as Tracy's population grows.

GHG emissions in Tracy are also a function of the energy, transportation and land use, solid waste, and water sectors, which are discussed in Sections B through E, respectively, below. Additional information on these and other sources of GHG emissions is provided in Appendix B.

B. Energy

1. Community-Wide Emissions Inventory

Community-wide energy consumption in 2020 includes electricity and natural gas consumption by residential buildings, commercial buildings, and industrial facilities. The forecast of residential energy use in 2020 was based on an average annual residential growth rate of 1.6 percent, which is consistent with the City's Growth Management Ordinance.[2] Residential energy consumption in 2020 is projected to be approximately 2.3 million MMBtu, which would produce 273,441 metric tons of CO_2e, an increase of approximately 24 percent above current conditions.

Energy use in 2020 by commercial and industrial facilities is projected to grow at a rate of approximately 1.8 percent per year. This growth rate reflects the projected growth in jobs in the area.[3] Commercial and industrial energy use in 2020 is projected to be approximately 1.7 million MMBtu, which would produce 206,228 metric tons of CO_2e, an increase of approximately 28 percent above current conditions.

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[1] Based on the total anticipated population and employment in Tracy in 2020, approximately 152,100 residents and workers. From: Watten, Mackenzie and Mike Wallace. Fehr & Peers. Personal communication with Tanya Sundberg, DC&E. January 29, 2010.

[2] The residential development allowed by the City's Growth Management Ordinance is described in Table 3-4 on page 3-37 of the April 2009 Draft EIR for the City of Tracy General Plan Amendment.

[3] The commercial and industrial development anticipated by the City's General Plan is described in Chapter 3, Section J.1 of the April 2009 Draft EIR for the City of Tracy General Plan Amendment.

These projections do not account for potential reductions in the carbon intensity of California electricity that may be achieved through the State's renewable portfolio standard, which is discussed further in Chapter 5 and Appendix C. These projections also do not account for improvements in energy efficiency of buildings that may result from changes to the building code, changes in behavior or advances in building materials that may reduce the energy consumed per square foot.

2. Municipal Operations Emissions Inventory

Because of data and modeling constraints, the BAU forecast does not include energy-related emissions from municipal operations. However, as indicated in Chapter 2, municipal emissions in 2006 accounted for less than 1 percent of the total emissions in Tracy. Therefore, the energy component of the municipal BAU forecast would not have a significant impact on the total BAU forecast.

C. Transportation and Land Use

As population and employment in Tracy grow, it is anticipated that VMT will also increase, which will contribute to GHG emissions in Tracy.

1. Community-Wide Emissions Inventory

The community-wide forecast for transportation emissions was based on projected city land use in 2020. The 2020 BAU forecast for transportation-related emissions is 1,118,705 metric tons of CO_2e, an increase of approximately 32 percent over 2006 emissions levels.

2. Municipal Operations Emissions Inventory

Because of data and modeling constraints, the BAU forecast does not include transportation-related emissions from municipal operations. However, as indicated in Chapter 2, municipal emissions in 2006 accounted for less than 1 percent of the total emissions in Tracy. Therefore, the transportation component of the municipal BAU forecast would not have a significant impact on the total BAU forecast.

D. Solid Waste

1. Community-Wide Emissions Inventory

Emissions associated with solid waste generation and subsequent burial in landfills are projected to grow in proportion to population, i.e. by 1.6 percent per year.[4] GHG emissions in the waste sector are forecast to be 41,939 metric tons CO_2e in 2020. This projection represents an increase of approximately 24 percent over existing conditions.

2. Municipal Operations Emissions Inventory

Tracy Delta Solid Waste Management provides service to the municipal buildings, as well as private residential and commercial buildings. Data aggregation did not allow for a unique estimate of the waste generated only by municipal

[4] Population growth is estimated based on the residential development allowed by the City's Growth Management Ordinance, which is described in Table 3-4 on page 3-37 of the April 2009 Draft EIR for the City of Tracy General Plan Amendment.

facilities. Therefore, the community forecast above includes future emissions due to waste generated through municipal operations of the City.

E. Water

1. Community-Wide Emissions Inventory

Water demand in the City of Tracy is estimated to be 23,900 acre-feet per year by 2020, according to Tracy's Urban Water Management Plan. The energy required for water pumping, treatment, and conveyance is projected to results in emissions of 1,012 metric tons of CO_2e in 2020. This forecast assumes that the energy intensity of City water remains constant in future years. The energy intensity is determined by several factors, including the relative percentages of locally-pumped to imported water and the energy mix in California. Water consumption due to municipal operations is estimated to comprise a small percentage of the community's total water use and is included in this forecast.

2. Municipal Operations Emissions Inventory

Water consumption due to municipal operations is included in the community forecast for emissions in this sector.

F. Agriculture and Open Space

The San Joaquin Valley is California's leading agricultural region, accounting for 55 percent of the State's total agricultural sales. Despite the importance of agriculture to the region, urbanization and population growth have resulted in the loss of substantial amounts of farmland, with the San Joaquin Valley losing approximately 70,000 acres of high quality farmland between 1990 and 2004.[5] Since 1990, urban development has consumed 1 acre of land for every eight people in the San Joaquin Valley.[6]

Loss of farmland has been particularly severe in San Joaquin County, where approximately 15,000 acres of high quality farmland – more than in any other county in California – were developed between 1990 and 2004. This loss of high quality farmland accounted for 76 percent of all the land urbanized in the county over the same period.[7]

In its report *Paving Paradise: A New Perspective on California Farmland Conversion*, the American Farmland Trust projected the amount of farmland that would be lost in future decades if current rates of urbanization continue. The San Joaquin Val-

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[5] American Farmland Trust, November 2007, *Paving Paradise: A New Perspective on California Farmland Conversion*, pages 6-7. (http://www.farmland.org/programs/states/ca/Feature%20Stories/documents/PavingParadise_AmericanFarmlandTrust_Nov07.pdf).

[6] Central Valley Farmland Trust website, http://www.valleyfarmland.org/archives/category/landowners/why-we-do-it, accessed on February 24, 2010.

[7] American Farmland Trust, November 2007, *Paving Paradise: A New Perspective on California Farmland Conversion*, pages 6-7. (http://www.farmland.org/programs/states/ca/Feature%20Stories/documents/PavingParadise_AmericanFarmlandTrust_Nov07.pdf).

ley is projected to lose approximately 218,500 additional acres of farmland in the period between 2004 and 2020 under current urbanization rates. San Joaquin County is projected to lose approximately an additional 40,800 acres by 2020.[8] Recognizing the problems of farmland conversion, the City of Tracy has an agriculture mitigation fee ordinance, which helps to fund farmland preservation through purchase and easements. Efforts are also underway at the regional level to counter this trend. The Central Valley Farmland Trust (CVFT) preserves productive farmland in Central Valley counties through land purchase, donation, and agricultural conservation easements from landowners. Through the San Joaquin Valley Blueprint process, policymakers have endorsed a preferred growth strategy through 2050 that would preserve approximately 118,000 acres of farmland in the San Joaquin Valley through efficient land use and transportation planning.

G. Biological Resources

As summarized in Chapter 2, Tracy is home to a range of wildlife and plant species that reflect the biological diversity of San Joaquin County and the larger San Joaquin Valley. These include seven threatened and endangered species and numerous special-status species, which are further threatened by inefficient development patterns. Development in and around Tracy will likely intensify pressures on these biological resources, and reduce the extent and diversity of Tracy's ecosystems.

In an effort to protect sensitive and threatened species throughout the county, the San Joaquin Council of Governments (SJCOG) has prepared the San Joaquin County Multi-Species Habitat Conservation and Open Space Plan (SJMSCP), which the City of Tracy has adopted. The purpose of the SJMSCP is to provide a countywide strategy for preserving open space; provide for the long-term management of plant, fish, and wildlife species, especially those that are currently listed or may be listed in the future under the federal or California Endangered Species Act (ESA); and provide and maintain multiple-use open spaces that contribute to the quality of life of the residents of San Joaquin County.

H. Air Quality

Ambient air quality is affected by the rate and concentration of pollutant emissions and meteorological conditions. Factors such as wind speed, atmospheric stability, and mixing height all affect the atmosphere's ability to mix and disperse pollutants. Long-term variations in air quality typically result from changes in emissions, while short-term variations result from changes in atmospheric conditions. There are several continuous air monitoring stations operated by government agencies in the Tracy area. As indicated in Chapter 2, measured air pollutant data indicate that ground-level ozone and particulate matter are the air pollutants of greatest concern because concentrations in the area exceed health-based standards each year.

In general, air quality in San Joaquin County between 2003 and 2007 was better than in other parts of the San Joaquin Valley. During this time, the State one-hour ozone standard was exceeded three to sixteen times a year, and the federal

[8] American Farmland Trust, November 2007, *Paving Paradise: A New Perspective on California Farmland Conversion*, Statewide, Regional, and County datasets. (http://www.farmland.org/programs/states/ca/Feature%20Stories/PavingParadise.asp).

standard was not exceeded. The national eight-hour ozone standards were exceeded three to ten times a year. State coarse particulate matter standards are calculated to have been exceeded from 36 to 60 days a year. Federal fine particulate matter daily standards were exceeded from one to five times a year. Standards for all other criteria pollutants were not exceeded in the five-year period.

I. Public Health

The link between sustainability and public health has become more prominent in recent years due to dramatic increases in obesity rates and obesity-related illnesses.

Obesity not only affects one's comfort and mobility, but has serious health consequences, including an increased likelihood of diabetes, heart disease, stroke, and a number of different cancers. The rates of chronic disease and disability attributable to poor diet and inactivity, including heart disease, Type 2 diabetes, high blood pressure, stroke, depression, sleep disorders, and some cancers, continue to increase. In the United States, about 75 percent of overweight and obese children are likely to be obese as adults. Public health experts predict that if current trends continue, one-third of American children born in 2000 and one-half of all children from ethnic and racially diverse populations will suffer Type 2 diabetes during their lifetime. Public health experts also predict that this generation of children could become the first in modern history whose lifespan is shorter than that of their parents.[9]

Community planning can directly address these health problems through development patterns that: are more conducive to transit, walking, and bicycling; allow for wider access to sources of healthy food like grocery stores and farmers' markets; and provide parks and open space in every neighborhood. Research has shown that individuals living in neighborhoods that exhibit these characteristics are significantly less likely to be overweight or obese; significantly more likely to get the recommended levels of physical activity; and significantly more likely to walk, bicycle, or ride transit. Such benefits are particularly important in San Joaquin County where, similar to other California locations, coronary heart disease, lower respiratory disease, cancer, diabetes, and stroke are among the leading causes of death. Improving physical fitness and eating healthy foods can significantly reduce the risks for these diseases and conditions.

J. Economic Development

Despite Tracy's proximity to high-tech and research centers in the Silicon Valley and Alameda County, Tracy's basic economy is firmly rooted in "goods movement industries," including truck transportation, warehousing and storage, wholesale trade, and food manufacturing. Secondary strengths in Tracy's economy are industries that serve its growing residential population, including retail stores and restaurants. Recent employment growth and an advantageous geographic position near the Altamont Pass suggest that these industries will continue to be strong into the future.

[9] California Department of Public Health website, http://www.cdph.ca.gov, accessed on February 24, 2010.

1. Economic Competitiveness

A shift-share analysis was conducted to evaluate the sectors and industries that are likely to experience growth in the future. The analysis classified Tracy's industrial sectors into the five categories discussed below. The results of the shift-share analysis are presented in Table 3-1.

a. Competitive Advantage

Competitive Advantage sectors and industries are those that have grown in importance in San Joaquin County, adding employment at a faster rate than the economy overall. Further, growth in these industries has been even greater in Tracy than in the rest of the county. Consequently, sectors and industries in this category are those most likely to experience growth, as local advantages are buoyed by regional strength.

The Competitive Advantage sectors can be clustered in two groups. The first, which includes the wholesale trade sector, is driven by inter-regional demand, both from the Bay Area and from the rest of the world, accessed through the Bay Area's ports. This suggests that the demand for the products that are traded through the firms in this sector is increasing, and that Tracy's key geographic position, as the gateway to the Bay Area from the Central Valley, is an important factor for these firms. The second group, which includes the educational services, health care and social assistance, accommodation and food services, and administrative and support and waste management sectors, are driven by local and regional demand. That these sectors are growing more quickly in Tracy than in San Joaquin County is a reflection both of Tracy's rapidly-growing residential population and of Tracy's growing role as a regional services node.

TABLE 3-1 **SUMMARY OF TRACY'S ECONOMIC STRENGTHS, 2002 – 2008**

Classification	Industries
Competitive Advantage	Wholesale Trade Educational Services Health Care and Social Assistance Accommodation and Food Services Administrative and Support and Waste Management
Local Advantage	Manufacturing Finance and Insurance Professional and Technical Services Management of Companies and Enterprises Arts, Entertainment, and Recreation Other Services (except Public Administration)
Emerging Opportunity	Transportation and Warehousing
Stable	Retail Trade
Declining	Agriculture, Forestry, Fishing, and Hunting Construction Real Estate and Rental and Leasing Mining Information

Source: California Economic Development Department, 2009; Strategic Economics, 2010.

b. Local Advantage

Local Advantage sectors and industries are those that have expanded their presence in Tracy, even as they have declined in importance in San Joaquin County as a whole, suggesting that Tracy has an advantage over the rest of San Joaquin County for drawing jobs in these industries. However, because these industries have a declining presence in San Joaquin County overall, they are potentially at risk for decline in Tracy. They should be considered for their unique role in differentiating Tracy's economy from the county's.

As with the Competitive Advantage sectors, much of this is related to Tracy's geographic position. Proximity to the Altamont Pass is likely a key factor in Tracy's growing manufacturing sector, as firms can make use of inputs from the Central Valley and quickly transport finished goods to consumers in the Bay Area. Other sectors in this category are more mixed in their reasons for locating in Tracy. For many firms in the finance and insurance, professional and technical services, and management of companies and enterprises sectors, location in Tracy may be mechanism to maintain proximity to Bay Area firms and clientele while economizing on rent and land prices. However, others are likely locating in Tracy to serve the growing residential population. Finally, the arts, entertainment, and recreation sector is primarily local- and county-serving, a reflection of population growth and Tracy's increasing economic importance to the region.

c. Emerging Opportunity

Emerging Opportunity sectors and industries are those that have increased their presence in San Joaquin County and have grown in Tracy, but at a slower rate than in the rest of the county. While this may be due to some inherent local disadvantage, these industries may also represent an opportunity to capture employment growth that is currently going elsewhere in the county.

The transportation and warehousing sector is the only industrial sector in the Emerging Opportunity category. However, in 2008, more than twice the share of Tracy's total employment was in this sector, compared to that of San Joaquin County. Consequently, the slow growth is likely a reflection of the dominance of larger, slow-growing establishments, such as the Safeway Distribution Center, rather than any local disadvantages. Reasons for locating in Tracy for firms in this sector are nearly identical to that of the wholesale trade sector.

d. Stable

Stable sectors and industries are those that have experienced local job growth, but have not gained in importance relative to other industries in Tracy or San Joaquin County.

Only one industrial sector, retail trade, can be classified as Stable. Currently, retail in Tracy is primarily local-serving and is growing, though at a slower pace than its overall economy.

e. Declining

Declining sectors and industries are those that have experienced a decline in the number of city jobs between 2002 and 2008.

With the exception of the information sector, the sectors in the Declining category are also related to housing construction and population growth, though with an opposite effect of those in the other categories. As housing construction has fallen precipitously from its peak in 2003, the construction and real estate sectors experienced contraction in em-

ployment. Employment in the agricultural and mining sectors has also fallen. The preservation of the remaining agricultural land and employment may be a key component of a sustainable economic development strategy. Finally, the information sector, which included only 44 jobs in 2008, has never been a significant component of Tracy's economy; its decline is largely a function of San Joaquin County's overall weakness in this sector.

2. Job Match Analysis

As discussed in Chapter 2, 20 percent of Tracy's resident workforce is employed within the city, significantly less than the 73 percent that would be predicted if Tracy's jobs-housing ratio were the only factor determining where residents work. One mechanism for reducing in- and out-commuting in the future is to foster a strong match between the skills of Tracy's residents and the training and educational requirements of Tracy's jobs. Highly trained or educated residents are unlikely to hold jobs for which they are overqualified, while residents with low levels of education are unlikely to be offered jobs with high training requirements. Consequently, the distribution of educational attainment of residents should closely resemble the occupational requirements of key industrial sectors for there to be a good skills-jobs match.

In general, the occupations in Tracy's key sectors do not have high training or educational requirements, with a majority requiring no post-secondary education. In comparison, in 2008, 55 percent of Tracy's resident workforce had some post-secondary education, including 20 percent that held bachelor's degrees or higher. This suggests that a potential source of mismatch between Tracy's jobs and residents is that the resident workforce may be "overqualified" for employment in the largest and most rapidly-growing sectors of the local economy.

4 SUSTAINABILITY TARGETS

This chapter presents the sustainability targets for Tracy for the year 2020. These targets were developed following a review of sustainability targets set by other entities, such as the State Department of Conservation and the Attorney General's Office, and have been refined iteratively and concurrently with the sustainability measures. Targets are presented for each sector of the Sustainability Action Plan.

A. Greenhouse Gas Emissions

This Sustainability Action Plan includes a community and municipal target for greenhouse gas (GHG) emissions by 2020, as listed below. In addition, the targets in each of the subsections below will support the overall reduction targets for GHG emissions. The GHG emission targets are as follows:

- Target #1: 15 percent reduction in per capita emissions from the 2006 baseline of 11.6 metric tons of carbon dioxide equivalent.

B. Energy

Within the energy sector, this Sustainability Action Plan aims to achieve the following:

- Target #2a: 25 percent of all community energy needs provided by renewable sources.
- Target #2b: 25 percent of all municipal energy needs provided by renewable sources.
- Target #3a: New residential and non-residential buildings powered by 10 percent using on-site solar panels.
- Target #3b: New municipal buildings powered by 10 percent using on-site solar panels.
- Target #4a: 15 percent reduction in community energy consumption from 2006 baseline levels.
- Target #4b: 10 percent reduction in the municipal peak electrical load from 2006 baseline levels.

C. Transportation and Land Use

Within the transportation and land use sector, this Sustainability Action Plan aims to achieve the following:

- Target #5a: 20 percent increase in the percentage of non-City employees who participate in travel demand management programs from 2006 baseline levels.
- Target #5b: 20 percent increase in the percentage of City employees who participate in travel demand management programs from 2006 baseline levels.
- Target #6a: 20 percent reduction in the community VMT per capita from current (2006) levels.
- Target #6b: 20 percent reduction in the municipal VMT from 2006 baseline levels.

D. Solid Waste

Within the solid waste sector, this Sustainability Action Plan aims to achieve the following:

- Target #7a: 75 percent of the community waste stream is diverted from landfills.
- Target #7b: 75 percent of the municipal waste stream is diverted from landfills.
- Target #8a: 50 percent of community construction waste is reused or recycled.
- Target #8b: 50 percent of municipal construction waste is reused or recycled.

E. Water

Within the water sector, this Sustainability Action Plan aims to achieve the following:

- Target #9a: 12 percent reduction in outdoor potable water use from 2010 levels.
- Target #9b: 20 percent reduction in per capita potable water use from Department of Water Resources Method 1 Ten Year Historical Average (1995-2004).
- Target #9c: 20 percent reduction in municipal water use from 2008 levels.

F. Agriculture and Open Space

Within the agriculture and open space sector, this Sustainability Action Plan aims to achieve the following:

- Target #10: No loss of Prime Farmland, Farmland of Statewide Significance or Unique Farmland outside of the City's Sphere of Influence (SOI).
- Target #11: Any loss of such farmland inside of the SOI is offset by mitigation fees to a qualified agriculture preservation trust, such as the Central Valley Farmland Trust, at a ratio related to every acre that is lost.

G. Biological Resources

Within the biological resources sector, this Sustainability Action Plan aims to achieve the following:

- Target #12: Any loss of critical habitat corridors is mitigated through the Habitat Conservation Plan or other appropriate mitigation.

H. Air Quality

This Sustainability Action Plan aims to achieve the following:

- Target #13: 25 percent reduction in the number of days exceeding National and California Ambient Air Quality Standards.

I. Public Health

Within the public health sector, this Sustainability Action Plan aims to achieve the following:

- Target #14a: 50 percent reduction in the percentage of obese adults in Tracy from 2006 baseline levels.
- Target #14b: 50 percent reduction in the percentage of obese children in Tracy from 2006 baseline levels.
- Target #15: 90 percent of households within ½ mile of a retail outlet selling fresh food and/or with a retail outlet selling fresh food as their closest food retailer.
- Target #16: 90 percent of households within ½ mile of a neighborhood or regional park or recreation facility.

J. Economic Development

Within the economic development sector, this Sustainability Action Plan aims to achieve the following:

- Target #17: Ratio of jobs to employed residents with matched skills between .90 and 1.10.
- Target #18: 10,000 square feet of neighborhood-serving retail within ¼ mile of 75 percent of all residents.
- Target #19: "Economic Diversity Index" score[1] equal to or better than the statewide average.
- Target #20: 10% of jobs are "green" by practice or product.

[1] The Economic Diversity Index is a score based on the economic diversity of the industries within a community. Communities with only one industry are inevitably impacted by shifts in the economy, and residents have few opportunities for alternative employment. Communities with a wider range of industries have more employment options for residents, and are expected to be more resilient to economic shifts.

5 SUSTAINABILITY MEASURES

This chapter presents the measures that the City of Tracy will implement in order to achieve its sustainability targets. These eighty-four measures were developed and refined through an iterative process that included community and stakeholder involvement. As discussed in Chapter 1, participants at the Community Workshop held in February 2010 provided ideas for additional sustainability measures to include in the Sustainability Action Plan. The City has determined that these measures would be complicated to implement at this time but will reconsider these measures when the Sustainability Action Plan is updated in the future.

The measures are described by sector in the sections below. Additional information on each measure is also provided in Tables 5-1 and 5-2, located at the end of this Chapter. Table 5-1 includes measures in the energy, transportation and land use, and solid waste sectors, , which all have a quantifiable GHG emission reduction benefit. For each measure, Table 5-1 provides the following information:

- How the measure is to be activated (e.g. by ordinance or program).
- The quantified reduction in carbon dioxide equivalent (CO_2e) emissions and the corresponding percentage of the total CO_2e reduction needed to reach the GHG target outlined in Chapter 4.
- Cost to the City per metric ton of CO_2e reduction.
- Secondary benefits of the measure (e.g. improving public health or increasing jobs).
- Anticipated new costs to the City to implement the measure.
- Anticipated costs to developers or residents.
- Projected cost savings and payback time.

Table 5-2 presents detailed information on the measures in the water, agriculture and open space, biological resources, public health, economic development, and public outreach and education sectors, which have not been quantified with a GHG emission reduction benefit. The table provides the following information for each measure:

- How the measure is to be activated.
- Primary and Secondary benefits of the measure.
- Anticipated new costs to the City to implement the measure.

A. Greenhouse Gas Emissions

The energy, transportation and land use, and solid waste sectors that are discussed below include measures that will reduce GHG emissions. In total, implementation of the Sustainability Action Plan will reduce GHG emissions by 378,461 to 482,154 metric tons of CO2 equivalent (CO2e). The assumptions that were used to quantify the GHG benefit are provided in Appendix C.

B. Energy

E-1: Green Building Ordinance

Develop an incentives-based Green Building Ordinance that promotes energy efficient design for new buildings. As part of this Ordinance:

a. Adopt the 2010 California Green Building Standards Code (Title 24, Part 11, CCR).

b. Encourage energy efficiency measures for new warehouses and warehousing in association with other commercial and industrial uses, including the use of reflective pavement and natural gas or electricity use for yard equipment.
c. Encourage the use of cement substitutes and recycled building materials for new construction.
d. Encourage the use of energy-efficient appliances that meet Energy Star standards when higher than Title 24 and the use of energy efficient lighting technologies that meet or exceed Title 24 standards.
e. Encourage all new buildings to be constructed to allow for the easy, cost-effective installation of future solar energy systems. "Solar ready" features should include: proper solar orientation (i.e. south facing roof area sloped at 20° to 55° from the horizontal); clear access on the south sloped roof (i.e. no chimneys, heating vents, plumbing vents, etc.); electrical conduit installed for solar electric system wiring; plumbing installed for solar hot water system; and space provided for a solar hot water storage tank.
f. Encourage any roof to have a Solar Reflectance Index (SRI) of at least 29.
g. Encourage that residential projects of 6 units or more participate in the California Energy Commission's New Solar Homes Partnership, which provides rebates to developers of 6 units or more who offer solar power in 50 percent of new units and is a component of the California Solar Initiative or a similar program with solar power requirements equal to or greater than those of the California Energy Commission's New Solar Homes Partnership.
h. Partner with Pacific Gas and Electric or other appropriate energy providers and the California Public Utilities Commission to develop an incentive program for solar installation on new and retrofitted warehouses. Consider a mandatory minimum solar requirement for new warehouse space.
i. Encourage that new or major rehabilitations of commercial, office, or industrial development greater than or equal to 25,000 square feet in size incorporate solar or other renewable energy generation to provide 15 percent or more of the project's energy needs. Major rehabilitations are defined as additions of 25,000 square feet of office/retail commercial or 100,000 square feet of industrial floor area.
j. In partnership with Pacific Gas and Electric and other appropriate energy providers, develop a program that provides incentives that meet or exceed those of AB 1470. AB 1470, the Solar Hot Water Energy Efficiency Act of 2007, directs the California Energy Commission to establish a ten-year, statewide incentive program to encourage the installation of 200,000 solar water heating systems to offset natural gas usage for water and space heating. The incentives would be funded by a utility company surcharge on certain natural gas customers up to $250 million over ten years.
k. Develop a public-private partnership to provide incentives for co-generation projects for commercial and industrial facilities using outside funds.
l. Encourage the development of alternative energy projects and conduct a review of City policies and ordinances to address alternative energy production. Develop protocols for alternative energy storage, such as biodiesel, hydrogen, and/or compressed air. Continue to research the location needs for alternative energy producers and send direct, targeted marketing pieces to alternative energy producers that are appropriate for Tracy. Identify possible City-owned sites for production of local renewable energy sources such as solar, wind, small hydro, and biogas.
m. Encourage the inclusion of alternative energy facilities that are a secondary use to another project. Identify the best means to avoid noise, aesthetic, and other potential land use compatibility conflicts for alternative energy facilities (e.g. installing tracking solar PV or angling fixed solar PV in a manner that reduces glare to surrounding land uses). Identify and remove regulatory or procedural barriers to producing renewable energy as a secondary use to another project, such as updating codes, guidelines, and zoning.
n. Encourage the use of locally-sourced, sustainable, salvaged and recycled-content materials and other materials that have low production energy costs for building materials, hard surfaces, and non-plant landscaping.

1. Primary Benefits

This measure would reduce GHG emissions in Tracy by 2,485 metric tons CO2e.

2. Secondary Benefits

This measure would provide the following secondary benefits:

- Conserve energy
- Increase renewable energy
- Reduce VMT
- Reduce waste
- Increase jobs

E-2: Energy Efficiency in Site Planning and Design

Amend the Zoning Ordinance, City Standards, or Subdivision Guidelines to do the following:

a. Establish measures that reduce energy use through solar orientation by taking advantage of landscaping and sun screens.
b. Allow increased height limits and greater development flexibility in exchange for incorporating energy-efficient green building practices. Provide permitting-related and other incentives for energy efficient building projects, for example by giving green projects priority in plan review, processing and field inspection services.
c. Establish guidelines for cool pavements and strategically placed shade trees.
d. Require all new development and major rehabilitation (i.e. additions of 25,000 square feet of office/retail commercial or 100,000 square feet of industrial floor area) projects to incorporate any combination of the following strategies to reduce heat gain for 50 percent of the non-roof impervious site landscape, which includes sidewalks, courtyards, parking lots, and driveways: shaded within five years of occupancy; use of paving materials with a Solar Reflectance Index (SRI) of at least 29; open grid pavement system; or locating parking spaces under deck, under roof, or under a building.
e. Require outdoor lighting fixtures to be energy-efficient. Require parking lot light fixtures and light fixtures on buildings to be on full cut-off fixtures, except emergency exit or safety lighting, and all permanently installed exterior lighting shall be controlled by adjustable timers. Prohibit continuous all night outdoor lighting in sports stadiums, construction sites, and rural areas unless they are required for security reasons.
f. Where feasible, increase solar access by requiring that new streets be designed so that the blocks have one axis within plus or minus 15 degrees of geographical east/west, and the east/west length of those blocks are at least as long, or longer, as the north/south length of the block. Areas with topological constraints, among others, may be excluded from this requirement.

1. Primary Benefits

This measure would reduce GHG emissions in Tracy by 11,752 metric tons CO2e.

2. Secondary Benefits

As a secondary benefit, this measure would conserve energy.

E-3: Green Building and Energy Efficiency Design and Education

a. Amend the City of Tracy Design Goals and Standards to do the following:
   i. Integrate guidelines from the Green Building Ordinance.
   ii. Integrate guidelines related to cool pavements in the City Standards.
   iii. Balance tradeoffs between solar access and landscape tree shading.
b. Conduct the following public education and outreach campaigns:
   i. Provide information about green building, marketing, training, and technical assistance to property owners, development professionals, schools, and special districts.
   ii. Develop an "energy efficiency challenge" campaign for community residents or businesses.
   iii. Provide public education and publicity about renewable resources, energy efficiency and emissions reduction programs and incentives.

1. Primary Benefits

This measure would reduce GHG emissions in Tracy by 10,781 metric tons CO2e.

2. Secondary Benefits

This measure would provide the following secondary benefits:

- Conserve energy
- Increase renewable energy
- Reduce VMT
- Reduce waste
- Conserve water
- Foster public awareness of sustainability

E-4: Energy-Efficient Products and Retrofits

a. Partner with PG&E to do the following, using outside funds:
   i. Promote the use of energy-efficient appliances that meet Energy Star standards when higher than Title 24.
   ii. Distribute compact fluorescent light (CFL) bulbs and/or fixtures to community members.
   iii. Offer a halogen torchiere lamp exchange to community members.
   iv. Promote energy efficiency audits of existing buildings to check, repair, and readjust heating, ventilation, air conditioning, lighting, water heating equipment, insulation and weatherization.
   v. Encourage energy audits to be performed when residential and commercial buildings are sold. Energy audits will include information regarding the opportunities for energy efficiency improvements, and will be presented to the buyer. Commercial buildings are encouraged to be "benchmarked" using EPA's ENERGY STAR Portfolio Manager Tool.
   vi. Encourage individualized energy management planning and related services for large energy users.
   vii. Fund and schedule energy efficiency retrofits or "tune-ups" of existing buildings.
b. Support San Joaquin Valley Unified Air Pollution Control District's lawnmower exchange program for residents to exchange conventional gas-powered lawnmowers for electric and rechargeable battery-powered lawnmowers.
c. Encourage new development to provide exterior electrical outlets so that electric lawnmowers and other landscaping equipment can be sufficiently powered.
d. Encourage the installation of programmable thermostat timers.

e. Encourage the installation of energy efficient boilers.

1. Primary Benefits

This measure would reduce GHG emissions in Tracy by 36,768 metric tons CO2e.

2. Secondary Benefits

This measure would provide the following secondary benefits:

- Conserve energy
- Increase renewable energy
- Reduce VMT
- Reduce waste
- Increase jobs
- Foster public awareness of sustainability

E-5: Weatherization Assistance

Continue to fund weatherization projects for households that meet the income eligibility criteria by utilizing the Community Development Agency's Downtown Rehabilitation Loan and Grant programs.

1. Primary Benefits

This measure would reduce GHG emissions in Tracy by 473 metric tons CO2e.

2. Secondary Benefits

This measure would provide the following secondary benefits:

- Conserve energy
- Foster public awareness of sustainability
- Retain and increase amount of affordable housing

E-6: Financing for Energy Efficiency and Renewable Energy Projects

Develop a program under AB 811 to offer innovative, low-interest financing for energy efficiency and renewable energy projects for existing and new development, including heating, ventilation, air conditioning, lighting, water heating equipment, insulation, weatherization, and solar.

1. Primary Benefits

This measure would reduce GHG emissions in Tracy by 8,789 metric tons CO2e.

2. Secondary Benefits

This measure would provide the following secondary benefits:

- Conserve energy
- Increase renewable energy

E-7: Energy Efficient Retrofits for City Street Lights

Retrofit City street lights to LED or induction lighting.

1. Primary Benefits

This measure would reduce GHG emissions in Tracy by 337 metric tons CO2e.

2. Secondary Benefits

This measure would provide the following secondary benefits:

- Conserve energy
- Decrease City's facilities costs

E-8: Solar Panel Installations on Municipal Facilities

Install solar panels on municipal facilities.

1. Primary Benefits

This measure would reduce GHG emissions in Tracy by 34 metric tons CO2e.

2. Secondary Benefits

This measure would provide the following secondary benefits:

- Conserve energy
- Increase renewable energy
- Increase jobs
- Decrease City's facilities costs

E-9: Energy Efficiency Settings for City Desktop Computers

Change the settings for all City desktop computers to achieve the following:

a. All monitors shall go into sleep mode after 15 minutes of inactivity.
b. All computers shall go into sleep mode after 90 minutes of inactivity.

1. Primary Benefits

This measure would reduce GHG emissions in Tracy by 5 metric tons CO2e.

2. Secondary Benefits

This measure would provide the following secondary benefits:

- Conserve energy
- Decrease City's facilities costs

The GHG emissions reductions from the energy-related measures above account for the external, State-level measure regarding the energy efficiency. The California Green Building Initiative (Executive Order S-20-04) calls for modifica-

tions to Title 24 standards that will increase energy efficiency in new government and commercial buildings by 20 percent by 2015.[1]

External State Title 24 Standards

In 2008, the California Energy Commission adopted new Title 24 Energy Efficiency Standards, which require implementation of energy-efficient technologies that will reduce energy consumption in new residential, commercial, and industrial development. The largest percentage reduction from Title 24 Standards will occur in new residential sector energy consumption. Title 24 is estimated to reduce new residential electricity consumption by 22.7 percent and natural gas consumption by 10 percent.[2]

The new Title 24 Standards will cause a GHG benefit in Tracy that would occur regardless of whether this Sustainability Action Plan is implemented. Therefore, in quantifying the ability for the City to reach its GHG target by 2020, the GHG benefit from this external, State-level measure is provided separately in Table 5-1. As shown in the table, the Title 24 standards are projected to reduce GHG emissions in Tracy by 16,926 metric tons CO_2e.

External State Renewable Portfolio Standard

California Executive Order S-14-08 requires California electricity providers to expand their renewable energy portfolio to serve 33 percent of their load through renewable energy sources by 2020.[3] Since renewable energy sources generally do not generate GHG emissions, this Executive Order will cause a GHG benefit in Tracy that would occur regardless of whether this Sustainability Action Plan is implemented. Therefore, in quantifying the ability for the City to reach its GHG target by 2020, the GHG benefit from this external, State-level measure is provided separately in Table 5-1. As shown in the table, this renewable energy portfolio measure is projected to reduce GHG emissions in Tracy by 44,034 metric tons CO_2e.

C. Transportation and Land Use

T-1: Live-Work and Work-Live Uses

Amend the Zoning Ordinance to allow live-work and work-live uses in existing and future residential development and adopt more flexible home occupation requirements.

1. Primary Benefits

This measure would reduce GHG emissions in Tracy by 292 metric tons CO2e.

2. Secondary Benefits

This measure would provide the following secondary benefits:

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[1] California Energy Commission website, http://www.energy.ca.gov/greenbuilding, accessed on July 30, 2009.

[2] California Energy Commission, *2008, Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings.* (**http://www.energy.ca.gov/**title24/2008standards/index.html)

[3] California Executive Order S-14-08 was signed by Governor Arnold Schwarzenegger in November 2008. This mandate further accelerated a renewable energy portfolio standard implemented under Senate Bill 107 in 2006. California Energy Commission website, http://www.energy.ca.gov/renewables/index.html, accessed on August 3, 2009.

- Reduce VMT
- Improve air quality

T-2: Reduced Parking Requirements

Amend the Zoning Ordinance to allow a reduction in parking requirements under the following circumstances:

a. Multiple uses with staggered parking demand
b. Actual demand lower than as required in code as demonstrated by a parking study
c. Proximity to bus stop/transit
d. Mixed use project
e. In-lieu fee in Downtown

1. Primary Benefits

This measure would reduce GHG emissions in Tracy by 146 metric tons CO2e.

2. Secondary Benefits

This measure would provide the following secondary benefits:

- Reduce VMT
- Improve air quality

T-3: Support for Bicycling

Promote bicycle usage through the following:

a. Continue to require bicycle parking for non-residential and multi-family uses.
b. Amend the Zoning Ordinance to require shower facilities and dressing areas for significant new or redevelopment of non-residential uses.
c. Create a bicycle-sharing program.
d. Provide bicycle parking near transit.

1. Primary Benefits

This measure would reduce GHG emissions in Tracy by 139 metric tons CO2e.

2. Secondary Benefits

This measure would provide the following secondary benefits:

- Reduce VMT
- Improve air quality
- Improve public health

T-4: Support for Transit

Promote transit ridership through the following:

a. Add to the Transportation Master Plan, where justified by ridership and funding availability, an increase transit route coverage to within ½ mile of all residents in the developed city and to within ¼ mile of 75 percent of residents within new development areas.

b. Continue to implement the City's program to provide covered and partially enclosed shelters that are adequate to buffer wind and rain and with at least one bench at each existing public transit stop and to provide local public transit information in transit shelters.
c. Provide information to city employees through the Human Resources Department and the City's Transit Coordinator on commute alternatives and incentives, including carpool/vanpool programs, transit service schedules, transit vouchers, alternative work week plans, telecommuting options, and incentives that can be used to increase employee use of alternative modes or work schedules.
d. Work with the San Joaquin Regional Rail Commission to study the feasibility of creating rail service in Tracy's downtown.
e. Continue to provide citywide door to door service for ADA customers and seniors on the City's Tracer service.
f. Continue to run Tracer along commuter routes during peak times, providing remaining service to all the middle and high schools and high employment areas, such as the West Valley Mall.
g. Encourage affordable housing to be located in transit-oriented development whenever feasible.

1. Primary Benefits

This measure would reduce GHG emissions in Tracy by 1,248 metric tons CO2e.

2. Secondary Benefits

This measure would provide the following secondary benefits:

- Reduce VMT
- Improve air quality
- Foster public awareness of sustainability
- Attract and retain business

T-5: Smart Growth, Urban Design and Planning

Promote pedestrian safety, neighborhood connectivity and walkable neighborhoods through the following:

a. Create development standards for commercial, office, and retail zones to promote a principal functional entry that faces a public street. In the Zoning Code, evaluate more restrictive parking requirements to achieve greater pedestrian connections between streets and building entrances. Require all new buildings within the Corridor Overlay Zone and the Village Center (VC) Zone to be located an appropriate distance from the street to promote walkability, such as 10 feet. Within these zones, increase use of windows or storefronts with views into the building along a minimum of portion of the ground floor building walls fronting the primary street, depending on the building context.
b. Amend the Municipal Code or create subdivision design standards to require all new development within applicable areas to do the following:
    i. Include an interconnected grid of collectors and arterials within the developed city and connecting to and through new development areas with the goal of ¼-mile to ½-mile minimum spacing of two- and four-lane roadways and minimal reliance on six-lane arterials.
    ii. Include at least one through-street and/or non-motorized right-of-way (nonmotorized rights-of-way may count for no more than 10 percent of the total) intersecting the project boundary at least every 400 feet, or at existing abutting street intervals, whichever is less.
    iii. Have internal connectivity such that there are at least 200 intersections per square mile.

c. Amend the Zoning Ordinance to require adequate pedestrian access through all commercial, residential, and mixed-used development.
d. Amend the Zoning Ordinance or create new subdivision standards to require new projects to include a pedestrian or bicycle through-connection in any new cul-de-sacs, except where prohibited by topographical conditions.
e. Add to the Transportation Master Plan a program to close sidewalk gaps on key routes within the developed city, contingent on grant funding.
f. Establish a ½-mile walkability standard for residents to access goods, services, and recreational facilities.

1. Primary Benefits

This measure would reduce GHG emissions in Tracy by 14,377 metric tons CO2e.

2. Secondary Benefits

This measure would provide the following secondary benefits:

- Reduce VMT
- Improve air quality
- Improve public health

T-6: Traffic Smoothing Through Congestion Management

Add to the Transportation Master Plan a program to implement traffic smoothing and congestion reduction at intersections along Eleventh Street, Grant Line Road, Schulte Road, Lammers Road, Tracy Boulevard, MacArthur Drive, and Chrisman Road corridors.

1. Primary Benefits

This measure would reduce GHG emissions in Tracy by 77 metric tons CO2e.

2. Secondary Benefits

As a secondary benefit, this measure would improve air quality.

T-7: San Joaquin County Park and Ride Lot Master Plan Implementation

Implement the County's Park and Ride Lot Master Plan, which identifies key locations for park and ride lots in Tracy.

1. Primary Benefits

This measure would reduce GHG emissions in Tracy by 226 metric tons CO2e.

2. Secondary Benefits

This measure would provide the following secondary benefits:

- Reduce VMT
- Improve air quality

T-8: Alternative Transportation Choices for Students

Promote alternative transportation choices for students through the following:

a. Continue to provide free or reduced bus passes for school students.

b. Work with school districts to expand "Safe Routes to Schools" programs.
c. Work with school districts to create ridesharing or "walking school bus" programs for students.

1. Primary Benefits

This measure would reduce GHG emissions in Tracy by 529 metric tons CO2e.

2. Secondary Benefits

This measure would provide the following secondary benefits:

- Reduce VMT
- Improve air quality
- Improve public health

T-9: Comprehensive Signal Coordination Program

Continue to implement a comprehensive signal coordination program for key routes in the developed city, connecting to and through new development areas and to the Interstate-205 interchanges. Include Intelligent Transportation System (ITS) elements to maximize effectiveness, such as adaptive traffic control, synchronized signals, transit and emergency signal priority, and other traffic flow management techniques.

1. Primary Benefits

This measure would reduce GHG emissions in Tracy by 675 metric tons CO2e.

2. Secondary Benefits

As a secondary benefit, this measure would improve air quality.

T-10: Ramp Metering on Interstate 205

Work with Caltrans and SJCOG to implement ramp metering on Interstate 205 to minimize congestion-related GHG emissions from both through trips and trips generated by Tracy that use Interstate 205.

1. Primary Benefits

This measure would reduce GHG emissions in Tracy by 113 metric tons CO2e.

2. Secondary Benefits

As a secondary benefit, this measure would improve air quality.

T-11: Increased Transit to Bay Area Cities and San Joaquin Valley Employment Centers

Work with regional transit agencies to increase the frequency and capacity of inter-city buses connecting Tracy to Bay Area cities, Stockton, and other San Joaquin Valley employment centers.

1. Primary Benefits

This measure would reduce GHG emissions in Tracy by 51 metric tons CO2e.

2. Secondary Benefits

This measure would provide the following secondary benefits:

- Reduce VMT
- Improve air quality

T-12: Altamont Route Approval and Transit-Oriented Development Around Rail

Work with ACE and the High Speed Rail Authority to approve the Altamont Route and achieve successful integration of rail transit into a transit-oriented development zone, including an intra-city feeder bus system.

1. Primary Benefits

This measure would reduce GHG emissions in Tracy by 1,146 metric tons CO2e.

2. Secondary Benefits

This measure would provide the following secondary benefits:

- Reduce VMT
- Improve air quality

T-13: Reduce Commute Trips

Support regional efforts to reduce commute trips, including the following:

a. Support San Joaquin Valley Unified Air Pollution Control District requirements that large employers establish employee trip reduction programs such as Rule 9410.
b. Promote the San Joaquin Council of Governments Commute Connection program, which provides information about commute options and connects commuters for carpooling, ridesharing and other activities.

1. Primary Benefits

This measure would reduce GHG emissions in Tracy by 26,993 metric tons CO2e.

2. Secondary Benefits

This measure would provide the following secondary benefits:

- Reduce VMT
- Improve air quality

T-14: Parking Cash-Out Programs for Employees

Encourage businesses to offer parking cash-out programs and offer incentives to employees for giving up their employee provided parking space.

1. Primary Benefits

This measure would reduce GHG emissions in Tracy by 135 metric tons CO2e.

2. Secondary Benefits

This measure would provide the following secondary benefits:

- Reduce VMT

- Improve air quality

T-15: Reduced Commuting from Out of the Region

Develop a program that will do the following:

a. Encourage and support the development of satellite office space or "hoteling" space for use by employees of Bay Area firms who may be assigned to work temporarily in Tracy by offering development incentives to these types of projects. Incentives may include less restrictive height limit, setback, and parking requirements.
b. Conduct public education and outreach to promote telecommuting and/or offices/businesses from home.

1. Primary Benefits

This measure would reduce GHG emissions in Tracy by 223 metric tons CO2e.

2. Secondary Benefits

This measure would provide the following secondary benefits:

- Reduce VMT
- Improve air quality

T-16: Transit Passes for Residents and Employees of New Developments

The City shall provide transit passes valid for at least one year to each resident or employee of new development projects for a period of at least the first three years of project occupancy.

1. Primary Benefits

This measure would reduce GHG emissions in Tracy by 292 metric tons CO2e.

2. Secondary Benefits

This measure would provide the following secondary benefits:

- Reduce VMT
- Improve air quality

T-17: Increased Use of Low Carbon Fueled Vehicles

Conduct the following to promote the use of low carbon fueled vehicles:

a. Use the Zoning Ordinance to allow no/low carbon fueling stations as part of the "gas and service station" land use category.
b. Amend the Zoning Ordinance or City Standards to require new projects to provide parking spaces reserved for hybrid or electric vehicles (EVs), carpool, or car share vehicles.
c. Require dedicated parking spots for alternative fuel, hybrid, carpool, or car share vehicles in City parking lots and consider installing charging connections.
d. Encourage employers to create vanpool or shuttle programs for employees.
e. Encourage the use of hybrid and electric construction equipment and the use of alternative fuels for construction equipment.
f. Convert the municipal automotive fleet to cleaner fuels and lower emissions. Convert the municipal non-automotive fleet to cleaner fuels and lower emissions where technologically possible.

1. Primary Benefits

This measure would reduce GHG emissions in Tracy by 3,832 metric tons CO2e.

2. Secondary Benefits

As a secondary benefit, this measure would improve air quality.

T-18: Carbon Sequestration on Municipal Property6

Develop a City program for maximizing carbon sequestration on municipal property through tree-planting.

1. Primary Benefits

This measure would reduce GHG emissions in Tracy by 132 metric tons CO2e.

2. Secondary Benefits

This measure would provide the following secondary benefits:

- Conserve energy
- Conserve biological resources

T-19: Mixed-Use and Traditional Residential Development

Continue City efforts to develop specific areas of the city as follows:

a. Redevelop the Bowtie area with mixed use development.
b. Where appropriate, develop new neighborhoods based on traditional residential development patterns and mixed use in a variety of densities with a pedestrian-friendly network of streets and parks.

1. Primary Benefits

This measure would reduce GHG emissions in Tracy by 73 metric tons CO2e.

2. Secondary Benefits

This measure would provide the following secondary benefits:

- Reduce VMT
- Improve air quality
- Improve public health
- Retain and increase amount of affordable housing

T-20: Employment-Generating and High-Density Infill Projects

Promote smart growth in Tracy through the following:

a. Increase the development of employment-generating uses, in particular in West Tracy areas.
b. Require mixed use nodes surrounded by high density development that transition to lower density development.
c. In keeping with the City's Growth Management Ordinance Guidelines, prioritize high density infill projects within Redevelopment Areas and Village Centers that have a high level of vehicular and pedestrian connectivity both internally and externally to the project through the allocation of Residential Growth Allotments.

d. Develop each phase of Tracy Hills with an appropriate mix of density and uses consistent with the Tracy Hills Specific Plan.
e. Develop each phase of new development in Tracy as close to existing development as practical and maximize the density and range of uses for each phase of development in a manner consistent with the applicable General Plan and Zoning designations.

1. Primary Benefits

This measure would reduce GHG emissions in Tracy by 4,800 metric tons CO2e.

2. Secondary Benefits

This measure would provide the following secondary benefits:

- Reduce VMT
- Improve air quality
- Retain and increase amount of affordable housing
- Improve public health
- Conserve or expand agricultural land

T-21: Compressed Natural Gas Buses for the City's Fleet

Continue to use compressed natural gas buses for the City's bus fleet and evaluate the conversion of the bus fleet to diesel-electric hybrid.

1. Primary Benefits

This measure, which is already in place, reduces GHG emissions in Tracy by 1,168 metric tons CO2e. Since this measure was in place at the time of the GHG inventory and is accounted for in the BAU forecast, the GHG benefit is not included in the calculation of the total CO2e reduction resulting from implementation of the Sustainability Action Plan.

2. Secondary Benefits

As a secondary benefit, this measure improves air quality.

External State Measures that Improve Fuel and Vehicle Efficiency

In addition to the transportation and land use measures listed above, the State has adopted fuel and vehicle efficiency standards that will reduce GHG emissions throughout the State and in Tracy, regardless of whether this Sustainability Action Plan is implemented. Therefore, in quantifying the ability for the City to reach its GHG target by 2020, the GHG benefit from these external, State-level measures are provided separately in Table 5-1.

As shown in the table, the fuel and vehicle efficiency standards are projected to reduce GHG emissions in Tracy by between 91,889 and 195,582 91,899 metric tons CO_2e. The range of benefits from these external State-level measures is based on different models. The lower range represents a conservative modeling approach; the upper range is based on a

method of modeling these fuel and vehicle efficiency standards by the Bay Area Air Quality Management District,[4] but adjusted for Tracy-specific data.

The fuel and vehicle efficiency standards are as follows:

- In April 2009, CARB adopted a Low Carbon Fuel Standard that will reduce GHG emissions from transportation fuels by 10 percent by 2020.[5] AB 118, the Alternative and Renewable Fuel and Vehicle Technology Program, will support this regulation by financing development and deployment of low-carbon fuels, such as plug-in hybrid, battery electric, fuel-cell, and fuels refined from organic waste.[6]
- AB 1493 directed CARB to adopt regulations that will decrease GHG emissions from new passenger vehicles through technical improvements, beginning with the 2009 model year. These regulations are expected to reduce emissions by 30 percent in new passenger vehicles by 2016, and are estimated to result in an 18 percent GHG emissions reduction across the passenger fleet.[7]

D. Solid Waste

SW-1: Diversion of Construction Waste from Landfills

Amend the Municipal Code to require at least 50 percent diversion (i.e. reuse or recycling) of non-hazardous construction waste from disposal.

1. Primary Benefits

This measure would reduce GHG emissions in Tracy by 1,321 metric tons CO2e.

2. Secondary Benefits

This measure would provide the following secondary benefits:

- Reduce waste
- Increase jobs

SW-2: Increased Recycling and Waste Diversion

Increase recycling and waste diversion in Tracy by expanding marketing efforts to increase participation by residents and businesses. As part of this program, conduct public education and outreach about reuse and recycling, including the City and PG&E's programs for appliance disposal, yard debris collection and composting, waste to energy, and zero waste programs. Work with the local waste hauler to permit collection and composting of residential food waste. In addition, train a recycling coordinator for each City department.

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[4] Bay Area Air Quality Management District, October 2009, *California Environmental Quality Act Thresholds of Significance: Revised Draft Options and Justification Report*.

[5] CARB adopted Governor Schwarzenegger's Low Carbon Fuel Standard in April 2009. CARB website, http://www.arb.ca.gov/newsrel/nr042309b.htm, accessed on July 29, 2009.

[6] California Energy Commission website, http://www.energy.ca.gov/ab118/index.html, accessed on August 5, 2009.

[7] California Clean Cars Campaign, 2006, Factsheet: *California's Vehicle Global Warming Pollution Reduction Regulation: How it Works*. (http://www.calcleancars.org/factsheets/staffproposal.pdf)

1. Primary Benefits

This measure would reduce GHG emissions in Tracy by 73,746 metric tons CO2e.

2. Secondary Benefits

This measure would provide the following secondary benefits:

- Reduce waste
- Increase jobs
- Foster public awareness of sustainability

SW-3: Recycling Service for Multi-Family Housing

Assist multi-family housing projects with developing an on-site recycling program.

1. Primary Benefits

This measure would reduce GHG emissions in Tracy by 23,544 metric tons CO2e.

2. Secondary Benefits

This measure would provide the following secondary benefits:

- Reduce waste
- Increase jobs

SW-4: Municipal Recycling and Reuse

Require all City departments and facilities to reuse office supplies, furniture and computers before buying new materials. When buying new materials, require City departments and facilities purchase products that are made with high levels of post-consumer recycled content and have limited packaging.

1. Primary Benefits

This measure would reduce GHG emissions in Tracy by 78 metric tons CO2e.

2. Secondary Benefits

As a secondary benefit, this measure would reduce waste.

E. Water

The water sector includes measures that will conserve water and support other sustainability targets, as discussed below.

W-1: Potable Water Conservation through Development Standards, Public Education, and Municipal Waste-water Reuse

Adopt the following water conservation measures:

a. In compliance with SBX7-7, develop water use and efficiency standards in the City's Green Building Ordinance to reduce overall potable water consumption utilizing Method 1 established in the Department of Water Resources'

Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use for targets of 202 gallons per capita daily (gpcd) by 2015 and 180 gpcd by 2020. Include clear parameters for integrating water efficient infrastructure and technologies, including low-flush toilets, low-flush urinals and low-flow showerheads that are more stringent than the Energy Policy Act of 1992 fixture performance requirements.

b. Conduct the following:
    i. Promote water conservation and its benefits and provide education to reduce watering of non-vegetated surfaces and promote the use of pervious paving materials.
    ii. Using outside funds, promote water audit programs that offer free water audits to single family, multi-family, and commercial customers.
    iii. Using outside funds, enact conservation programs for commercial, industrial, and institutional accounts and create programs to install ultra-low-flush toilets in facilities.
c. Produce and promote the use of municipal wastewater (i.e. treated wastewater) for agricultural, industrial, and irrigation purposes consistent with the appropriate provisions of Title 22 and approval of the State Department of Public Health. As part of this measure, conduct the following:
    i. Inventory potential non-potable uses of water for potential substitution by recycled water.
    ii. Collaborate with responsible agencies to encourage the use of recycled water where cost and energy efficiencies for its production, distribution and use are favorable.
    iii. Plan for recycled water infrastructure in the Infrastructure Master Plans.
d. Promote the use of gray water systems for underground landscape irrigation in accordance with the incorporation of the new residential Graywater Standard into California Plumbing Code (Title 24, Part 5, Chapter 16A).
    i. Collaborate with other agencies to encourage the use of graywater systems where cost and energy efficiencies for its production, distribution and use are favorable.
e. Require through Ordinance or City standard that all new development and re-development install irrigation controllers in landscaping that shall be weather- or soil moisture-based controllers which automatically adjust irrigation in response to changes in plants' needs as weather conditions change in compliance with the City's water efficient landscape ordinance.
f. Require through Ordinance or City standard that all new development and re-development of buildings in excess of 50,000 square feet install separate submeters as follows:
    i. For each individual leased, rented or other tenant space within the building projected to consume more than 100 gal/day of potable water.
    ii. For spaces used for laundry or cleaners, restaurant or food service, medical or dental office, laboratory, or beauty salon or barber shop projected to consume more than 100 gal/day of potable water.
    iii. Any building within a project or space within a building that is projected to consume more than 1,000 gal/day of potable water.
g. Require through Ordinance or City standard that all plumbing fixtures using potable water (showerheads, toilets, faucets, urinals, etc.) be in compliance with Energy Policy Act of 1992 fixture performance requirements upon lease, resale, or remodel.
h. Develop incentives for property owners to replace high water use landscaping to more water efficient landscaping.

1. Primary Benefits

This measure would conserve water.

2. Secondary Benefits

This measure would provide the following secondary benefits:

- Conserve energy
- Reduce GHG emissions

W-2: Water Efficient Landscape Ordinance

Develop a water efficient landscape ordinance to be at least as effective as the State Department of Water Resources' (DWR) Model Water Efficient Landscape Ordinance (MWELO), which requires a 12% reduction of outdoor potable water use through irrigation efficiency, plant species, recycled wastewater and captured rainwater; and consistent with SBX7-7, utilizing Method 1 targets.

1. Primary Benefits

This measure would conserve water.

2. Secondary Benefits

This measure would provide the following secondary benefits:

- Conserve energy
- Reduce GHG emissions

W-3: Incentives for Water Efficiency Retrofits

Adopt water efficiency retrofit ordinances based on EPA's Water Sense Program that provide incentives for upgrades, including replacement of shower heads, faucets, urinals and toilets with more water efficient models, when conducting renovations or additions on residential and CII projects.

1. Primary Benefits

This measure would conserve water.

2. Secondary Benefits

This measure would provide the following secondary benefits:

- Conserve energy
- Reduce GHG emissions

W-4: Water Conservation Pricing

Adopt water conservation pricing, such as tiered rate structures, to encourage efficient water use for all user types. As part of this measure, conduct the following:

a. Provide notices in each billing to accounts with water use budgets showing the relationship between the budget and actual consumption.
b. Meter all new connections and retrofit existing connections. Implement sub-metering of multi-family residential and commercial customers.
c. To help monitor landscaping water use, create accounts with dedicated irrigation meters or develop and implement a strategy targeting and marketing large landscape water use surveys to commercial/industrial/ institutional accounts with mixed-use meters.

1. Primary Benefits
This measure would conserve water.

2. Secondary Benefits
This measure would provide the following secondary benefits:

- Conserve energy
- Reduce GHG emissions

In 2009, the Association of California Water Agencies (ACWA) adopted policy principles supporting comprehensive improvements in water use efficiency to achieve a goal of reducing water use statewide by 20 percent by 2020.[8] The State Water Resources Control Board in 2009 released a draft plan to achieve a 20 percent reduction in per capita water use statewide by 2020.[9] In addition to a 20 percent reduction in water use by 2020, a corresponding reduction in energy use for water conveyance is assumed.

F. Agriculture and Open Space

The agriculture and open space sector includes measures that will conserve and/or expand agricultural lands and support other sustainability targets, as discussed below.

AG-1: Agricultural Mitigation Fee Ordinance
Continue to implement the City's Agricultural Mitigation Fee Ordinance.

The primary benefit of this measure would be to conserve and/or expand agricultural lands.

AG-2: Farmland Preservation Around Tracy
Pursue funding from the California Farmland Conservancy Program to preserve farmland around the city in coordination with the Central Valley Farmland Trust and in conformance with the General Plan.

1. Primary Benefits
The primary benefit of this measure would be to conserve and/or expand agricultural lands.

2. Secondary Benefits
This measure allows for the potential of locally grown food and would provide the following secondary benefits:

[8] In March 2009, the Association of California Water Agencies (ACWA) adopted policies to reduce water consumption by 20 percent by 2020. ACWA is an organization of public agencies responsible for about 90 percent of the water delivered in California. ACWA website, http://wwn-online.com/articles/ 2009/04/03/calif-association-backs-20-water-use-reduction.aspx, accessed on August 4, 2009.

[9] Draft 20X2020 Water Conservation Plan was released on April 30, 2009. State Water Resources Control Board website, http://www.swrcb.ca.gov/water_issues/hot_topics/20x2020/docs/comment043009/202020_final_report_draft.pdf, accessed on January 12, 2010.

- Improve public health
- Reduce GHG emissions
- Reduce VMT

AG-3: Small-Scale and Pesticide-Free Food Production

Allow small-scale and pesticide-free food production through the Zoning Ordinance, with an emphasis on local food production.

1. Primary Benefits

The primary benefit of this measure would be to conserve and/or expand agricultural lands.

2. Secondary Benefits

This measure would provide the following secondary benefits:

- Conserve biological resources
- Improve public health
- Reduce GHG emissions
- Reduce VMT

AG-4: Increased Attendance at Weekly Farmers' Markets

Support an increase in attendance at weekly farmers' markets in appropriate places throughout the city.

1. Primary Benefits

The primary benefit of this measure would be to reduce GHG emissions.

2. Secondary Benefits

The secondary benefit of this measure would be to improve public health.

AG-5: Parkland Requirement Increase

Increase the City's parkland requirement from 4 acres per 1,000 residents to 5 acres per 1,000 residents.

1. Primary Benefits

The primary benefit of this measure would be to expand open space.

2. Secondary Benefits

The secondary benefit of this measure would be to improve public health.

AG-6: Natural Landscape and Minimal Turf in City Parks

Amend the Parks Master Plan to minimize turf in City parks and use a natural park landscape whenever possible.

1. Primary Benefits

The primary benefit of this measure would be to conserve water.

2. Secondary Benefits

The secondary benefit of this measure would be to conserve biological resources.

AG-7: Carbon Sequestration through Cultivation Practices

Consider, in collaboration with State and industry resources, the costs, benefits, grant funding opportunities, and constraints to developing a program for increasing carbon sequestration and/or cellulosic biofuel on private City parcels and public or private land in the county through the conversion of fallow, pasture and/or low value cropland and cultivation of:

a. Fruit and nut orchards or tree farms that sequester carbon for at least twenty years.
b. Cellulosic biofuel production from appropriate non-food, dedicated energy wood, grasses, or plants that meet Council on Sustainable Biomass Production (CSBP) Standards.

1. Primary Benefits

The primary benefit of this measure would be to reduce GHG emissions.

2. Secondary Benefits

This measure would provide the following secondary benefits:

- Conserve and/or expand agricultural land
- Increase renewable energy

G. Biological Resources

The biological resources sector includes measures that will conserve biological resources and support other sustainability targets, as discussed below.

BIO-1: Setbacks and Buffers Along Riparian and Critical Habitat Corridors

Require that new development provide setbacks and buffers along riparian and critical habitat corridors, unless the setback or buffer is already included in the riparian or critical habitat corridor. Where disturbance is unavoidable, provide on-site habitat mitigation or mitigation elsewhere in the county in accordance with SJCOG's Habitat Conservation Plan or other appropriate mitigation.

The primary benefit of this measure would be to conserve biological resources.

BIO-2: Consistency with Federal, State and Regional Regulations for Habitat and Species Protection

Continue to require that new development meet all federal, State and regional regulations for habitat and species protection.

The primary benefit of this measure would be to conserve biological resources.

BIO-3: Native Landscaping

Require that new development incorporate native vegetation into landscape plans, where appropriate, and reduce the use of invasive, non-native plant species.

1. Primary Benefits

The primary benefit of this measure would be to conserve water.

2. Secondary Benefits

The secondary benefit of this measure would be to conserve biological resources.

BIO-4: San Joaquin County Habitat Conservation Plan

Continue to participate in, implement and enforce the San Joaquin County Habitat Conservation Plan.

The primary benefit of this measure would be to conserve biological resources.

BIO-5: Stormwater Best Management Practices

Require best management practices for stormwater in all significant development projects in accordance with City Standards.

The primary benefit of this measure would be to conserve biological resources.

BIO-6: Joint Use of Retention and Detention Facilities

Require that retention and detention facilities be designed for joint use, such as recreation and environmental stewardship, where feasible.

1. Primary Benefits

The primary benefit of this measure would be to conserve biological resources.

2. Secondary Benefits

The secondary benefit of this measure would be to expand open space.

BIO-7: Sustainable Storm Drainage Design

Where feasible, require that storm drainage design be integral to the design of each project and mimic the undeveloped natural hydrologic conditions of the watershed while providing for flood protection and/or water quality control needs where feasible.

The primary benefit of this measure would be to conserve biological resources.

H. Air Quality

While many of the measures included in this Sustainability Action Plan have air quality benefits, they are not called out as separate air quality measures, since they are closely tied to the other sectors discussed above, such as Energy and

Transportation and Land Use. See Tables 5-1 and 5-2 for a list of measures within these other sectors that address air quality and Chapter 6 for a summary of the air quality benefits from this Sustainability Action Plan.

I. Public Health

The public health sector includes measures that will improve public health and support other sustainability targets, as discussed below.

PH-1: Public Education and Outreach on Healthy Eating and Exercise

Continue to conduct public education and outreach to promote healthy eating and exercise.

The primary benefit of this measure would be to improve public health.

PH-2: Healthy Practices at City Offices and City-Sponsored Events

Model healthy practices at City offices and City-sponsored events, for example by offering ample bicycle parking or offering healthy food choices or locally grown food that use fresh ingredients and minimize saturated fats and sugars.

1. Primary Benefits

The primary benefit of this measure would be to improve public health.

2. Secondary Benefits

This measure would provide the following secondary benefits:

- Reduce GHG emissions
- Reduce VMT

PH-3: Recreational Programs and Activities

Provide recreational programs and activities that are accessible and appealing to residents of all age groups, abilities, and income levels.

The primary benefit of this measure would be to improve public health.

PH-4: Joint-Use Agreements for Recreational Facilities

Pursue joint-use agreements to share recreational facilities with schools, particularly in areas that lack recreational facilities.

1. Primary Benefits

The primary benefit of this measure would be to improve public health.

2. Secondary Benefits

The secondary benefit of this measure would be to expand open space.

PH-5: Grants for Increased Park Capacity
Pursue grants to increase the capacity of parks.

1. Primary Benefits
The primary benefit of this measure would be to improve public health.

2. Secondary Benefits
The secondary benefit of this measure would be to expand open space.

PH-6: Active Recreation in Parks
Review proposed park designs to ensure they provide sufficient opportunities for active recreation, including walking, jogging, organized team sports, and informal group sports.

The primary benefit of this measure would be to improve public health.

PH-7: Goods, Services, and Recreation in Underserved Neighborhoods
Identify neighborhoods underserved by goods, services, and recreation, and amend the Zoning Ordinance if needed to allow for such uses in these neighborhoods.

The primary benefit of this measure would be to improve public health.

PH-8: Community Garden Inventory and Development
Identify and inventory potential community garden and urban farm sites on existing parks, public easements, right-of-ways, and schoolyards, and develop a program to establish community gardens in appropriate locations.

1. Primary Benefits
The primary benefit of this measure would be to improve public health.

2. Secondary Benefits
The secondary benefit of this measure would be to expand open space.

PH-9: Process for Community Garden Adoption By Neighborhoods
Establish a process through which a neighborhood can propose and adopt a site as a community garden.

1. Primary Benefits
The primary benefit of this measure would be to improve public health.

2. Secondary Benefits
The secondary benefit of this measure would be to expand open space.

PH-10: Public Food Benefits at Farmers' Markets
Encourage farmers' markets to accept food stamps and other public food benefits.

The primary benefit of this measure would be to improve public health.

PH-11: Municipal Integrated Pest Management (IPM) Program
Institute an Integrated Pest Management (IPM) program for pest control activities within City operations.

1. Primary Benefits
The primary benefit of this measure would be to improve public health.

2. Secondary Benefits
The secondary benefit of this measure would be to conserve biological resources.

PH-12: Non-Toxic Building Materials
Encourage new development to use non-toxic building materials.

1. Primary Benefits
The primary benefit of this measure would be to improve public health.

2. Secondary Benefits
The secondary benefit of this measure would be to improve air quality.

J. Economic Development

The economic development sector includes measures that will increase jobs, retain and increase amount of affordable housing, and support other sustainability targets, as discussed below.

ED-1: Job Training and Job Placement
Continue to utilize economic development staff to act as a liaison to local businesses to ascertain workforce needs. Continue to refer businesses with either hiring or workforce development needs to WorkNet to provide job placement and training services to job seekers.

The primary benefit of this measure would be to increase jobs.

ED-2: Opportunity Sites Inventory for Affordable Housing
Develop and maintain an inventory of opportunity sites for future affordable housing development.

The primary benefit of this measure would be to retain and increase amount of affordable housing.

ED-3: Shared and Public Parking
Allow for shared parking arrangements for new development citywide, and allow for public parking arrangements in the downtown area.

The primary benefit of this measure would be to conserve biological resources.

ED-4: Technical Assistance to Businesses

Continue to offer technical assistance to businesses regarding business credit and assist businesses in obtaining financing from available sources. Refer businesses to the Small Business Development Center and SCORE for further technical assistance options.

1. Primary Benefits

The primary benefit of this measure would be to increase jobs.

2. Secondary Benefits

The secondary benefit of this measure would be attract and retain business.

ED-5: Retention, Recruitment, and Support of Industry Clusters and High-Wage Jobs

Continue the City's economic development program to retain and recruit businesses that provide high-wage jobs and support existing and emerging industry clusters.

1. Primary Benefits

The primary benefit of this measure would be to increase jobs.

2. Secondary Benefits

This secondary benefit of this measure would be to attract and retain business.

ED-6: Work Groups with Industry Leaders

Continue to conduct on-going work groups with industry leaders.

1. Primary Benefits

The primary benefit of this measure would be to attract and retain business.

2. Secondary Benefits

The secondary benefit of this measure would be to increase jobs.

ED-7: Recruitment of Firms to Match Skills and Education Levels of Tracy Residents

Periodically study the skills and education levels of Tracy residents, and use the information as a guide for recruiting new firms to the city as a means of improving the city's jobs/housing match.

1. Primary Benefits

The primary benefit of this measure would be to increase jobs.

2. Secondary Benefits

The secondary benefit of this measure would be to attract and retain business.

ED-8: Local Hiring for Contracts and Services

Continue to offer local vendor preference for City contracts and services.

1. Primary Benefits

The primary benefit of this measure would be to increase jobs.

2. Secondary Benefits

The secondary benefit of this measure would be to reduce VMT.

ED-9: Child Care Services Near Jobs

Consult with child care advocates, employers, and developers to:

a. Address barriers that may be preventing the development of childcare supply near jobs.
b. Establish child care services in proximity to jobs.

1. Primary Benefits

The primary benefit of this measure would be to increase jobs.

2. Secondary Benefits

The secondary benefit of this measure would be to attract and retain business.

ED-10: Accessible Locations for Local Government and Civic Institutions

Concentrate the local government sector and civic institutions in accessible locations.

1. Primary Benefits

The primary benefit of this measure would be to reduce VMT.

2. Secondary Benefits

The secondary benefit of this measure would be to increase jobs.

ED-11: Warehousing, Transportation and Manufacturing Uses Along Rail Spurs in the Northeast Industrial Area

Zone land along rail spurs in the Northeast Industrial area for warehousing, transportation, and manufacturing uses.

1. Primary Benefits

The primary benefit of this measure would be to increase jobs.

2. Secondary Benefits

The secondary benefit of this measure would be to attract and retain business.

ED-12: Green Business Program

Establish a citywide green business recognition program.

1. Primary Benefits

The primary benefit of this measure would be to reduce GHG emissions.

2. Secondary Benefits

This measure would provide the following secondary benefits:

- Conserve energy
- Reduce VMT
- Reduce waste
- Conserve water
- Improve air quality
- Conserve biological resources

ED-13: Variable Frequency Drives in City Water Pumps

Continue to use variable frequency drives in all City water pumps.

The primary benefit of this measure would be to conserve water.

ED-14: Methane Recovery at Wastewater Treatment Facilities

Continue to provide for methane recovery at all wastewater treatment facilities.

The primary benefit of this measure would be to reduce GHG emissions.

K. Outreach and Education

The outreach and education sector includes measures that will foster public awareness of sustainability and support other sustainability targets, as discussed below.

OE-1: Sustainability Criteria in Evaluation of Proposals and Applications

When requesting proposals or applications for contracts, professional service agreements, or grants, request that proposals or applications include information about the sustainability practices of the organization, and use such information as a partial basis for proposal evaluations.

The primary benefit of this measure would be to foster public awareness of sustainability.

OE-2: Green Building Training for City staff

Train all plan review and building inspection staff to evaluate plans and improvements for compliance with green building requirements and practices.

1. Primary Benefits

The primary benefit of this measure would be to reduce GHG emissions.

2. Secondary Benefits

This measure would provide the following secondary benefits:

- Conserve energy
- Reduce VMT
- Reduce waste
- Conserve water
- Improve air quality
- Conserve biological resources

OE-3: Emerald Tracy Website

Continue to update and develop the Emerald Tracy website.

The primary benefit of this measure would be to foster public awareness of sustainability.

OE-4: Sustainable Communities Strategy

To the degree feasible for Tracy, implement the Sustainable Communities Strategy that will be released by the San Joaquin Council of Governments, and update relevant planning documents to ensure that they are consistent with the regional strategy.

1. Primary Benefits

The primary benefit of this measure would be to reduce GHG emissions.

2. Secondary Benefits

The secondary benefit of this measure would be to foster public awareness of sustainability.

OE-5: Coordination with Other Agencies for Green Building Policies and Programs

Work with interested agencies such as Build It Green to develop green building policies and programs in Tracy.

1. Primary Benefits

The primary benefit of this measure would be to reduce GHG emissions.

2. Secondary Benefits

This measure would provide the following secondary benefits:

- Conserve energy
- Reduce VMT
- Reduce waste
- Conserve water
- Improve air quality
- Conserve biological resources

OE-6: Public Education on Non-Petroleum Waste Oil Collection Locations

Conduct a public education and outreach campaign in coordination with the local waste hauler to publicize locations where non-petroleum waste oil is collected.

1. Primary Benefits

The primary benefit of this measure would be to reduce GHG emissions.

2. Secondary Benefits

This measure would provide the following secondary benefits:

- Improve air quality
- Reduce waste
- Conserve biological resources
- Foster public awareness of sustainability

Table 5-1 Quantified Sustainability Measures

	Actions	Activated By	Estimated Total CO2e Metric Tons Emissions Reductions	Percentage of Total Emissions Reductions	Cost Per Metric Ton of Reduced CO2e Emissions	Reduce GHG Emissions	Conserve Energy	Increase Renewable Energy	Reduce VMT	Improve Air Quality	Reduce Waste	Conserve Water	Increase Jobs	Conserve Biological Resources	Foster Public Awareness of Sustainability	Improve Public Health	Attract and Retain Business	Retain and Increase Amount of Affordable Housing	Decrease City Facilities Costs	Estimated New Costs to City	Developer/Resident Costs or Burden	Estimated Return On Investment
Energy																						
E-1	Green Building Ordinance	Ordinance	2,485	0.66% to 0.52%	$40.24	●	○	○	○		○		○							Ranges from $50,000 to $100,000 in consulting services.	N/A	Estimated savings = $295/home. Simple Payback = 17 years for residential or 3.2 years commercial
E-2	Energy Efficiency in Site Planning and Design	Ordinance and Program	11,752	3.11% to 2.44%	$0.00	●	○													Incidental costs; existing staff time.	$0.06/sqft	Annual cost savings estimated at $1,980,815. Payback is estimated at 0.1 year
E-3	Green Building and Energy Efficiency Design and Education	Program	10,781	2.85% to 2.24%	$1.86	●	○	○	○		○	○			○					Approximately $20,000 in consulting services.	$4.00/sqft	Annual cost savings estimated at $6.2 million dollars per year. Payback is estimated at 4.3 years
E-4	Energy-Efficient Products and Retrofits	Program	36,768	9.72% to 7.63%	$0.00	●	○	○	○		○		○		○					Incidental costs; existing staff time.	$1.50/sqft	Payback time estimated at 4.8 years
E-5	Weatherization for Low-Income Households	Program	473	0.12% to 0.10%	$0.00	●	○								○			○		Incidental costs; existing staff time (existing program).		Annual cost savings per home estimated at $491. Payback time = 14.3 years
E-6	Financing for Energy Efficiency and Renewable Energy Projects	Program	8,789	2.32% to 1.82%	$1.71	●	○	○												$15,000 for Tracy to join the California First Statewide 811 program.	N/A	N/A
E-7	LED Retrofits for City Street Lights	Program	337	0.09% to 0.07%	$6,252.23	●	○												○	$2,107,000 to convert 3,500 streetlights to LED, based on incremental cost of $602 per LED streetlight	N/A	Annual cost savings = $147,840. Payback time = 14.3 years
E-8	Solar Panel Installations on Municipal Facilities	Program	34	0.01% to 0.01%	$29,411.76	●	○	○					○						○	Between $350,000 and $1,000,000 to install 100 kW of solar panels, based on estimate of $3.50 to $10.00 per installed watt of solar power	N/A	Payback time estimated at 35 years, based on the current cost of solar panels
E-9	Energy Efficiency Settings for City Desktop Computers	Policy	5	0.00% to 0.00%	$0.00	●	○												○	Incidental costs; existing staff time	N/A	N/A
	External State Title 24 Standards		16,926	4.47% to 3.51%																		
	External State Renewable Portfolios Standard		44,034	11.64% to 9.13%																		
	Energy SUBTOTALS		**132,384**	**34.98% to 27.46%**																		
Transportation and Land Use																						
T-1	Live-Work and Work-Live Uses	Ordinance	292	0.08% to 0.06%	$0.00	●			○	○										Incidental costs; 40 hours of existing staff time.	N/A	Increased business/ sales tax
T-2	Reduced Parking Requirements	Ordinance	146	0.04% to 0.03%	$1,095.89	●			○	○										Incidental costs; existing staff time.	N/A	Decreased SF of impervious surface; reduced "heat island" load on AC
T-3	Support for Bicycling	Ordinance and Program	139	0.04% to 0.03%	$0.00	●			○	○						○				Incidental costs; 20 hours existing staff time for bicycle parking. For bicycle sharing program, $80,000 in capital costs, plus $40,000 annually in operating costs. Assumes fleet of 20 bikes and 3 docking stations located in downtown.	$300 per bike cost to install at time of construction	Potential for reduced parking. Bike sharing revenues and advertising can offset up to 80% operating costs.
T-4	Support for Transit	Ordinance, Program, and Infrastructure Master Plan	1,248	0.33% to 0.26%	$0.00	●			○	○					○		○			Incidental costs; 150 hours existing staff time (existing programs and outside transit funding)	$5,000 to $8,000 per shelter cost at time of construction	Potential for reduced parking. Increased business/sales tax. Transit funding dependent. Transit funding dependent.
T-5	Smart Growth, Urban Design and Planning	Ordinance, Program, and Infrastructure Master Plan	14,377	3.80% to 2.98%	$0.00	●			○	○						○				Incidental costs; 180 hours existing staff time.	$500 per cul-de-sac. $6 per square foot of new sidewalk.	Decreased SF of impervious surface; reduced "heat island" load on AC. potential for reduced parking.
T-6	Traffic Smoothing Through Congestion Management	Program and Infrastructure Master Plan	77	0.02% to 0.02%	$649.35	●				○										$50,000 for engineering; 40 hours existing staff time		
T-7	San Joaquin County Park and Ride Lot Master Plan Implementation	Program and Infrastructure Master Plan	226	0.06% to 0.05%	$0.00	●			○	○										Incidental costs (will use County or CMA funds); 160 hours existing staff time		Potential for parking fees
T-8	Alternative Transportation Choices for Students	Program	529	0.14% to 0.11%	$0.00	●			○	○						○				Incidental costs; existing staff time (existing program). Incidental costs; 80 hours existing staff time (outside funding)		Longer term reduction in school parking and bus transit
T-9	Comprehensive Signal Coordination Program	Program	675	0.18% to 0.14%	$0.00	●				○										Incidental costs; existing staff time (existing program).		
T-10	Ramp Metering on Interstate 205	Program	113	0.03% to 0.02%	$0.00	●				○										Incidental costs; existing staff time (Caltrans funding).		
T-11	Increased Transit to Bay Area Cities and San Joaquin Valley Employment Centers	Program	51	0.01% to 0.01%	$0.00	●			○	○										Incidental costs; existing staff time (transit funding).		

Table 5-1 Quantified Sustainability Measures

	Actions	Activated By	Estimated Total CO2e Metric Tons Emissions Reductions	Percentage of Total Emissions Reductions	Cost Per Metric Ton of Reduced CO2e Emissions	Reduce GHG Emissions	Conserve Energy	Increase Renewable Energy	Reduce VMT	Improve Air Quality	Reduce Waste	Conserve Water	Increase Jobs	Conserve Biological Resources	Foster Public Awareness of Sustainability	Improve Public Health	Attract and Retain Business	Retain and Increase Amount of Affordable Housing	Decrease City Facilities Costs	Estimated New Costs to City	Developer/Resident Costs or Burden	Estimated Return On Investment
T-12	Altamont Route Approval and Transit-Oriented Development Around Rail	Program	1,146	0.30% to 0.24%	$0.00	●			○	○										Incidental costs; existing staff time (transit funding).		Increased real estate investment; long term reduction in highway infra-structure
T-13	Reduce Commute Trips	Program	26,993	7.13% to 5.60%	$0.00	●			○	○										Incidental costs; existing staff time		Potential for reduced parking
T-14	Parking Cash-Out Programs for Employees	Program	135	0.04% to 0.03%	$0.00	●			○	○										Incidental costs; 60 hours existing staff time		Potential for reduced parking
T-15	Reduced Commuting from Out of the Region	Program	223	0.06% to 0.05%	$0.00	●			○	○										Incidental costs; 120 hours existing staff time		Increased business and sales tax
T-16	Transit Passes for Residents And Employees of New Developments	Ordinance	292	0.08% to 0.06%	$0.00	●			○	○										Incidental costs; existing staff time.		
T-17	Increased Use of Low Carbon Fueled Vehicles	Ordinance, Program, and Policy	3,832	1.01% to 0.79%	$1,826.72	●				○										Approximately $7 million		Cost/benefit increases as oil prices rise,
T-18	Carbon Sequestration on Municipal Property	Program	132	0.03% to 0.03%	$3,000.00 (excluding maintenance costs)	●	○							○						$396,000 in capital costs; assumes 33 acres of tree planting.		1-10 years
T-19	Mixed-Use and Traditional Residential Development	Policy	73	0.02% to 0.02%	$0.00	●			○	○						○		○		Incidental costs; existing staff time		Increased real estate investment; increased business/ sales tax
T-20	Employment-Generating and High-Density Infill Projects	Program, Policy, and Ordinance	4,800	1.27% to 1.00%	$0.00	●			○	○				○		○		○		Incidental costs; existing staff time		Increased real estate investment; increased business/ sales tax
T-21[a]	Compressed Natural Gas Buses for the City's Fleet[a]	Program	1,168	0.31% to 0.24%	$0.00	●				○										Incidental costs; existing staff time (existing program)		Depends on fuel prices
	External State Measures That Improve Fuel and Vehicle Efficiency[b]		91,889 to 195,582	24.28% to 40.56%	0.12																	
	Transportation SUBTOTALS		**147,388 to 251,081**	**38.94% to 52.07%**																		
	Solid Waste																					
SW-1	Diversion of Construction Waste from Landfills	Ordinance	1,321	0.35% to 0.27%	$0.00	●					○		○							Incidental costs; existing staff time	Costs uncertain but related to construct debris hauling services and/or increased distances for waste removal	unknown
SW-2	Increased Recycling	Program	73,746	19.49% to 15.30%	$0.04	●					○		○		○					Incidental costs; existing staff time (Tracy Delta Solid Waste Management program), plus $3,000 to train existing employees		unknown
SW-3	Recycling Service for Multi-Family Housing	Program	23,544	6.22% to 4.88%	$0.00	●					○		○							Incidental costs; existing staff time (Tracy Delta Solid Waste Management program)		
SW-4	Municipal Recycling and Reuse	Policy	78	0.02% to 0.02%	$0.00	●					○									Incidental costs; existing staff time		
	Solid Waste SUBTOTALS		**98,689**	**26.08% to 20.47%**																		
	GRAND TOTAL		**378,461 to 482,154**																			

● **Primary Benefit** ○ **Secondary Benefit**

Footnotes

[a]The GHG emissions reduction for this measure has already accounted for in the 2006 emissions inventory, and is therefore not included in the total emissions reduction calculation in the SAP.

[b]Modeling results provided a range for the benefits of these external State measures; see Chapter 5 of the Sustainability Action Plan for more information.

Note: Gray-shaded rows are State-level external measures that will happen regardless of the City's Sustainability Action Plan. These State-level measures will contribute to the GHG emission reduction in Tracy.

Table 5-2 Non-Quantified Sustainability Measures

	Actions	Activated By	Reduce GHG Emissions	Conserve Energy	Increase Renewable Energy	Reduce VMT	Improve Air Quality	Conserve and/or Expand Agricultural Lands	Expand Open Space	Reduce Waste	Conserve Water	Increase Jobs	Conserve Biological Resources	Foster Public Awareness of Sustainability	Improve Public Health	Attract and Retain Business	Retain and Increase Amount of Affordable Housing	Cost to the City
Water																		
W-1	Potable Water Conservation through Development Standards, Public Education, and Municipal Wastewater Reuse	Ordinance, Program, and Infrastructure Master Plan	○	○							●							Incidental costs; existing staff time
W-2	Water Efficient Landscape Ordinance	Ordinance and Program	○	○							●							Incidental costs; existing staff time.
W-3	Incentives for Water Efficiency Retrofits	Ordinance	○	○							●							Incidental costs; existing staff time
W-4	Water Conservation Pricing	Program	○	○							●							Incidental costs; existing staff time
Agriculture and Open Space																		
AG-1	Agricultural Mitigation Fee Ordinance	Ordinance						●										Incidental costs; existing staff time.
AG-2	Farmland Preservation Around Tracy	Program	○			○		●							○			Incidental costs; existing staff time.
AG-3	Small-Scale and Pesticide-Free Food Production	Ordinance	○			○		●					○		○			Incidental costs; existing staff time.
AG-4	Increased Attendance at Weekly Farmers' Markets	Policy and Program	●												○			Incidental costs; existing staff time.
AG-5	Parkland Requirement Increase	Policy and Infrastructure Master Plan							●						○			Incidental costs; existing staff time.
AG-6	Natural Landscape and Minimal Turf in City Parks	Policy and Infrastructure Master Plan									●		○					Incidental costs; existing staff time.
AG-7	Carbon Sequestration through Cultivation Practices	Program	●		○			○										Incidental costs; existing staff time.
Biological Resources																		
BIO-1	Setbacks and Buffers Along Riparian and Critical Habitat Corridors	Policy and Ordinance											●					Incidental costs; existing staff time.
BIO-2	Consistency with Federal, State and Regional Regulations for Habitat and Species Protection	Policy											●					Incidental costs; existing staff time.
BIO-3	Native Landscaping	Policy and Ordinance									●		○					Incidental costs; existing staff time.
BIO-4	San Joaquin County Habitat Conservation Plan	Program											●					Incidental costs; existing staff time.
BIO-5	Stormwater Best Management Practices	Policy and Ordinance											●					Incidental costs; existing staff time.
BIO-6	Joint Use of Retention and Detention Facilities	Policy, Ordinance, and Infrastructure Master Plan							○				●					Incidental costs; existing staff time.
BIO-7	Sustainable Storm Drainage Design	Policy, Ordinance, Infrastructure Master Plan											●					Incidental costs; existing staff time.
Public Health																		
PH-1	Public Education and Outreach on Healthy Eating and Exercise	Program													●			Incidental costs; existing staff time.
PH-2	Healthy Practices at City Offices and City-Sponsored Events	Program	○			○									●			Incidental costs; existing staff time.
PH-3	Recreational Programs and Activities	Policy													●			Incidental costs; existing staff time.
PH-4	Joint-Use Agreements for Recreational Facilities	Program							○						●			Incidental costs; existing staff time.
PH-5	Grants for Increased Park Capacity	Program							○						●			Incidental costs; existing staff time.
PH-6	Active Recreation in Parks	Policy and Ordinance													●			Incidental costs; existing staff time.

Table 5-2 Non-Quantified Sustainability Measures

	Actions	Activated By	Reduce GHG Emissions	Conserve Energy	Increase Renewable Energy	Reduce VMT	Improve Air Quality	Conserve and/or Expand Agricultural Lands	Expand Open Space	Reduce Waste	Conserve Water	Increase Jobs	Conserve Biological Resources	Foster Public Awareness of Sustainability	Improve Public Health	Attract and Retain Business	Retain and Increase Amount of Affordable Housing	Cost to the City
PH-7	Goods, Services, and Recreation in Underserved Neighborhoods	Program and Ordinance													●			Incidental costs; existing staff time.
PH-8	Community Garden Inventory and Development	Program							○						●			Incidental costs; existing staff time.
PH-9	Process for Community Garden Adoption By Neighborhoods	Ordinance							○						●			Incidental costs; existing staff time.
PH-10	Public Food Benefits at Farmers' Markets	Policy and Program													●			Incidental costs; existing staff time.
PH-11	Municipal Integrated Pest Management (IPM) Program	Program											○		●			Incidental costs; existing staff time.
PH-12	Non-Toxic Building Materials	Policy and Ordinance					○								●			Incidental costs; existing staff time.
Economic Development and Fiscal Health																		
ED-1	Job Training and Job Placement	Program										●						Incidental costs; existing staff time.
ED-2	Opportunity Sites Inventory for Affordable Housing	Program															●	Incidental costs; existing staff time.
ED-3	Shared and Public Parking	Ordinance											●					Incidental costs; existing staff time.
ED-4	Technical Assistance to Businesses	Program										●				○		Incidental costs; existing staff time.
ED-5	Retention, Recruitment, and Support of Industry Clusters and High-Wage Jobs	Program										●						Incidental costs; existing staff time.
ED-6	Work Groups with Industry Leaders	Program										○				●		Incidental costs; existing staff time.
ED-7	Recruitment of Firms to Match Skills and Education Levels of Tracy Residents	Program										●				○		Incidental costs; existing staff time.
ED-8	Local Hiring for Contracts and Services	Policy				○						●						Incidental costs; existing staff time.
ED-9	Child Care Services Near Jobs	Program										●				○		Incidental costs; existing staff time.
ED-10	Accessible Locations for Local Government and Civic Institutions	Policy				●						○						Incidental costs; existing staff time.
ED-11	Warehousing, Transportation and Manufacturing Uses Along Rail Spurs in the Northeast Industrial Area	Ordinance and Policy										●				○		Incidental costs; existing staff time.
ED-12	Green Business Program	Program	●	○		○	○			○	○		○					$20,000 to develop and launch, plus $20,000 per year to administer
ED-13	Variable Frequency Drives in City Water Pumps	Program									●							Incidental costs; existing staff time (existing program).
ED-14	Methane Recovery at Wastewater Treatment Facilities	Program	●															Incidental costs; existing staff time (existing program).
Public Outreach and Education																		
OE-1	Sustainability Criteria in Evaluation of Proposals and Applications	Policy												●				Incidental costs; existing staff time.
OE-2	Green Building Training for City staff	Program	●	○		○	○			○	○		○					Incidental costs; existing staff time.
OE-3	Emerald Tracy Website	Program												●				Incidental costs; existing staff time.
OE-4	Sustainable Communities Strategy	Program	●											○				Incidental costs; existing staff time.
OE-5	Coordination with Other Agencies for Green Building Policies and Programs	Program	●	○		○	○			○	○		○					Incidental costs; existing staff time.
OE-6	Public Education on Non-Petroleum Waste Oil Collection Locations	Program	●				○			○			○	○				Incidental costs; existing staff time.

● **Primary Benefit** ○ **Secondary Benefit**

6 SUMMARY OF BENEFITS

As described in detail in Chapter 5, this Sustainability Action Plan will provide a number of benefits in Tracy, some of which can be quantified, and some of which are qualitative. This chapter summarizes the benefits of the Sustainability Action Plan in its entirety. The assumptions that were used for the quantified benefits are provided in Appendix C.

A. Greenhouse Gas Emissions

In combination with the external State measures discussed in Chapter 5, implementation of this Sustainability Action Plan is projected to reduce greenhouse gas (GHG) emissions in Tracy by between 378,461 to 482,154 metric tons of carbon dioxide equivalent (CO_2e). This translates into a projection of 1,266,816 to 1,370,509 total metric tons CO_2e in year 2020, or 8.3 to 9.0 metric tons CO_2e per person in 2020.[1] This GHG emissions reduction exceeds the target that is identified in Chapter 4, which is a 15 percent reduction in per capita emissions from the 2006 baseline. As stated in Chapter 2, the 2006 per capita emissions were 11.6 metric tons CO_2e. The target is therefore a reduction of 1.7 metric tons CO_2e per capita, or a result of 9.9 metric tons CO_2e per person in 2020. The Sustainability Action Plan, in combination with the external State measures, will achieve and exceed this target.

This Sustainability Action Plan provides other GHG-related benefits. Under the Sustainability Action Plan, the traffic model shows that the percentage of jobs in Tracy that are filled by residents of Tracy aims to be 72 percent in 2020, a 32 percent increase from the conditions in 2000.[2] This increase in worker capture would significantly decrease commute trips for Tracy residents, a major component of Tracy's GHG emissions inventory.

As part of the process to develop this Sustainability Action Plan, many potential measures were considered. Some of the potential measures were not included in the Sustainability Action Plan for a variety of reasons, such as a lack of data or examples. However, City staff will maintain a list of these other potential measures for additional investigation and consideration. As discussed in Chapter 7, the City will undertake a comprehensive implementation and monitoring plan to ensure that the implementation of the measures in this Sustainability Action Plan achieve the modeled GHG emission reductions. If, based on this monitoring, the City finds that adjustments to the Sustainability Action Plan measures are needed, the City will revisit the measures that were not included in the Plan at this time.

B. Energy

Implementation of this Sustainability Action Plan will reduce energy consumption and consumer costs in Tracy. The measures described in Chapter 5 are projected to reduce electricity consumption in Tracy by approximately 293 million kWh per year and natural gas consumption by approximately 5 million therms per year, or a total of approximately 1.5 million MMBtu per year. As stated in Chapter 3, energy consumption in 2020 under BAU conditions is projected to be approximately 4.1 million MMBtu. Therefore, with implementation of the Sustainability Action Plan, energy consump-

[1] Based on the total anticipated population and employment in Tracy in 2020, approximately 152,100 residents and workers. From: Watten, Mackenzie and Mike Wallace. Fehr & Peers. Personal communication with Tanya Sundberg, DC&E. January 29, 2010.

[2] Based on data from the US Census, the percentage of jobs in Tracy that were filled by residents of Tracy was 40 percent in 2000.

tion in Tracy is projected be approximately 2.6 million MMBtu, a 40 percent decrease from BAU conditions and a 20 percent decrease from 2006 conditions (3.2 million MMBtu).

This reduction in energy use will achieve the related energy target identified in Chapter 4, which is a 15 percent reduction in per capita emissions from the 2006 baseline of 11.6 metric tons CO_2 equivalent.[3]

Many of the measures in this Sustainability Action Plan will address the other energy-related targets by conserving energy and increasing renewable energy. In total, 17 measures will assist the City in reaching its energy conservation targets and six measures will assist the City in reaching its renewable energy targets.

C. Transportation and Land Use

This Sustainability Action Plan includes a number of measures that will reduce VMT compared to BAU conditions. In total, 26 of the measures in this Sustainability Action Plan will reduce VMT. As indicated in Section A of this chapter, the measures in this Sustainability Action Plan will increase the percentage of jobs in Tracy that are filled by residents of Tracy to 72 percent, an increase of 32 percent from the conditions in 2000.[4] This increase in worker capture will significantly decrease commute trips and thus decrease VMT, for Tracy residents. In addition, as population continues to grow into the future beyond the 10-year time period modeled in this document, these measures will provide an even greater reduction in per capita VMT.

D. Solid Waste

As indicated in Chapter 4, there are two solid waste targets related to waste diversion. In total, 11 of the measures in this Sustainability Action Plan will reduce waste. Although the specific volume of waste that would be diverted due to implementation of the Sustainability Action Plan was not forecast due to modeling constraints, these 11 measures will assist the City in reaching its waste diversion targets.

E. Water

As indicated in Chapter 4, this Sustainability Action Plan aims to reduce water consumption. Reduced water consumption better enables the City to accommodate growth with existing water supplies, and defers and/or eliminates the need for future water supplies. In total, 11 of the measures in this Sustainability Action Plan will conserve water. Although the specific volume of water that would be conserved due to implementation of the Sustainability Action Plan was not forecast due to modeling constraints, these 11 measures will assist the City in reaching its water conservation targets.

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[3] Because 2020 forecast energy data were not available for municipal operations, this analysis only considers the energy target for community emissions.

[4] Based on data from the US Census, the percentage of jobs in Tracy that were filled by residents of Tracy was 40 percent in 2000.

F. Agriculture and Open Space

There are two targets related to the conservation of agricultural lands. In total, three of the measures in this Sustainability Action Plan will conserve and/or expand agricultural land, and six measures will expand open space. Although the specific amount of agricultural land that would be conserved due to implementation of the Sustainability Action Plan was not forecast due to modeling constraints, these nine measures will assist the City in reaching its targets related to the conservation of agricultural lands.

G. Biological Resources

This Sustainability Action Plan aims to mitigate any loss of critical habitat corridors through the Habitat Conservation Plan. In total, 17 of the measures in this Sustainability Action Plan will conserve biological resources. Although the biological resource benefits of the Sustainability Action Plan were not forecast due to modeling constraints, these 17 measures will assist the City in reaching its biological resource target.

H. Air Quality

This Sustainability Action Plan aims to reduce the number of days exceeding air quality standards. In total, 25 of the measures in this Sustainability Action Plan will improve air quality. Although the air quality benefits of the Sustainability Action Plan were not forecast due to modeling constraints, these 26 measures will assist the City in reaching its air quality target.

I. Public Health

This Sustainability Action Plan includes targets to reduce obesity, improve access to healthy food, and improve access to opportunities for physical activity. In total, 21 of the measures in this Sustainability Action Plan will improve public health. Although the public health benefits of the Sustainability Action Plan were not forecast due to modeling constraints, these 21 measures will assist the City in reaching its public health targets.

J. Economic Development

As indicated in Chapter 4, there are five targets related to economic development. As indicated in Tables 5-1 and 5-2, the measures contained in this Sustainability Action Plan will support economic development targets as follows:

- Fifteen measures will increase jobs.
- Six measures will attract and retain business.
- Four measures will retain and increase amount of affordable housing.

Although the economic development benefits of the Sustainability Action Plan were not forecast due to modeling constraints, these measures will assist the City in reaching its economic development targets.

7 IMPLEMENTATION AND MONITORING PLAN

This chapter presents the implementation and monitoring plan for this Sustainability Action Plan. The benefits of the Sustainability Action Plan measures shown in Chapters 5 and 6 are based on models that predict the greenhouse gas (GHG) emissions reductions associated with each measure. The GHG emission reduction model is based on a set of metrics that are discussed further in this chapter. In addition to the measures that achieve a quantified GHG emission reduction benefit, this chapter presents a monitoring plan for measuring reduction in water use. This implementation and monitoring plan includes periodic reviews of these metrics, as well as an update to the GHG emissions inventory and release of a progress report in approximately 2015 to measure the actual GHG emissions in Tracy and demonstrate the status of implementation at the halfway point to the Sustainability Action Plan's target year.

Based on the periodic reviews and the comprehensive GHG inventory update, if the City finds that it is not on track to meet the GHG emission reductions predicted by the model, the City will make adjustments to the measures and their implementation in order to achieve the needed reductions.

A. Implementation Schedule

Following adoption of the Sustainability Action Plan, the City will create Work Plans for the implementation of the sustainability measures. Each Work Plan will identify sustainability measures that will be implemented within a performance period of two consecutive fiscal years. The contents of the Work Plan are anticipated to be as follows:

Objective:	Identifies the measure that will be implemented during the performance period of the Work Plan
Action:	Steps that need to be taken to achieve implementation of the measure identified in the objective
Due Date:	The anticipated date of completion of each action
Lead Staff:	The Department, Division, Strategic Team, or Staff person responsible for completing each action by their due dates

Prior to the beginning of each Work Plan performance period, the City will determine the measures that are to be implemented, using criteria such as cost, return on investment, availability of funding and resources, City Council direction, and community interest to identify those measures. The City recognizes that not all metrics will be achieved in a linear progression. Some measures will be implemented early on, while others will not be fully implemented until 2020 or as funding and necessary resources become available.

B. Periodic Reviews

As the sustainability measures are implemented, the City will measure the effectiveness of the Sustainability Action Plan on an ongoing basis. The City will conduct periodic reviews that will include data gathering related to a series of metrics and checking the City's progress in meeting the values that were assumed in the GHG model for the Sustainability Action Plan. The metrics that were used in the GHG model, source of data for each metric, and relevant Sustainability Action Plan measures are listed in Table 7-1 and discussed further in the sections below.

1. Energy Use

Energy use in Tracy will be determined from the Pacific Gas & Electric Company (PG&E). The GHG model for the Sustainability Action Plan assumes that energy use in Tracy will decrease by 20 percent from 2006 levels by 2020.

TABLE 7-1 **GHG MODEL METRIC SOURCES**

Metric	Data Source	Relevant Measures
Energy Use	Pacific Gas & Electric Company	E-1 through E-9
VMT	California Department of Motor Vehicles	T-1 through T-5 T-7 through T-8 T-11 through T-16 T-19 and T-20
Tailpipe Emissions	Floating car surveys	T-6; T-9; T-10
Municipal Vehicle Fleet	Tracy Public Works Department	T-17
Municipal Tree Planting	Tracy Public Works Department	T-18
Solid Waste	Tracy Delta Disposal Service, Inc.	SW-1 through SW-4
Water Use	Tracy Public Works Department	W-1 through W-4

In 2006, energy use in Tracy was approximately 3,200,000 million metric British thermal units (MMBtu), and the GHG model predicted that the Sustainability Action Plan measures would reduce energy use to 2.6 million MMBtu in 2020. Based on the energy use data provided by PG&E, the City will evaluate whether the actual energy use reflects the reductions anticipated by the GHG model.

2. Vehicle Miles Traveled

Vehicle miles traveled (VMT) in Tracy will be determined from odometer readings aggregated by zip code from the California Department of Motor Vehicles (DMV).[1] The GHG model for the Sustainability Action Plan, in addition to accounting for reductions based on the Plan, also accounts for increases in population and changes in land use. This model assumes that VMT in Tracy in 2020 will be 57 percent greater than it was in 2006.

VMT estimates that were used in the GHG model were based on a traffic model. Because the VMT measured in the periodic reviews will be based on a different data source, the 2006 VMT baseline using the DMV data will first be determined. The periodic reviews will then evaluate whether the actual VMT in Tracy reflects the change in VMT anticipated by the GHG model.

3. Tailpipe Emissions

Tailpipe emissions will be determined using floating car surveys conducted by the City. Floating car surveys measure tailpipe emissions through sensors as the vehicle drives through the areas where congestion-relief measures were implemented. The GHG model for the Sustainability Action Plan assumes that tailpipe emissions will decrease by 6.2 percent in the AM peak hour and 2.7 percent in the PM peak hour after the measures are implemented.

[1] The odometer readings are based on smog check station reporting to the DMV.

In order to provide a baseline, the City will conduct floating car surveys before any of the congestion-relief measures (i.e. Measures T-6, T-9, and T-10) are implemented. The periodic reviews will evaluate whether the actual tailpipe emissions reflect the reductions anticipated by the GHG model.

4. Municipal Vehicle Fleet

The entire benefit of Measure T-17, Increased Use of Low Carbon Fueled Vehicles, is based on conversion of the City's automotive fleet to low carbon fueled vehicles by 2020. For the periodic reviews, the City's Public Works Department will provide data on vehicular fleet conversion.

5. Municipal Tree Planting

The benefit of Measure T-18, Carbon Sequestration on Municipal Property, is based on an assumption that the City will plant 33 acres of healthy trees by 2020, with each acre consisting of 35 to 40 trees. For the periodic reviews, the City's Public Works Department will provide information on the progress of the program to evaluate whether the City is on track to meet this target. As part of this review, the City will consider both the amount and health of the trees that are planted.

6. Solid Waste

Solid waste reduction efforts in Tracy will be determined from data provided by the Tracy Delta Disposal Service, Inc. The GHG model for the Sustainability Action Plan assumes that solid waste in Tracy will be reduced as follows:

- 25 percent reduction in recycling and yard waste sent to landfills compared to 2006.
- 50 percent reduction in food waste sent to landfills compared to 2006.
- 50 percent diversion of all construction waste (assuming 4 pounds of construction waste per square foot of construction).

Based on the information provided by Tracy Delta Disposal Service, Inc., the periodic reviews will evaluate whether the actual solid waste in Tracy reflects the reductions anticipated by the GHG model.

7. Water Use

Although GHG emission reduction benefit from water conservation efforts were not quantified, reduction in water use can be easily tracked. Water use in Tracy will be determined through Water Usage Data (WUDS) and monthly production wells data provided by the Tracy Public Works Department. As of 2010, metered landscape irrigation accounted for 13 percent of total gallons per capita per day (gpcd), or 29 gpcd. The Sustainability Action Plan assumes that water use in Tracy will be reduced by 2020 as follows:

a) 12 percent reduction in outdoor potable water use from 2010 baseline data. This equates to 26 gpcd by 2020.

b) 20 percent reduction in per capita potable water use utilizing State Department of Water Resources' (DWR) Method 1 historical average.[2] Total gpcd less metered landscape irrigation gpcd equates to total potable water use reduction to 180 gpcd by 2020.

c) 20 percent reduction in municipal potable water use compared to 2008 baseline data.

Based on the information provided by the Public Works Department, the periodic reviews will evaluate whether the actual water use in Tracy reflects the reductions anticipated by the GHG Model.

C. Progress Report and Greenhouse Gas Inventory Update

Approximately every five years following the adoption of the Sustainability Action Plan, or as funding is available, the City will conduct a comprehensive update to the baseline 2006 GHG inventory and release a progress report. The GHG inventory and progress report will demonstrate the effectiveness of the Sustainability Action Plan. The progress report will list the measures that have been implemented to date and summarize the results of periodic reviews that have been conducted. The inventory update will measure actual GHG emissions in Tracy at the halfway point to the 2020 target year for this Sustainability Action Plan. The GHG model for the Sustainability Action Plan assumes that GHG emissions in Tracy will be reduced by 378,461 to 482,154 metric tons carbon dioxide equivalent (CO_2e) in 2020. Based on the comprehensive updates to the GHG inventory, the City will evaluate whether the actual GHG emissions in Tracy reflect the reductions anticipated by the model. If target reductions are not met at the halfway point, the City will re-evaluate and adjust the measures and overall targets to reach the established 2020 targets.

[2] DWR requires the use of one of four methods to determine the 2020 goal. Method 1 states: A 20 percent reduction from historical baseline per capita water use based on a 10-year average per capita water use ending between December 31, 2004 and December 31, 2010. Utilizing this method and historical data from 1995-2004, the City will need to achieve 202 gpcd by 2015 and 180 gpcd by 2020.

APPENDIX A

COMMUNITY WORKSHOP INPUT

APPENDIX A

The City held a Community Workshop on Wednesday, February 17, 2010 to discuss draft sustainability targets and measures for the Sustainability Action Plan, as well as priorities for future funding opportunities.

During this workshop, participants brainstormed other projects and measures that could be included in the Sustainability Action Plan or that the City could pursue through future funding opportunities. These suggestions include:

- Nuclear fusion and nuclear energy.
- Nuclear laser to manage garbage.
- Light rail from Tracy to Stockton.
- Desktop manufacturing.
- Small-scale biodiesel plant.
- Food conspiracy/cooperative.
- Enhanced Building Code enforcement.
- Continuation of allowing secondary (in-law) units.
- Enhanced City-School District collaboration, including multi-use of school campuses for social events and exchanges.
- Rewards for residents who identify energy cost savings.
- Support for home composting.
- Encouraging green manufacturing.
- Rainwater harvesting.
- Converting methane at wastewater treatment plant to energy.
- Graywater capture at individual homes.
- Time of sale energy retrofit requirements.

The workshop also featured an interactive exercise in which participants used dots to identify their preferred measures among the draft sustainability measures and the new measures that were suggested during the brainstorming session. The following measures, which are discussed further in Chapter 5, were the most popular measures that received the most dots:

- E-6, Financing for Energy Efficiency and Renewable Energy Projects (17 dots)
- T-12, Increased Transit to Bay Area Cities and San Joaquin Valley Employment Centers (13 dots)
- SW-2, Increased Recycling (13 dots)

- E-8, Solar Panel Installations on Municipal Facilities *and* Energy Target #2a, New municipal buildings powered by 10% using on-site solar panels (13 dots)
- AG-2, Farmland Preservation Around Tracy *and* Agricultural Lands Target #1, No loss of Prime Farmland, Farmland of Statewide Significance, or Unique Farmland outside of the City's Sphere of Influence (13 dots)
- T-5, Smart Growth, Urban Design and Planning (10 dots)
- SW-3, Recycling Service for Multi-Family Housing (9 dots)
- E-3, Green Building and Energy Efficiency Design and Education (8 dots)
- T-3, Support for Bicycling (8 dots)
- ED-12: Green Business Program (8 dots)

APPENDIX B

BASELINE GREENHOUSE GAS INVENTORY AND BUSINESS AS USUAL FORECAST

City of Tracy

Baseline Greenhouse Gas Emissions Inventory Report

December 2009

Conducted by Town-Green in Partnership with the City of Tracy

City of Tracy Baseline Greenhouse Gas Emissions Inventory

Table of Contents

Acknowledgements

This Greenhouse Gas Emissions Inventory Report was a collaborative effort between the staff members from the City of Tracy, local business representatives, and regional transportation organizations. We would like to thank staff members from ICLEI and ICF/Jones & Stokes and Fehr & Peers for their assistance, and the City of Tracy staff for their help in researching and compiling data for the analysis. City staff provided invaluable input and assistance in locating key data resources in the City. We would also like to thank Pacific Gas & Electric Company (PG&E) for its cooperation in providing data.

I. Introduction

It is widely known in the scientific community that as the world's population increases, we are globally releasing more greenhouse gases than can be absorbed back into nature. While there are some greenhouse gases that are produced naturally, the principal greenhouse gas emissions, which are a result of human activities, are: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and Fluorinated Gases. Known as the greenhouse effect or global climate change, models show that this phenomenon will lead to a 2^oF to 10^oF temperature increase over the next 100 years. Already the Intergovernmental Panel on Climate Change warns that most of the warming observed over the last 50 years is attributable to human activities.

Changes in the earth's temperature will have impacts for residents of Tracy, California. These impacts could include:

- Increase in severe weather events
- Increase in annual rainfall of 20 to 30 percent leading to more serious storm events
- Rising sea levels that will threaten ecosystems and water supplies
- Decrease in the Sierra snow pack which will effect fresh water availability
- Increase in insect-borne diseases

It is essential that each city understand its own contribution to the cumulative effects of climate change. By understanding the major sources of the greenhouse gas emissions, cities may make informed changes to land use and transportation planning, waste management, and energy usage that impact emissions.

A. Baseline Emissions Inventory Report: Purpose

This report, conducted by Town-Green, presents the levels of greenhouse gas (GHG) emissions that the City of Tracy emitted in its base year, 2006, on a municipal level and a community-wide level. The emission forecast represents a business-as-usual (BAU) prediction of how GHG emissions may change the City of Tracy over time if no emissions reduction programs are implemented. This information will inform the city about the sources and severity of emissions as potential targets for reductions. The inventory will help the City tailor its emissions reduction strategies towards significant sources and meet specific State and community environmental and energy goals.

B. California Emerald Cities Program

The City of Tracy is the second participant in the Emerald Cities Pilot Program. Emerald Cities (EC) consists of a program to help transform California cities and counties, especially those underserved or at risk, into more environmentally, economically, and socially sustainable places. Under the general direction of the State Department of Conservation, with assistance from the non-profit National Charrette Institute (NCI) and the California Sustainability Alliance, Town-Green leads the Tracy pilot in collaboration with State and private technical consultants in the appropriate fields of sustainability.

EC is intended to significantly:

- Assist jurisdictions in meeting or exceeding local and state statutory requirements such as California's Assembly Bill 32 (AB32) and Senate Bill 375 (SB375);
- Help communities reduce their carbon footprint, preserve renewable resources, and decrease reliance on fossil fuels;
- Improve the community's ability to prepare for and adapt to economic (e.g., jobs, food, and utility costs), environmental (e.g., climate, air quality), and energy (e.g., power, fuels, reduce auto dependency) changes; and
- Help forge a community-supported policy, regulatory, programmatic, and implementation framework to achieve these desired outcomes

II. Emissions Inventory

A. Reasoning, Methodology & Model

The GHG inventory provides local governments with a baseline or benchmark for quantifying changes in their greenhouse gas emissions. By identifying stationary and mobile sources of CO_2 emissions, local governments may methodically focus on targeting the most significant emissions from energy use, transportation, and waste related activities at the community-wide scale and those resulting directly from municipal operations.

Once completed, these inventories offer a baseline to forecast BAU emissions. These forecasts inform the local government by estimating future emissions resulting from continued limited or inaction, and provide an incentive for setting reduction targets; the targets help policy-makers design and implement the corresponding greenhouse gas emission reduction measures.

1. Emissions Analysis Software

Town-Green employed International Council for Local Environmental Initiatives' (ICLEI) Clean Air and Climate Protection (CACP) software to calculate the emissions derived from energy consumption, transportation, and waste generation within Tracy. The methodology assumes that electricity and natural gas use, transportation, and solid waste generation will increase over time in proportion to population, number and type of jobs, and housing availability. It also assumes that fuel economy and the percentage of electricity generated from renewable sources remains constant throughout the forecast period.

The CACP software determines emissions using coefficients according to the type of fuel consumed. Emissions from different types of fuel consumption are converted into equivalent measures of carbon dioxide units, or CO_2e, in order to be able to compare different greenhouse gases more easily.

The methodologies that the CACP software uses to calculate current and predict future greenhouse emissions follow the same national and international standards established by national and international inventory standards established by the Intergovernmental Panel on Climate Change (1996 Revised IPCC Guidelines for the Preparation of National GHG Emissions Inventories), the U.S. Voluntary Greenhouse Gas Reporting Guidelines (EIA for 1605), and, for emissions generated from solid waste, the U.S. EPA's Waste Reduction Model (WARM).

While the CACP software has been successfully used across the U.S. to calculate greenhouse gas emissions, it is important to note that the ICLEI software model and available community-wide field data on fuel consumption is limited. Therefore, some of the data requires assumptions to be made about the conditions of community-wide fuel consumption. While the numbers generated by this software are very close approximations, the computations may not reflect exact values. Forecasted information about both community emissions and municipal emissions are projected using a different methodology, as the CACP software was insufficient for accurate analysis. The community-wide forecast was calculated using a separate ICLEI spreadsheet that bases its forecast on population and employment growth. The municipal forecast calculated by Town-Green was based on municipal parks, infrastructure, and water and wastewater facility growth estimates provided by City of Tracy staff.

2. Inventory Sources and Data Collection Process

To conduct the greenhouse gas emissions inventory, Town-Green used 2006 as the designated year to collect information from several sources and energy sectors. PG&E provided data on electricity and natural gas consumption for the community and local government. Fehr & Peers provided fuel

consumption data for community travel, and Altamont Commuter Express (ACE) and the City's transit provider, Tracer, provided data on emissions from the regional passenger train and public transportation. Solid waste data was gathered from the Tracy Delta Solid Waste Management. City staff coordinated the City's overall municipal data collection process.

Town-Green aggregated this 2006 data to create a community emissions inventory and a municipal operations emissions inventory. The community inventory represents all the energy and transportation-related fuels used, and waste produced by non-government owned and operated establishments within the City of Tracy and its contribution to greenhouse gas emissions. The municipal inventory includes emissions derived from internal government operations and local government employee commute.

It is important to calculate community and municipal GHG emission inventories separately. This allows the local government to analyze its own impacts on climate change, and helps them to lead by example, demonstrating how it will exert control over its own reduction efforts. The City of Tracy will play a critical role in inspiring community members to change their energy consumption patterns and set an example for other local governments to address their greenhouse gas emissions and reduce their environmental impacts.

Tracy's community emissions inventory includes all electricity and natural gas consumption energy within the city limits, excluding energy consumption from County-owned facilities. This means that, even though the electricity used by Tracy's residents is produced elsewhere, the energy and emissions associated with it appears in Tracy's inventory. By calculating emissions to include the impacts of the source of their energy consumption, a community will look at their energy consumption more holistically and not limited by the city's political boundaries.

B. Inventory Results

The results below represent the City of Tracy's completion of the greenhouse gas inventory. The community-wide analysis will be discussed first and the municipal analysis will follow.

1. Community Emissions Inventory

In the base year 2006, the City of Tracy emitted approximately 1,338,872 tons of CO_2e from residential, commercial, industrial, transportation and waste sectors, as well as fugitive and refrigerant emissions. Fugitive emissions result as a byproduct of industrial processes. These are emissions of gases from pressurized equipment, generally from leaks and irregular releases of gases.

Burning fossil fuels in motor vehicles and for energy use in buildings and facilities represent the major contributor to Tracy's greenhouse gas emissions. This single largest source of emissions consists of fuel consumption in the transportation sector, contributing 63% of total emissions. Table (1) and Figure (a) below show Tracy's total greenhouse gas emissions from all major sources for the year 2006. The residential, commercial, and industrial sectors represent emissions that result from electricity and natural gas used in both private and public sector buildings and facilities. The transportation sector includes emissions from private and commercial vehicles driven within the City's geographical boundaries, commuter traffic, off-road emissions, as well as the emissions from trips taken by Tracy residents on ACE, the regional passenger train.

The Tracy "Citywide Travel Demand Model" covers all of the vehicle miles traveled (VMT) associated with trips completed within Tracy and half of the VMT generated by jobs and residences located within Tracy but that resulting in travel to/from external destinations. The model does not account for vehicles that pass through Tracy without either a point of origin or a destination within the city. Tracy assumes

emissions accountability for the VMT that occurs outside of the city borders only if is directly related to Tracy residents.

The emissions from transit vehicles and the city-owned fleet, Tracer, are included in the municipal emission summary.

Table (1): Tracy Community Emissions Summary

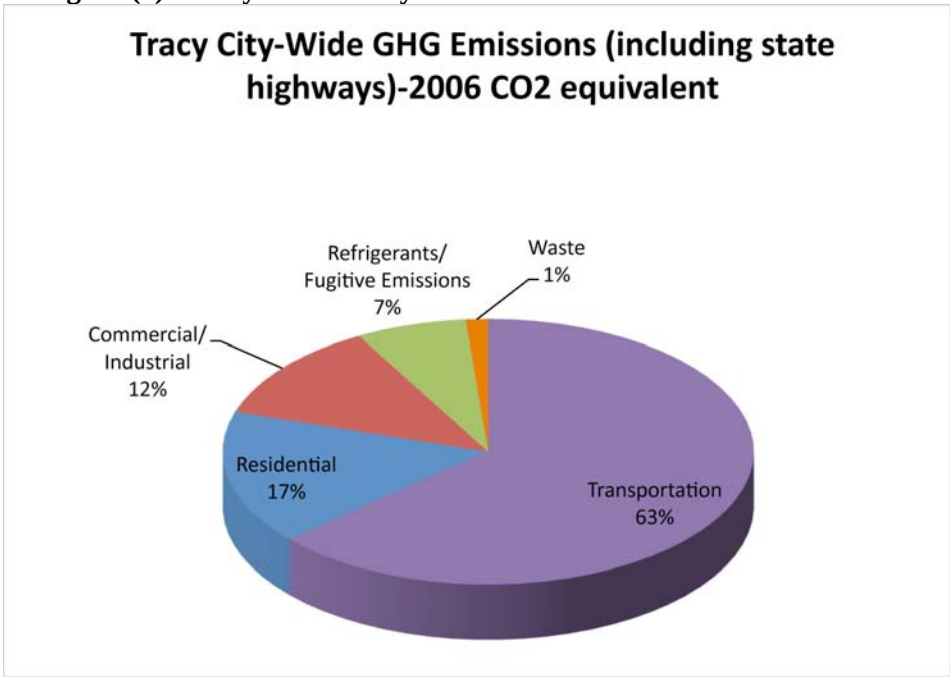
Potential Sources	**Equiv CO_2e (metric tons)***	**Energy (MMBtu)****
Residential	220,036	1,856,775
Commercial/Industrial	160,740	1,355,305
Transportation	849,673	10,816,752
Waste	18,190	0
Fugitive Emissions/Refrigerant	90,233	0
TOTAL	**1,338,872**	**14,028,832**

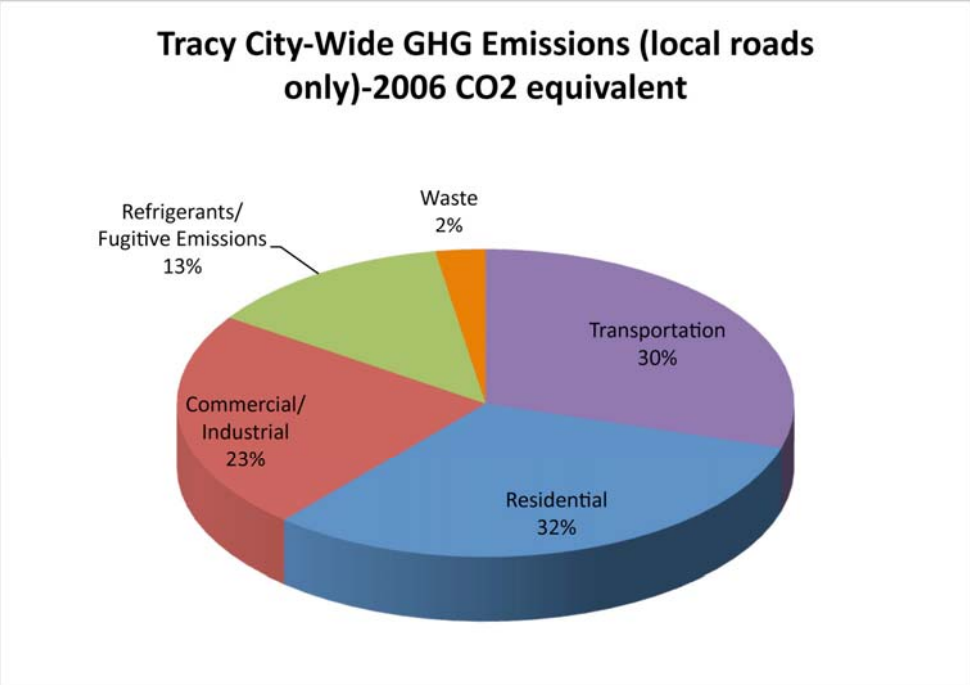
Source: CACP Model output

*Equiv CO_2e refers to equivalent carbon dioxide. It is standard international practice to convert other greenhouse gasses into CO_2e so that their impacts can be directly compared.

**Energy is measured in British Thermal Units. MMBtu represents one million BTUs.

Figure (a): Tracy Community Greenhouse Gas Emissions - Year 2006





Source: CACP Model output

Energy / Stationary Source Emissions

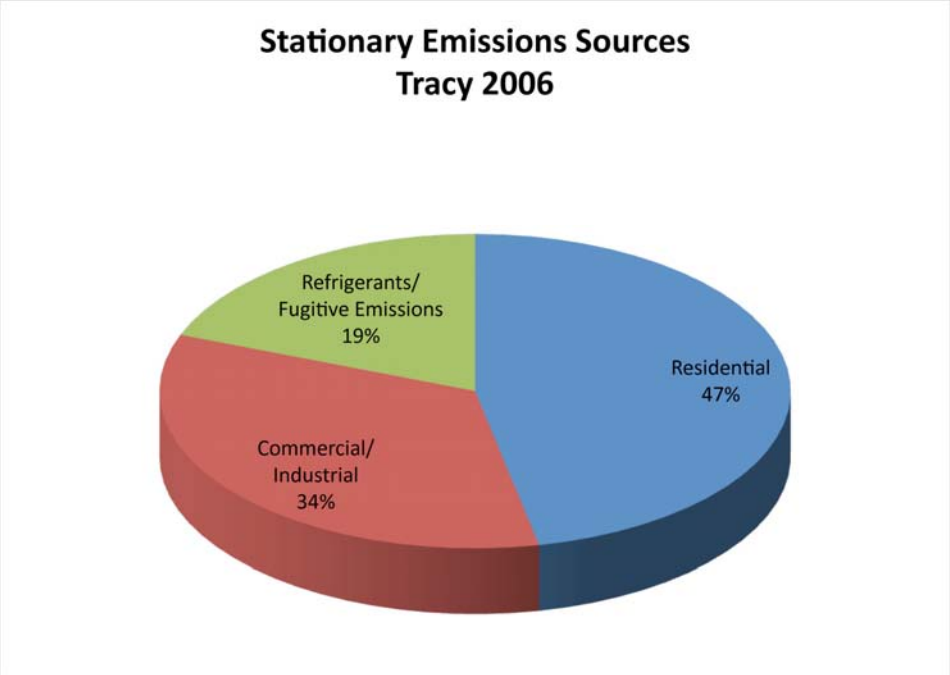
In 2006, Tracy's total stationary energy consumption was about 395,669,635 kWh of electricity and 18,616,718 therms of natural gas. Stationary energy use by all sectors (residential, commercial, industrial activities, and refrigerants/fugitive emissions) accounts for 35.21% of total greenhouse gas emissions in Tracy. These emissions are a result of the combustion of fossil fuel, but do not include fugitive emissions

or refrigerants. Tracy's stationary energy use resulted in a total of approximately 470,670 tons of CO_2e emissions in 2006.

The City of Tracy receives its electricity from Pacific Gas & Electric Company (PG&E). The 2006 emissions coefficients for electricity provided by PG&E are included in the notes in Appendix A (Data Summary Reports and Inventory Detailed Reports). The types of power sources that make up a utility's electricity generation mix have a significant impact on a city's greenhouse gas emissions. A coal fired power plant, for example, releases 1.3 tons of CO_2e per megawatt-hour of electricity generated versus 0.7 tons for gas turbines and 0 tons for renewable sources such as solar, wind, or hydroelectric power.

Figure (b) shows the breakdown of greenhouse gas emissions by sector for both electricity and natural gas combined. Of the total 470,670 tons of CO_2e emitted due to stationary energy use, 46.75% was from residential building, 34.08% was from commercial/industrial buildings, and 19.17% was from refrigerants and fugitive emissions.

Figure (b): Tracy Community Greenhouse Gas Emissions Breakdown (Residential and Commercial/Industrial) - Year 2006



Source: CACP Model output

Residential

In 2006, Tracy's 80,308 residents consumed 227,359,090 kWh of electricity, or about 9,103 kWh per household, and 10,808,054 therms of natural gas, or about 433 therms per household. This consumption resulted in a release of 220,036 tons of CO_2e. Major residential energy uses include refrigeration, lighting, and water heating.

Commercial/Industrial

In 2006, Tracy's commercial/industrial sector buildings consumed 168,310,545 kWh of electricity and 7,808,664 therms of natural gas. This consumption resulted in a release of 160,740 tons of CO_2e into the atmosphere.

While industrial establishments are located in Tracy, separating the emissions attributed to industrial facilities from those from commercial facilities is not possible. Calculating separate Commercial and Industrial energy consumption is constrained because PG&E is not permitted by the California Public Utilities Commission to release that aggregate data, under the '15-15 rule.' If any single private industrial customer makes up more than 15% of the total industrial usage or there are fewer than 15 total industrial customers, PG&E is required to "roll-up" or combine the industrial data into the commercial sector to prevent a 15-15 confidentiality violation.

Fugitive Emissions/Refrigerants

In 2006, Tracy's residential and commercial/industrial sectors use of refrigerants and leaking pressurized equipment resulted in a release of 90,233 tons of CO_2e. These emissions were measured at a 1.1 $MTCO_2e$ per capita rate based on data from the California Air Resources Board. The estimate is included in the inventory as refrigerants, but is defined broadly to include CFCs and HCFCs, and the emissions are considered "High Global Warming Potential GHGs." For more information regarding the methodology of how this was calculated, please refer to Appendix A. At the time this report was written, the City of Tracy did not have a standardized method of recording fugitive emissions and refrigerants emitted by the residential, commercial, or industrial sectors.

Stationary Sources

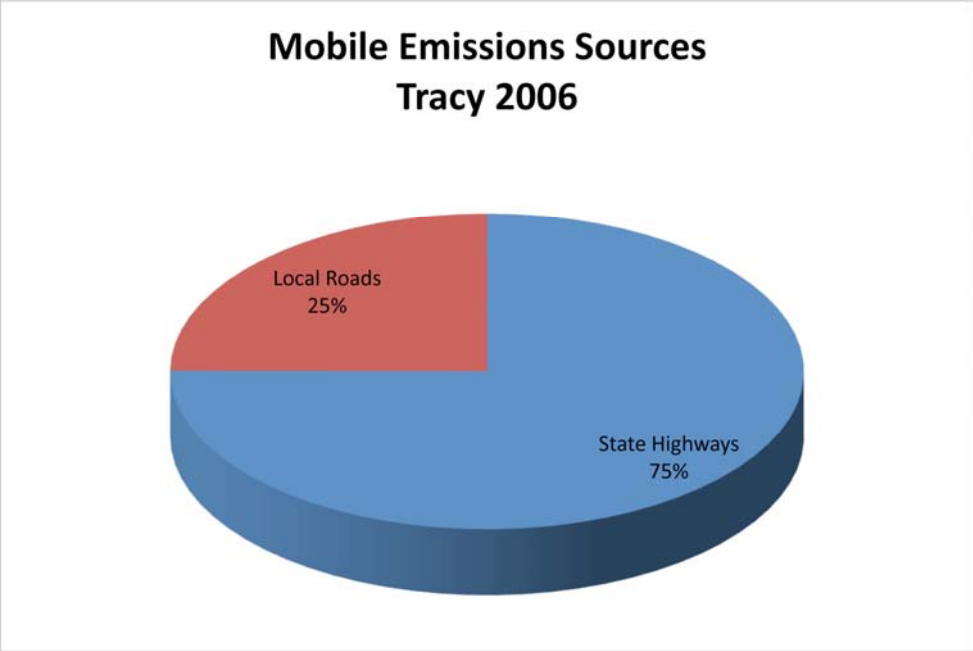
Commercial and industrial facilities consume both electricity and natural gas, and may consume other types of fuel onsite for operation of their equipment or vehicles. Information regarding propane and kerosene used by private entities was not tracked by the City of Tracy, and at the time of this inventory, was not available. However, the off-road emissions inventory from the Air Resources Board (ARB) show that construction, agricultural, recreational, and industrial equipment and vehicles consumed 1,852,417 gallons of diesel, 255,700 gallons of gas, and emitted 23,949 tons of CO_2e. Including aviation gas and jet fuel, the off-road emissions were responsible for emitting 24,873 tons of CO_2e. These off-road emissions are accounted for in the transportation emissions section.

Transportation Emissions

The community transportation sector, including travel on state highways, local roads, and the commuter train, as well as all off-road emissions, is responsible for approximately 63.43% of Tracy's greenhouse gas emissions. Motor vehicles driven within the City's geographical boundaries on both local and state roads emitted approximately 823,136 tons of CO_2e in 2006. The regional commuter train, ACE, plus aviation and jet fuel from the Tracy Municipal Airport contribute another 1,664 tons of CO_2e, or 0.2% of the transportation emissions. Off-road vehicles and equipment emitted approximately 24,873 tons of CO_2e in 2006, accounting for 2.9% of the transportation emissions. The VMT model used to help calculate the motor vehicle emissions does not account for travel passing through Tracy without either a point of origin or a destination within the city.

Figure (c) shows the breakdown of greenhouse gas emissions by vehicle miles traveled (VMT) from local roads and VMT from state highways. Of the total 849,673 tons of CO_2e emitted from transportation on all roads, 25% was from local roads and 75% was from state highways. This percentage does not include off-road emissions.

Figure (c): Tracy Community Greenhouse Gas Emissions Breakdown (Local Roads and State Roads) - Year 2006



Calculations for transportation emissions are based on figures for total VMT in the City of Tracy. Fehr and Peers supplied the necessary VMT data, the breakdown of vehicle types, and the percentage of vehicles in each speed-bin.

Solid Waste Emissions

In 2006, Tracy sent approximately 92,202 tons of solid waste to the San Joaquin County Foothill Landfill, resulting in 18,190 tons of CO_2 e emissions. Of this total landfilled waste, 66,600 tons were hauled by Tracy Delta Waste Management and passed through the Tracy Delta Facility. 25,602 tons of waste was hauled by individuals, landscapers, and construction companies. Tracy employs recycling measures to reduce the amount of waste sent to landfills.

Greenhouse gases are generated by landfilling the waste, and by the decomposition of the organic fraction, which produces methane. Methane is a greenhouse gas 21 times more potent than carbon dioxide. Table (2) shows the approximate breakdown of the materials Tracy sent to landfills in 2006. The WARM model estimates the CO_2e emissions released from the landfill based on the percentages of waste from a 2003 study for Cascadia, California. At the time this inventory was written, San Joaquin County had not conducted a more current waste characterization study.

Table (2): Tracy Waste Composition

Waste Type	Waste Share
Paper Products	21%
Food Waste	15 %
Plant Debris	14 %
Wood/Textiles	23 %
All Other Waste	27 %
TOTAL	**100 %**

Source: Tracy Delta Solid Waste Management

The U.S. EPA's Waste Reduction Model (WARM) model is used to estimate the greenhouse gas impacts of landfilling Tracy's waste. The WARM model makes the following assumptions in the analysis: 75% of landfill gas, methane, is collected and flared, so that only 25% escapes to the atmosphere. The flaring of methane converts it back into CO_2. The calculation does not account for any sequestration at the site. The landfill is 20 miles from the transfer station, so the model accounts for the energy used in the transfer of waste to the landfill.

The CACP software calculates waste disposal emissions using a model based on the WARM model and is therefore consistent with national standards.

However, the CACP software does not fully account for or reflect the emission reductions in the energy use from recycling and composting programs. This is important because recycling and composting programs can have a significant impact on reducing GHG emissions. Tracy Delta Solid Waste Management calculated that Tracy's recycling programs helped avoid 24,266 metric tons of CO_2e in calendar year 2006. Recycling also avoids GHG emissions by returning materials back into the production stream to replace the use of virgin materials that require additional energy use in the production of goods, and by recycling paper products that avoid cutting down forests.

2. Municipal Operations Emissions Inventory

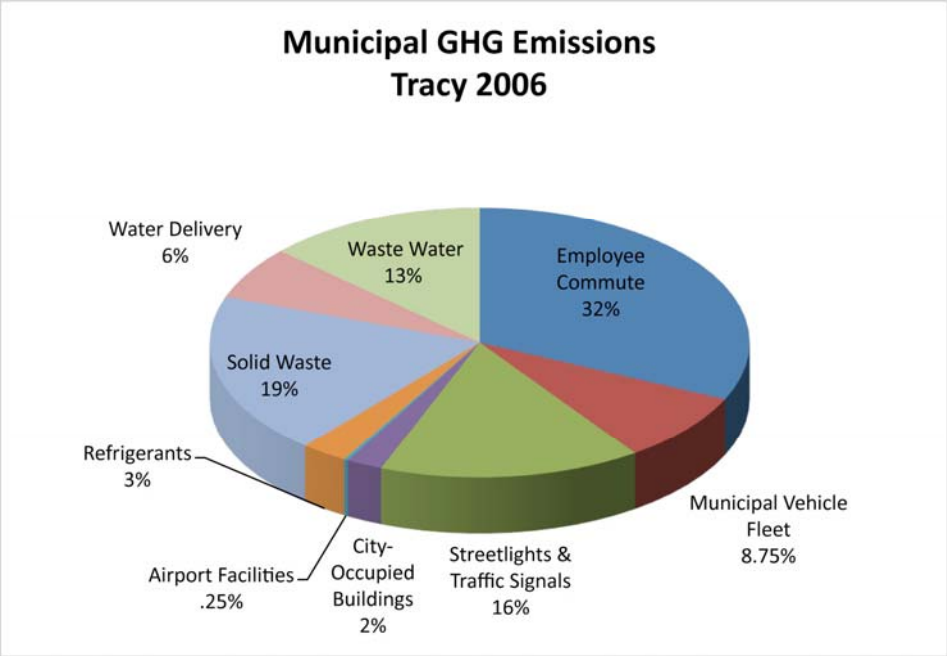
In the base year of 2006, Tracy's municipal operations generated 11,449 tons of CO_2e. As Table (3) and Figure (d) show, the emissions from City's employee commute accounted for the plurality of emissions at 32%.

Table (3): Tracy Municipal Emissions Summary

Potential Sources	Equiv CO_2e (tons)	Energy (MMBtu)
Buildings/Facilities	247	4,191
Vehicle/Transit Fleet	958	12,230
Employee Commute	3,650	46,671
Streetlights/Traffic Signals	1,798	26,696
Water Delivery	722	10,720
Wastewater	1,512	23,799
Solid Waste	2,211	5,009
Fugitive Emissions/Refrigerants	323	0
Airport Facilities	28	406
TOTAL	**11,449**	**129,722**

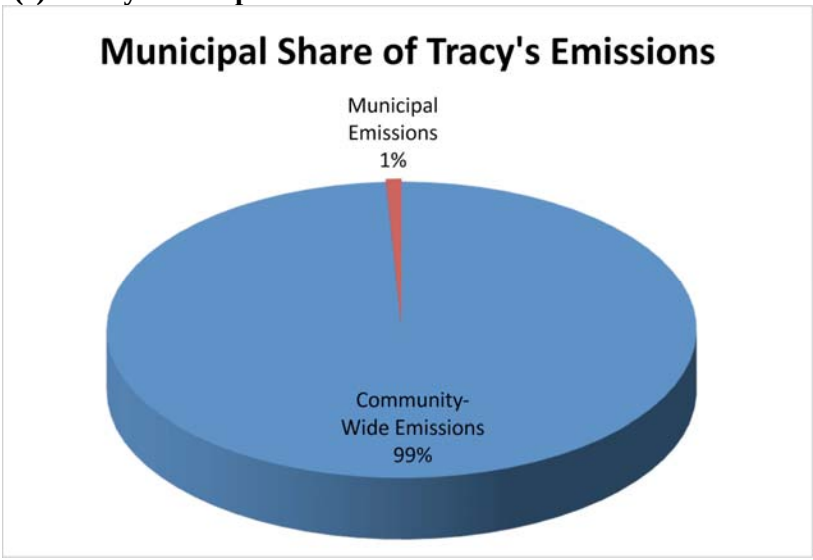
Source: CACP Model output

Figure (d): Tracy Municipal Greenhouse Gas Emissions – Year 2006



Source: CACP Model output

Figure (e): Tracy Municipal Share of Greenhouse Gas Emissions – Year 2006



Source: CACP Model output

Municipal emissions in Tracy constitute less than 1% of Tracy's total emissions. Local government emissions typically fall between one and five percent of overall community emissions. Appendix B shows the results of the CACP analysis. As a minor contributor to total emissions, actions to reduce municipal energy use may have a small impact on Tracy's overall community emissions levels. However, municipal action can help reduce operation costs and has symbolic value demonstrating leadership that extends beyond the magnitude of emissions actually reduced.

Energy/Stationary Source Emissions

In 2006, Tracy municipal buildings, facilities, streetlights, and water distribution consumed 11,115,896 kWh of electricity and 40,743 therms of natural gas, which resulted in a release of 2,795 tons of CO_2e emissions into the atmosphere.

Although the City manages the distribution of water supply, almost all water goes towards community water consumption. Only 1.3% of total water demand within the City is from institutional users. In 2006, imported and local water distribution consumed 3,140,931 KWh of electricity, which used 10,720 MMBtu and released 722 tons of CO_2e. No natural gas is used for water distribution. It should be noted that energy emissions from water distribution accounts for facilities and pumping within Tracy's boundaries, as well as from imported water from the Delta Mendota Canal and the Stanislaus River. According to Tracy's 2005 Urban Water Management Plan, surface water has historically comprised between 50 to 60% of the City's total water supply. All of the City's surface water is imported, and its ground water is taken from inside Tracy's boundaries. As groundwater supplies decrease and water demand increases, Tracy intends to increase its imported surface water supply, thus increasing the City's electricity consumption.

Transportation Emissions

The City's vehicle and transit fleet consumed 97,605 gallons of fuel and emitted about 958 tons of CO_2e. The municipal vehicle fleet includes all vehicles owned and operated by the City of Tracy plus some contractor vehicles performing City functions. The transit fleet includes Tracer, the public bus system.

Waste Emissions

The City of Tracy's wastewater and solid waste facilities consumed 4,647,311 kWh of electricity and 107,948 therms of natural gas. This consumption emitted 3,803 CO_2e emissions into the atmosphere. The Tracy Wastewater Treatment Plant processes approximately 8 million gallons of wastewater per day and releases approximately 375 tons of methane per year. This methane is not released into the atmosphere, but is used for heat generation in the two solid waste digesters.

Tracy Delta Solid Waste Management does not distinguish between municipal waste and community waste, therefore municipal solid waste production is rolled into the 92,206 tons of waste sent to the landfill. (See Waste section in the Community Analysis.) The City of Tracy has recycling programs that help to reduce waste stream and CO_2e emissions.

III. Forecast for Greenhouse Gas Emissions

Town-Green used Tracy's community and municipal operations emissions inventories developed for the base year 2006 to forecast future emissions for the year 2020 and 2050. The emission forecast represents a business-as-usual (BAU) prediction of how greenhouse gas (GHG) emissions may change in the City of Tracy over time.

Community Forecast

Projections of greenhouse gas emissions are based on the assumption that energy consumption will grow as population increases. For the community analysis, the forecast was conducted by applying population growth factors to Tracy's base year residential, commercial/industrial, and transportation data. Between 2006 and 2020, the forecast reported a 31.1% growth in emissions based on a BAU scenario. For the municipal operations analysis, the City's Public Works Department forecasts a 20% growth in emissions.

Transportation emission forecasts

The community forecast for transportation emissions were based on projected City land use for 2020 and 2050. For 2020, Fehr & Peers estimated the release of 1,118,705 tons of CO_2e, a 31.7% growth in emissions from 2006.

Refrigerant emissions forecast

Refrigerant emission numbers were based on the ARB's statewide growth in per capita emission estimates. The refrigerant emissions include ozone depleting substances (ODS) and HFC. The ARB used 2007 as their baseline for the per capita emissions, and assumes that the 2007 emissions are similar to the 2006 emissions. The ARB forecasts that in 2020, the metric tons of CO_2e will increase by 26.9%, from 90,233 metric tons of CO_2e in 2007 to 114,477 metric tons of CO_2e in 2020. Between 2007 and 2050, emissions will decrease by 9.1%, to 190, 264 metric tons of CO_2e. The 2050 estimate takes into account trends between 1990 and the present, and takes into account the Montreal Protocol phase-out of CFCs and HCFCs. It assumes that these refrigerants will be replaced by reduced-CO2e gases such as HFO-1234yf that have a very low global warming potential (GWP). See Appendix C for the methodology for this estimate.

Please note that the BAU scenario for Tracy's community-wide emission forecast assumes that the City's Growth Management Ordinance (GMO) remains constant over time. The City of Tracy adopted a GMO in 1987 and amended it in 2000. The GMO aims to help Tracy achieve a steady and orderly growth rate that allows for the adequate provision of services and community facilities, and includes a balance of housing opportunities. The GMO limits the number of Residential Growth Allotment (RGAs) and building permits to an average of 600 housing units per year for market rate housing, with a maximum of 750 units in any single year, although there are exceptions for affordable housing. This means that the estimated rate of fuel consumption for residential, commercial, industrial, and municipal facilities may be lower than the calculations predicted by the ICLEI model.

Municipal forecast

The municipal forecast was based on the growth expectations for buildings and facilities, parks, and infrastructure. Information available regarding the expected increase in square footage for municipal operations was very limited, and PG&E was unable to provide a forecast of energy consumption. City staff was able to provide the square footage and future construction plans for Tracy's fire facilities, the square footage of existing and planned park space, and the planned increases in the water and wastewater treatment plants' capacities. Public Works staff estimated that the wastewater treatment plant's capacity might increase by 33% by 2020, and by 78% by 2050. Assuming that the CO_2 emissions per KWh stay constant between 2006 and 2020, CO_2 emissions will increase by almost 40% in 2020, and 116% by 2050. However, when staff averaged these growth rates of CO_2 emissions with the growth rate of parks, the water treatment plant, and the firehouse facilities, a 20% increase in energy consumption and CO_2 emissions was estimated. The raw data considered in this estimate is included in Appendix D.

Water Supply emission forecasts

The ICLEI software forecast does not calculate the increased rate of GHG emissions from an increase in imported water from outside of Tracy's political boundaries. Based on the City of Tracy's 2005 Urban Water Management Plan, Tracy will consume 23,900 acre-feet in 2020, resulting in the consumption of 4,402,830 KWh, and the release of 1,012 metric tons of CO_2e. This represents a 2.87% increase from 2006 levels. The UWMP assumes a 9.21% increase in water consumption every five years from 2005-2020; this same growth rate was used to project a water demand of 40,537 acre-feet in 2050. This will result in the consumption of 7,467,679 KWh, and the release of 1,717 metric tons of CO_2e, representing a 3.13% increase from 2006 levels. These calculations do not factor in special energy conserving technology for water distribution that may be implemented in the future.

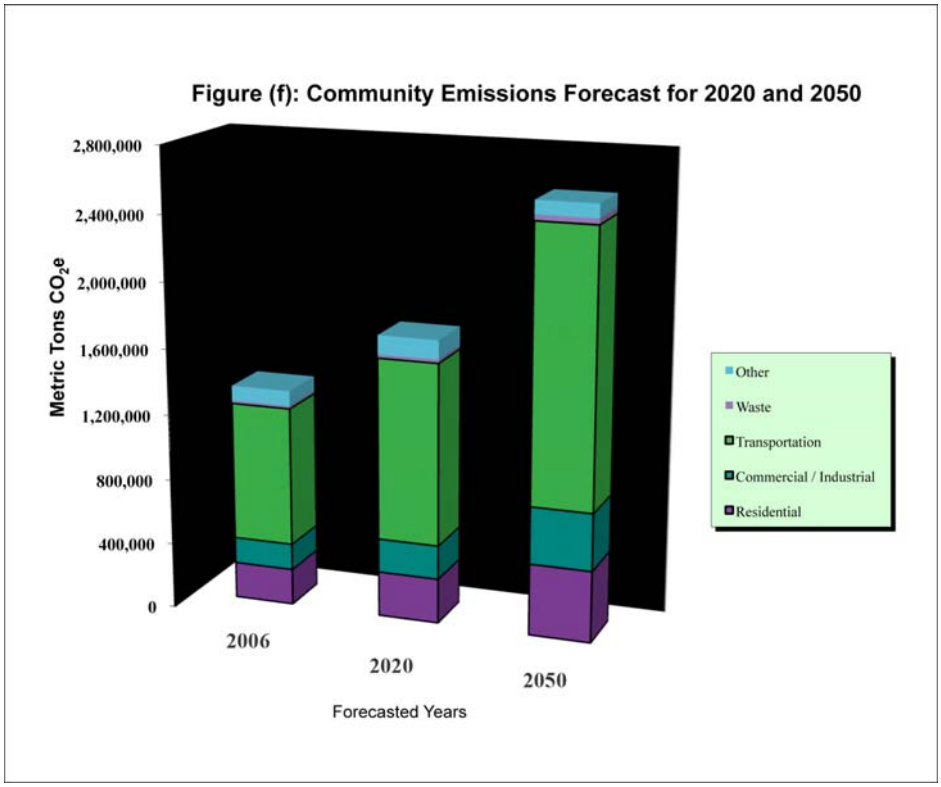
Table (4) provides an emissions summary for Tracy's base year and forecast year.

Table (4): Tracy's Emissions Summary

Tracy's Emissions Summary		
	Community Analysis	**Municipal Operations Analysis**
Base year	**2006**	**2006**
Indicators used to generate forecast	1.99 % (Annual population growth rate based on the April 2009 Draft Supplemental EIR for the General Plan Amendment)	1.42% (Annual rate based on increase in municipal operations)
Quantity of CO_2e emissions in base year (metric tons)	1,336,869	11,449
Forecast year	**2020**	**2020**
Business-as-usual projection of CO_2e emissions in *2020* (metric tons)	1,735,022; 29.6% increase over baseline	13,948; 21.8% increase over baseline
Forecast year	**2050**	**2050**
Business-as-usual projection of CO_2e emissions in *2050* (metric tons)	2,568,068; 92.1% increase over baseline*	21,291; 86% increase over baseline

Source: CACP Model Output

*Fehr & Peers will be providing the 2050 forecast for mobile transportation vehicles. The revised 2050 transportation forecast should be added to the Tracy Forecast Builder worksheet in order to calculate the 2050 community analysis' BAU projection.



Source: CACP Model output

Conducting an emissions forecast is essential for setting an emissions reduction target, since the amount of GHG emissions Tracy pledges to reduce will be derived from projected emissions. Appendix C provides the results of the CACP analysis.

IV. Conclusion

This greenhouse gas emissions inventory report represents a profile of the greenhouse gases that the City of Tracy emitted in its base year, 2006, from community and municipal sources. The report also estimates the greenhouse gases that the City will emit in the year 2020 and 2050, if the community and municipality continue to emit business-as-usual GHG emissions, without additional emission reduction actions or a growth management ordinance.

This inventory is a crucial tool for the City as it develops a climate action plan with new policies, regulations, programs, and practices to meet its emission reduction targets. The inventory serves to direct the City towards the major sources of greenhouse gas emissions. For example, the community inventory for the City of Tracy reveals that the transportation sector is responsible for 63% of total emissions. In response, the city might implement actions that reduce the frequency and length of motor vehicle trips, decrease fossil fuel consumption, and reduce the toxicity of tailpipe emissions. Potential action items may include improving the connectivity to and diversity of destinations for pedestrians and cyclists and increasing public transportation frequency and convenience.

The inventory demonstrates that the municipal government emissions comprise a minimal percentage of community emissions, less than one percent. However, the City of Tracy has the opportunity to exhibit strong and visible leadership role in addressing climate change by reducing its own emissions.

Appendix A – CACP Reports by Sector, Data Sources, Assumptions and Notes for the Community Inventory

See PDF files: Appendix A_Tracy Community-Wide CACP Reports.pdf, Appendix A_Fehr and Peers Community-Wide Transportation Report.pdf, Appendix A_Solid Waste Stream Worksheet.pdf, Appendix A_ARB Refrigerant Emissions Worksheet.pdf

Assumptions

The greenhouse gas inventory calculates emissions based on many assumptions.

- The population and job growth did not account for the recent economic depression. This data assumes that the population and job growth rate will be consistent with past trends. The BAU forecasts do take into account the Growth Management Ordinance that limits the residential growth allotment and building permits per year. This inventory assumes the Ordinance will not be significantly modified in the near future.
- Fugitive emissions and refrigerants from non-municipal or municipal operations are not documented in the City of Tracy. This data was extrapolated from California Air Resources Board's refrigerant calculations on a per capita basis. It was assumed that the consumption per capita rate of emissions is the same throughout California.
- The BAU forecast uses 2030 emissions factors which reflect projected improvements in vehicle efficiency but since it is based on the baseline General Plan land use plan, it does not reflect reductions in VMT due to progressive land use and transportation planning.
- Forecasts are based on "business-as-usual" projections. This does not take into account federal and/or state regulations which address energy consumption and greenhouse gas emissions, such as the Low Carbon Fuel Standard adopted by CARB or the vehicle efficiency requirements directed by AB 1493.
- BAU forecasts also do not consider any change in the electricity grid emission factor. The emission factor will likely change in the future as utilities use more renewable energy and as power plants become more efficient. Lastly, it also doesn't consider adjustments to the per capita energy use; these may increase or decrease according to a mix of technology and behavior changes.
- Forecasts for 2050 use the same the growth rate as that which was used for the period of 2006 – 2020. This is using the BAU assumptions, and assumes that the Growth Management Ordinance will continue to be enforced.

Community Analysis Methodology

The data entered into the ICLEI software came from numerous sources of information.

- The residential, commercial and industrial electricity and natural gas data came directly from PG&E.
- Industrial establishments: No energy information is available for industrial establishments under rule 15-15. If any one private industrial customer makes up more than 15% of the total industrial usage or there are fewer than 15 total industrial customers, PG&E is not permitted by the California Public Utilities Commission to release that aggregate data.
- Transportation: Transportation data came from a combination of sources: Fehr & Peers wrote a VMT report, ACE provided data on Tracy ridership and train fuel consumption, and the Tracy airport facilities provided data on aviation and jet fuel for the private airplanes and jets. The off-road emissions were calculated with the ARB's Off-Road Emission model. The model calculated off-road emissions for San Joaquin County. Approximately 0.2% of San Joaquin County's agriculture is in Tracy, therefore, 0.2% of the off-road agricultural equipment was assumed originate in Tracy. Based on data from the San Joaquin Council of Governments, 16% of

construction in San Joaquin County is in Tracy, and 5.49% of industrial off-road equipment is in Tracy. Tracy's population is 12% of San Joaquin County; this number was used as an approximation to calculate Tracy's consumption of fuel from recreation, and small utility vehicles.

- Solid Waste: Solid waste data was provided by Tracy Delta Waste Management. An additional analysis, provided by consultants Edgar and Associates, explains the amount of CO_2e emissions avoided by the City's recycling program. This information is explained in the appendix below.
- Refrigerants: Refrigerant information, under "other" category, was provided by the Air Resources Board (ARB), which calculated a detailed analysis of refrigerants per capita in Tracy, and also broke those emissions down into community and municipal use. The 1.1 $MTCO_2e$ per capita measurement includes CFCs and HCFCs. For more information, please refer to the detailed methodology below.
- Water**:** Emissions from water distribution and treatment are reported in the government analysis section because water is a city managed resource. However, only 1.3% of total water demand within the City is from institutional users.[1]

Waste Methodology

There is a discrepancy between the ICLEI software and the WARM model:

WARM calculates the methane generation potential of the landfilled waste and allocates that amount of methane generation in the year that the waste is placed, even though the landfill gas will be generated over many years. This is different than most landfill gas generation models, which use a first order decay equation to allocate the potential methane generation over future years in accordance with a decay constant for the waste.

Edgar & Associates produced a report detailing the waste stream handled by Tracy Delta Waste Management Company, and describing the CO_2 emissions avoided by the recycling and composting program. Their final number is slightly different than the number calculated through the ICLEI software, possibly because of the different calculation methods. Edgar & Associates report that the "net" result, which is emissions generated less carbon storage, is -12,258. The carbon storage amount is -33,595, so the actual emissions generated are 24,747 $MTCO_2e$. See PDF file, Appendix A_GHG Landfilling Transfer Tonnages.pdf

San Joaquin County has done no waste characterization studies since the state-wide study in 2003, so the Cascadia study was the best information available for waste stream information.

The percentages in the Cascadia study were applied to the 66,600 tons of waste that is landfilled, so that an assumed waste characterization embedded in the WARM model that is based on national averages isn't be relied on.

There is a difference between the tonnages reported by Tracy Delta for recyclables and landfilled waste and those that the city reported to the CIWMB as far as disposal and diversion.

In addition, the WARM model accounts for the energy used in the transfer of waste from the transfer station to the landfill, a distance of 20 miles. Due to modeling limitations, these trips are also counted in the transportation section.

[1] 2005 Tracy Urban Water Management Plan, page 13

Disposal Tonnages

Tracy Delta tracks the origin of all waste that passes through their facility. In 2006, total tons of outbound waste to the landfill was 104,885 and the amount originating in the City was 66,600 tons, meaning that 38,285 tons of landfilled waste managed by Tracy Delta originated outside of the City. The City of Tracy reported to the State that 92,202 tons were disposed in 2006, which is 25,602 tons greater than the 66,600. However, there is also waste that originates in the City that doesn't pass through the Tracy Delta facility and isn't hauled by Tracy Delta. For instance, individuals, landscapers, and construction companies may haul waste directly to the landfill themselves and those tonnages would not be known by Tracy Delta.

There is a State Disposal Reporting System that requires haulers and disposal facilities to report the tonnage of waste back to the jurisdiction of origin, so the City should have records of disposed waste by Tracy Delta and any other haulers. At the time this inventory was written, the City was not able to track down this information.

Recyclables

Tracy Delta collects garbage, recyclables and green waste in 3 separate containers. The weight of recyclables was 20,136 tons and green waste was 3,772 tons. For purposes of calculating greenhouse gas impacts, the green waste was assumed to lose half of its mass during composting.

Fugitive Emissions/Refrigerants Methodology

The ARB's source of data is the U.S. EPA Vintaging Model estimates for CFC, HCFC, HFC, Halon, and PFC emissions (attached). The national estimates to California's 12.5% share of population was scaled down. It was assumed that the per capita emissions in 2010 (estimated) would be about the same as those for 2006 or 2007.

For the large commercial refrigeration and AC systems (greater than 50 pounds charge of refrigerant), ARB's own methodology was used, as described in detail in Appendix B of the Initial Statement of Reasons of ARB's Refrigerant Management Plan (rule and appendices available on our website at: http://www.arb.ca.gov/cc/reftrack/reftrack.htm (go to "What's New"; click on that link, and scroll down to Appendix B "California Facilities and Greenhouse Gas Emissions Inventory".)

There was a discrepancy between the ICF estimates and ARB estimates of the fugitive emissions/refrigerants for the community analysis. This can be explained as followed:

ARB's per capita emissions included all sources of CFC, HCFC, HFC, Halon, and PFC emissions in California. ICF may be looking at HFC emissions only; as CFC and HCFC emissions are often not counted towards GHG inventories (CFC and HCFC are ODSs are supposed to be gradually eliminated through the Montreal Protocol, and therefore, are generally not counted towards GHG reduction goals). On the attached Vintaging Model spreadsheet, it is shown the HFC-only per capita emissions to be about 0.45 $MTCO_2e$ per Californian, which is closer to the ICF estimate of 0.36 $MTCO_2e$/person. When Refrigerant HFC emissions only are looked at, it is estimated to be 0.38 $MTCO_2e$/person, which is very close to the ICF estimate.

The methodology for estimating refrigerant emissions from large commercial refrigeration and AC systems is spelled out in great detail in Appendix B Initial Statement of Reasons for the Refrigerant Management Plan CARB will put forth for Board adoption December 9, 2009. All other sources (residential AC and appliances, insulating foam, consumer products, etc.) have been scaled down from national estimates based on the U.S. EPA Vintaging Model (data source: VM IO

File_V4_3.25.08.xls) A description of the methodology used in the U.S. EPA Vintaging Model can be found in EPA document 430-R-05-003 "Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2003". It's in Section 3.8, page 158 (available on US EPA website at http://epa.gov/climatechange/emissions/usgginv_archive.html.

If the methodology of the GHG inventory report calls for only HFCs from refrigerants, the most accurate per capita emissions to use are 0.36 to 0.38 MTCO2e/person (California average). To show HFC emissions from all sources (refrigerant plus non-refrigerant), use the estimate of 0.45 MTCO2e/person.

Appendix B – CACP Reports by Sector, Data Sources, Assumptions and Notes for the Municipal Inventory

See PDF file, Appendix B_Tracy Government Operations CACP Reports.pdf

Municipal Assumptions

- The population and job growth did not account for the recent economic depression. This data assumes that the population and job growth rate will be consistent with past trends. The BAU forecasts do take into account the Growth Management Ordinance that limits the residential growth allotment and building permits per year. This inventory assumes the Ordinance will not be significantly modified in the near future.
- Fugitive emissions and refrigerants from non-municipal or municipal operations are not documented in the City of Tracy. This data was extrapolated from California Air Resources Board's refrigerant calculations on a per capita basis. It was assumed that the consumption per capita rate of emissions is the same throughout California.
- The City of Tracy's 2005 Urban Water Management Plan (UWMP) states that future water contracts with other water districts and retailers are possible. New energy emissions will need to be calculated for future sources of imported water.
- Forecasts are based on "business-as-usual" projections. This does not take into account future changes in federal and/or state regulations which address energy consumption and greenhouse gas emissions
- BAU forecasts also do not consider any change in the electricity grid emission factor. The emission factor will likely change in the future as utilities use more renewable energy and as power plants become more efficient. Lastly, it also doesn't consider adjustments to the per capita energy use; these may increase or decrease according to a mix of technology and behavior changes.

Municipal Analysis Methodology

All of the data for the municipal analysis was collected from the individual departments related to each sector. Town-Green spoke with employees in the Public Works dept, Planning dept, Public Utilities, Airport, Solid Waste, Economic Development, and Tracer (the public bus system). All of these departments supplied us with information regarding fuel consumption. Much of this data had to be calculated further in order to isolate the information demanded by the CACP software. Should ICF or DC&E have questions regarding how specific numbers were arrived at, please contact Town-Green.

Methodology for calculating Embodied Emissions from Imported Water

In addition to the groundwater that is drawn from within the City boundaries, currently there are 2 sources of imported water: Mendota Canal (Central Valley Project), and the South San Joaquin Irrigation District. All water distribution uses electrical energy.

Delta Mendota Canal (DMC)
Approximately 7,500 ac-ft of water per year moves from the Shasta Dam, which produces electricity, to the WAPA power plant, which is directed by the *Bureau of Reclamation*. The water delivery to WAPA and to the Tracy Processing Plant is via gravity and uses minimal electricity. At the processing plant, there is one 250-foot lift, which uses a significant amount of electricity. This treatment plant's energy consumption is accounted for in Tracy's municipal PG&E bill.

South San Joaquin Irrigation District (SSJID)
The water for SSJID originates from 3 dams, all which generate energy. The water flows by gravity to the Woodward Reservoir and then to the Nick deGroot water treatment plant. Here, there is electricity consumption. 2006 electricity data was not available, therefore, 2007 data was used for SSJID imported water. In 2007, Tracy was responsible for 1,958,581 KWh being used. The water pump in Lathrop, which sends water to Tracy, used 3,313 KWh. Tracy was responsible for 1,961,894 KWh from SSJID water distribution.

Waste Water
The Tracy Waste Water Treatment Plant processes approximately 8 million gallons/day of wastewater. The WWTP emits between 90-116,000 cubic feet/day of CH4

Methane emission Calculations:
1 million cu. ft. of natural gas = 18.91 tons liquid

Therefore the methane content of digester gas is 60% of natural gas so then 1 Mcuft = 0.6 x 18.91 = 11.4 tons liquid

In one year the Tracy WWTP generates 90,000 cu. ft. x 365 days = 32,850,000 cu. ft. or 32.85 Mcuft or 375 tons liquid. The methane is not released into the air, but is used to generate heat for the 2 digesters.

Appendix C –Summary Report for the Community Emissions Forecast

See PDF file, Appendix C_2020 Tracy VMT Forecast Report.pdf, Appendix C_Tracy Refrigerant Forecast Worksheet.pdf, Appendix C_Tracy Forecast Builder.xls

Community Forecast
ICLEI recommended that we use their in-house forecast builder, rather than the forecast in the ICLEI software. The ICLEI software is limited in its prediction capabilities because PG&E does not predict the mix of energy types that will be used in the future, and therefore 2006 data was used in the forecasts. Please refer to the excel spreadsheet for the details of the Community Forecast for 2020 and 2050.

The data which Town-Green was required to input in the excel sheet is highlighted in red.

- The CO_2e numbers for 2006 came from the CACP software summary reports.
- The population calculation for 2006, 2020, and 2050 came from the General Plan.
- The job count for 2006 came from the April 2009 Draft Supplemental EIR for the General Plan Amendment. Data from the General Plan was used to calculate the annual growth rate, and this growth rate was used to calculate the projection for 2020 and 2050.

Transportation emission forecast
Fehr & Peers calculated the forecast for 2020 and 2050 using the baseline data for 2006. Please refer to PDF file, Appendix C_2020 Tracy VMT Forecast Report.pdf

Refrigerant emission forecast
Glenn Gallagher from the Air Resources Board estimated the forecast for 2020 and 2050 based on the ARB's statewide per capita emission estimates. Please refer to PDF file, Appendix C_Tracy Refrigerant Forecast Worksheet.xls

The summary table breaks out emissions by ODS versus HFC. They are measured in metric tons of CO_2e.

California Per Capita CFC, HCFC, and HFC emissions (and HFO-1234yf substitute in 2050):

Year	per capita total GHG emissions CFC, HCFC, HFC (MTCO2e) in CA	per capita HFC (Kyoto gas) MTCO2e only	per capita ODS (CFC + HCFC) MTCO2e	Note
2007	1.121	0.413	0.707	
2020	1.147	0.891	0.256	BAU
2050	1.175	1.009	0.165	BAU
2050	0.330	0.168	0.162	With HFC phase-out

ARB used a one percent per year growth rate for pounds of material used and a 1.56% annual population growth rate. The 2020 proportion of materials used is from the US EPA Vintaging Model estimates.

The 2050 proportion of materials used is a little more hypothetical, even assuming business-as-usual. CFCs, HCFCs, and even HFC usage will largely go away, to be replaced by new refrigerants such as HFO-1234yf, which has a global warming potential of 4. It was assumed that in 2050, 80 % of refrigerant usage is HFO-1234yf, or a similar very low GWP refrigerant; and 20 % is still HFC-134a. Although it is not for certain that HFC usage will be limited after 2020, all signs point to HFC usage being severely limited after 2020 either through a US climate bill or HFC's inclusion as a Montreal Protocol refrigerant with a timetable for its gradual elimination.

Appendix D – Summary Report for the Municipal Emissions Forecast

See PDF file: Appendix D_City Facilities Sq Ft 2009.pdf

Municipal Forecast

For reasons similar to the community analysis, the CACP software was not sufficient to forecast municipal CO_2e emissions. ICLEI did not have a forecast builder for municipal operations, therefore Town-Green has been working with the City of Tracy and PG&E to predict energy emissions for 2020 and 2050. This information is pending while PG&E looks for requested data. Although it will be helpful for the City of Tracy to know the forecasted growth of municipal operations, this data will not make up a huge portion of Tracy's overall future emissions. The municipal operations account for less than 1% of Tracy's emissions, so the BAU forecasts most crucial to understand will be from the Community sectors.

Water Delivery Emission Forecast

The following calculations were based off of the 2005 UWMP's water forecasts for 2020. Year 2050 was calculated using a 9.21% increase every 5 years, as was seen in the forecast for 2020-2050.

Year	Water Demand ac-ft/Year	Total KWh consumed	Total metric tons of CO_2e emitted	Percent Increase from Base Year
2020	23,900	4,402,830	1,012	2.87%
2050	40,537	7,467,679	1,717	3.13%

Water Demand forecasts:
Year 2020: 23,900 af-ft/year
Year 2050: 40,537.18 af-ft/year
KWh per ac-ft/year= 2005 total KWh (3,140,931 KWh: imported and local)/Total water for 2005 (17,050 ac-ft/yr) = 184.22 KWh/ac-ft per year.

2020 KWh=184.22 KWh/ac-ft*23,900 ac-ft=4,402,830 KWh
2020 BTUs=15,027
CO2e=1,012 metric tons
2050 KWH=184.22 KWh/ac-ft*40,537 ac-ft=7,467,679 KWh
2050 MBTUs=25,487
CO2e=1,717 metric tons

APPENDIX C

ASSUMPTIONS FOR EMISSIONS REDUCTIONS

Appendix C: Assumptions for Emissions Reductions

	Measure	Methodology	Assumptions	Cost Assumption Notes	Citations/ Sources	Estimated Years to Activate
			Energy			
E-1	Green Building Ordinance		The Solar Benefits modeled for Measures E-1g, E-1h, and E-1i (1,087 MTCO2e) are based on an assumption that these measures would result in the installation of 3,172 kW of solar PV before 2020. Approximately 2/3 of the benefit is related to warehouse installations. This quantification is separate from the benefits from installations on municipal facilities, which were modeled in Measure E-8. Other benefits from this measure are from Measures E-1d (1,138 MTCO2e) and E-1j (260 MTCO2e). Benefits from Title 24 standards are provided separately.			1-2 years
E-2	Energy-Efficiency in Site Planning and Design		This value is the sum of all components of the measure. The majority of these reductions come from bullet (e). For (e), we used the CAPPA "Lights Out at Night" measure and assumed the measure would apply to the following land use types with varying levels of penetration: hotel, commercial, medical, park, public, school, place of worship, and industrial. The quantification represents a scenario where 50% of this land us area is targeted with a 20% adoption rate. For bullet (d), we assumed that 10% of the existing commercial space will be retrofit with a 5% gain in efficiency associated with the non-roof buildings components listed in the measure. This bullet is focused on specific types of retrofits and thus the penetration rate is somewhat less than that assumed for other submeasures. Additional benefits from the Subdivision and Zoning Ordinances were also included under this meaure. If the measure were voluntary, estimated emissions reduction would be 3,150 metric tons CO2e, and estimated percentatge emissions reduction of all measures would be .53 percent.			1-2 years
E-3	Green Building and Energy Efficiency Design and Education		This measure is a more stringent variant of E-1(a). Its reductions benefits are not strictly additive with E-1(a) and depend highly on assumptions about penetration and applicability of both measures. We used the CAPPA measure "Green Building" and assumed that 25% of all new residential and commercial construction (6.7 million square feet) would fall under the code. No penetration rate was assumed. The reductions listed represent an upper limit.			1-2 years
E-4	Energy-Efficient Products and Retrofits		This value is the sum of all components of this measure. The majority of these reductions come from bullets (f) and (g) and depend primarily on the total sqft of buildings that are retrofitted. The quantification represents a scenario with 40% of the residential and commercial building stock being retrofit and 20% of the industrial. Used CAPPA Retrofit measure. If the both the submeasures were voluntary, estimated emissions reduction would be 10,376 metric tons CO2e, and estimated percentage emissions reduction of all measures would be 1.39 percent. The voluntary scenario assumes 20% of the existing residential and commercial stock being retrofit and 5% of the industrial stock.			2 years
E-5	Weatherization for Low-Income Households		This measure assumes that 6,520 homes are eligible for the program and that 5% of these homes are weatherized. Used CAPPA weatherization measure.	Estimated that weatherization projects cost approximately $7,000 per home; however, this is an existing City program, so there is no new cost to the City		2 years
E-6	Financing for Energy Efficiency and Renewable Energy Projects		Assumes a 10% increase in the number of residential and commercial energy retrofits due to this program. Economic analysis performed by the Center for Climate Protection (CCP) suggests that this is an aggressive but not unrealistic target. This measure essentially "boosts" the penetration rate of E-5(f) by 10%.			2 years
E-7	LED Retrofits for City Street Lights		Based on information provided by PG&E: 4,266 streetlights would be retrofit by 2020; annual kW saved = 1,613,716; GHG emissions factor = 0.00020858.	Cost assumes $602 per fixture.		3-4 years
E-8	Solar Panel Installations on Municipal Facilities		Assumes the installation of 100kW of solar power on municipal facilities by 2020.	Assumes cost range of $3.50 - $10.00 per watt of installed solar power (depending on materials, rebates and discretional installer costs). An average residential solar installation in California is on the order of 3-4 kW. An installation on a municipal building could potentially be larger than this.	CAPPA Model	3-4 years
E-9	Energy Efficiency Settings for City Desktop Computers		Assumes that all computers are on at night, so 250 machines go into sleep mode that would otherwise be on, and that these machines are active all day (no additional sleep mode time during the day).			1 year
			Transportation and Land Use			
T-1	Live-Work and Work-Live Uses	1. Total New SF Residential Units 2020: 5,160 DU @ Average 2,000 SF; 2. Total New Retail SF 2020: 3,000,000 SF; 3. Total New SF Office 2020: 1,500,000 SF; 4. Percentage of Retail Captured by LW/WL 2020: 4% or 120,000 SF; 5. Percentage of Office Captured by by LW/WL 2020: 6% or 90,000 SF; 6. Total Percentage of Retail and Office Captured by by LW/WL 2020: 210,000 SF; 7. Average Live-Work/Work-Live SF Non-Residential Space: 500 SF; 8. Total Estimated Live-Work and Work-Live Units 2020: 210,000/500 = 420. 9. Total Percentage of New Residential Units 2020: 420/5,160 = 8% 10. Reduction in Total Daily Trip Generation: 420. Daily Commute VMT: 904,730 VMT [Internal- External/Day] x 35% [commute] = 316,555 VMT/Day, or . Daily trip reduction: 420 trips @ 21 VMT per capita = 8,820 VMT reduction or 4.8 CO2e/per day	Live-work is somewhat location efficient, but typically 80 percent of household trip making is for non-work purposes; having a grocery store nearby makes a world of difference, as do other amenities. "The median square footage of newly built homes SF 2,065 square feet in the first three months of this year, compared with the same period last year, according to the U.S. Census Bureau". [Les Christie, CNNmoney.com staff writer Last Updated: August 11, 2009]. We assume commute trips account for about 35% of the total external travel, and about 40% of total external VMT. Assume only new live-work/work-live units, no conversions. Estimates for conversions are anecdotal and cannot be quantified at this time. Development Types Affected: New; Residential; Trip Purposes Affected: Work; Areas Affected: All Tracy		1. Land use changes depend on policy changes. 2. Todd Litman, Victoria Transport Policy Institute research <http://www.vtpi.org/sgcp.pdf> suggests that while many consumers want to live in more compact, mixed communities, there is no way to project how much cities will respond to this demand, and will vary from one jurisdiction to another. 3. Scott Bernstein, Center for Neighborhood Technology: Refer to maps at htaindex.cnt.org, the Affordability Index website. "Based on 2000 Census, within regions, as you move to areas of greater density and accessibility, you can see how VMT drops; if you click on Greenhouse Gas Emissions at the top, it's all pre-calculated (metric tons of CO2 per HH per year from driving) at the Census Block Group level; just click on the map and you'll get a pop-up window with the score for any of the variables. Live-work is somewhat location efficient, but typically 80 percent of household trip making is for non-work purposes."	1 year
T-2	Reduced Parking Requirements		Development Types Affected: All; Residential/Non-Residential; Trip Purposes Affected: All; Areas Affected: Downtown Tracy	60 to 120 hours staff time; $5,000 to $8,000 parking study; $50,000 to $150,000 for a TDM program	Moving Cooler	1 to 3 years
T-3	Support for Bicycling		Development Types Affected: New; Residential/Non-Residential; Trip Purposes Affected: Work; Areas Affected: New development within 3 miles of Tracy	$3,000 to $4,000 per bike, including cost of docking stations, computer software, licensing, bikes, and other capital expenditures. Operating costs range from $1,000 to $2,000 per bike annually, although some business plans purport that 80 to 100% of operating costs can be re-captured through subscriptions and rental and user fees. Cell phone activated systems have lower capital costs ($500 to 1500 per bike).	TDM Encyclopedia	1 to 5 years
T-4	Support for Transit		Development Types Affected: New; Residential/Non-Residential		TCRP Web Document 12	1 year
T-5	Smart Growth, Urban Design and Planning	Index 4D Method	Development Types Affected: All; Residential/Non-Residential; Trip Purposes Affected: All; Areas Affected: All Tracy.			1 to 10 years
T-6	Traffic Smoothing Through Congestion Management		GHG reduction strategies such as transportation system management (e.g. bottleneck removal, ramp metering) may also have the potential fo inducing travel. For such strategies, if the estimated improvement exceeds 10% benefit in travel time reduction, we recommend conducting project specific analysis on induced travel prior to establishing GHG reduction benefits. The conditions may vary considerably over time and the extent of induced travel depends on a variety of factors, and may also vary over time as these factors change. Development Types Affected: New; Residential/Non-Residential			2-10 years
T-7	San Joaquin County Park and Ride Lot Master Plan Implementation		Development Types Affected: All; Residential; Trip Purposes Affected: Work; Areas Affected: Trips out of Tracy		WSDOT	1-10 years

Appendix C: Assumptions for Emissions Reductions

	Measure	Methodology	Assumptions	Cost Assumption Notes	Citations/ Sources	Estimated Years to Activate
T-8	Alternative Transportation Choices for Students		Development Types Affected: New; Residential; Trip Purposes Affected: School; Areas Affected: Tracy Trips to Schools within 1 mile		WSDOT	1 to 10 years
T-9	Comprehensive Signal Coordination Program		Areas Affected: 11th St., Grant Line, Schulte, Lammers, Tracy, MacArthur, and Chrisman corridors		Barth Curves by Matthew Barth, University of California at Riverside	1-10 years
T-10	Ramp Metering on Interstate 205		GHG reduction strategies such as transportation system management (e.g. bottleneck removal, ramp metering) may also have the potential fo inducing travel. For such strategies, if the estimated improvement exceeds 10% benefit in travel time reduction, we recommend conducting project specific analysis on induced travel prior to establishing GHG reduction benefits. The conditions may vary considerably over time and the extent of induced travel depends on a variety of factors, and may also vary over time as these factors change. Development Types Affected: New; Residential/Non-Residential			2-10 years
T-11	Increased Transit to Bay Area Cities and San Joaquin Valley Employment Centers		Development Types Affected: All; Residential/Non-Residential; Trip Purposes Affected: Work; Areas Affected: Trips with one end in Tracy		Moving Cooler	2 years
T-12	Altamont Route Approval and Transit-Oriented Development Around Rail		Development Types Affected: All; Residential/Non-Residential; Trip Purposes Affected: Work; Areas Affected: Trips to/from Santa Clara and Alameda		High Speed Rail Ridership, TCRP-95	2 years
T-13	Reduce Commute Trips		This measure requires large employers to reduce vehicle trips by at least 20 percent, without defining ways to go about achieving that 20 percent. The other sustainability measures listed above did affect large employers, but not to the 20 percent desired by this measure. The planning areas identified as large new employer sites are Gateway, Cordes Ranch, Catellus, Filios, I-205 Expansion, West Side Industria and Chrisman Road. Development Types Affected: New; Residential/Non-Residential.			2-10 years
T-14	Parking Cash-Out Programs for Employees		Development Types Affected: New; Non-Residential; Trip Purposes Affected: Work; Areas Affected: 30% of new developments in Tracy		Moving Cooler	2 years
T-15	Reduced Commuting from Out of the Region		Development Types Affected: All; Residential/Residential; Trip Purposes Affected: School; Areas Affected: All Tracy			2-5 years
T-16	Transit Passes for Residents And Employees of New Developments		Development Types Affected: New; Non-Residential; Trip Purposes Affected: Work; Areas Affected: All Tracy		Santa Monica	1 year
T-17	Increased Use of Low Carbon Fueled Vehicles	To create cost effective program, focus on biodiesel conversions of conventional diesels, including multiple axle and vehicles above 18,000 GVW. Cost projections should consist of increasing percentage of annual new and replacement purchase budget such as 10% increase per year [10%, 20% 30%, 40% to 100% by 2020 or sooner.] Total average GHG emission per fleet vehicle = 4.96 CO2eMT. Total annual municipal fleet emissions: 958 CO2e MT x 50% emission reduction = 479 x 8 years [implementation 2012] = 3,832 total CO2eMT and total reduction.	Development Types Affected: New; Residential/Non-Residential. AB 118 (Chapter 750, Statues of 2007) can offset purchase costs. The total number of vehicles in the City's fleet currently: 68 sedans and 125 light trucks. We assume that all of the existing fleet will convert to suc vehicles by 2020, and that each vehicle will require replacement within 10 years with an emission reduction of 50% of 2006 levels. Emissions reductions benefits derive from the conversion of the City's fleet to cleaner fuels; the other components of the measure support the use of alternative fuel vehicles but do not reduce emissions.	Assumes Tracy will replace entire automotive fleet by 2020. Assumes a 10 percent increase each year in number of vehicles in fleet being replaced. Assumes all sedans in fleet have diesel engines, with an average tank size of 17 gallons. Diesel engine vehicles in the fleet are ready to run on biodiesel, but there are no retailers in the Tracy area; assume that biodiesel B99-B100 blend will be available and that prices will correspond roughly to average West Coast biodiesel fuel prices. Cost estimate does not include potential cost offsets for purchases of hybrids under the Enhanced Fleet Modernization Program of AB 118.	Jeff Long at CARB: "With respect to greenhouse gases there currently is not much of a change in the newer model years. That is, the fuel economy assumptions are assumed to not change. In the next update or outside of the model we will likely be applying Pavley [Fran Pavly is a CA Assemblywoman] adjustments but we have not done so yet...As we go into the future what can change is the mix of cars and trucks. This process is complex in that we use future VMT projections from local transportation planning agencies to get future growth. Using survival rates we determine how many vehicles fall out of the fleet as you roll into the future. we then deduce what the growth in new vehicles needs to be to maintain that VMT. Because cars and trucks have different mileage accrual rates there can be a modest shift towards cars or trucks depending on the default splits of an individual region. With respect to criteria pollutants there is no longer much difference between light cars and trucks, but for greenhouse gases obviously light trucks get lower fuel economy than passenger cars. With into the future is the mix of the LEV [low emissions vehicles] fleet changes (more PZEV and SULEV)."	2-10 years
T-18	Carbon Sequestration on Municipal Property	Total sequestration of carbon in CO2e in metric tons: Number of mature, healthy trees [age, health] x 13 lbs. CO2e = 0.005896 CO2eMT [http://www.metric-conversions.org/weight/pounds-to-metric-tons.htm] or acres of mature, healthy trees [age, health] x 3.5 = CO2e MT	Trees "sequester" carbon, by removing it from the atmosphere and storing it in their wood and in the soil. A single mature tree can absorb carbon dioxide at a rate of about 48 lbs./year; a healthy tree stores [sequesters] about 13 pounds of carbon annually or 2.6 tons per acre each year, all depending on species, condition, and location. Trees tend to have a low albedo. Deciduous trees have an albedo value of about 0.1 to 0.18 while coniferous trees have a value of about 0.09 to 0.15.	Assumes $250-$300/ tree, plus $15-$40 in maintenance/tree/year; 35-40 trees/acre; 33 acres of tree planting.	Studies by the Hadley Centre have investigated the relative (generally warming) effect of albedo change and (cooling) effect of carbon sequestration on planting forests. They found that new forests in tropical and mid-latitude areas tended to cool; new forests in high latitudes (e.g. Siberia) were neutral or perhaps warming	through 2020
T-19	Mixed-Use and Traditional Residential Development	Index 4D Method	Development Types Affected: New; Residential/Non-Residential; Trip Purposes Affected: All; Areas Affected: Bowtie, Ellis.			2-10 years
T-20	Employment-Generating and High-Density Infill Projects	Index 4D Method	Development Types Affected: New; Residential/Non-Residential; Trip Purposes Affected: All; Areas Affected: Cordes Ranch, West Tracy, Tracy Hills, other new development.			1-10 years
T-21	Compressed Natural Gas Buses for the City's Fleet	228,935 Total average annual miles; CNG=8 miles/ gallon=28,616.8 Annual Gallons=155 Tonnes CO2; Diesel=10 miles/ gallon=22,893.5 Annual Gallons=238.4 Tonnes CO2= A difference of 83.4 Annual Tonnes of CO2			City-supplied inventory.	Continuous
	Solid Waste					
SW-1	Diversion of Construction Waste from Landfills		A significant portion of the reductions achieved through implementation of this measure are life-cycle emissions and do not correspond with emissions counted in the inventory. Assumed CAPPA default value for waste generation of 4lbs/sqft of construction. Assumed that the measure applies to total new construction for year 2020, only. A single year snapshot was used to match the methodology for waste related emissions calculated in the inventory. However, ICF is uncertain of the extent that C&D waste related emissions were captured in the inventory.			1-2 years
SW-2	Increased Recycling		The following CAPPA measures were used to estimate GHG reductions associated with this measure: Curb Recycle, Yard Composting, and Kitchen Composting. Assumed the City would set a goal to capture an additional 25% of the recyclable materials that are currently going to landfills by expanding the current program. Assumed the City would set a goal to capture an additional 25% of yard waste that is currently going to landfills by expanding the current program. Assumed the City would set a goal to capture 50% of the food waste that is currently going to landfills by establishing a new program. A majority of the emissions reductions achieved are life cycle emissions related to energy saved in the production of new materials. These reductions do not correspond to emissions counted in the inventory.			1-2 years and ongoing
SW-3	Recycling Service for Multi-Family Housing		Assumed that the same diversion rate that was set as the target for single-family homes (SW-5) would also be achieved by multi-family home but at a ratio consistent with national patterns for recycling in single vs multi family homes as measured by the EPA. Single family homes recycle more waste at a ratio of 1.6/1.0.			1-2 years
SW-4	Municipal Recycling and Reuse		A portion of the reductions achieved through implementation of this measure are life-cycle related. Quantification of this measure should be considered highly uncertain. Used CAPPA measure "Reuse" and assumed 527 City employees and that this measure would result in a diversion or avoidance of 40 lbs/person of waste annually.			1-2 years

Transportation GHG Emissions Assumptions:
Tracy's greenhouse gas inventory is defined as the total amount of VMT generated by Tracy land use. This includes:
a) all of the VMT associated with trips made completely internally within Tracy;
b) half of the VMT generated by jobs and residences located within Tracy but that travels to/from external destinations (this is consistent with the recent SB 375 Regional Targets Advisory Committee (RTAC) decision that the two generators of an inter-jurisdictional trip should each be assigned half of the responsibility for the trip and its VMT);
c) none of the responsibility for travel passing completely through the City with neither an origin point or a destination within the city (also consistent with RTAC decision).

Index 4D Method:
US EPA, October 2001, *Index 4D Method: A Quick-Response Method of Estimating Travel Impacts from Land-Use Changes.*

Carbon Content Values
1. Assuming a carbon content of fuel consistent with the values from EMFAC, about 91 gallons of fuel per metric ton of CO2.
2. Commute trips account for about 35% of the total external travel, and about 40% of total external VMT

Appendix C: Assumptions for Emissions Reductions

Presumed Emission Reduction Factors

The 2020 emissions forecast is based on the assumption that GHG generation in Tracy, San Joaquin County, California, and the nation will change due to various factors through 2020, including increased technological efficiencies and stricter regulatory controls. This model incorporates the following emissions reduction assumptions in the 2020 emissions forecast:

• In 2008, the California Energy Commission adopted new Title 24 Energy Efficiency Standards, which require implementation of energy-efficient technologies that will reduce energy consumption in new residential, commercial, and industrial development. The largest percentage reduction from Title 24 Standards will occur in new residential sector energy consumption. Title 24 is estimated to reduce new residential electricity consumption by 22.7 percent and natural gas consumption by 10 percen

• The California Green Building Initiative (Executive Order S-20-04) calls for further modifications to Title 24 standards that will increase energy efficiency in new government and commercial buildings by 20 percent by 2015.

• California Executive Order S-14-08 requires California electricity providers to expand their renewable energy portfolio to serve 33 percent of their load through renewable energy sources by 2020. Renewable energy sources generally do not generate GHG emissions.

• In April 2009, CARB adopted a Low Carbon Fuel Standard that will reduce GHG emissions from transportation fuels by ten percent by 2020. AB 118, the Alternative and Renewable Fuel and Vehicle Technology Program, will support this regulation by financing development and deployment of low-carbon fuels such as plug-in hybrid, battery electric, fuel-cell, and fuels refined from organic waste.

• AB 1493 directed CARB to adopt regulations that will decrease GHG emissions from new passenger vehicles through technical improvements, beginning with the 2009 model year. These regulations are expected to reduce emissions by 30 percent in new passenger vehicles by 2016, and are estimated to result in an 18 percent GHG emissions reduction across the passenger fleet.

Carbon Sequestration Values

Type	Amount	Unit	Mean Annual Seq. CO2e Metric Tpns/acre/year
Vineyard/Orchard		Acres	.59 to 1.68[2]
Oak woodlands		Acres	3.71[2]
Coniferous forest		Acres	8.89[2]
Grasslands & Shrub[1]		Acres	Unknown
Urban		Acres	Per Tree
Water/Roads		Acres	0

1 - Not Quantified (no factor) and offset by some grazing emissions.
2 - Source: Kroodsma and Field (2006) for the Vineyard factor
Source: Baldacci et al. (unpublished) for the Oak Woodlands factor.

EROEI (Energy Return on Energy Invested) for Various Fuels, Apr 12 2006

	Fuel Potency (1)	Energy Return on Energy Invested
1	**Biodiesel**	3:1
2	**Coal**	1:1 to 10:1
3	**Ethanol**	1.2:1
4	**Natural Gas**	1:1 to 10:1
5	**Hydropower**	10:1
6	**Hydrogen**	0.5:1
7	**Nuclear**	4:1
8	**Oil**	1:1 to 100:1
9	**Oil Sands**	2:1
10	**Solar PV***	1:1 to 10:
11	**Wind***	3:1 to 20:1

*Wind and solar power have the potential to offer respectable EROEI ratios and should be very helpful in our energy transition. They cannot though help us out of the near-term challenges we face of having agricultural and transport systems that require very large amounts of petroleum, the global production of which is soon to peak, and then decrease annually

APPENDIX D

BACKGROUND ECONOMIC ANALYSIS

STRATEGICECONOMICS

MEMORANDUM

Date: February 10, 2010

To: Tanya Sundberg

From: Mason Austin and Sujata Srivastava, Strategic Economics

Project: Tracy Sustainability Action Plan (Strategic Economics Project No. 0916)

Subject: Background Economic Analysis for Tracy Sustainability Action Plan

This memo is a supplement to the overall measures and benchmarks provided as a part of the Sustainability Action Plan. Whereas that plan focuses on goals and policies that Tracy can adopt to grow in a more sustainable manner, this memo provides an assessment of the economic context wherein that growth will take place. Specifically, what follows is an analysis of the industrial and employment base of the City of Tracy, including an evaluation of the growth and competitiveness these industries. These economic factors are assessed in the context of Tracy's role in the regional economy and related back to the potential for increasing the number of "green" jobs in the city.

There are a variety of metrics by which one can measure a sustainable economy. These include diversity of industries and occupations; stability/robustness of employment growth; the share of industries that are engaged in the green economy; fiscal resilience; efficient use of natural resources; a minimal amount of in- or out-commuting; the minimization of auto-based trips; and many others. The analysis below is intended to guide the formulation and implementation of measures that advance the sustainability of Tracy's economy.

Tracy's industries are related deeply to San Joaquin County- the city's transportation, warehousing, and food manufacturing sectors are reliant on the raw goods produced in the agricultural lands of the County and nearly half of the city's workforce lives in the County. However, Tracy's economy is also highly reliant on the Bay Area, where nearly half of the city's residents are employed, and from which much of the demand for Tracy's goods and services originates. The employment growth relative to peer-locations in San Joaquin County will help to highlight opportunities for, as well as limitations on, the expansion of individual industries. This, in turn, will help to guide recommendations for crafting policy that helps to ensure the skills of local residents are matched to those required by local employers, allowing for shorter commutes for residents and a smaller environmental footprint.

The following analysis begins with a brief discussion of the defining "green" businesses. It next focuses on major trends and features of Tracy's economy. This is followed by a comparison of these trends to those in San Joaquin County as a whole, allowing for an identification of industrial sectors in which the city is particularly competitive and key subsectors which are likely to host the bulk of Tracy's future employment growth. Finally, the memo evaluates the city's jobs-housing balance, assessing the compatibly of the skill-base of residents to the requirements of jobs in key industrial subsectors.

A TAXONOMY OF GREEN BUSINESSES/JOBS

The "greening" of employment uses in Tracy is an important component of the Sustainability Action Plan. Any discussion of such a goal, however, must first recognize that the "green economy" encompasses a broad range of definitions for "green jobs" and "green business." For the purposes of this memo, we make use of the following taxonomy of businesses that may be considered to be "green":

Green by Product/Service: Businesses in this category are those whose products or services are explicitly designed to reduce energy consumption, pollution, or carbon release. Firms that are green by product would include such firms alternative fuels producers, photovoltaic panel manufacturers, or organic farms; firms that are green by service would include such businesses as energy-related R&D firms, environmental remediation consultants, or construction firms that specialize in retrofitting buildings for energy-efficiency.

Green by Process: Businesses in this category may not offer services or products that inherently "green," but do help to improve the environment by virtue of their business practices. In manufacturing sectors, this might include making use of recycled materials, sourcing inputs locally, or limiting/reusing waste products. In offices, this might include employing recycling and composting programs or retrofitting a building for higher energy efficiency.

Green by Location: Businesses in this category have a reduced environmental impact by virtue of their location relative to that of their suppliers, costumers, and employees. If a firm is in a location that permits it to source its inputs or deliver its goods within a short distance or via rail or boat, it will be able to limit its energy consumption and carbon footprint; similarly, if a firm is located close to its employees or close to a regional transit node, workers will be able to reduce the distance and number of their automobile-based trips.

While a given firm may be in more than one of these categories, this distinction is important for generating policies that foster green jobs. Policies that augment the number of Green by Product/Service firms would include those aimed at either at attracting larger firms from outside of the city or at fostering the growth of smaller start-ups in the city that are already "green." Policies that increase the number of firms that are Green by Process could instead be directed at mature firms already operating in the city; these are likely to include the provision of incentives (either in the form of direct fees or subsidies or in the form of enhanced public awareness) that encourage firms to change their practices. Finally, the generation of more firms that are Green by Location is best accomplished through land use policies that mandate energy efficient locations for new or existing firms.

These definitions of "green businesses," which include a wide variety of industries, also encompass a full array of "green jobs." In many cases, the occupations that serve a green business are identical to those in a non-green business. In others, green businesses provide jobs (such as energy-efficiency

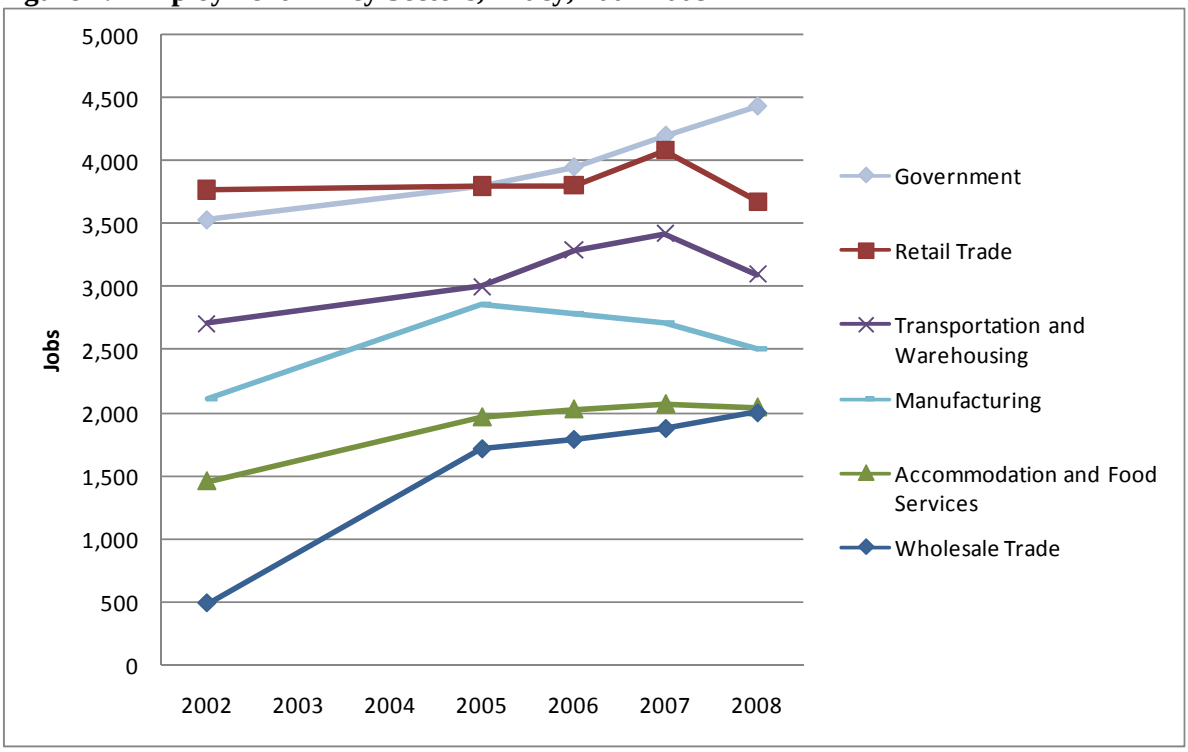
monitors or landscape architects) are distinct to the green economy. Finally, many green jobs are similar to existing occupations, but require some amount of training to adjust to new practices and processes. The provision of training programs that can help employees and employers to make these process changes is one set of policy measures than may be taken without the need of any change in industrial composition. While the process of greening the economy may not result in a dramatic increase in total employment, preparing the workforce to adapt to green practices will enhance the sustainability of the environment and the resilience of the local economy.

PROFILE OF EMPLOYMENT IN THE CITY OF TRACY

Employment Data and Distribution in the City of Tracy

Though the rapid expansion of housing construction in Tracy has been the focus of many policymakers, the last decade has also brought considerable job growth in the city. In fact, Tracy's employment base is growing at a significantly higher rate than the San Joaquin County. Between 2002 and 2008, the number of jobs in Tracy grew by about 24 percent, adding 5,338 jobs for a total of 27,829. The County's employment grew by less than seven percent in that same time period. By 2008, Tracy represented a major employment center in San Joaquin County, with approximately 15 percent of the total jobs in the County.[1]

Figure 1: Employment in Key Sectors, Tracy, 2002-2008



Source: California Economic Development Department 2009, Strategic Economics 2010

As shown in Figure 1, these jobs came from within a variety of industrial sectors. In 2008, the top four sectors in Tracy were Government, Retail Trade, Transportation and Warehousing, and Manufacturing, which account for more than 16 percent, 13 percent, 11 percent, and 9 percent of the

[1] California Economic Development Department

jobs in Tracy, respectively. Other key, growing sectors were Accommodation and Food Services and Wholesale Trade.

Commute Patterns of Workers

Although the labor shed for jobs in Tracy is expansive, a relatively high share of workers commutes from within a short distance. Nearly 45 percent of workers based in Tracy are San Joaquin County residents, including 21 percent that are Tracy residents. Roughly 19 percent of workers travel from elsewhere in the Central Valley, while 25 percent are Bay Area residents making the reverse commute. This suggests that there is a strong match between Tracy jobs and San Joaquin county residents. Strengthening this match can help to reduce the environmental footprint of Tracy industries. This issue of job-resident match is discussed in greater depth later in this document.

Major Employers

Major employers in the City of Tracy sphere of influence are shown in Table 1. In keeping with the industrial base described above, the largest employers are those in Government or Transportation and Warehousing. Manufacturing, especially of food products, is also represented by a large number of firms with at least 150 employees. The Safeway Distribution Center is the City's leading employer, with 2,000 jobs.

Table 1: Twenty Largest Employers in Tracy

Employer Name	# Employees	Type of Agency
Distribution		
Safeway Distribution Center	2000	Distribution Perishable
Orchard Supply Hardware	340	Distribution Hardware
Costco Wholesale Co.	329	Distribution Grocery
Yellow Freight	250	Freight
Food Processing		
Pacific Pre-Cut Produce	400	Food Processing
Leprino Foods	308	Mozzarella Cheese
Musco Olive Products	230	Ripe Olive Processing
Costco Meats	182	Wholesale Meat Process
Government		
Tracy Unified School District	1600	Education
Defense Depot San Joaquin	1375	Government Agency
Deuel Vocational Institute	1300	State Prison Facility
City of Tracy	630	Municipal Services
CA Department of Water Resources	140	State Agency
Health Care		
Sutter Tracy Community Hospital	568	Medical Care
Manufacturing		
Owens-Illinois of NA	400	Glass Container Manufacturer
Barbosa Cabinets	275	Cabinet Builders
Inland Paperboard & Packaging	200	Corrugated Containers
Ameron International WTG-NCD	192	Concrete Pipe
Pacific Medical	150	Rehabilitation Products
Other		
Adesa Golden Gate	360	Wholesale Auto Auction

Source: City of Tracy

Resident Workforce

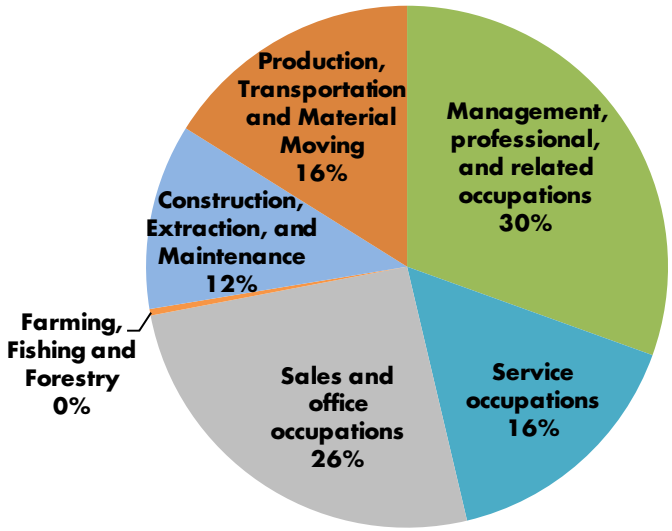
From 2000 to 2008, Tracy's resident workforce grew by 50 percent, a significantly greater rate than that of San Joaquin County (Table 2). Despite this rapid growth, however, the occupations of new workers were similar in distribution to those of existing workers. In 2000, 61 percent of the resident workforce was employed in white collar occupations (management, professional and related occupations and sales and office jobs); by 2008, this had only declined slightly to 57 percent. The share of residents in blue collar occupations (construction, extraction and maintenance and production, transportation, and material moving jobs) was steady at 28 percent (Figure 2).

Table 2: Occupations for Tracy and San Joaquin County Residents, 2000 - 2008

	City of Tracy				San Joaquin County			
	2000		2006-2008		2000		2006-2008	
	#	%	#	%	#	%	#	%
Management, professional, and related occupations	7,825	31%	11,686	31%	59,397	27%	76,668	28%
Service occupations	3,085	12%	6,061	16%	31,921	15%	45,811	17%
Sales and office occupations	7,579	30%	9,835	26%	59,341	27%	70,904	26%
Farming, Fishing and Forestry	209	1%	172	0%	9,044	4%	10,073	4%
Construction, Extraction, and Maintenance	2,782	11%	4,390	12%	22,439	10%	29,741	11%
Production, Transportation, and Material Moving	4,012	16%	6,148	16%	36,858	17%	44,951	16%
Total Workers	*25,492*	*100%*	*38,292*	*100%*	*219,000*	*100%*	*278,148*	*100%*

Source: 2000 Census, 2006-2008 American Communities Survey, Strategic Economics 2009

Figure 2: Occupations of Tracy Residents, 2006-2008



Source: 2006-2008 American Communities Survey, Strategic Economics 2009

Commute Patterns of Residents

Only 35 percent of Tracy's resident workforce is employed in San Joaquin County, including 20 percent that work in Tracy. A far greater share of residents (46 percent) commutes across the Altamont Pass to jobs in the Bay Area, including 27 percent that work in Alameda County. Only 9 percent of residents work elsewhere in the Central Valley.

ASSESSMENT OF ECONOMIC COMPETITIVENESS

Strategic Economics completed a statistical measure known as a "shift-share analysis" in order to assess the future competitiveness of local sectors and industries. The shift-share analysis helps us

break down employment trends to understand different factors that might influence local employment growth. By identifying these factors, we can determine which industries are likely to experience future growth, and understand the dynamics of this growth. The shift-share analysis also allows for the classification of industrial sectors into the following major categories:

Competitive advantage- These sectors and industries have grown in importance in San Joaquin County, adding employment at a faster rate than the economy overall. Further, growth in these industries has been even greater in Tracy than in the rest of the county. Consequently, sectors and industries in this category are those most likely to experience growth, as local advantages are buoyed by regional strength.

Local advantage- These sectors and industries have expanded their presence in Tracy, even as they have declined in importance in San Joaquin County as a whole. It is likely that the Tracy has an advantage over the rest of San Joaquin County for drawing jobs in these industries. However, because these industries have a declining presence in San Joaquin County overall, they are potentially at risk for decline in the Tracy. They should be considered for their unique role in differentiating the city's economy from the County's.

Emerging opportunity- These sectors and industries have increased their presence in San Joaquin County and grown in absolute numbers in Tracy, but at a slower rate than in the rest of the County. While this may be due to some inherent local disadvantage, these industries may also represent an opportunity to capture employment growth that is currently going elsewhere in the county.

Stable- These sectors and industries have experienced local job growth, but have not gained in importance in the City of Tracy or San Joaquin County. These industries are maintaining a healthy presence in the economy but have not gained strength over other industries.

Declining- These sectors and industries have experienced a decline in the number of city jobs between 2002 and 2008.

Sectors

The results of this shift-share analysis on Tracy's industrial sectors are as follows:

Figure 3: Summary of Economic Strengths of the City of Tracy, 2002-2008

		Growth in SJ County > Growth In Overall Employment	
		+	-
Growth in Tracy > SJ County	+	**Competitive Advantage** Wholesale Trade Educational Services Health Care and Social Assistance Accommodation and Food Services Administrative and Support and Waste Management	**Local Advantage** Manufacturing Finance and Insurance Professional and Technical Services Management of Companies and Enterprises Arts, Entertainment, and Recreation Other Services (except Public Administration)
	-	**Emerging Opportunity** Transportation and Warehousing	**Stable** Retail Trade
Job Loss in Tracy		**Declining** Agriculture, Forestry, Fishing and Hunting Construction Real Estate and Rental and Leasing	 Mining Information

Source: California Economic Development Department 2009, Strategic Economics 2010

The Competitive Advantage sectors can be clustered in two groups. The first, which includes Wholesale Trade is driven by inter-regional demand, both from the San Francisco Bay Area and from the rest of the world, accessed through the Bay Area's ports. That these sectors are growing more quickly in Tracy than in the rest of San Joaquin County suggests, not only that the demand for the products that are traded through the firms in this sector is increasing, but also that Tracy's key geographic position, as the gateway to the Bay Area from the Central Valley, is an important factor for these firms. The second group, which includes Educational Services, Health Care and Social Assistance, Accommodation and Food Services, and Administrative and Support and Waste Management, are driven by local and regional demand. That these sectors are growing more quickly in Tracy than in San Joaquin County is a reflection both of Tracy's rapidly-growing residential population and of Tracy's growing role as a regional services node.

Whereas Competitive Advantage sectors are those wherein Tracy has captured a disproportionate amount of San Joaquin County's growth, the Local Advantage sectors are those that have grown in Tracy despite a decline in San Joaquin County as a whole. As with the Competitive Advantage sectors, much of this is related to Tracy's geographic position. Proximity to the Altamont Pass is likely a key factor in Tracy's growing manufacturing sector, as firms can make use of inputs from the Central Valley and quickly transport finished goods to consumers in the Bay Area. Other sectors in this category are more mixed in their reasons for locating in Tracy. For many firms in the Finance and Insurance, Professional and Technical Services, and Management of Companies and Enterprises, location in Tracy may be mechanism maintain proximity to Bay Area firms and clientele while economizing on rent and land prices. However, others are likely locating in Tracy to serve the growing residential population. Finally, the Arts, Entertainment, and Recreation sector is primarily local- and county-serving, a reflection of population growth and Tracy's increasing economic importance to the region.

Transportation and Warehousing is the only industrial sector in the Emerging Opportunity category. However, in 2008, more than twice the share of Tracy's total employment was in this sector, compared to that of San Joaquin County. Consequently, the slow growth is likely a reflection of the dominance of larger, slow-growing establishments (such as the Safeway Distribution Center), rather

than any local disadvantages. Reasons for locating in Tracy for firms in this sector are nearly identical to that of Wholesale Trade.

Only one industrial sector, Retail Trade, can be classified as Stable. Currently, retail in Tracy is primarily local-serving and is growing, though at a slower pace than its overall economy.

For sectors in these four categories, the distinction between local serving and interregional-serving is critical, as each represents a different set of strategies for fostering economic development and generating green jobs. In sectors for which demand is generated locally, the City of Tracy may have a greater ability to influence the existing businesses through programs that incentivize sustainable practices and through marketing programs encouraging local patronage of green businesses. In sectors where practices are more dependent on demand from customers outside of Tracy, the City should instead focus on attracting green firms and influencing the location preferences of these firms, through incentives, zoning, and other land use policies.

With the exception of Information, the sectors in the Declining category are also related to housing construction and population growth, though with an opposite effect of those in the other categories. As housing construction has fallen precipitously from its peak in 2003, the Construction and Real Estate sectors experienced contraction in employment. Employment in Agricultural and Mining sectors has also fallen as land has been converted from the production/extraction of natural resources to residential use- the preservation of the remaining agricultural land and employment may be a key component of a sustainable economic development strategy. Finally, Information, which included only 44 jobs in 2008 has never been a significant component of Tracy's economy; its decline is largely a function of San Joaquin County's overall weakness in this sector.

Key Subsectors

Performing a similar shift-share analysis on subsectors leads to the emergence of the following key industry groups:

Figure 4: Key Subsectors the City of Tracy, 2002-2008, (total employment in parentheses)

		Growth in SJ County > Growth In Overall Employment	
		+	**-**
Growth in Tracy > SJ County	**+**	**Competitive Advantage** Food Services and Drinking Places (1,964) Administrative and Support Services (1,408) Merchant Wholesalers- Nondurable Goods (918) Nonmetallic Mineral Product Manufacturing (841) Merchant Wholesalers- Durable Goods (788)	**Local Advantage** Truck Transportation (799) Professional and Technical Services (529)
	-	**Emerging Opportunity** Warehousing and Storage (2,303) Food Manufacturing (718)	**Stable**

Source: California Economic Development Department 2009, Strategic Economics 2010

These subsectors are likely to be the sources of the greatest amount of employment and employment growth in Tracy. Consequently, it is critical that, when formulating policies and incentives augmenting "green business" in Tracy, the operations and requirements of the firms and industries in these categories are considered.

JOBS-SKILLS-RESIDENTS BALANCE ANALYSIS

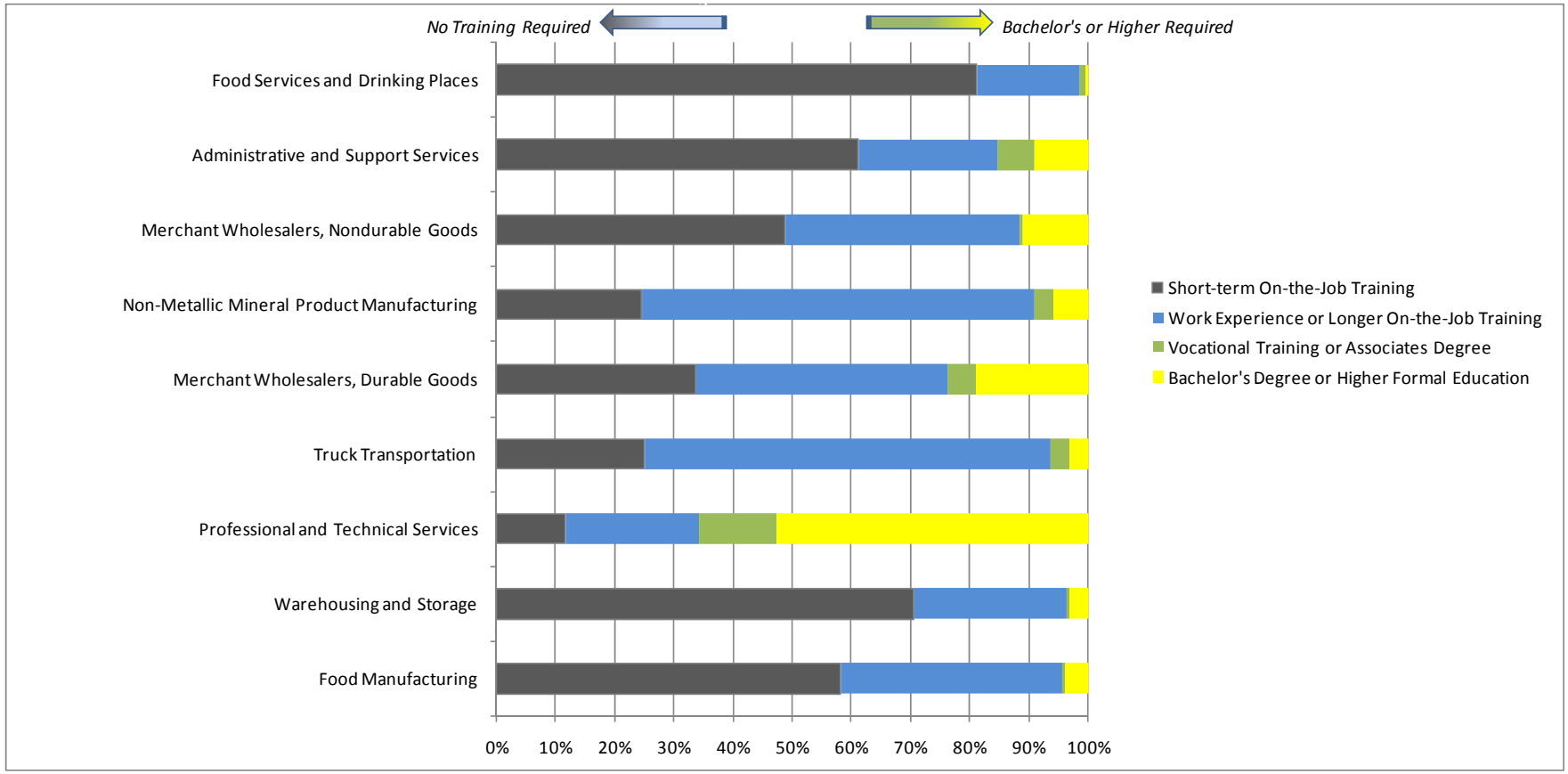
A metric that is often touted as a key element for a sustainable city is jobs-housing balance. The rationale behind this is that if the number of housing units is roughly equivalent to the number of jobs, there will be less in- and out-commuting; to the extent that there is intercity travel, a strong balance will ensure bi-directional traffic flows, reducing rush-hour congestion in a single direction. While the City of Tracy has experienced strong employment growth over the last several years, the city's population has grown at a faster pace than its employment. Consequently the city's jobs-housing balance has declined in recent years such that in 2008, there were roughly 0.73 jobs for every employed resident. However, this ratio significantly understates the imbalance that currently exists for commute flows of residents and works.

As noted above, 20 percent Tracy's resident workforce is employed within the city, significantly less than the 73 percent that would be predicted if spatial match were the only factor determining where residents work. Some combination of job quality, accessibility, and occupation/skills requirements drives a higher proportion of Tracy workers to commute that would be necessary if the jobs located in Tracy were better matched to the skills and needs of residents. To some extent, this phenomenon is natural and to be expected- employment opportunities are highly idiosyncratic and workers rarely limit their job searches to such a narrow geographical area. Nevertheless, one mechanism for reducing in- and out-commuting is to foster a strong match between the skills of Tracy's residents and the training/educational requirements of Tracy's jobs. The following analysis examines the degree to Tracy's residents may be qualified for jobs in the Key Subsectors, identified above. The analysis also includes an assessment of the quality of these jobs, to determine whether they are likely to offer wages at a level sufficient for workers to afford housing in the city.

Job Match Analysis

Figure 5 shows the distribution of training requirements for occupations within each of the Key Subsectors. In general, occupations in these subsectors do not have high training or educational requirements. While more than 50 percent of jobs in the Professional and Technical Services Industries require at least a bachelor's degree, for all other subsectors, at least 76 percent of jobs require no post-secondary education.

Figure 5: Training Requirements of Key Tracy Subsectors, 2006



Source: California Economic Development Department, Strategic Economics 2009

In comparison, Table 3 shows the educational attainment of Tracy residents. Highly trained or educated residents are unlikely to hold jobs for which they are overqualified while residents with low levels of education attainment are unlikely to be offered jobs with high training requirements. Consequently, for there to be a good skills-jobs match, the distribution below should closely resemble the occupational requirements shown above.

Table 3: Educational Attainment of Tracy Residents, Age 25+, 2000 - 2008

	City of Tracy		San Joaquin County	
	2000	2006-2008	2000	2006-2008
Less than High School Diploma	18.5%	13.6%	28.8%	23.6%
High school diploma	25.3%	31.8%	25.2%	28.8%
Some college or Associate Degree	38.1%	35.1%	31.5%	31.3%
Bachelor's Degree or Higher	18.0%	19.6%	10.2%	11.7%
Total	100%	100%	96%	95%

Source: 2000 Census, 2006-2008 American Communities Survey, Strategic Economics 2009

In 2008, 55 percent of Tracy's resident workforce had some post-secondary education, including 20 percent that held bachelor's degrees or higher. This suggests that a potential source of mismatch between Tracy's jobs and residents is that the resident workforce may be "overqualified" for employment in the largest, most-rapidly growing subsectors of the local economy.

As Table 4 shows, although most of the jobs offered in these subsectors offer relatively high wages for their low training requirements, they are somewhat below the levels that are required to occupy much of Tracy's housing stock. Even in a highly suppressed housing market, from September to November 2009, the median sales price for a home in Tracy was $220,000. Using standard assumptions, a household would need to earn $48,400 per year to afford a home at that price. However, Professional and Technical Services is the only subsector wherein the median salary is greater than that figure. With the exception of Food Services and Drinking Places, the plurality of jobs in each of these subsectors offer salaries from $25,000 to $49,999, meaning that a two-income household at these wages could afford the median sales price. However, there is also a large share of jobs in each of these subsectors that offer less than $25,000.

Table 4: Wages of Occupations in Key Subsectors, San Joaquin County, 2009

NAICS code	Subsector	less than $25,000	$25,000 to $49,999	$50,000 to $74,999	$75,000 or more	Median Wage
311	Food Manufacturing	37%	52%	9%	3%	$ 32,007
327	Nonmetallic Mineral Product Manufacturing	16%	66%	13%	5%	$ 39,103
423	Merchant Wholesalers, Durable Goods	9%	53%	29%	10%	$ 46,759
424	Merchant Wholesalers, Nondurable Goods	20%	53%	21%	6%	$ 40,293
484	Truck Transportation	2%	92%	4%	2%	$ 41,535
493	Warehousing and Storage	20%	72%	6%	2%	$ 34,061
541	Professional and Technical Services	5%	39%	26%	30%	$ 60,011
561	Administrative and Support Services	25%	61%	8%	5%	$ 34,169
722	Food Services and Drinking Places	88%	11%	0%	1%	$ 21,050

Source: California Economic Development Department, Strategic Economics 2009

Taken with the commute patterns data, these suggest that a large share of Tracy residents commute to the Bay Area in order to access the higher wage jobs for which they are qualified. Simultaneously, residents of other areas of San Joaquin County commute into Tracy partly because they are unable to afford housing in the city. The first of these phenomena is difficult to address, given that only one of

the subsectors projected to generate significant employment growth in Tracy (Professional and Technical Services) will offer jobs that will satisfy the needs of highly educated workers. However, the expansion of Tracy's affordable housing stock is a key strategy for addressing the second issue which, in turn, would help to support the goals of the Sustainability Action Plan.

CONCLUSIONS

Despite its proximity to high-tech and research centers of the Silicon Valley and Alameda County, Tracy's basic economy is firmly rooted in blue-collar "goods movement industries," including truck transportation, warehousing and storage, wholesale trade, and food manufacturing. Secondary strengths in the city's economy are in industries that serve the city's rapidly growing residential population, including retail stores and restaurants. Recent employment growth and an advantageous geographic position near the Altamont Pass suggest that these industries will continue to be strong in the foreseeable future.

Despite this strong local employment growth, much of Tracy's dramatic residential growth is attributable to households with workers employed in the Bay Area, especially Alameda County. Concomitantly, the city's housing prices are such that many of the predominantly low-wage workers of jobs based in Tracy must commute in from elsewhere in the San Joaquin County and the rest of the Central Valley.

These phenomena point to the following strategies for enhancing the sustainability of Tracy's economy:

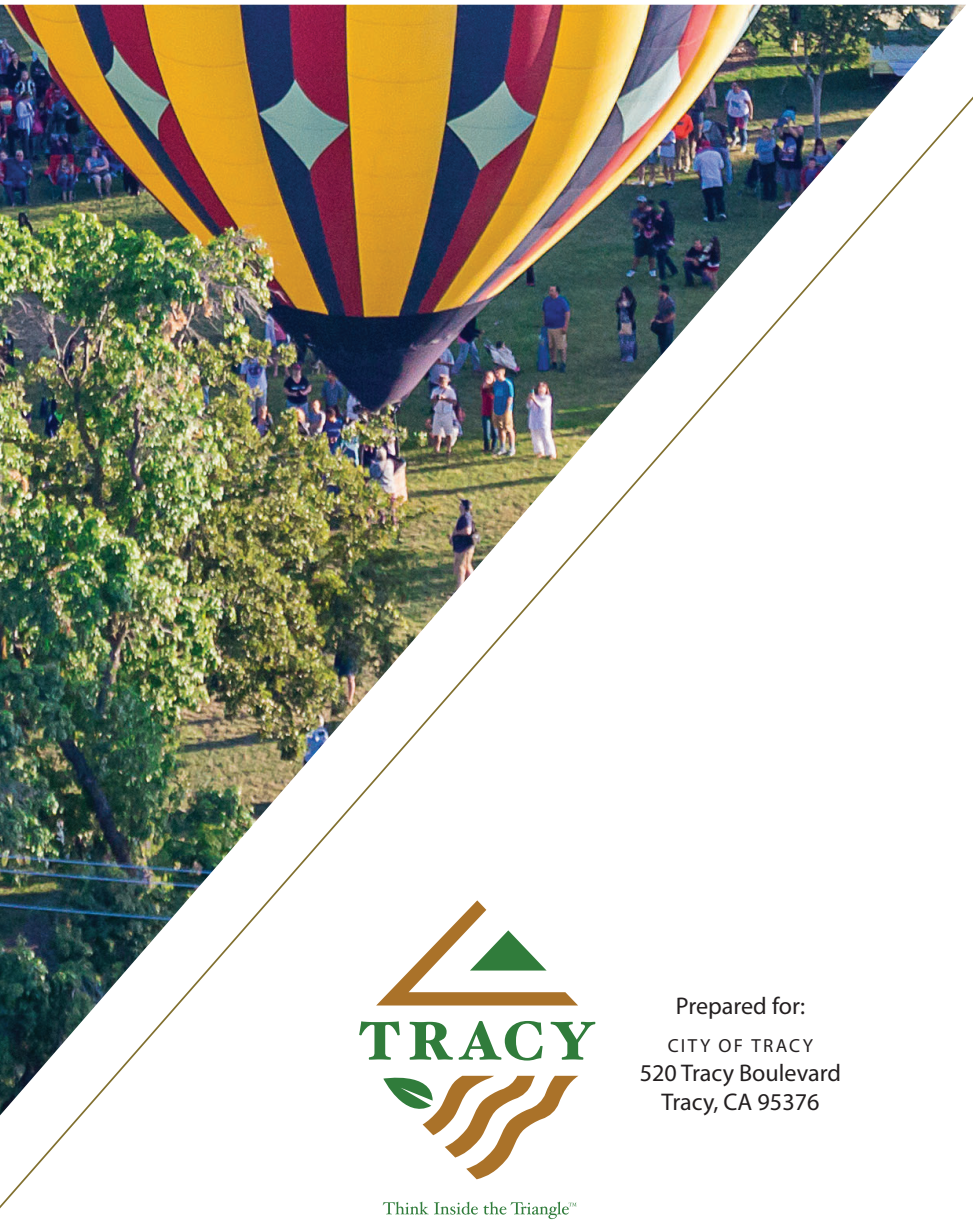
1) Augment affordable housing opportunities, aimed at households with workers whose incomes are likely match the profile industries in the key subsectors identified in this memo.
2) Link workers to training programs that will prepare them to adopt green practices in existing or related occupations
3) Incentivize the use of rail transportation by goods movement industries.
4) Incentivize the adoption of other green practices, such as local sourcing and recycling, by all industries
5) For local-serving businesses, brand and market "green" firms to Tracy residents.
6) When opportunities arise, leverage proximity to Bay Area to attract high-skilled jobs, including firms in Professional and Technical Services. Special attention should be paid to attracting green spin-offs from energy research labs in Livermore.

City of Tracy

Urban Forest Management Plan

TRACY

Think Inside the Triangle℠



City of Tracy

Urban Forest Management Plan 2022

Think Inside the Triangle℠

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PG&E

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Davey Resource Group, Inc.

Photo Credits

City of Tracy
Davey Resource Group, Inc.

Scope & Purpose

The purpose of the Urban Forest Management Plan (UFMP) is to provide a guide for managing, enhancing, and growing Tracy's community tree resource over the next 20 years. The plan also includes goals for long-range planning to promote sustainability, species diversity, and greater canopy cover.

Community trees are publicly managed trees along streets, in parks, and at City facilities. The UFMP also provides some consideration for private trees because they contribute significantly to Tracy's livability and environmental quality.

Therefore, the UFMP aims to:

- Identify best management practices that support tree health, benefits, and community safety
- Increase health and resiliency of the urban forest by improving species diversity, and by managing pests and invasive species
- Develop a cohesive organizational structure to facilitate collaboration among all urban forest managers
- Nurture an ethic of stewardship for the urban forest among City staff, community organizations, businesses, and residents
- Identify baseline metrics and clear goals for urban forest managers
- Promote community engagement and advocacy for the urban forest

The UFMP includes both long and short-term actions in support of these ends. The plan provides specific goals and actions for managing community trees, preserving and increasing canopy cover, and improving community outreach.

Table of Contents

Executive Summary

What do we have?

The review process established that Tracy has built a strong foundation for an exceptional urban forestry program. The community has made an outstanding commitment to planting, preserving, and promoting the care of trees and other natural resources.

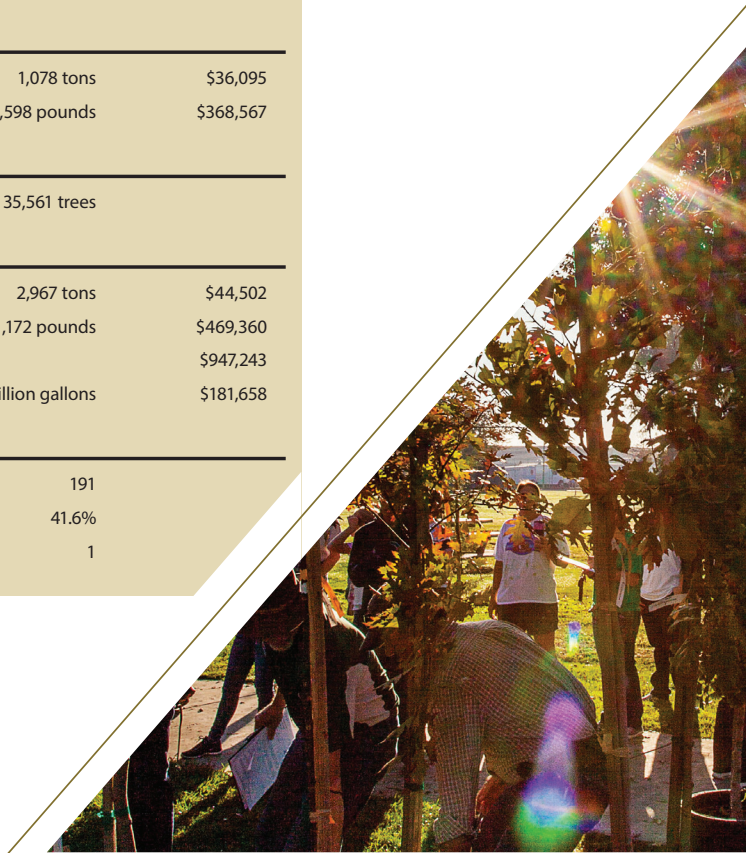
Several factors contribute to Tracy having the tools and information necessary to make well informed and effective management choices. These factors include:

- The support of local non-profits that advocate for the urban forest and provide a volunteer base;
- An Urban Tree Canopy Assessment that includes GIS mapping of the location and extent of Tracy's entire tree canopy (public and private);
- An inventory of public trees in parks, medians, streets, and City facilities;
- A Resource Analysis that defines the composition, benefits, and benefit versus investment ratio of the public tree resource;
- Tree protection regulations that promote the preservation and protection of community trees; and
- A well-trained, dedicated urban forestry staff.

With these tools and a relatively young urban forest, in good condition, Tracy is poised to enjoy increasing environmental benefits and value from its public trees.

Tracy's Urban Forest Benchmark Values

Urban Tree Canopy Cover (Public and Private, 2016)		
Overall Canopy Cover	7.4%	
Land Use Canopy Cover (Residential & Parks)	12.8%	
Impervious Surfaces	37.9%	
Canopy Benefits (Public and Private, 2016)		
Carbon Stored to Date	10,633 tons	$159,500
Annual Canopy Benefits (Public and Private, 2016)		
Annual Carbon Benefits	1,078 tons	$36,095
Annual Air Quality Benefits	25,598 pounds	$368,567
Community Urban Forest (Public Tree Resource)		
Inventoried Trees (2018)	35,561 trees	
Community Tree Benefits		
Annual Carbon Benefits	2,967 tons	$44,502
Annual Air Quality Benefits	31,172 pounds	$469,360
Annual Energy Benefits		$947,243
Annual Stormwater Management	23.3 million gallons	$181,658
Species Diversity (Inventoried Trees, 2018)		
Total Number of Unique Species	191	
Prevalence of Top Five Species	41.6%	
Species exceeding recommended 10%	1	



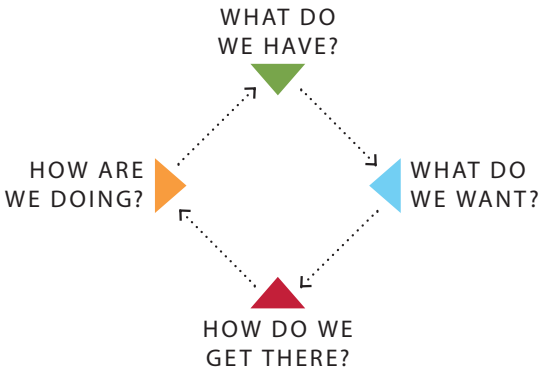
What do we want?

A primary emphasis for the UFMP is to identify adequate resources to ensure that critical tree care needs can be addressed in a timely, cost-effective, and efficient manner. Trees are living organisms, constantly changing and adapting to their environment and increasing in size over time. Because of this, trees have specific needs at various life stages, including training for proper structure when they are young and increased monitoring and proactive risk management as trees age.

Deferring maintenance can have a significant effect on the overall health, structure, value, and lifespan of a tree. In addition, deferred maintenance often results in higher costs and less beneficial results, including increased risk potential. As a result, the UFMP identifies goals for optimizing urban forest programming, existing funding, staffing, and urban forest policy.

How do we get there?

The UFMP identifies three guiding principles, five goals, and eight existing policies that support preserving the health, value, services, and sustainability of Tracy's community urban forest. Each of these goals and existing policies are supported by comprehensive objectives and actions. Recognizing that community engagement is integral to success, the UFMP includes solid objectives for engaging the community and encourages partnership and collaboration.



How are we doing?

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

Grow, maintain, preserve, and enhance a sustainable urban forest.

Goal 1: Preserve trees whenever possible.

Goal 2: Reach 40% canopy cover by 2040.

Existing Policy 1: Plan for trees.

Existing Policy 2: Foster current partnerships with local non-profits and continue to explore opportunities with additional non-profit groups.

Existing Policy 3: Promote the longevity of trees as a public resource.

Optimize the environmental, social, economic, and public health benefits of trees and canopy.

Goal 3: Engage the community to increase support for the urban forest.

Goal 4: Encourage the planting of trees on private property.

Existing Policy 4: Manage risk.

Existing Policy 5: Expand the tree canopy through tree plantings on public property.

Align urban forest management policy with community expectations and promote efficiency within the Department of Public Works.

Goal 5: Revise Municipal Code to respond to community needs.

Existing Policy 6: Ensure policy documents communicate a shared vision.

Existing Policy 7: Provide emergency response to ensure accessibility for emergency responders and restoration of regular operations.

Existing Policy 8: Maintain a fire safe community.

Primary Objectives:

- Develop a Private Protected Tree or Heritage Tree Ordinance to protect specific species, native trees, specimen trees, or trees of historic value from damage or unpermitted removal.
- Greater preservation of trees on public property.
- Ensure all newly planted trees have the necessary resources to be maintained throughout the lifetime of the tree.
- Explore alternative designs to avoid removals during construction or renovations.
- Encourage preservation of trees on private property.
- Improve everyday care of trees, to prevent future removals.
- Greater and more equitable distribution of environmental benefits from trees.
- Invest in trees for the long-term environmental benefits they provide to the community.
- Allow for flexibility in planting considerations for new development.
- Continue to provide support for local non-profit organizations.
- Encourage new industries within the City to expand the tree canopy.
- Continue to explore partnerships with non-profit and environmental advocacy groups.
- Provide water to trees to encourage establishment of newly planted trees, as well as, prolong the life of mature trees.
- Educate the community about property owner responsibilities for the care of City trees.

Primary Objectives:

- Engage the community in urban forestry activities and educational events.
- Improve diversity of Tracy's urban forest through plantings on private property.
- Provide sustainable and adequate resources to sustain the urban forest for future generations.
- Use a variety of methods to provide tree related information to the community.
- Continue to distribute information about the urban forest to the community.
- Increase canopy cover through tree plantings on private property.
- Maintain trees throughout their lifetimes to improve structure in maturity and reduce the likelihood of structural failures in the future.
- Improve the diversity of the urban forest on public property, to create a more resilient urban forest.

Primary Objectives:

- Review and revise Municipal Code to address the challenges facing the urban forest.
- Unify guiding documents to transcend departmental changes and address inefficiencies and reduce confusion.
- Optimize interdepartmental communication and coordination.
- Restore operations and public safety as efficiently and as quickly as possible following storm or other emergency events.
- Focus fire mitigation efforts on Tracy Hills and other areas of vulnerability.

Introduction

Tracy is in San Joaquin County, within an hour of San Jose, San Francisco, and Sacramento. Although Tracy is generally considered a bedroom community, the City is currently experiencing significant growth in the industrial and commercial employment sectors. In fact, Tracy has the largest industrial park in the country (Prologis, 2019). Tracy is located inside a geographic triangle formed by Interstate 205, Interstate 5, and Interstate 580, which contributes to the City's motto of "Think Inside the Triangle". In addition to the laid back and friendly character of Tracy, the City is close to numerous recreational opportunities, such as, Lake Tahoe, Yosemite, and the San Francisco Bay.

Tracy has a semidesert climate with an average annual precipitation around 13.3 inches, which is less than other communities in the San Joaquin Valley. With the average temperature in winter hovering around 46.8°F and summers with an average temperature of 75.1 (U.S. Climate Data, 2018). The average annual wind speed for Tracy is 7.6 MPH from April to September, with average wind speeds in the summer of 9.4 MPH (Weather Spark, 2018).

Community

Tracy prides itself on being a friendly small City; the kind of place where traditional values of faith, family, education, and the arts are highly valued by all who live there. In addition to close proximity to popular California attractions, Tracy offers a vibrant entertainment scene with numerous festivals and community events throughout the year, as well as live theater, art shows, and music concerts.

History

Tracy's history follows a similar story to much of the history of the Central Valley of California, where the major drivers of the population are tied to railroads and agriculture.

1700s

The Yokuts were the first peoples to call the area that is now Tracy, home. Where the livelihood of the native peoples revolved around the water from the river and food from the acorns of the native valley oak trees (Tracy History, 2018). After the arrival of European settlers, most of the Yokuts were displaced or died from the introduction of new disease.

1800s

In the mid-nineteenth century, the building of an expansive railroad system across California, led to the foundation of Tracy, where the Southern Pacific and the Central Pacific intersected in 1878. Tracy was named for Lathrop J. Tracy, a grain merchant and railroad director from Mansfield, OH (Tracy History, 2018).

1900s

Up until the turn of the century, Tracy grew into a major railroad hub and was incorporated in 1910. The railroad industry declined in the beginning half of the 20th century and Tracy evolved into a thriving agricultural center (Tracy Magazine, 2017).

First sheep herders moved down from the hills into the valley with the seasons, then later cattle ranching, and later crops, such as barley, tomatoes, asparagus, nuts, fruit were grown, and processing plants to follow. Agriculture and the railroad were the main avenues of commerce up until the 1970s, then the growth of the Bay Area extended beyond the Altamont Pass and into Tracy.

Today, Tracy continues to attract people who are seeking an affordable lifestyle in close proximity to the Bay Area. Along with being an attractive place to live, many companies are taking note of Tracy as an optimal distribution location and are choosing to be located in the small City, including, companies like Amazon and most recently DHL.

Think Inside the Triangle

Benefits of Urban Trees

Research has linked the presence of urban trees to...

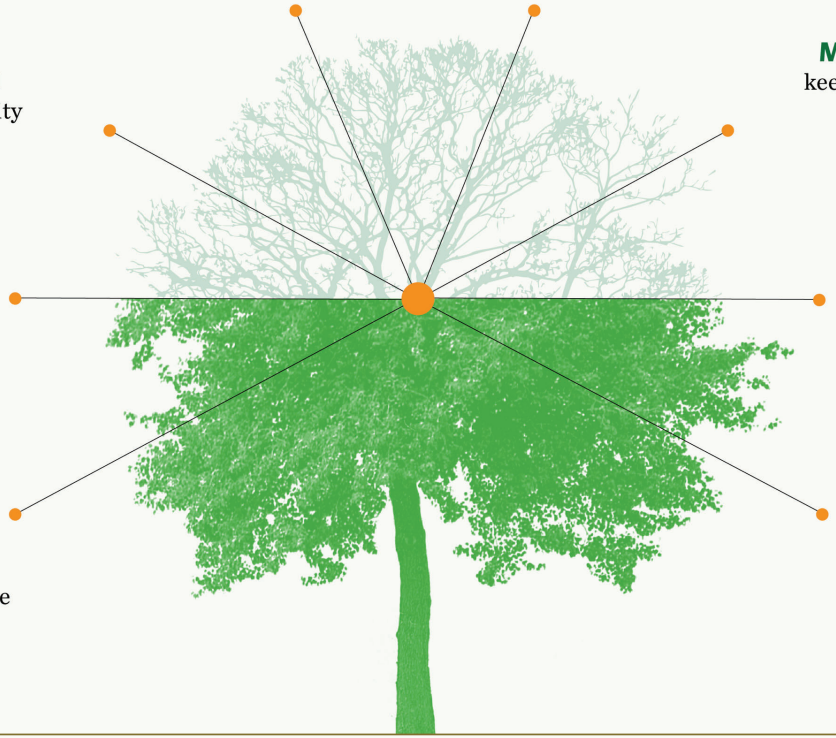
The Nature Conservancy

PROTECTING BIODIVERSITY
including habitat for migrating birds and pollinators

REDUCING OBESITY LEVELS
by increasing physical activity including walking and cycling

REDUCING RATES
of cardiac disease, strokes, and asthma due to improved air quality

MANAGING STORMWATER,
keeping pollutants out of waterways, and reducing urban flooding



COOLING city streets by 2-4° F, reducing deaths from heat and cutting energy use

INCREASING
neighborhood property values

FILTERING up to a third of fine particle pollutants within 300 yards of a tree

REDUCING STRESS by helping interrupt thought patterns that lead to anxiety and depression

Source: The Nature Conservancy

Tree and Canopy Benefits

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

- Energy savings
- Air quality improvements
- Carbon dioxide reductions
- Water quality improvements
- Aesthetics & socioeconomics
- Health benefits
- Wildlife

The Urban Canopy provides numerous benefits, including reducing summer peak temperatures, the reduction of air pollutants, enhancement of property values, provides habitats for different wildlife, aesthetic value to the community, and improves social ties among neighbors. (Hilton, 2017)

Energy Savings

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

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

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

Trees reduce energy use in summer by cooling the surrounding areas and shading-built environments. Shade from trees reduces the amount of radiant energy absorbed and stored by hardscapes and other impervious surfaces, thereby reducing the heat island effect, a term that describes the increase in urban temperatures in relation to surrounding locations. Transpiration releases water vapor from tree canopies, which cools the surrounding area. Evapotranspiration, alone or in combination with shading, can help reduce peak summer temperatures by 2 to 9°F (1 to 5°C) (Huang et al, 1990). The energy saving potential of trees and other landscape vegetation can mitigate urban heat islands directly by shading heat-absorbing surfaces, and indirectly through evapotranspiration cooling (McPherson, 1994). Individual trees through transpiration have a cooling effect equivalent to two average household central air-conditioning units per day or 70 kWh for every 200 L of water transpired (Ellison et al, 2017). Studies on the heat island effect show that temperature differences of more than 9°F (5°C) have been observed between city centers without adequate canopy cover and more vegetated suburban areas (Akbari et al, 1997).

Trees also reduce energy use in winter by mitigating heat loss. Trees reduce wind speeds by up to 50% and influence the movement of warm air and pollutants along streets and out of urban canyons. Urban canyons are streets flanked by dense blocks of buildings, which can affect local conditions, including temperature, wind, and air quality. By reducing air movement into buildings and against conductive surfaces (e.g., glass and metal siding), trees reduce conductive heat loss from buildings, translating into potential annual heating savings of 25% (Heisler, 1986).

Three trees properly placed around the home can save $100-$250 annually in energy costs. Shade from trees significantly mitigates the urban heat island effect – tree canopies provide surface temperature reductions on wall and roof surfaces of buildings ranging from 20-45°F and temperatures inside parked cars can be reduced by 45°F. Reducing energy use has the added bonus of reducing carbon dioxide (CO_2) emissions from fossil fuel power plants.

Introduction

Air Quality

Trees improve air quality in five fundamental ways:

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

Trees protect and improve air quality by intercepting particulate matter (PM_{10}), including dust, pollen, and smoke. The particulates are filtered and held in the tree canopy until precipitation rinses the particulates harmlessly to the ground. Trees absorb harmful gaseous pollutants like ozone (O_3), nitrogen dioxide (NO_2), and sulfur dioxide (SO_2). Shade and transpiration reduce the formation of O_3, which is created at higher temperatures. Scientists are now finding that some trees may absorb more volatile organic compounds (VOCs) than previously thought (Karl, T. 2010; Science Now, 2010). VOCs are carbon-based particles emitted from automobile exhaust, lawnmowers, and other human activities.

Carbon Dioxide Reduction

As environmental awareness continues to increase, governments are paying particular attention to global warming and the effects of greenhouse gas (GHG) emissions. As energy from the sun (sunlight) strikes the Earth's surface, it is reflected into space as infrared radiation (heat). Greenhouse gases absorb some of this infrared radiation and trap this heat in the atmosphere, increasing the temperature of the Earth's surface. Many chemical compounds in the Earth's atmosphere act as GHGs, including methane (CH_4), nitrous oxide (N_2O), carbon dioxide (CO_2), water vapor, and human-made gases/aerosols. As GHGs increase, the amount of energy radiated back into space is reduced and more heat is trapped in the atmosphere. An increase in the average temperature of the earth may result in changes in weather, sea levels, and land use patterns, commonly referred to as "climate change." In the last 150-years, since large-scale industrialization began, the levels of some GHGs, including CO_2, have increased by 25% (U.S. Energy Information Administration).

California's Global Warming Solutions Act (AB 32) passed in 2006 set the 2020 GHG emissions reduction goal into law. In December 2007, the California Air Resources Board (ARB) approved the 2020 emission limit of 427 million metric tons of carbon dioxide equivalent (CO_2). As of 2007, regulations require that the largest industrial sources of GHG must report and verify their emissions. In 2011, the ARB adopted the cap-and-trade regulation. Under a cap-and-trade system, an upper limit (or cap) is placed on GHG emissions. This cap can be applied to any source, industry, region, or other jurisdictional level (e.g., state, national, or global). Regulated entities are required to either reduce emissions to required limits or purchase (trade) emission offsets to meet the cap. In 2011, the ARB approved four offset protocols for issuing carbon credits under cap-and-trade, including the Forest Offset Protocol (ARB, 2011). This Protocol recognizes the key role forests play in fighting climate change. The USDA Forest Service Urban Ecosystems and Social Dynamics Program (EUP) recently led the development of an Urban Forest Project Reporting Protocol.

The Protocol, which incorporates methods of the Kyoto Protocol and Voluntary Carbon Standard (VCS), establishes methods for calculating reductions, provides guidance for accounting and reporting, and guides urban forest managers in developing tree planting and stewardship projects that could be registered for GHG reduction credits (offsets). The Protocol can be applied to urban tree planting projects within municipalities, campuses, and utility service areas anywhere in the United States. Trees and forests reduce atmospheric carbon dioxide CO_2 in two ways:

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

Trees and forests directly reduce CO_2 in the atmosphere through growth and sequestration of CO_2 in woody and foliar biomass. Indirectly, trees and forests reduce CO_2 by lowering the demand for energy and reducing CO_2 emissions from the consumption of natural gas and the generation of electric power.

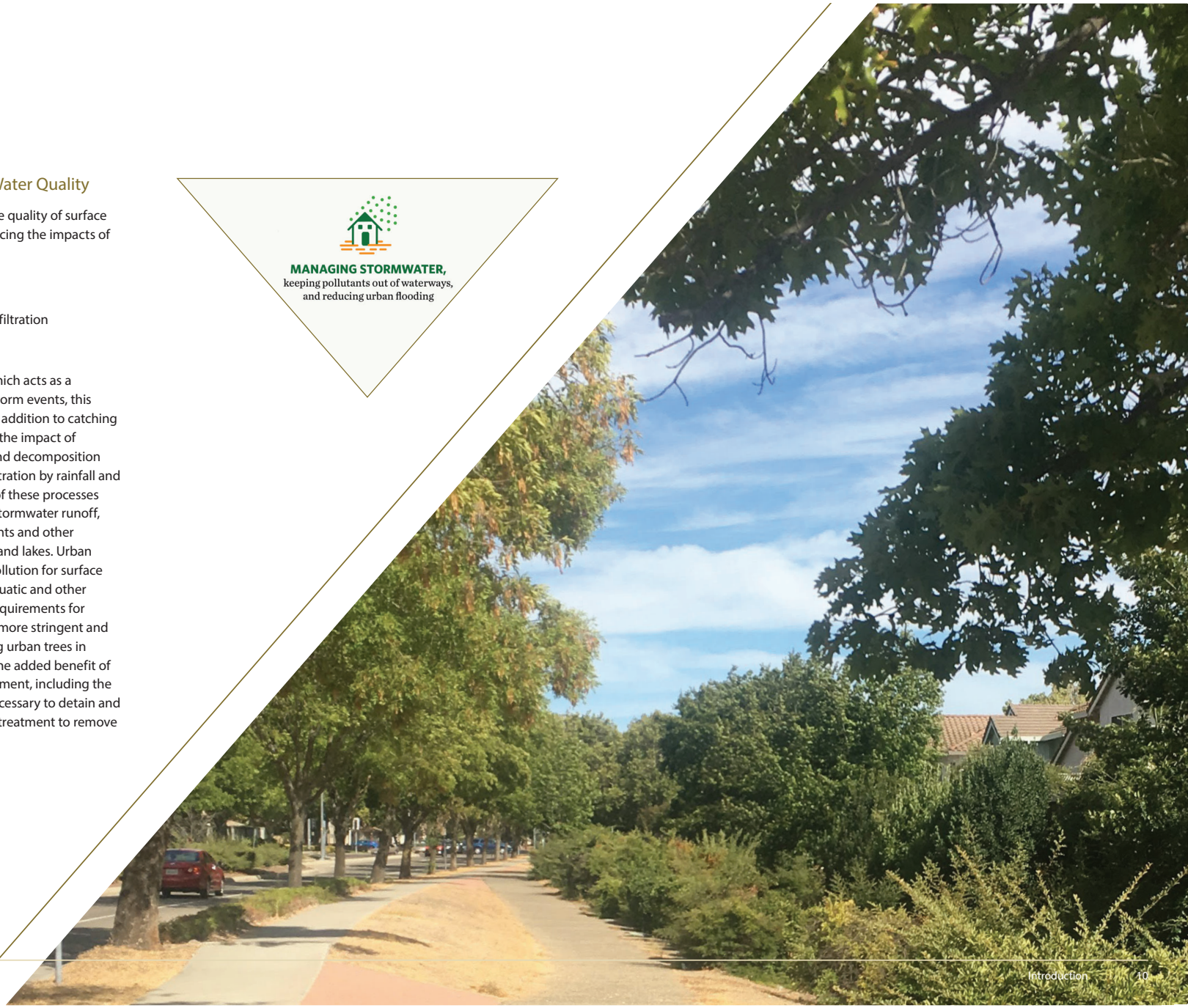
Stormwater Management and Water Quality

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

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

Trees intercept rainfall in their canopy, which acts as a mini-reservoir (Xiao et al, 1998). During storm events, this interception reduces and slows runoff. In addition to catching stormwater, canopy interception lessens the impact of raindrops on barren soils. Root growth and decomposition increase the capacity and rate of soil infiltration by rainfall and snowmelt (McPherson et al, 2002). Each of these processes greatly reduces the flow and volume of stormwater runoff, avoiding erosion and preventing sediments and other pollutants from entering streams, rivers, and lakes. Urban stormwater runoff is a major source of pollution for surface waters and riparian areas, threatening aquatic and other wildlife as well as human populations. Requirements for stormwater management are becoming more stringent and costly. Reducing runoff and incorporating urban trees in stormwater management planning has the added benefit of reducing the cost of stormwater management, including the expense of constructing new facilities necessary to detain and control stormwater as well as the cost of treatment to remove sediment and other pollutants.

MANAGING STORMWATER,
keeping pollutants out of waterways, and reducing urban flooding



REDUCING RATES
of cardiac disease, strokes, and
asthma due to improved air quality

Introduction

Health Benefits

Exposure to nature, including trees, has a positive impact on human health and wellness through improvements in mental and physical health, reductions in crime, and academic success.

A study of individuals living in 28 identical high-rise apartment units found residents who live near green spaces had a stronger sense of community and improved mental health, coped better with stress and hardship, and managed problems more effectively than those living away from green space (Kuo, 2001). In a greener environment, people report fewer health complaints, more often rate themselves as being in good health, and having better mental health (Sherer, 2003). Other research has revealed lower incidence of depressive symptoms in neighborhoods with greater access to green space (Jennings et al, 2016).

Tracy is susceptible to heat waves, which cause the most deaths worldwide out of any weather-related-natural disaster, with an estimated 12,000 deaths annually. Trees shade impervious surfaces and prevent the sun's rays from hitting them, thus reducing heat storage and later release, which contribute to the urban heat island effect. Tall trees that create a large shaded area are more useful than short vegetation. Trees also contribute to cooler temperatures through transpiration, increasing latent heat storage (the sun's energy goes to converting water from its liquid to vapor form), rather than increasing air temperature (sensible heat). According to a study conducted by the Nature Conservancy, it is estimated that trees have the potential to reduce summer maximum air temperatures by 0.9 to 3.6° F. Trees help to address public health concerns for both heat and air quality. Globally, an annual investment of $100 million in planting and maintenance costs would give an additional 77 million people a 1° C (1.8° F) reduction in maximum temperatures on hot days (McDonald et al, 2016).

A number of studies have examined the relationship between urban forests and crime rates. Park-like surroundings increase neighborhood safety by relieving mental fatigue and feelings of violence and aggression that can occur as an outcome of fatigue (American Planning Association, 2003). Research shows that the greener a building's surroundings are, the fewer total crimes. This is true for both property crimes and violent crimes. Landscape vegetation around buildings can mitigate irritability, inattentiveness, and decreased control over impulses, all of which are well established psychological precursors to violence.

Residents who live near outdoor greenery tend to be more familiar with nearby neighbors, socialize more with them, and express greater feelings of community and safety than residents lacking nearby green spaces (American Planning Association, 2003). Public housing residents reported 25% fewer domestic crimes when landscapes and trees were planted near their homes (Kuo, 2001). Two studies (one in New Haven, CT and the other in Baltimore City and County, MD) found a correlation between increased tree coverage and decreased crime rates, even after adjusting for a number of other variables, such as median household income, level of education, and rented versus owner-occupied housing in the neighborhoods that were studied (Gilstad-Hayden et al, 2015; Troy et al, 2012).

A 2010 study investigated the effects of exposure to green space at school on the academic success of students at 101 public high schools in southern Michigan (Matsuoka, 2010). The study found a positive correlation between exposure to nature and student success measured by standardized testing, graduation rate, percentage of students planning to go to college, and the rate of criminal behavior. This trend persisted after controlling for factors such as socioeconomic status and race or ethnicity. Conversely, views of buildings and landscapes that lacked natural features were negatively associated with student performance.

Wildlife

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

- Preservation and optimization of wildlife habitat
- Natural corridors for increased movement and dispersal

Furthermore, trees and forest lands provide critical habitat (for foraging, nesting, spawning, etc.) for mammals, birds, fish, and other aquatic species. Trees can offer pollinators a valuable source of flowering plants. By including an array of flowering trees that provide pollen and nectar in the urban forest, bees are provided with additional food sources. Increasing tree species diversity and richness contributes to greater numbers of bird species among urban bird communities (Pena et al, 2017). Wooded streets potentially function as movement corridors, allowing certain species—particularly those feeding on the ground and breeding in trees or tree holes—to fare well by supporting alternative habitat for feeding and nesting (Fernandez-Juricic E. 2000). Greater tree density also contributes to bat activity in urban environments and improves outcomes for birds and bats (Threlfall et al, 2016).

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

Calculating Tree Benefits

Communities can calculate the benefits of their urban forest by using a complete inventory or sample data in conjunction with the USDA Forest Service i-Tree software tools (itreetools.org). This open-source, state-of-the-art, peer-reviewed software suite considers regional environmental data and costs to quantify the ecosystem services unique to a given urban forest resource.

Individuals can calculate the benefits of trees to their property by using i-Tree Design (www.itreetools.org/design).

i-Tree™

If a London plane tree were planted and lived for 20 years, it would provide numerous environmental benefits including sequestering 4,023 lbs of CO_2 ($93.56), preventing 4,543 gallons of rainfall runoff ($40.59), and intercepting 20.7 lbs of air pollutants. If it were planted next to a building, it would save 1,923 kWh of electricity ($298.01).

I-TREE DESIGN

What do we have?

History of Urban Forestry in Tracy

In the late 1960's, the Public Works Department was established, which assumed responsibility for the care of street trees in Tracy. To address the cost of tree care and landscape needs for public landscaped areas throughout the City, Landscape Maintenance District (LMD) zones were established in 1985.

Storm events and periods of drought have had a noticeable impact on City trees. In 1968, nearly 324 trees were lost in a single storm, which resulted in clean-up efforts that lasted 24 hours a day for nearly a month. Tree losses also occurred during extreme wind and heavy rain events in 1997 and 2007. While Tracy continues to experience strong wind events, with improved routine maintenance and structural training of young trees, fatalities from storm events generally do not exceed 10 trees in any given storm event. Along with the increased maintenance needs for trees following strong wind events, persistent westerly winds cause a noticeable lean in many of Tracy's trees. In addition, trees have been widely used for windbreaks.

Drought has also made trees more prone to pests over the years. Most notably, Raywood ash (Fraxinus oxicarpus) have been more susceptible to Raywood Ash Canker (Botryosphaeria stevensii), which has contributed to the decline and removal of numerous City trees (Raywood Ash Canker and Decline, 2017).

Public Works is on track to plant more than 300 trees in 2019; however, tree plantings have mostly been sporadic and primarily done by request following removals. Over the years, numerous community groups have hosted tree planting events. However, Tracy did not experience consistent tree plantings until the first Arbor Day Celebration in 2015 where 15 trees were planted. In the following years, tree plantings at Arbor Day celebrations increased to well over 100 trees per year. In fact, in 2018, 156 trees were planted.

In 2016, a former council member and other community members collaborated with City staff to form the Tracy Tree Foundation (TTF). TTF aims to enhance, protect, and sponsor a healthy, beautiful, and safe urban and community forest. The importance of trees is noticeable through considerations for the inclusion of trees in the Community Character Element in the City's General Plan. In recognition of Tracy's commitment to trees, Tracy was officially recognized as a Tree City USA in 2015 and has sustained that status ever since.

Managers can regularly assess, evaluate, and indicate the current performance levels of the urban forest through a Sustainable Urban Forest Assessment Matrix. The current assessment can be found in Appendix G.

Urban Forest Resource

The development of the UFMP included an urban tree canopy (UTC) assessment. Tree canopy is the layer of leaves, branches, and stems of trees and other woody plants that cover the ground when viewed from above. Understanding the location and extent of tree canopy is critical to developing and implementing sound management strategies that will promote the smart growth and resiliency of Tracy's urban forest and the invaluable services it provides. The UTC assessment provides a bird's-eye-view of the entire urban forest and includes consideration of tree canopy along with other primary land cover, including impervious surface, bare soils, and water. This information helps managers better understand tree canopy in relation to other geospatial data, including:

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

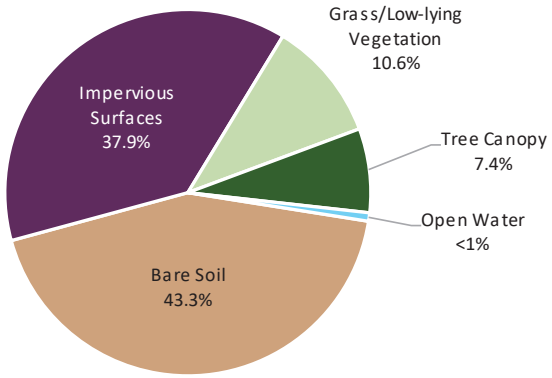
The analysis does not distinguish between trees on public and private property since the benefits of trees extend beyond property lines. The information can be used by urban forest managers to explore tree canopy in conjunction with other available metrics, including geography, land use, and community demographics. This information also establishes a baseline for assessing future change.

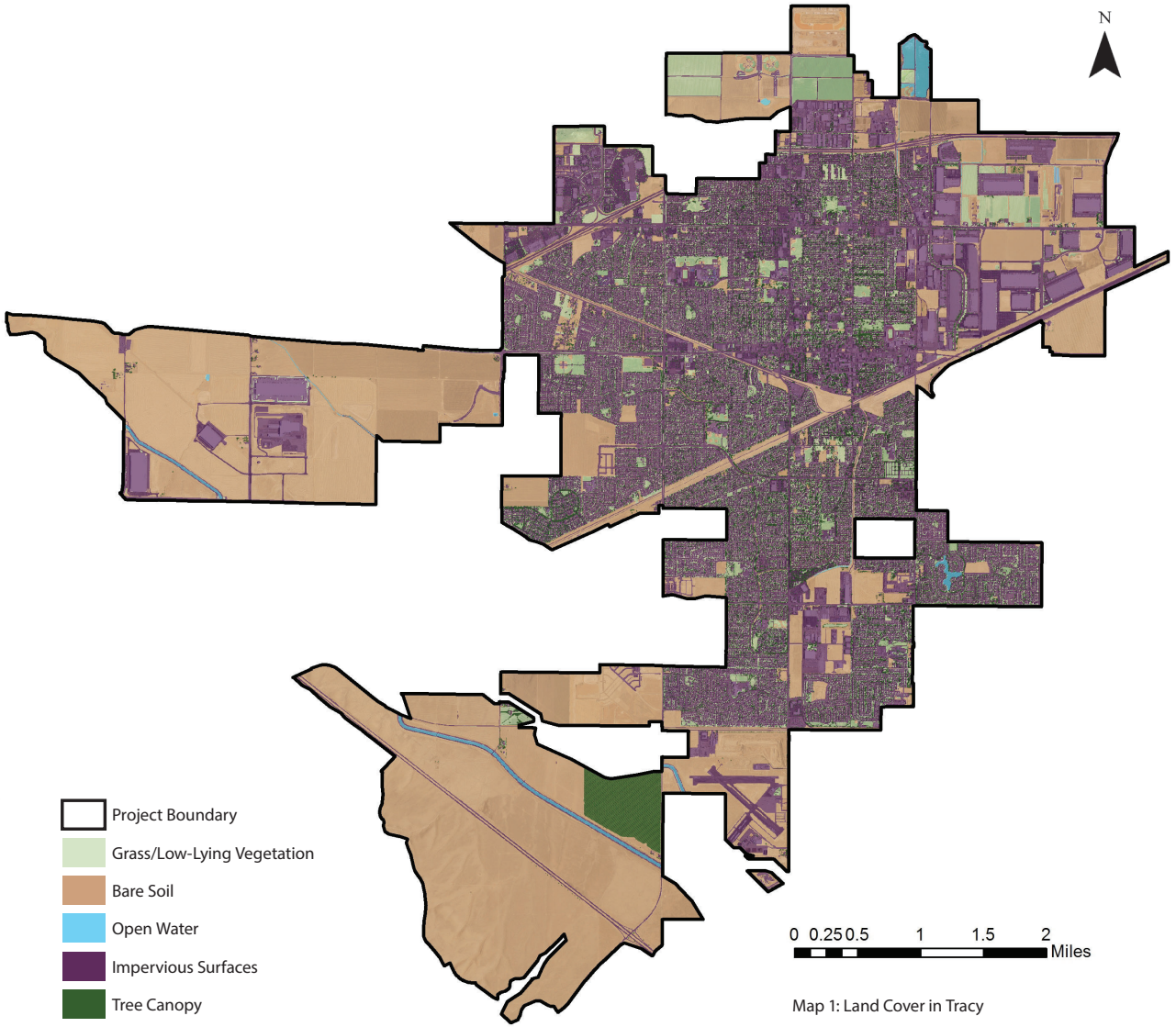
Tree Canopy

Land Cover Summary

The City encompasses approximately 26 square miles (16,615.9 acres). Excluding impervious surface (6,299.8 acres) and open water (123.2 acres), Tracy contains approximately 9.7 square miles (6,233.8 acres) which has the potential to support tree canopy. The following characterizes land cover within Tracy:

- 7.4% (1,233.1 acres) tree canopy, including trees and woody shrubs.
- 12.8% (1,123 acres) tree canopy on residential and park land use parcels.
- 37.9% (6,299.8 acres) impervious surface, including roads; parking lots, and structures.
- 79.4% of the urban forest canopy is in fair or better condition.
- A maximum potential canopy of 44.9%.
- Since 1993, canopy cover increased from 4.2% to 6.2% in 2010, or a 47.6% increase in canopy cover.



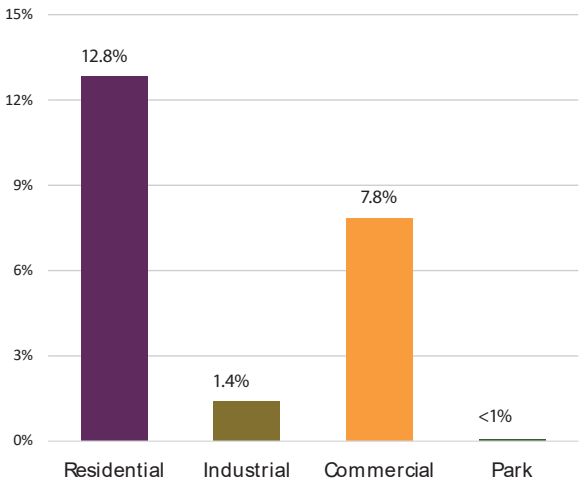


Map 1: Land Cover in Tracy

What do we have?

Tree Canopy by Land Use

The significant development of previous agricultural land and intensity of industrial and commercial properties misrepresents the percentage of tree canopy throughout the City, specifically the urban core. The urban core typically has a greater tree canopy coverage than the overall 7.4% throughout the City. The following divides the community into four land use classifications to help gauge the canopy cover in the central urban core of Tracy. If industrial and commercial areas and some select previously agricultural land is excluded, residential areas and parks combined make up nearly 9,080 acres with nearly 1,123 acres or 12.8%.



Map 2: Land Use Classes in Tracy

Tree Canopy by Parks

Tracy's 73 parks encompass over 248 acres. Among the top ten largest parks by acreage, Tracy Sports Complex and Plasensia Fields, the two largest parks, combined include 47.6 acres of land with 5.4% of tree canopy. The maximum potential UTC for both parks is lower than the next six parks, largely because Tracy Sports Complex and Plasensia Fields are primarily covered with ball fields.

The third largest park, Veterans Park; however, contrasts with the first two parks in that it encompasses 15.8 acres with 2.31 acres of tree canopy cover, or 14.6%, and a potential canopy cover of 65.8%. Ceciliani Park has the highest canopy cover among the top 10 largest parks, with 30.2% canopy cover (2.5 acres).

Overall, tree canopy covers 6.9% of parks. The assessment identified an additional 105.7 acres that could potentially support tree plantings, for a potential canopy cover of 49.4%.

Park Name	Acres	Canopy Acres	Canopy %	Potential Canopy %
Ceciliani Park	8.2	2.5	30.2	64.1
Lincoln Park	13.7	2.9	21.2	80.9
Dr. Powers Park	8.6	1.8	21.1	78.0
Gretchen Talley Park	6.7	1.3	19.8	83.4
El Pescadero Park	13.8	2.7	19.3	78.8
Veteran's Park	15.8	2.3	14.6	65.8
Clyde Bland Park	8.6	0.9	9.9	60.0
Tracy Sports Complex	26.8	1.5	5.4	5.8
Plasensia Fields	20.8	1.1	5.4	12.9
Tracy Ball Park	7.3	0.1	1.1	1.7
All other parks	118.0	23.8	20.1	73.8
All parks total	248.3	17.0	6.9	49.4

Map 3: Tree Canopy by Parks

What do we have?

Tree Canopy by Landscape Maintenance District

Tracy maintains 49 mini parks, over 220 acres in landscaping, over 28,000 trees, landscaped channel ways, and bike trails through a Landscape Maintenance District (LMD). The LMD consists of 41 zones, which are funded through an assessment that property owners pay with their property tax bill (Landscape Maintenance District, 2018).

Of these zones, Zone 36 has the highest canopy cover of 28.9%, followed by Zone 25 at 25.7%. Zone 33 is the largest with 941.4 acres and 11.0 acres of tree canopy, or 1.17%, and a potential canopy cover of 52.6%. Zone 41 encompasses 1.0 acres with nearly 0.2 acres of tree canopy, or 14.7%.

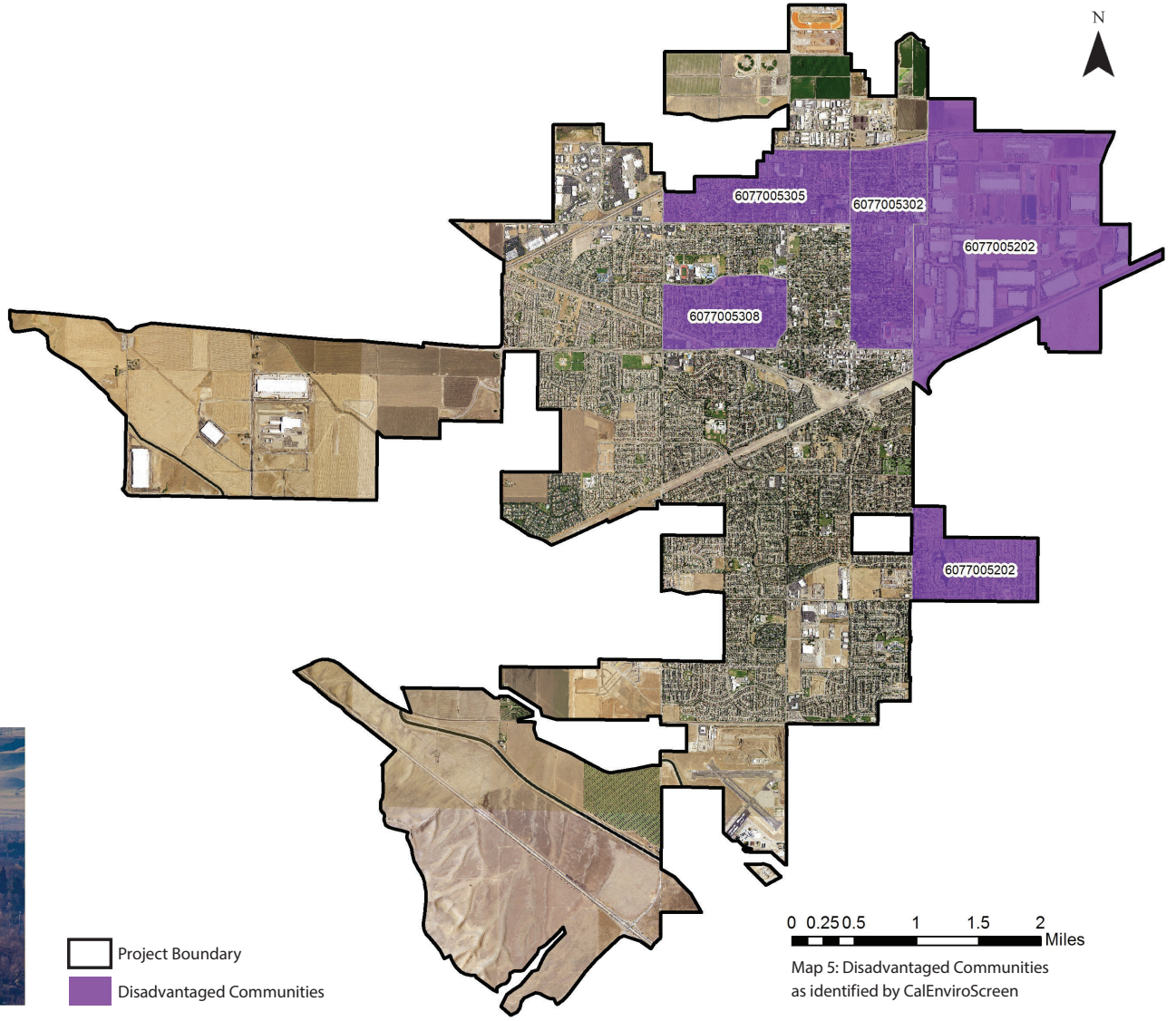
Map 4: Tree Canopy by Landscape Maintenance District

Tree Canopy by Disadvantaged Communities

California SB 535 targets disadvantaged communities for investment of proceeds from the state cap-and-trade program. Funding is aimed at improving public health, quality of life, and economic opportunity while reducing pollution that causes climate change. Disadvantaged communities are identified using the CalEnviroScreen tool (About CalEnviroScreen, 2019) to rank each of California's 8,000 census tracts with data on 20 indicators of pollution, environmental quality, and socioeconomic and public health conditions (Disadvantaged Communities, 2019). Disadvantaged communities are defined as the top 25% scoring areas from CalEnviroScreen along with other areas with high amounts of pollution and low populations (SB 535 Disadvantaged Communities, 2019).

Four census tracts in northeast Tracy have been identified as disadvantaged communities: 6077005302, 6077005305, 6077005308, and 6077005202. The UTC assessment analyzed canopy cover in conjunction with sensitive populations (health status and age) and socioeconomic factors (income) for these four census tracts. No correlation was found between those population characteristics and tree canopy cover.

Even though there were no correlations found, evidence shows that some of the pollution burdens that CalEnviroScreen considers in its analysis, like air quality, are positively impacted by trees.



Map 5: Disadvantaged Communities as identified by CalEnviroScreen

What do we have?

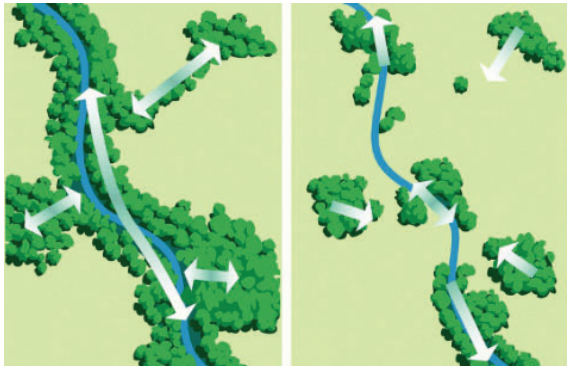


Figure 1: Canopy Fragmentation Comparison[1]

Figure 2: Historic change for tree canopy, impervious surface, and population

Forest Fragmentation

Forest fragmentation analysis can help managers understand the spatial distribution and connectivity of urban forests. Fragmented forests can significantly affect plant and wildlife populations, forest biodiversity and health (Nowak et al, 2005). Most of Tracy's urban forest is patch forest. This finding is logical because Tracy is located in the San Joaquin Valley, which originally had minimal tree presence. Like many cities in the valley, the arrival of humans and urban development led to an increase in trees.

Strategic planting near core areas can greatly benefit forest ecosystem function and increase wildlife habitat and corridors. The analysis found that Tracy's urban forest includes the following:

- 178.5 acres of Core Canopy (14.5%): Tree canopy that exists within and relatively far from the forest/non-forest boundary (i.e., forested areas surrounded by more forested areas).
- 0 acres of Perforated Canopy (0.0%): Tree canopy that defines the boundary between core forests and relatively small clearings (perforations) within the forest landscape.
- 1,039.7 acres of Patch Canopy (84.3%): Tree canopy of a small-forested area that is surrounded by non-forested land cover.
- 15.02 acres of Edge Canopy (1.2%): Tree canopy that defines the boundary between core forests and large core forests and large non-forested land cover features. When large enough, edge canopy may appear to be unassociated with core forests.

The wildlife of Tracy requires especially careful attention because the native wildlife is originally adapted to the historical prairie environment.

Historic Change

Historical change in tree canopy was assessed using a point sampling of canopy data derived from 1993 and 2010 imagery to determine change in canopy cover over 17 years. Land cover was visually inspected at each point for both years simultaneously and was identified as one of five classes: tree canopy, impervious surfaces, grass/shrub, bare soil, and open water. Tree canopy cover was analyzed using a "top-down" or "birds'-eye" approach, therefore where tree canopy visibly overlaps another land cover class, tree canopy was recorded at the point location.

From 1993 to 2010, tree canopy cover increased from 4.2% to 6.2%, which is a 47.6% increase (Figure 2). As identified in this analysis canopy cover for the overall community identified in this analysis is 7.4%. In comparison to 1993 the estimated canopy cover from the point sampling is 4.2%, this is a 76.3% increase over a 17-year period. Contributing factors to the increase in tree canopy include:

- Trees have been added to the community resource through tree plantings.
- New construction included new trees on public and private parcels.
- Community members have planted new trees on private property.
- Existing trees and new trees continue to increase in size and leaf surface.

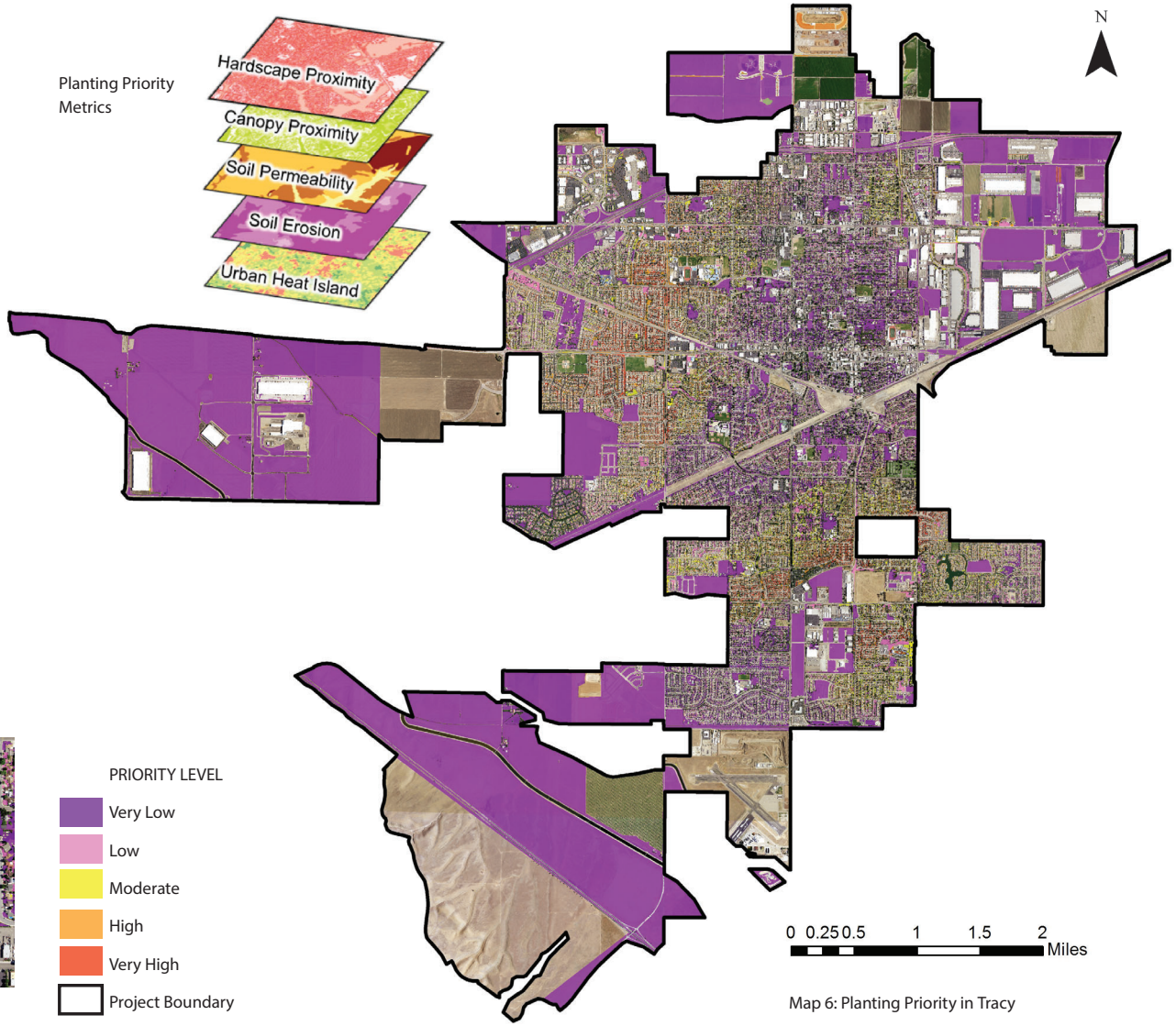
[1]Wildlife corridors (far left) link habitats while fragmented

Priority Planting

To identify and prioritize planting potential, DRG assessed environmental features. It could be assumed that all pervious areas, including grass, shrubs, low-lying vegetation, and bare soil (10,728 acres) are potential tree planting locations. Realistically, not all of these areas are suitable planting sites due to intended site uses (e.g., agricultural fields, sports fields, developments) and because some of these areas are not appropriate for tree planting. Potential plantable areas can be determined by excluding pervious areas that are unsuitable for planting and including impervious areas where trees could feasibly be added, such as in parking lot islands, along sidewalks, and near road edges.

The UTC analysis considered site design and environmental factors, including proximity to hardscape, canopy fragmentation, soil permeability, slope, and soil erosion factors to prioritize planting sites on both public and private property for the greatest potential return on investment. The analysis identified 6,207 acres of potential planting areas in Tracy, where 249 of these acres are high or very high priority planting areas. This analysis provides a snapshot of current conditions, where some existing young trees may not be fully accounted for. The UTC analysis prioritized potential planting areas with GIS remote sensing. Site visits are necessary to determine suitability and the actual number and location of planting sites. The potential canopy cover for Tracy is estimated to be 44.9%, which considers potential planting area (6,207 acres) and existing canopy (1,233 acres).

Priority Planting Close-Up



Map 6: Planting Priority in Tracy

What do we have?

Community Tree Resource

Community trees (publicly managed trees along City streets and in City parks) play a vital role in Tracy. They provide numerous tangible and intangible benefits to residents, visitors, and neighboring communities.

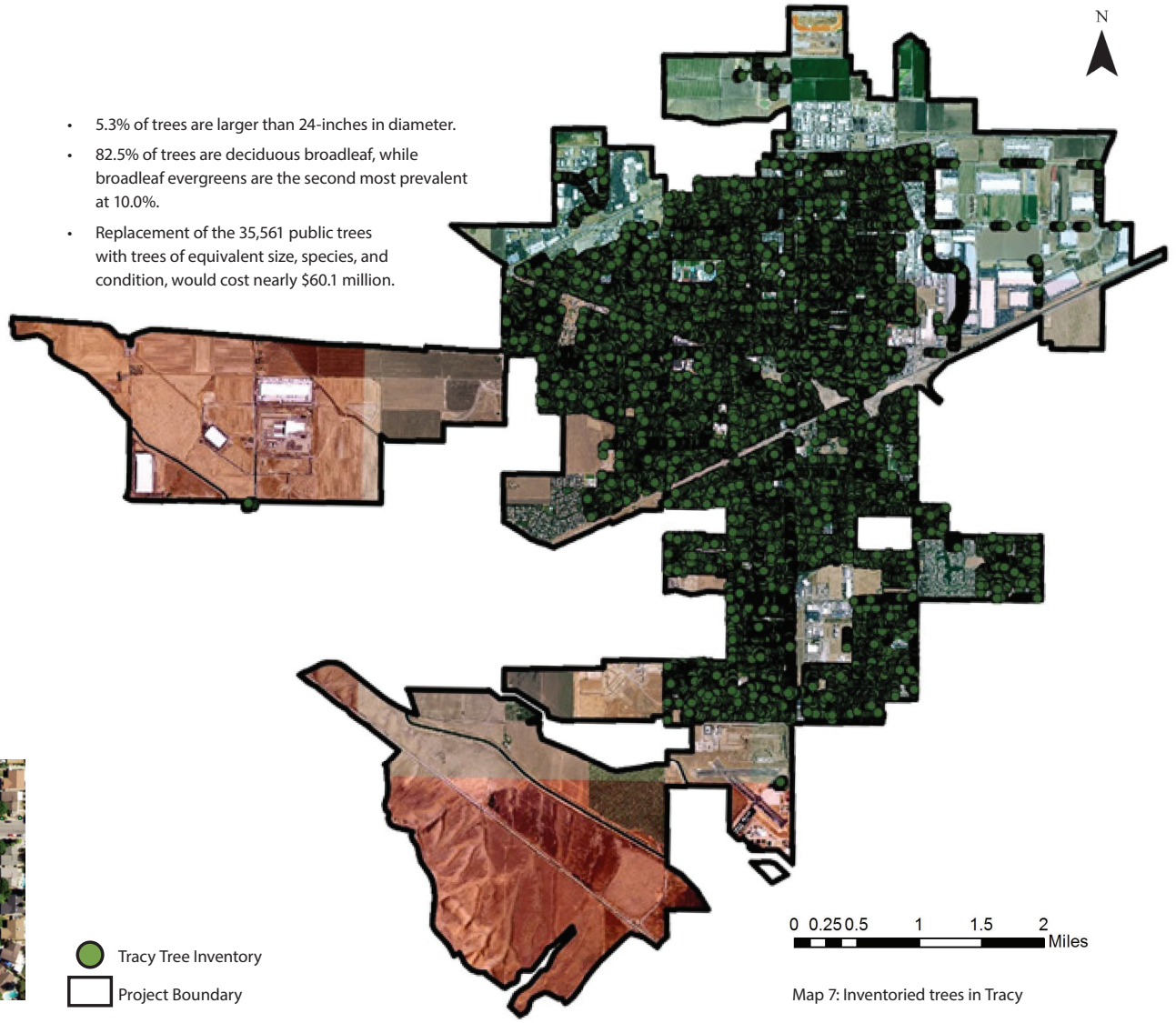
The City recognizes that public trees are a valued resource, a vital component of urban infrastructure, and part of the City's identity. As of 2018, the public inventory includes 35,561 trees on streets and parks, although many trees were not included in the original inventory and more trees have been planted since its completion.

Structure

A structural analysis is the first step towards understanding the benefits provided by these trees as well as their management needs. As of 2018, Tracy's community tree resource includes 35,561 trees and 191 unique species. Considering species composition and diversity, relative age distribution (diameter at breast height, DBH[2]), canopy coverage, and replacement value, DRG determined that the following information characterizes the community tree resource:

- Among all trees, the predominant species are flowering pear (Pyrus calleryana, 10.1%), Chinese pistache (Pistacia chinensis, 9.3%), and Raywood ash (Fraxinus angustifolia, 8.1%).
- 71.0% of trees are less than 12-inches in diameter.
- 5.3% of trees are larger than 24-inches in diameter.
- 82.5% of trees are deciduous broadleaf, while broadleaf evergreens are the second most prevalent at 10.0%.
- Replacement of the 35,561 public trees with trees of equivalent size, species, and condition, would cost nearly $60.1 million.

[2] DBH: Diameter at Breast Height. DBH represents the diameter of the tree when measured at 1.4 meters (4.5 feet) above ground (U.S.A. standard).



Map 7: Inventoried trees in Tracy

Species Diversity

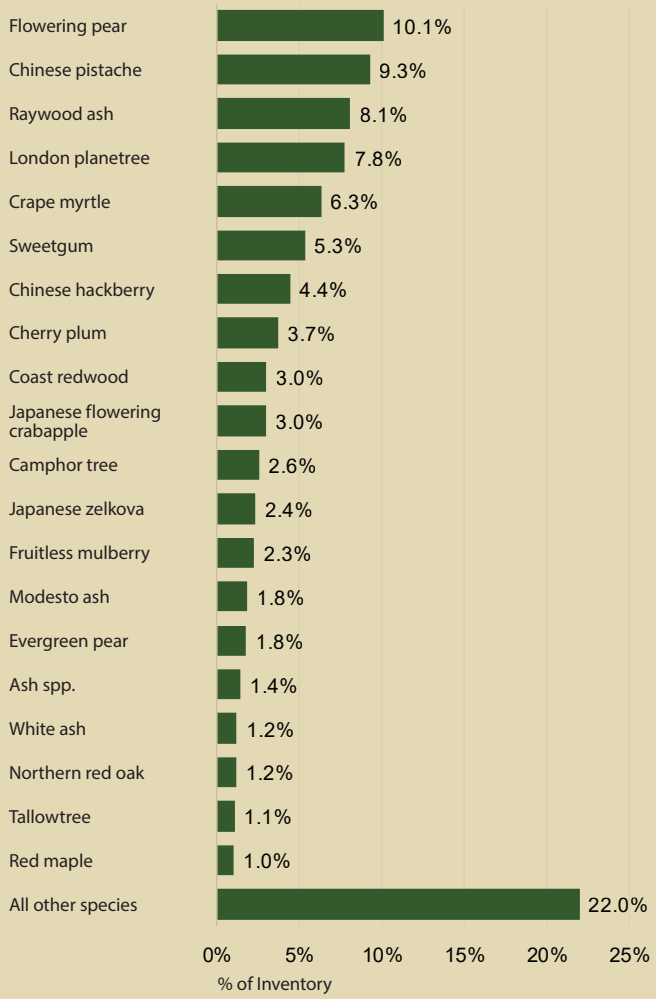
Maintaining diversity in a public tree resource is important. Dominance of any single species or genus can have detrimental consequences in the event of storms, drought, disease, pests, or other stressors that can severely affect a public tree resource and the flow of benefits and costs over time. Catastrophic pathogens, such as Dutch elm disease (Ophiostoma ulmi), emerald ash borer (Agrilus planipennis), Asian longhorned beetle (Anoplophora glabripennis), and sudden oak death (Phytophthora ramorum) are some examples of unexpected, devastating, and costly pests and pathogens that highlight the importance of diversity and the balanced distribution of species and genera. In addition to these pests there is growing concern for polyphagous shot hole borer (PSHB) (Euwallacea sp.), a new pest that has devastated urban areas in Southern California due to its wide host range, including avocado (Persea americana) and boxelder (Acer negundo) (Eskalen, 2015).

The 10-20-30 rule of thumb is a widely used standard that states that an urban tree population should consist of no more than 10% of any one species, 20% of any one genus, and 30% of any one family (Clark et al, 1997). The rule encourages greater genetic diversity, and thus, greater resilience. Considering significant pests and diseases, many cities are now opting to increase diversity to improve resilience.

The top five most prevalent species in Tracy represent more than 41.6% of the overall population, including: flowering pear (Pyrus calleryana, 10.1%), Chinese pistache (Pistacia chinensis, 9.3%), Raywood ash (Fraxinus angustifolia, 8.1%), London planetree (Platanus x acerifolia, 7.8%), and crape myrtle (Lagerstroemia indica, 6.3%). The prevalence of flowering pear exceeds the 10% genetic diversity rule.

Future plantings should focus on increasing diversity and reducing reliance on overused species. As over-predominant species are removed and replaced, new species should be introduced when possible. New species should be resistant to the known pest issues that currently pose a threat to the region.

Figure 3: Most Prevalent Species in Tracy



What do we have?

Age Distribution

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

The urban forest's age distribution is a key indicator and driver of maintenance needs. With Tracy's public tree resource (excluding palms), the age distribution reveals that 38% of trees are 12 inches or less in diameter (DBH) and 5.3% of trees are larger than 24 inches DBH.

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

6,881 trees (24.3%) in the inventory are young (<6 inches DBH) medium and large-stature tree species that still have a lot of growing to do before they reach maturity. Training, defined as the selective pruning of small branches to influence the future shape and structure of a young tree, is critical at this stage to prevent costly structural issues and branch failures as these young trees mature into their final size in the landscape.

61.8% in the inventory are of intermediate age with a diameter between 7 to 24 inches. Similarly, the younger trees would benefit from structural pruning.

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

5.3% of the inventory are mature with diameters greater than 24 inches. When trees reach mature stature, they provide the greatest benefits. However, mature trees should be regularly assessed for health and risk factors as they approach or reach the end of their natural lifespan. They may have higher maintenance needs or require removal to reduce risk and liability.

Canopy from Public Trees

The amount and distribution of leaf surface area are driving forces behind the public tree resource's ability to produce benefits for the community (Clark et al, 1997). As canopy cover increases, so do the benefits afforded by leaf area. Tracy covers an area of approximately 26 square miles (16,615.9 acres). i-Tree estimates that public trees are providing 0.7 square miles (424 acres) of canopy cover which accounts for 3.0% of total land area.

Benefits Versus Investment

Trees in Tracy's community trees (public trees) provide an estimated 424 acres of canopy, approximately 3.0%. To date, trees in the community tree resource have sequestered 1,580 tons of carbon (CO_2) is avoided through decreased energy use, valued at $23,698.

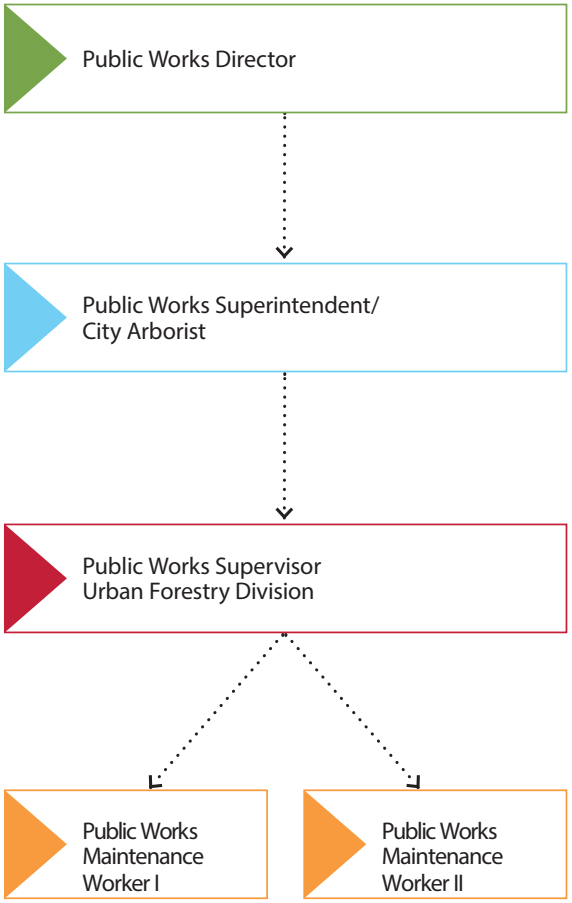
Annually, public trees provide nearly $5.4 million overall benefits to the community at an average value of $150.47 per tree. These benefits include:

- $727,347 in energy use (reduction, electricity and natural gas) through shading and climate effect, an average per tree benefit of $20.46 per tree.
- $16,171 trees in sequestered atmospheric CO_2 (1,078 tons), an average per tree benefit of $0.45.
- $368,567 in air quality improvements, an average of $10.37 per tree.
- $140,123 in intercepted stormwater (18 million gallons), an average of $3.94 per tree.
- $4.1 million (76.2%) are related to aesthetic and socio-economic benefits, an average of $114.70 per tree.

Considering the estimated annual budget of $1.4 million currently invested to manage the community tree resource, the net annual benefit (benefits minus investment) to the community is $43.4 million. In other words, for every $1 invested in the community trees, Tracy receives $3.81 in benefits.

If a cork oak were planted and lived for 20 years, it would provide numerous environmental benefits including sequestering 1,818 lbs of CO_2 ($42.27), preventing 1,480 gallons of rainfall runoff ($13.23), and intercepting 13.6 lbs of air pollutants. If it were planted next to a building, it would save 2,160 kWh of electricity ($333.71).

I-TREE DESIGN



Urban Forestry Operations

Tracy's Urban Forestry Division operates under the direction of the Public Works Department. The Urban Forestry Division has been understaffed in recent years, which has resulted in a backlog of service requests.

Urban Forestry Division staff are responsible for the care of 35,561 trees funded by the General Fund and the Landscape Maintenance District (LMD). Services provided by the Urban Forestry Division include:

1. Tree Pruning
2. Tree Removals
3. Stump Grinding
4. Biomass Disposal and Utilization
5. Tree Planting
6. Tree Protection
7. Pest Management
8. Community Outreach and Engagement
9. Leaf Pickup (via Solid Waste and Recycling Division)
10. Emergency Response and Risk Assessment

Services

Tree maintenance involves the inspection, tree risk assessment, preservation, trimming, removal, stump grinding, and planting of trees along city streets and city property. Street tree staff estimate that nearly 70% of tree maintenance is performed by contractors.

Residents can request service for their City tree by contacting the Public Works Department by phone, in person, or through the City internet Government Outreach Program.

Requests are tracked through the City service management system and are addressed based on priority. Public safety concerns identified by staff or through service requests are prioritized first. Other service requests are addressed on a case-by-case basis and dependent on operational funding availability. Similarly, to street trees, park tree maintenance is prioritized by public safety concerns, service requests, and operational funding availability.

Appendix D summarizes the prioritization of tree maintenance tasks and associated courses of actions to maintain public safety as well as protect and preserve a tree whenever possible.

The City currently uses an inventory management program that is managed by City staff and operated through the City contractor. Field staff and contract crews update the inventory management program through mobile tablet devices.

Trees within the property boundaries of homeowner's associations (HOA) are cared for by the HOA. The City has no role in the care or the inspection of the work performed on trees within these areas, unless specifically identified in a separate agreement.

The Urban Forestry Division is working to expand plant health care operations to include fertilizer applications and expansion of the use of plant growth regulators to improve plant health and reduce hardscape conflicts with tree roots and canopy.

What do we have?

Tree Pruning

The City approaches tree maintenance from a public safety perspective and prioritizes clearance and visibility, followed by structural pruning. Tracy uses both contractors and a small in-house crew to maintain City trees. The Urban Forestry Division has a 60-foot boom truck with a tow behind chipper. Parks has another small chipper designated for parks use. The small tree crew primarily respond to initial service requests, small removals, hanging limbs, and sign clearance concerns. These two staff are supervised by the City Arborist.

The primary contractor has worked with the City for nine years and the work performed by the contractor is regularly inspected and reviewed by Street Tree staff to regularly communicate expectations and ensure the use of BPMs on City trees. Like the in-house forestry crew, contractors are scheduled based on priority, first addressing public safety concerns followed by preventive maintenance. In addition to regularly scheduled tree maintenance, contractors are available to support tree maintenance needs for emergency response or storm events.

Ideally, tree maintenance should be scheduled based on the City grid system. Grid pruning allows for efficient scheduling and ensures that all City trees are regularly inspected and pruned to promote tree health and prevent structural defects. Grid pruning primarily has been used for scheduling contractor pruning operations, but with revisions to grid pruning maps will provide structure for in-house crew operations, with the goal to provide tree maintenance for public trees on a five to seven-year cycle, depending on the availability of funding. To improve communication with property owners and increase the efficient use of resources, city staff are working to develop a grid pruning cycle, complete with mapping.

Tree Removals

Similarly, to pruning, tree removals are prioritized by public safety. Small removals can be managed by the in-house tree crew, but most large removals will be addressed by the City contractor.

Stump Grinding

Urban forestry has a stump grinder and performs approximately half of all stump grinding operations, with the other half conducted by the City contractor.

Biomass Disposal and Utilization

Whenever feasible, the City diverts wood chip debris from landfills by utilizing wood chips as mulch in City parks and around City facilities.

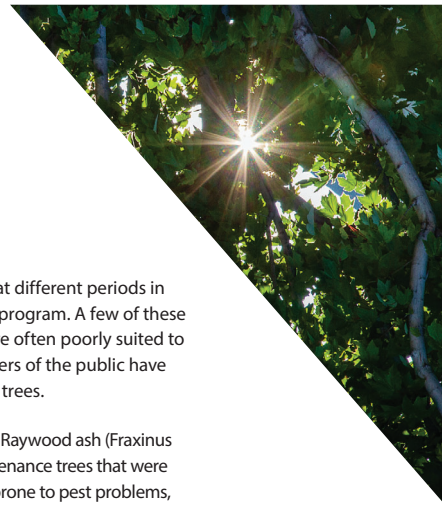
Tree Planting

Tracy's current tree planting budget is $30,000. Funds are used to plant trees on Arbor Day, as well as to replace trees upon request.

When trees are removed the City will replace the tree when funding is available. If a planting site is determined to be unsuitable for tree planting, an alternative location will be selected.

As a result of a prolonged period of drought, tree planting has been limited to new construction projects in the last seven years. Because of limited funding and staffing, only small planting projects can be coordinated through contractors and available City staff. Larger planting projects are made possible through collaboration with local nonprofits and through volunteers.

Recently, Tracy was awarded a grant, through Cal Fire, to fund the "Tracy Trees for Tomorrow" project to plant 634 trees over the next three years (CAL FIRE Urban and community Forestry CCI Grant Awards 2016/2017). As a result of the grant, the City has been working to plant 634 trees in areas designated within the City as populations that are disadvantaged.



Right Tree, Right Place

Some species were planted heavily at different periods in the history of Tracy's urban forestry program. A few of these species are costly to maintain and are often poorly suited to the local climate. Thus, some members of the public have developed a negative perception of trees.

Flowering pear (Pyrus calleryana) and Raywood ash (Fraxinus oxycarpa) are examples of high maintenance trees that were planted historically. Both species are prone to pest problems, as well as heaving sidewalks, and dropping nuisance fruit. With prolonged periods of drought, pests and storm events have exacerbated the maintenance needs for both species.

As a result of the high maintenance costs associated with these two species and their over representation in the public tree population (flowering pear, 10.1% and Raywood ash, 8.7%), the City has mostly stopped planting them. In addition to poor species selection, unsuitable planting locations have resulted in conflicts with overhead utilities, heaving sidewalks, water meters, and fire hydrants. In some cases, large stature trees were planted in spaces that prohibited canopy growth and often result in the removal of trees prematurely. Conversely, in some locations, small stature species were planted in sites that could have accommodated larger trees.

Going forward, the City has elected to plant tree species that are more appropriate for the region (i.e. drought-tolerant) and installing them in planting sites where trees are less likely to conflict with utilities and hardscape. Urban Forestry Division staff are actively seeking tree species that are well suited to the local climate. They are coordinating with the Engineering Division to review site plans and make recommendations to avoid planting trees where future conflicts with infrastructure may arise and to maximize the potential benefits of the tree through choosing the right tree species for the right planting site.

Irrigation

Although irrigation is not explicitly defined as required maintenance, water is critical to tree health. Despite recent relief from a few relatively wet winters, California is still considerably dry and the central valley in particular generally experiences low average rainfall (~14 inches per year in Tracy) and extended periods without precipitation. The effects of our most recent drought will have a noticeable impact on Tracy's trees for years to come. Supplemental irrigation will continue to be a necessity if trees are to remain healthy and robust.

While state regulations restrict the irrigation of turf during watering restrictions, many residents are unaware that trees are exempt from these restrictions except under the most extreme conditions (MWELO). It is important to provide adequate water to trees during periods of drought. Turf and other small plants can be more easily replaced once drought conditions subside. However, if a tree dies and needs to be replaced, it can take 10 to 20 years before mature tree benefits are restored by a newly planted tree. Trees that do not receive adequate water are also more likely to be attacked and succumb to pests and disease. Continued outreach and education about the responsibilities of property owners for the care of neighborhood trees and irrigating under water restrictions is crucial for supporting the health of trees.

City trees along major arterials, in center medians, at City facilities, and in parks are irrigated through irrigation systems with a valve that is separate from other landscape components. The separate irrigation system allows trees to be irrigated even when there are water restrictions.

Tree Protection Zones (TPZ)

Roots are a critical part of tree anatomy. They provide access and transport for water and other nutrients that support the growth of the tree. Roots also provide anchorage and foundational support for the above ground portion of the tree. Tree roots spread out over large areas and often well beyond the dripline and most roots are concentrated in the upper 12 to 36 inches of soil. As such, roots are vulnerable to disturbance, which can have an immediate and direct impact on tree health. Tree roots are especially at risk for damage during construction.

Construction and redevelopment are inevitable, but with foresight and planning trees can be preserved through Tree Protection Zones (TPZ). The TPZ is an area where the storage of construction materials and equipment, construction activities that may result in mechanical damage, and equipment
traffic are prohibited within the Critical Root Zone (CRZ). The CRZ according to Best Management Practices is defined at the area of soil extending from the tree trunk where roots required for future tree health and survival are located.

Pest Management

At this time, there are no major active threats to Tracy's urban forest. However, like any urban forest, Tracy has a few pest problems, which are primarily addressed and controlled on a case-by-case basis, but including:

Fire Blight

Fire blight (Erwinia amylovora) is a bacterial disease that can invade all parts of pear trees (Elkins et al, 2017). Symptoms include wilting, blackening, and death of shoots, flowers, and fruits. If infections on the plant are not removed, the disease can spread to the main branches, trunk, and roots. The bacteria can spread from rain, insects, and pruning cuts.

Street Tree staff identified fire blight as one of the most damaging pests, due to the species prevalence in the City tree inventory. Fire blight infestations are addressed on an individual tree basis and does not have a formal treatment program.

Raywood Ash Canker

Fraxinus oxycarpa 'Raywood' commonly is affected by Raywood ash canker. Although trees usually are not killed, severely affected ash are often removed because of unsightly dieback, reduced shading, and their potential limb drop hazard (Raywood Ash Canker and Decline, 2019). Raywood ash was originally believed to be drought tolerant but a canker causing fungus (Botryosphaeria stevensii) has been noticeably impactful on drought stressed trees. These trees are apparently less drought tolerant than previously believed. Watering and pruning to thin canopies and reduce transpiration demand may improve the performance of Raywood ash. The long-term management strategy for this pest is reduced plantings of the species and managing infested trees on a case-by-case basis, dependent on funding.

Mistletoe

Broadleaf mistletoe (Phoradendron macrophyllum) is an evergreen parasitic plant that grows on a number of landscape tree species in California (Perry, 2006). In Tracy, mistletoe is a common occurrence. The City does not have a specific management program for managing this pest. Management primarily is controlled through the removal of infested branches.

What do we have?

Invasive Pests and Diseases

While there currently are no major pest or disease organisms impacting trees in Tracy, there are a few emerging concerns in other areas of California and the U.S that have the potential and likelihood to affect Tracy's urban forest (public and private trees) in the future. Because many pests and disease pathogens are species specific, it is critical to promote and maintain a high degree of species diversity. This ensures that when a major pest or disease outbreak occurs, overall tree loss is minimized along with the costs associated with treatment, tree removal, and the loss of environmental benefits.

For example, polyphagous shot hole borer (PSHB) and Kuroshio shot hole borer (KSHB) are two invasive, wood-boring beetles, which together are known to affect 110 species of trees (Avocado: Polyphagous Shot Hole Borer and Kuroshio Shot Hole Borer, 2017). Currently the closest known infestation of either insect is in Ventura County, which is over 300 miles away; however, research suggests that there is potential for the pest to spread to northern California (Distribution of PSHB/FD and KSHB/FD in California, 2019). Multiple tree species in Tracy are vulnerable to these invasive pests.

Similarly, Citrus Greening (Candidatus liberibacter asiaticus), a bacterial disease that causes bitter, hard fruit production, is very concerning as it threatens the viability of California's citrus crops. While citrus species represent less than 1% of Tracy's public tree population, there are many citrus trees on private property. Due to quarantines in place to protect California's citrus crop, infected trees must be destroyed and disposed of appropriately (Grafton-Cardwell et al, 2019).

Citrus greening, PSHB, and KSHB are all confirmed to be in California, but another pest of concern that is currently not found in California is the emerald ash borer (EAB) (Agrilus planipennis). As of October 2018, EAB has been detected in 35 states and has contributed to the death of hundreds of millions of ash trees in North America (Emerald Ash Borer Information Network, 2019). The closest state with EAB is Colorado, but with a highly mobile human population, movement of infested ash trees through firewood, logs, branches, nursery stock, chips, or other ash materials this pest could be a future problem for Tracy's urban forest. Considering that more than 8% of Tracy's community tree population (public trees) are Raywood ash, with other ash species included in the inventory of trees, EAB could easily contribute to the death of more than an eighth of the public tree population.

Although, most of these invasive pests and diseases are not currently a problem for Tracy's trees, it is likely that one or all of these pests will be a problem in the future. It is important to take steps now to reduce the potential impact of an infestation. The primary focus should be to increase the diversity of the urban forest through new tree plantings; especially avoiding the use of ash species to decrease the potential effects of EAB. Secondly, many pests target trees in poor health first. Best Management Practices for reducing the impacts of pest and disease focus on optimizing tree health and prompt removal of trees that are in decline. Through regular inspections of trees, infestation can likely be detected early, which can in turn prompt a quick response to manage the pest and avoid further movement of a pest, as much as possible.

What is honeydew?

Shade is highly coveted during hot 100-degree days in Tracy and residents park their cars in the shade of trees to manage the heat. It is not uncommon for car owners to return to their vehicle and find it covered in a sticky film. This substance, commonly called honeydew, is the excrement, or frass, of aphids, soft scale, or other soft-bodied insects. These insects feed on the phloem of plants (Cranshaw, 2018). The phloem is the part of the vascular system which moves sugars and other metabolites produced in the leaves down to the roots. Because these insects are primarily consuming sugar, the waste that is produced is also mostly made up of sugars. The honeydew from these insects drips off the leaves of a tree and onto anything beneath the canopy of the tree.

Aside from the nuisance of the sticky residue, honeydew also is strongly associated with black sooty mold. When honeydew drips onto sidewalks, spores of numerous species of fungi germinate on the honeydew producing black fungal strands (mycelial threads), which give a sooty appearance to the sidewalk or any other surfaces where the honeydew encouraged colonization (Cranshaw, 2018).

Generally, aphids and sooty mold do not harm trees, and more often than not are nuisance pests. In an effort to manage the undesirable aesthetics and mess from aphids and consequently, sooty mold, the Urban Forestry division has purchased a tree injector system to reduce aphid populations in street trees through chemical applications. In addition to setting regularly application schedules, trees with higher aphid populations are being avoided for future street tree plantings.

Leaf Pickup

In the fall, typically from November through January, the Public Works Department coordinates a City-wide leaf pick up program. Residents are asked to fill totes with yard waste and place the containers on the curb on scheduled days. When yard waste exceeds the capacity of the tote, excess leaves can be swept into a pile in the street (away from the gutter to allow water flow). Tracy Disposal will pick up the piles of leaves on the regular garbage collection day.

Community Outreach and Engagement

Community outreach and education are an important component of the urban forestry program. The engagement of residents in issues relative to public trees ensures that the community has an appreciation for the value and benefits of the urban forest. Engagement of residents also increases their understanding of the program and resources that are required to support its vitality and sustainability.

The Urban Forestry Division relies primarily on door hangers to communicate with residents about tree maintenance. The city website has a page that features information specific to trees and landscape maintenance. The page explains the differences in funding and maintenance between the General Fund and LMD Tree Divisions. In addition, the webpage features several links to resources, including the approved Street Tree Species list, Municipal Codes relevant to trees, tree care information for trees at planting and maturity, and additional information about the General Fund and LMDs.

Arbor Day events and other tree related events are advertised through the city's social media platform (e.g., Facebook, Twitter, Instagram, etc.).

"The planting of a tree, especially one of the long-living hardwood trees, is a gift which you can make to posterity at almost no cost and with almost no trouble, and if the tree takes root it will far outlive the visible effect of any of your other actions, good or evil."

GEORGE ORWELL

What do we have?

Emergency Response and Risk Assessment

The Federal Emergency Management Agency (fema.gov) recommends that an emergency response plan identify the goals and objectives for emergency response, define expectations for response team members, and identify any regulations that apply (e.g. OSHA, fire code, etc.) (2014). An Emergency Response Plan should include considerations to mitigate the potential for disasters, as well as define steps for preparedness and response.

According to Title 1, Division 4, Chapter 8, Section 3100 of California Government Code states that public employees are Disaster Service Workers and are subject to such disaster service activities as may be assigned by their superiors or emergency service commanders (2016). The term "public employees" includes all persons employed by the state or any county, city, city and county, state agency or public district.

Tracy's Municipal Code, Title 7, provides considerations for emergency maintenance of utilities in the event of conditions which endanger life or property.

Storm events and other natural disasters can result in damage to trees. Tracy is prone to destructive strong winds and other storm events that result in loss and damage to trees. During such events, high winds can dislodge small branches and limbs and have toppled whole trees. All of which can interfere with emergency crews and disrupt essential services. Forestry staff has a role in assisting with clearing hazards, debris, and ensuring timely restoration of essential services. When storm events result in downed trees and limbs, Public Works staff are responsible for clearing debris from streets, sidewalks, and facilities to ensure safe passage for emergency vehicles and responders. Following storm events, forestry staff respond to other downed trees and limbs in less critical areas (e.g. parks) and visually inspect trees for damaged and/or hanging branches.

In preparation for future emergencies and natural disasters, Tracy has identified numerous funding mechanisms to support response efforts, including:

- Clearance of channel ways and utilities is funded through solid waste
- Approximately 15% of LMD and General Fund provide additional support for cleanup efforts

In readiness, Public Works staff are on a rotational, stand-by schedule for emergency response. For events that occur outside of normal operations, the person on stand-by is the lead. If events occur during normal operation, leadership defaults to normal managerial hierarchy. Stand-by or on-call personnel can call additional staff as needed. Public Works has established an after-hours crew that has been trained in the use of chainsaws, chippers, and aerial lifts. All after-hours crew members are trained on necessary equipment. During emergency events, all staff are considered mandatory reporters. In
some circumstances, communications may be down. Staff are equipped with cell phones and some city vehicles have radio systems which are more reliable and generally unaffected. Policy for catastrophic events dictates that city staff ensure their own personal safety and the safety of their family and then report to the Public Works corporation yard. The responsibility for coordination of resources during storm and emergency response falls under the assigned Superintendent. During multi-day events, supervisors work to schedule relief to improve worker safety and allow for adequate rest. While emergency response policies are generally understood, the Department would benefit from an emergency response handbook that clearly communicates protocol, responsibilities, and practices to promote compliance and provide a reference for staff.

Initial staging for storm and emergency events is conducted at the Public Works corporation yard where maintenance equipment is readily available. During events, debris is taken directly to the City waste facility or temporarily stored at other City facilities. Following emergency response, temporary storage areas are cleared as quickly as possible.

Storms are variable and impacts on the urban forest can range from minimal to severe. In most instances, in-house crews are able to manage the workload. However, in severe storm events, when very large trees are involved, or where there is significant potential for damage to property, the City uses contracted services to assist. When fallen trees and branches are in contact with overhead or downed power lines, the City notifies the affected utility and contracts with specially trained, line-clearance contractors when appropriate. Field staff prioritize safety and are responsible for determining which activities are contracted out during emergency events. Historically, approximately 60% of emergency related activities have been performed by contractors.

Residents can report non-emergency tree damage through the City's non-emergency phone line, online service request program, or call Public Works and submit a service request during normal operating hours. Forestry staff will inspect trees for risk and respond accordingly during regular operational hours.

Emergency responders (e.g., fire, police) communicate through emergency dispatchers for downed trees and limbs affecting emergency response. Main arterial roadways and emergency facilities receive the highest priority. To better facilitate future response, Public Works is coordinating with the Fire Department to prioritize critical areas and to develop corresponding community-wide maps. At times, the City's non-emergency phone line is overwhelmed with calls. Procedures to handle high-call volumes are currently under review to improve efficiency and response times.

To increase resilience in the urban forest to wind and other storm events, forestry staff address structural issues during regular maintenance cycles. Reducing weight on extended branches, removing dead wood, and correcting poor branching structure reduces the likeness of limb and tree failure in high winds and major storms.

Funding

Summary of Annual Operations and Funding

Currently, tree maintenance is funded through the General Fund and Landscape Maintenance Districts (LMDs).

Tree Operations Budget

Annual Planting	$30,000
Annual Pruning	$500,000
Tree Removals, Stump Grinding, and Disposal	$300,000
Irrigation and Establishment	$1,000
Annual Price of Repair/Mitigation of Infrastructure Damage	$30,000
Annual Price of Litter/ Storm Clean-up	$180,000
Average Annual Litigation and Settlements due to Tree-Related Claims	$2,753
Annual Expenditure for Program Administration	$200,000
Annual Expenditure for Inspections/ Answer Service Requesters	$150,000

General Fund and the Landscape Maintenance Districts

In 2019, the General Fund experienced cuts, which resulted in the loss of funds for tree maintenance. This loss of funds reduced contractor pruning operations for grid pruning, which is critical for maintaining public safety and sustaining public tree health and benefits. The General Fund is subject to increases and decreases with economic fluctuations and instances where there is a loss of funds for tree care, not all cyclical maintenance can be addressed. The General Fund is not typically used to supplement tree maintenance in the LMD.

Tracy has 42 LMD zones, which fund 49 mini parks, 220 acres of landscaping, landscaped channel ways, bike trails, and high-use arterial roads. Currently there are 25,842 trees within the LMD.

The LMD is funded through assessments, paid by property owners through property taxes and similarly to the General Fund are vulnerable to changes in the economy. In the past, some LMD zones were not established with sufficiently high assessments, resulting in disparities in funding and in the level of maintenance between neighborhoods. In addition, high maintenance trees, such as, flowering pear (Pyrus calleryana) and Raywood ash (Fraxinus oxycarpa) are more heavily planted in some zones, putting a considerable strain on the budget for those areas.

Many trees along main arterial roadways are maintained through the LMD. However, these areas are broadly used by the community and forestry managers are evaluating the feasibility of other funding mechanisms.

Landscaped channel ways are historically underfunded. As a result, tree maintenance is often deferred and many trees are overgrown or are encroaching on adjacent properties. It is important to maintain these channels to ensure they are free of debris and plant material that would hinder stormwater flows and increase the potential for flooding in the event of heavy precipitation. Dedicated funding for channel way maintenance, can help ensure that clearance and flow potential are maintained.

What do we have?

Partners

Interdepartmental

Parks Division

The Parks Division is responsible for the maintenance of turf and landscaped areas. Trees within parks are cared for by the Urban Forestry Division.

Parks and Community Services Commission

The Parks and Community Services Commission, a council-appointed membership of seven residents with Tracy city limits, communicates with the Public Works Department to address public safety concerns and other maintenance tasks for trees within City parks both in the General Fund and the LMD.

"The UFMP can help by establishing clear standards for species selection, replacement, maintenance, planting, locations both throughout the City and where on each lot/parcel"

UNKNOWN STAKEHOLDER

Development Services Department - Engineering Division

The Engineering Division in coordination with the Urban Forestry Divison, is responsible for the approval and final inspection of the installation of trees and other landscape material within the public right-of-way and for Capital Improvement Projects. Specific plans outline the specific design specification for subdivisions. Engineering also ensures compliance with the Americans with Disabilities Act and coordinating with Urban Forestry Division to address trees that are creating conflict with sidewalks.

Engineering coordinates with the City Arborist to identify tree related issues within construction projects, including identifying trees that are suitable for preservation and coordinating tree protection around those trees on construction sites. Engineering coordinates with the City Arborist to inspect design plans for the inclusion of different species. Upon review by the City Arborist, the City Engineer may approve the species selection and placement of those trees according to city design standards. In instances where species are not listed on the approved species palette list, the City Arborist can use their discretion for the approval of such species. Following installation of landscape, a City landscape inspector is responsible for inspecting if landscape materials were installed according to the design plan. However, Engineering staff report that while developers may install landscape material according to design plans, homeowners frequently alter the design after purchasing a property, including removing trees in the right-of-way.

In addition to reviewing and providing recommendations for designs, the City Arborist coordinates with Engineering staff to identify and inspect TPZs for construction projects.

Planning Division

The Planning Division is primarily responsible for enforcing zoning ordinances and reviewing and inspecting projects on private property. While there is no Municipal Code that protects trees on private property, community members have prompted the protection of large trees on prominent construction projects. In such events, Planning Division staff has sought the recommendations of the City Arborist for solutions for tree protection.

Public Works Department- Street and Sidewalk Maintenance Division

Street and sidewalk repairs that involve street trees are coordinated with the City Arborist to inspect work to support tree health.

Fire Department

The Fire Operations Division's goal is to maintain a constant state of readiness to respond and protect against injury, loss of life, and/or property damage caused by fire, medical, and emergencies when needed.

The Department coordinates with the Public Works Department during storm or emergency events to manage debris from trees and to maintain accessibility for emergency response crews. In addition, the Department is prepared to respond to wildland urban interface (WUI) areas where residential development meets with open space and natural wilderness areas. Although Tracy does not currently have any neighborhoods that might be classified as WUI, the Tracy Hills development will require active management of the natural areas adjacent to homes. The Department coordinates with Public Works staff to manage ladder fuels in areas vulnerable to fire.

Community Partners

Pacific Gas and Electric

In California, all utility providers are subject to General Order 95; Rule 35 Vegetation Management (California Public Utilities Commission, revised 2012) and FAC-003-2 Transmission Vegetation Management (NERC) which outlines requirements for vegetation management in utility easements. These requirements include clearance tolerances for trees and other vegetation growing in proximity to overhead utilities.

Trees located under utility lines should be directionally pruned by trained, authorized line clearance personnel only to provide clearance and/or reduce height. Selecting small-stature tree species that are utility friendly for planting sites in utility rights-of-way can minimize the need for these maintenance activities.

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

Non-profit Tree Advocacy

The Tracy Tree Foundation (TTF) was founded in 2016, with strong support from the City, to educate the public on the benefits of trees and coordinate tree plantings. They also encourage the preservation of trees within Tracy.

In response to community interest in hiking and biking, the Tracy Nature Park Advocates was founded by numerous community members. This group advocated and petitioned for the creation of a nature park, which would provide numerous hiking and biking trails.

Community non-profit groups, like the Tracy Tree Foundation and the Tracy Nature Park Advocates, are valuable partners for the City. Not only do community non-profit groups serve as strong advocates on the behalf of trees and green space, but they also provide a strong network of volunteers. Volunteers have been and will continue to be critical to the success of Arbor Day and other tree planting events. Furthermore, volunteer-led education and outreach activities will be critical for promoting the preservation of private trees and enhancing the urban forest. Tracy Nature Park Advocates

What do we have?

Policy and Regulation

City policies and regulations provide the foundation for the Urban Forestry Division. They outline requirements and specifications for the planting, installation, and care of Tracy's public trees. They also provide the regulatory framework for the protection and preservation of the urban forest assets as well as the enforcement of activities and issues that impact the community's trees. The development of Tracy's Urban Forest Management Plan included a comprehensive review of City policies, development and construction standards, ordinances and other regulations that apply to the urban forest. The following provides a summary of the review process and key findings.

Federal and State Law

California Urban Forestry Act

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

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

Public Park Preservation Act

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

Migratory Bird Treaty Act

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

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

Endangered Species Act

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

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

Model Water Efficient Landscape Ordinance

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

California Senate Bill No. 606 and No. 1668

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

California Solar Shade Act

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

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

Tracy Municipal Code

The Tracy Municipal Code includes ten Titles that provide considerations for trees:

Title 2 Administration Provides definitions for professional or consultant services, including tree trimming.

Title 3 Public Safety Provides considerations for graffiti control as it relates to trees, as well as, removal of obstruction to traffic including by trees. Requires the reporting of damage to trees to Police following an accident.

Title 4 Public Morals, Welfare, and Conduct Prohibits the posting of handbills on trees along streets in the City.

Title 5 Sanitation and Health Provides important rules regarding leaf pickup that is provided by the City in the winter months.

Title 6 Business, Professions, and Trades Provides considerations for the Downtown Incentive Program for off-street improvements, following approval by the City, applicant agrees to make the improvement to street trees and tree wells/grates with are located in the public right-of-way fronting a property must meet City Standards.

Title 7 Public Works Establishes the Parks and Community Services Commission and authorizes provisions for violations of Title 7, but allows the City to seek additional relief, including recovering for the value of the damaged or removed tree.

Provides definitions for relevant terms for trees and tree maintenance activities and the role of the director and gives the director authority to inspect, maintain, remove, replace street trees, and require property owners to maintain privately planted trees that interfere with the growth and health of street trees, including the use of dust reducing agents that are hazardous or detrimental to the health of trees. Title 7 also defines the director's role and authority in the application process for tree removal permits.

Title 7 prohibits the mutilation or impairment, or destruction of City trees and provides that the City is not responsible for tree maintenance in areas not within the City. Prohibits the planting of trees in public areas without permission. Title 7 authorizes maintenance of trees if interfering with public utility and prior to maintenance on public utility, agencies are required to get permission from the director if a street tree may be damaged but provides exceptions for emergencies.

Title 8 Finance, Revenue, and Taxation Provides exceptions for cable providers to trim trees to prevent contact with wires, cables and other equipment on public and private property.

Title 10 Planning and Zoning Designates the type and number of trees that are approved by the director for parking areas and requires a certain number of trees with reasonable spacing per parcel. The Title refers to City of Tracy Specification Standards for planting standards. The Title establishes the vision clearance for corner lots for street trees at least eight feet above the established grade of the curb and requires the use of trees and other methods to shield visible parking areas of parking garages and around drill sites.

Title 11 Public Utilities Provides selection criteria for trees in landscape design plans and requires that where feasible, trees should be irrigated by separate valves from other landscaped areas.

Title 12 Subdivisions Requires that subdivisions should be designed to limit the removal of non-production (trees that do not produce fruit or nuts) and should be accurately denoted on development plans. Any recommendations to remove a tree due to defects or disease must be supported by a report from a licensed arborist, with additional recommendations for proposed grading within a certain number of feet within the dripline of any saved tree.

Design Standards

Revised every 5 years, Tracy's Design Standards provide landscape standards, including shade tree requirements, for sites adjacent to freeways, parking lots/areas, lighting, buildings over 50,000 square feet, outdoor spaces, and landscaped areas. The Design Standards also provide considerations for the use of trees for screening, large trees for shading, drought tolerant trees, and tree box filters for bioretention and redirection of runoff.

Guiding Documents

Tracy General Plan 2011

The General Plan provides a vision for the future and establishes a framework for how Tracy should grow and change over the next two decades. The Community Character Element within the General Plan includes language about the incorporation and inclusion of trees in the urban landscape. According to the General Plan, trees should be planted along all residential streets, along the I-205 Commercial Area, parking lots in Village Centers, areas within Corridors, on the south and west sides of new buildings or buildings being renovated, and riparian corridors.

Tracy Sustainable Action Plan 2011

Tracy's Sustainability Action Plan is a detailed, long-range strategy to achieve sustainability in the sectors of greenhouse gas (GHG) emissions, energy, transportation and land use, solid waste, water, agriculture and open space, biological resources, air quality, public health, and economic development. The Plan encourages the strategic placement of trees with the intent for cooling pavements. The municipal tree planting subsection within the Plan identifies the goal of planting 33 acres of healthy trees by 2020, with each acre consisting of 35 to 40 trees in order to encourage carbon sequestration.

Standard Specification (2008)

Title 10 refers to the City's Standard Specification for planting guidelines for the installation of parking lot trees; however, the document does not have any guidelines or standards for planting street trees.

What do we have?

Conclusions

The City currently has an inventory of 35,561 public trees, with more trees being removed or planted every day. The Resource Analysis summarizes the composition of this community resource. The urban tree canopy assessment provides a land cover layer that identifies the location and extent of existing canopy (public and private), establishes a baseline for monitoring overall tree canopy cover throughout the community, and augments the City's GIS database. Additional protections for private trees would promote the preservation and protection of some large or unique tree species. A well-trained and dedicated City Arborist and forestry staff provide leadership and expertise and promote stewardship of the urban forest. All of this provides the foundation and tools necessary to make meaningful and effective management choices and illustrates the investment that Tracy has made in its urban forest. The information provides a basis for developing community goals and urban forest policies and establishes benchmarks for measuring the success of long-term planning objectives over time.

The City has ample capacity to increase the urban forest given an existing canopy cover of 12.8% and a potential for nearly 45%. Areas slated for development (residential and commercial) will eventually represent a mixture of land cover that includes both hardscape (impervious surface) and tree canopy. It is important to recognize that impervious surfaces and canopy cover can co-exist in many instances, especially with the incorporation of appropriate design standards. Canopy that extends over hardscape features, including parking lots, streets, and structures can add to the overall amount of canopy cover and reduce the ratio between canopy cover and impervious surfaces. In addition, shade provided by tree canopy can demonstrably extend the lifespan of materials used in the construction of hardscape features (McPherson, et al, 2005). Another opportunity for expanding tree canopy cover is through private property, where trees can provide direct benefits to residents.

Stakeholder interviews and a review of operations identified a number of opportunities and challenges facing Tracy's urban forestry program over the next couple of decades. Potential issues include maintaining adequate resources (staffing, funding, and equipment), increasing forest resiliency, inventory management, revisions to Municipal Code, and the partnership with the Partnerships with local nonprofits.

The City aims to provide service to public trees through five to seven-year maintenance cycles. The City Arborist ensures that contractors and Urban Forestry Division staff follow best management practices and industry standards, including standards for safety and professional training.

The Urban Forestry Division has two staff and has experienced periods of time where positions with the division were vacant. As a result, the Division has been working to fulfill high volumes of open work orders. Therefore, preventative maintenance is largely restricted based on available funds. With a small in-house tree crew and a contract tree care company, the care of public trees is currently reactive, focused on clearance pruning and response to hazardous and emergency situations. However, the program pruning cycle that began in recent years is having a positive effect. Additionally, high maintenance trees are concentrated in LMD zones, some of which have fewer resources than the General Fund, and as such require more frequent maintenance to maintain clearance and minimize risk. Urban trees are a living resource that benefit from timely maintenance to address health and safety needs and encourage strong structure. Proactive inspection and maintenance promote tree longevity, maximizes benefits, and helps manage risk potential.

Increasing interdepartmental coordination for planning and resource sharing promotes greater efficiencies for urban forestry operations. Collaboration with Engineering staff during revisions for Design Standards allows for considerations for planting sites. Greater consideration should be given to adequate soil volume, minimum dimensions, and alternative designs, all of which would improve environmental conditions for trees and support community canopy goals.

The urban forest is a living resource subject to environmental and cultural stressors, including pests, disease, extreme weather and climate change, pollution, and accidental damage. While it is impractical to protect and preserve every tree, actions and strategies that increase overall resilience can ensure that the community continues to receive a stable flow of benefits. Strategies for increasing forest resilience include increasing species diversity, planting the right tree in the right place, regular inspection and maintenance, and management of pests and disease. While the city must still contend with the planting decisions of the past, moving forward, forestry is focused on selecting species that are better suited to the local climate, drought tolerant, and more resilient to potential pest threats. It is also vital to provide sufficient funding to support the tree throughout its lifetime.

A complete inventory of public trees and a comprehensive inventory management system are vital components for urban forest management. Ideally, trees that were not included in the original inventory will be added and include the location, species, condition, and size (DBH). An updated inventory and updated data metrics for existing trees in the inventory will allow managers to track tree history, create work orders, and create grid-based pruning cycles. This will improve program efficiency and provide information to support funding requests and for programming work tasks.

In Tracy, according to Municipal Code, it is unlawful to damage or remove any tree planted or maintained by the City in right-of-way or planting easements, unless a person obtains a permit through the City. However, the fines for violations of Municipal Code are based on Street Tree Removal Criteria, which may not reflect industry's current standards for the true replacement value of a tree. Additionally, enforcement of the Municipal Code can be challenging. The urban forest webpage should continue to provide important links and fact sheets that summarize key messages for maintaining and preserving all trees.

Community support for the urban forest is critical for sustainable programming and the realization of long-term goals. Engaging community members through workshops, online resources, and volunteer projects engenders a greater sense of ownership and stewardship for the urban forest. In partnership with the Tracy Tree Foundation urban forestry staff have a great opportunity to promote the urban forest on private property through coordinated outreach activities and materials. While this partnership presents a great opportunity for facilitating community engagement and educational activities, leadership changes at TTF have led to some instability in the partnership and the City should continue to explore other opportunities with local non-profits.

Since 2015, Tracy has achieved Tree City USA status, reflecting the City's commitment to responsibly care for trees through tree care ordinances, dedicated funding, and annual observances of Arbor Day. Beyond this recognition, city staff are motivated to innovate the existing urban forestry program and ensure that the urban forest is preserved and protected for future generations. With prolonged periods of drought and an increasing risk of introduced pests and disease pathogens, park staff are acutely aware of the challenges and potential vulnerabilities that urban trees face. Because the urban forest is a dynamic, growing, and ever-changing resource, it requires sound and proactive management to fully realize its maximum potential.

What do we want?

To better understand how the community values the benefits of the urban forest resource and to provide residents and other stakeholders an opportunity to express their views, The Tracy Tree Foundation and other community and City staff stakeholders were engaged through multiple outreach efforts to gather input on content and recommendations contained in the UFMP.

Stakeholder Outreach

While it may not be their primary focus, many individuals and departments within the City share some level of responsibility for the community urban forest, including planning for, caring for, and/or affecting the policy of urban forest assets. City Partners were invited to participate in an interview and discussion about their role and perspective for the urban forest as well as their views, concerns, and ideas for the UFMP. These interviews provided important information about the current functions of the Urban Forestry Division and potential areas for improvement. Concerns, requests, and suggestions from all stakeholders were of primary interest and were provided full consideration in the development of the UFMP.

Key stakeholders were invited to provide insight into the current state of the urban forest. Participants identified challenges and opportunities for the urban forest, as well as, helped to create a consensus for the goals of the UFMP.

Stakeholders included:

- Engineering Division
- Planning Division
- Parks Commission
- Public Works Staff
- Tracy Tree Foundation (TTF)
- Tracy Nature Parks Advocates

Challenges and opportunities identified through the stakeholder interview process include the following:

1. Additional outreach and engagement is needed
2. Forestry is underfunded, resulting in reactive maintenance
3. Increasing species diversity will lead to greater resilience in the urban forest
4. Future tree planting should focus on planting the right tree in the right place for greater benefits and cost savings
5. Review and revise Municipal Code to address the challenges facing the urban forest

"Educate civic leaders and citizens about the benefits of trees and to advocate for the urban forest."

UNKNOWN STAKEHOLDER

Community Meetings

A meeting was held on May 1, 2019 from 6:00 p.m. To 7:30 p.m. at the Tracy Transit Center. The meeting was advertised through social media, city emails, and the city website. The meeting was attended by 18 community members, six of which were city staff.

The meeting included a presentation about the community's urban forest and current program status. Following the presentation, attendees participated in a discussion and planning session to identify goals and objectives for the UFMP. Attendees were asked to provide their expectations for public tree maintenance and locations for additional tree plantings. Participants were also asked to share their opinions on the types of education and outreach, the best opportunities for providing educational materials and outreach activities, the professional licensing requirement for tree care providers within the city, protections for private trees, and collaboration opportunities.

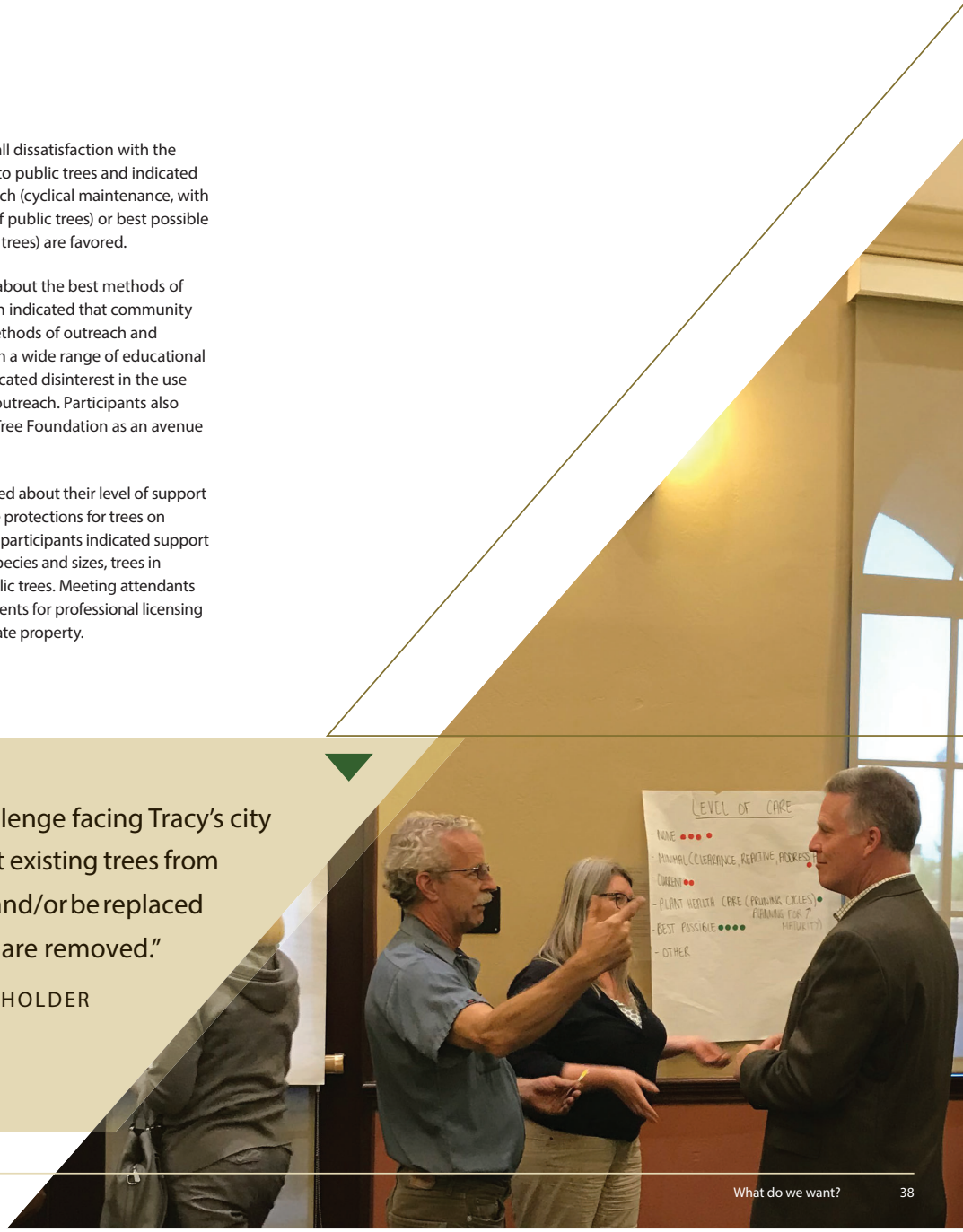
Community meeting participants overwhelmingly expressed interest in learning more about the Sacramento Tree Foundation Greenprint Initiative to adopt a 35% canopy goal. They did not support a goal of no net loss (to maintain the current level of 12.8% canopy cover). Similarly, the majority favored additional plantings along streets and medians, parks and open space, commercial and industrial areas, but did not support opting for no additional plantings of trees.

Most participants indicated overall dissatisfaction with the current level of service provided to public trees and indicated a plant health care-based approach (cyclical maintenance, with regular inspection and pruning of public trees) or best possible care (structural training of young trees) are favored.

Questions posed to participants about the best methods of outreach and topics for education indicated that community members appreciate multiple methods of outreach and engagement and are interested in a wide range of educational topics; however, participants indicated disinterest in the use of door hangers for educational outreach. Participants also expressed support for the Tracy Tree Foundation as an avenue for outreach and education.

Community participants were asked about their level of support for ordinances that would provide protections for trees on public and private property. Most participants indicated support for protections for trees specific species and sizes, trees in parking lots, native trees, and public trees. Meeting attendants indicated opposition for requirements for professional licensing for tree care professionals on private property.

> "The biggest challenge facing Tracy's city trees is to prevent existing trees from being cut down and/or be replaced when they die or are removed."
>
> UNKNOWN STAKEHOLDER



What do we want?

Plans, Goals and Actions

Based upon a review of the current Urban Forestry program and resources, and collaborative input from the community and other stakeholders, the UFMP identifies five goals and eight existing policies that support and represent what Tracy residents, stakeholders, and staff want for the future of Tracy's urban forest. These goals, and the strategies that support them, are intended to optimize the management of the city's community forest in an efficient, cost-effective, sustainable, and safe manner. The Plan identifies three major areas of focus:

1. Grow, maintain, preserve, and enhance a sustainable urban forest
2. Optimize the environmental, social, economic, and public health benefits of trees and canopy
3. Align urban forest management policy with community expectations and cost efficiency

Grow, maintain, preserve, and enhance a sustainable urbanforest

The urban forest provides numerous benefits to the community. Although it might be tempting to plant as many trees as possible, it is important to grow and enhance the urban forest in a sustainable manner. It is important to ensure not only that trees are planted, but also that they can be maintained throughout their lifetimes.

Goal 1: Preserve trees whenever possible.

Trees take a long time to grow and the benefits that they provide increase as they mature. Therefore, tree removals should be avoided whenever possible to ensure all trees provide the maximum potential benefits. Trees that pose an unacceptable risk to public safety or the overall urban forest shall be removed and replaced with a suitable species.

Goal 2: Reach 40% canopy cover by 2040.

Tracy has the potential to support nearly a 45% canopy cover. However, with development and constraints on funding, the City should first work towards a goal of 40% canopy cover over the next 20 years.

Existing Policy 1: Plan for trees.

When proper consideration is given to planting trees, future removals can potentially be avoided. Selecting the right tree right tree for The right place increases the ability for a tree to reach maturity and ensures that it has ample space for canopy and root growth.

Existing Policy 2: Foster current partnerships with local non-profits and continue to explore opportunities with additional non-profit groups.

Growing, maintaining, and educating the greater community about the benefits of the urban forest are greatly enhanced through the partnership with local nonprofits.

Existing Policy 3: Promote the longevity of trees as a public resource.

Like all living things, trees have a finite lifespan, though some are longer lived than others. Managers have an important role in reducing mortality rates through proactive tree maintenance practices.

Optimize the environmental, social, economic, and public health benefits of trees and canopy

Trees are a valuable community asset and an integral part of the infrastructure. The environmental, social, economic, and public health benefits provided by trees and canopy are directly related to the distribution of leaf surface and tree canopy. As trees mature, the benefits that are provided to the community increase.

"As a comprehensive document, the UFMP can define and illustrate the course from the present state of the urban forest toward the ultimate goal of a well-appreciated, sustainable, enviable urban forest."

T. ROCHA

Goal 3: Engage the community to increase support for the urban forest.

The urban forest is more likely to be preserved and maintained by a community that understands the benefits that the urban forest provides to the community. Community members that are strong advocates on the behalf of the urban forest also improve the long-term viability of the urban forest.

Goal 4: Encourage the planting of trees on private property.

Private trees contribute significantly to the urban forest and the benefits that it provides to the community as a whole. While trees on public property are significant contributors to community benefits, private property provides an opportunity for additional planting sites and more direct flow of benefits to community members.

Currently park trees are maintained through both the General Fund and the Landscape Maintenance Districts (LMD). Because these resources are limited, care for park trees and trees in open space is prioritized based on public safety and dependent on available funding. Alternative funding sources to support the Urban Forestry program should continue to be explored and implemented as appropriate and/or available. Examples of these are: special assessments specific to urban forestry, parks and street-scaping; grants; recycling program funds; etc.

Existing Policy 4: Manage risk.

When trees are well-maintained throughout their lifetimes, the risks trees pose to the public are reduced.

Existing Policy 5: Expand the tree canopy of Tracy through the planting of trees on public property.

Public trees are a valuable component of infrastructure. Not only do trees reduce the rate of deterioration of asphalt and concrete, but also decrease the effects of urban heat islands.

Align urban forest management policy with community expectations and promote efficiency within the Public Works Department

Increasingly, there is more scientific data on the benefits that trees provide to communities, which promotes greater appreciation for the urban forest. Optimization of urban forestry funding and programming allows for the City to meet and exceed community expectations and increase efficiency.

Goal 5: Revise Municipal Code to respond to community needs.

As a community grows, its needs can change. Municipal Code should be periodically reviewed and revised to improve the benefits that trees provide to the environment and to the overall community.

Existing Policy 6: Ensure policy documents communicate a shared vision.

Inconsistencies across city policies, documents, and departments creates confusion between departments and the community. Uniformity promotes strong and efficient policy that aligns with community expectations.

Existing Policy 7: Provide emergency response to ensure accessibility for emergency responders and restoration of regular operations.

Following storm events or other emergency situations, trees may have been damaged and create problems for emergency responders, as well as, disrupt normal city operations. Emergency response is important for ensuring access for emergency crews and restoring normalcy following such events.

Existing Policy 8: Maintain a fire safe community.

In the last decade, California has experienced catastrophic losses as a result of wildfire. With prolonged periods of drought and a changing climate, wildfire is likely to continue to be a threat to communities that neighbor the wildland urban interface. The risk of living in these areas can be reduced through numerous wildfire mitigation strategies.

How do we get there?

The goals and actions proposed by the Urban Forest Management Plan (UFMP) are organized by area of focus:

1. Align urban forest management policy with community expectations and cost efficiency
2. Optimize the environmental, social, economic, and public health benefits of trees and canopy
3. Grow, maintain, preserve, and enhance a sustainable urban forest

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

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

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

The estimated cost is categorized in the following ranges:

- $ = less than $25,000
- $$ =$25,000–$100,000
- $$$ = more than $100,000

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

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

Grow, maintain, preserve, and enhance a sustainable urban forest.

Goal 1: Preserve trees whenever possible.

Performance Measure: Reduced number of removals.

Rationale: Trees take a long time to grow. While the needs for land use change and sometimes trees are prohibitive of a desired use, there are often solutions and compromises that can be made to allow a tree to reach maturity and provide the maximum benefits to a community.

Risk: Removals that could have been avoided through alternative design solutions and repairs.

Benefit: The potential for all trees to reach maturity and provide the optimal amount of benefits to a community.

Objective:	Cost	Priority	Timeframe
Develop a Private Protected Tree or Heritage Tree Ordinance to protect specific species, native trees, specimen trees, or trees of historic value from damage or unpermitted removal.	$	High	1–5

Action:

1. Add "Protected Tree" definition to Municipal Code.

Objective:	Cost	Priority	Timeframe
Greater preservation of trees on public property.	$	Moderate	Ongoing

Action:

1. Revisit tree violation/mitigation fees.
2. Review and inspect Tree Protection Zones during construction projects.

Objective:	Cost	Priority	Timeframe
Ensure all newly planted trees have the necessary resources to be maintained throughout the lifetime of the tree.	$	Moderate	Ongoing

Action:

1. Have a mechanism that triggers additional funding for tree maintenance when new trees are planted.

$ = less than $25,000 $$ = $25,000–$100,000 $$$ = more than $100,000

How do we get there?

Grow, maintain, preserve, and enhance a sustainable urban forest.

Goal 1: Preserve trees whenever possible.

Performance Measure: Reduced number of removals.

Rationale: Trees take a long time to grow. While the needs for land use change and sometimes trees are prohibitive of a desired use, there are often solutions and compromises that can be made to allow a tree to reach maturity and provide the maximum benefits to a community.

Risk: Removals that could have been avoided through alternative design solutions and repairs.

Benefit: The potential for all trees to reach maturity and provide the optimal amount of benefits to a community.

Objective:	Cost	Priority	Timeframe
Explore alternative designs to preserve valuable trees in the landscape.	$	Moderate	Ongoing

Action:

1. Explore alternative sidewalk designs to allow space for trees and compliance with the Americans with Disabilities Act.
2. Explore the use of alternative sidewalks designs to avoid tree removal.
3. Continue to protect valuable trees located in construction zones.

Objective:	Cost	Priority	Timeframe
Encourage preservation of trees on private property.	$	Moderate	Ongoing

Action:

1. Revisit Municipal Code to provide protection for native trees and heritage trees or trees of historical significance.
2. Revisit Municipal Code to prohibit the use of topping or other improper pruning practices for trees in parking lots.

Objective:	Cost	Priority	Timeframe
Improve everyday care of trees, to prevent future removals.	$	High	Ongoing

Action:

1. Include trees along main arterial roadways in the General Fund.

$ = less than $25,000 $$ = $25,000–$100,000 $$$ = more than $100,000

Grow, maintain, preserve, and enhance a sustainable urban forest.

Goal 2: Reach 40% canopy cover by 2040.

Performance Measure: Increased canopy cover.

Rationale: The benefits that an urban forest provides to the community are directly related to the expanse of tree canopy cover and leaf surface area. The greater the tree canopy cover, the greater distribution of benefits to the community.

Risk: No expansion or even loss of canopy cover may result in a loss or stagnation in the benefits provided to the community by the urban forest.

Benefit: Expansion of tree canopy increases the benefits provided by trees as well as equitable access to shade and other benefits across the community.

Objective:

Greater and more equitable distribution of environmental benefits from trees.

Action:

1. Continue to replace trees as they are removed.
2. Create a planting plan, which identifies specific planting priorities for different areas of the City.
    a. Consider planting priority areas in planting plans.
    b. Consider planting priorities identified by the community.
    c. Continue to plant trees in areas identified as Disadvantaged Communities.
    d. Utilize best management practices for planting and maintaining trees.
3. Conduct a Land Cover Assessment in 10 years to review progress towards meeting 40% canopy.

Cost	Priority	Timeframe
$	High	Ongoing

$ = less than $25,000 $$ = $25,000–$100,000 $$$ = more than $100,000

How do we get there?

Grow, maintain, preserve, and enhance a sustainable urban forest.

Existing Policy 1: Plan for trees.

Performance Measure: Reduction in removals that are a result of a tree being planted in an inappropriate site.

Rationale: Trees take a long time to grow and are a long-term investment. If a tree is planted in a space that is too small or too large or is not well suited for the local climate and soil conditions, the potential benefits that the tree could have provided to the community are lost.

Risk: Premature death of trees.

Benefit: Fewer tree removals and maximum community benefit.

Objective:

Invest in trees for the long-term environmental benefits they provide to the community.

Action:

1. Practice right tree, right place.
2. Maintain and regularly update a tree species list that is suitable for a variety of site conditions.
    a. Include newly available nursery stock and omit species susceptible to pests and pathogens.
    b. Publish species palette list on the city website.
3. As design standards are updated, include standards for the following:
    a. Tree well sizes.
    b. Irrigation plans with separate valves for trees.
    c. Distances from utilities (water meters, fire hydrants, etc.).
4. Explore the use of expanding tree wells.
5. Incorporate innovative solutions for tree planting in areas where available soil volume is limited; also paying particular attention to appropriate species selections in these areas.
6. Formalize planting distances from water meters, fire hydrants, or other public utilities.
7. Develop minimum soil volume requirements for parking lots.

Cost	Priority	Timeframe
$	High	Ongoing

$ = less than $25,000 $$ = $25,000–$100,000 $$$ = more than $100,000

Grow, maintain, preserve, and enhance a sustainable urban forest.

Existing Policy 1: Plan for trees.

Performance Measure: Reduction in removals that are a result of a tree being planted in an inappropriate site.

Rationale: Trees take a long time to grow and are a long-term investment. If a tree is planted in a space that is too small or too large or is not well suited for the local climate and soil conditions, the potential benefits that the tree could have provided to the community are lost.

Risk: Premature death of trees.

Benefit: Fewer removal of trees and maximum community benefit.

Objective:	Cost	Priority	Timeframe
Allow for flexibility in planting considerations for new development.	$	Low–Moderate	1–10 Years

Action:

1. Have separate streetscape landscaping standards.
    a. Provide options for; park strips, meandering sidewalks, monolithic sidewalks.
    b. Set minimum widths for planting strips.

Objective:	Cost	Priority	Timeframe
Encourage new industries within the city to expand the tree canopy.	$	Low–Moderate	1–10 Years

Action:

1. Collaborate with companies to encourage tree planting on those properties.
2. Explore the use of tree planting funds for companies to offset their development.

$ = less than $25,000 $$ = $25,000–$100,000 $$$ = more than $100,000

How do we get there?

Grow, maintain, preserve, and enhance a sustainable urban forest.

Existing Policy 2: Foster current partnerships with local non-profits and continue to explore opportunities with additional non-profit groups.

Performance Measure: Participation in forestry programming.

Rationale: Non-profit partners can coordinate planting events, including volunteers, and provide educational materials/activities.

Risk: Without non-profit partners, Urban Forestry Division staff have less time to manage and maintain city trees.

Benefit: Non-profit partners advocate for the urban forest and increase the protection and preservation of the benefits that the urban forest provides to the community.

Objective:	Cost	Priority	Timeframe
Continue to provide support for local non-profit organizations.	$	Moderate	Ongoing

Action:

1. Continue to set clear expectations for the role of non-profits in coordinating community outreach events and promote tree planting on private property.
2. Provide clearly defined expectations for funding designated to local non-profit organizations.

Objective:	Cost	Priority	Timeframe
Continue to explore partnerships with other non-profit and environmental advocacy groups.	$	Moderate	Ongoing

Action:

1. Identify passionate community members as tree-advocacy leaders.

$ = less than $25,000 $$ = $25,000–$100,000 $$$ = more than $100,000

Grow, maintain, preserve, and enhance a sustainable urban forest.

Existing Policy 3: Promote the longevity of trees as a public resource.

Performance Measure: Reduced mortality rates.

Rationale: Trees are a valuable component of the urban infrastructure, and when trees die prematurely, the investment in that infrastructure is lost.

Risk: If efforts are not made to reduce tree mortality, the investment in the time and labor to plant and care for a tree is lost.

Benefit: Reductions in tree mortality provide the opportunity for all trees to reach maturity and offer the most community benefits.

Objective:	Cost	Priority	Timeframe
Provide water to trees to encourage establishment of newly planted trees, as well as prolong the life of mature trees.	$	Low–Moderate	Ongoing

Action:

1. Continue to irrigate trees in accordance with California Senate Bill No. 606 and No. 1668.
2. Continue to select and plant drought-tolerant species.

Objective:	Cost	Priority	Timeframe
Educate the community about property owner responsibilities for the care of City trees.	$	Moderate	Ongoing

Action:

1. Increase education around watering trees even during drought.
2. Revisit appraisal fees for replacement of trees illegally removed.

$ = less than $25,000 $$ = $25,000–$100,000 $$$ = more than $100,000

How do we get there?

Optimize the environmental, social, economic, and public health benefits of trees and canopy.

Goal 3: Engage the community to increase support for the urban forest.

Performance Measure: Participation in forestry programming.

Rationale: An educated and engaged community is more likely to support and advocate on the behalf of the urban forest.

Risk: Apathy towards the urban forest may result in loss in benefits provided by the urban forest to the community.

Benefit: A community that supports the urban forest protects the urban forest and the benefits that it provides to the city.

Objective:

Engage the community in urban forestry activities and educational events.

Cost	Priority	Timeframe
$	Low–Moderate	Ongoing

Action:

1. Continue to facilitate tree plantings with community groups on private property and in parks.
2. Develop a regular presence at various community events such as Earth Day, Arbor Day, Tracy Make a Difference Day, etc.
3. Coordinate engagement activities with local schools.
4. Offer workshops on a variety of tree care topics.
5. Continue to provide tree educational materials through the Trees and Landscape Maintenance webpage.
    a. Provide downloadable fact sheets.
    b. Regularly update responses to Frequently Asked Questions (FAQ).
    c. Provide a summary of tree ordinances.

$ = less than $25,000 $$ = $25,000–$100,000 $$$ = more than $100,000

Optimize the environmental, social, economic, and public health benefits of trees and canopy.

Goal 3: Engage the community to increase support for the urban forest.

Performance Measure: Participation in forestry programming.

Rationale: An educated and engaged community is more likely to support and advocate on the behalf of the urban forest.

Risk: Apathy towards the urban forest may result in loss in benefits provided by the urban forest to the community.

Benefit: A community that supports the urban forest protects the urban forest and the benefits that it provides to the city.

Objective:

Provide sustainable and adequate resources to sustain the urban forest for future generations.

Action:

1. Incorporate innovative solutions for tree planting in areas where available soil volume is limited; also paying particular attention to appropriate species selections in these areas.
2. Audit the LMDs to analyze the number of public trees versus funding (per tree cost) and explore opportunities to equalize funding levels and increase efficiencies.
    a. Identify adequate funding level.
    b. Explore inequities.
3. Include funding for trees in Capital Improvement Projects.
4. Explore funding opportunities through public health improvement.
5. Explore the use of carbon offset credits.

Cost	Priority	Timeframe
$–$$	High	Ongoing

$ = less than $25,000 $$ = $25,000–$100,000 $$$ = more than $100,000

How do we get there?

Optimize the environmental, social, economic, and public health benefits of trees and canopy.

Goal 4:Encourage the planting of trees on private property.

Performance Measure: Increased canopy cover on private property.

Rationale: Trees on private property not only provide direct benefits to the property owner, but also to the overall community.

Risk: Loss in benefits provided to individual households.

Benefit: Direct benefits to residents.

Objective:	Cost	Priority	Timeframe
Increase canopy cover through tree plantings on private property.	$	Low–Moderate	Ongoing

Action:

1. Explore incentive programs for planting trees on private property.
    a. Track participation in incentive programs to estimate new tree plantings.
2. Explore opportunities to modify or extend the fall/winter leaf collection program as needed

Objective:	Cost	Priority	Timeframe
Improve the diversity of Tracy's urban forest through plantings on private property.	$	Moderate–High	Ongoing

Action:

1. Continue to publish the Tree Species Palette on the city website.

$ = less than $25,000 $$ = $25,000–$100,000 $$$ = more than $100,000

Optimize the environmental, social, economic, and public health benefits of trees and canopy.

Goal 4:Encourage the planting of trees on private property.

Performance Measure: Increased canopy cover on private property.

Rationale: Trees on private property not only provide direct benefits to the property owner, but also to the overall community.

Risk: Loss in benefits provided to individual households.

Benefit: Direct benefits to residents.

Objective:	Cost	Priority	Timeframe
Use a variety of methods to provide tree related information to the community.	$	High	2 Years

Action:

1. Utilize "tree tags" on trees to educate the public on various tree care topics, including: pest management, pruning, and water.
2. Continue to provide external resources on the Trees and Landscape Maintenance webpage.
3. Develop a regular presence at various community events such as Earth Day, Arbor Day, Tracy Make a Difference Day, etc.

Objective:	Cost	Priority	Timeframe
Continue to distribute information about the urban forest to the community.	$	High	Ongoing

Action:

1. Continue to distribute information to the community through the City website.
2. Continue to use social media to engage the community.
3. Conduct a State of the Urban Forest Report (at year one), then every two to five years to communicate progress on the Plan.
4. Report progress and challenges of the UFMP via The State of the Urban Forest Report.

$ = less than $25,000 $$ = $25,000–$100,000 $$$ = more than $100,000

How do we get there?

Optimize the environmental, social, economic, and public health benefits of trees and canopy.

Existing Policy 4: Manage risk.

Performance Measure: Reduction in service requests related to public safety.

Rationale: Trees can develop structural problems that can result in concerns for public safety, but through proactive management of trees, the risks associated with trees are greatly reduced.

Risk: Damage to property and loss of life as a result of tree or branch failures or conflicts with infrastructure.

Benefit: Increased public safety and reduced liability.

Objective:

Maintain trees throughout their lifetimes to improve structure in maturity and reduce the likelihood of structural failures in the future.

Action:

1. Use current Best Management Practices for tree care.
2. Finalize pruning cycle schedule and mapping.
   a. Communicate this schedule to the community.
3. Identify and repair or remove trees that pose a threat to life and property on an ongoing basis.
4. Update tree inventory as maintenance occurs and to include trees that were previously not included.
5. Update inventory to include all trees that are the responsibility of the City.
6. Replace problematic trees as soon as funding allows.

Cost	Priority	Timeframe
$	Low–Moderate	Ongoing

$ = less than $25,000 $$ = $25,000–$100,000 $$$ = more than $100,000

Optimize the environmental, social, economic, and public health benefits of trees and canopy.

Existing Policy 5: Expand the tree canopy through tree plantings on public property.

Performance Measure: Number of plantings of trees on public property.

Rationale: Trees are a valuable part of urban infrastructure and are the only infrastructure whose value increases over time. Trees even help to extend the lifespan of the hardscape.

Risk: Depreciation of the current community resource without replacement and new planting will result in loss of tree canopy and the benefits provided by that canopy to the community.

Benefit: Additional trees and tree canopy will help provide benefits to the community.

Objective:

Improve the diversity of the urban forest on public property, to create a more resilient urban forest.

Action:

1. Provide recommendations for species and placement for projects within the public right-of-way and Capital Improvement Projects.

Cost	Priority	Timeframe
$	Moderate–High	Ongoing

$ = less than $25,000 $$ = $25,000–$100,000 $$$ = more than $100,000

How do we get there?

Align urban forest management policy with community expectations and promote efficiency within the Public Works Department.

Goal 5:Revise Municipal Code to respond to community needs.

Performance Measure: A Municipal Code that clearly defines and addresses the vision of the community.

Rationale: Communities evolve and the rules and laws that govern that group should change to better meet community expectations.

Risk: If Municipal Code does not change, then the weaknesses in outdated rules leave the urban forest vulnerable.

Benefit: Municipal Code changes can better protect, preserve, and enhance the urban forest.

Objective:

Review and revise Municipal Code to address the challenges facing the urban forest.

Action:

1. Revisit 10.08.1770 and define "Reasonable spacing" for trees in a parcel.
2. Update Municipal Code to prohibit the use of "topping" or other improper pruning practices that are inconsistent with industry standards in parking lots.
3. Include protections for private trees that include specific species, native species, heritage trees or trees of historical significance, and specimen trees.

Cost	Priority	Timeframe
$	High	2–Year

$ = less than $25,000 $$ = $25,000–$100,000 $$$ = more than $100,000

Align urban forest management policy with community expectations and promote efficiency within the Public Works Department.

Existing Policy 6: Ensure policy documents communicate a shared vision.

Performance Measure: Consistent vision, direction, and goals between plans and policy documents.

Rationale: Having a uniform policy reduces confusion between departments and community members and transcends departmental changes.

Risk: When policies have inconsistencies, setting a high standard of care is difficult.

Benefit: Uniformity promotes a strong and efficient policy that aligns with community expectations.

Objective:

Unify guiding documents to transcend departmental changes, address inefficiencies and reduce confusion.

Action:

1. Collaborate with Engineering, as City of Tracy Standard Specifications are revised.
    a. Include planting standards and minimum site and soil volume requirements.
2. Provide a link to the Street Tree Species Palette on the Engineering Division webpage.
3. Ensure that UFMP goals are considered in all overarching planning and visionary documents as revisions and updates occur.
    a. General Plan as it is revised.
    b. Sustainability Action Plan as it is revised.
    c. Parks Master Plan as it is revised.

Cost	Priority	Timeframe
$	High	Ongoing

Objective:

Optimize interdepartmental communication and coordination.

Action:

1. Share the UFMP among City departments following completion.
2. Communicate internally to develop standards that all departments are subject to.
3. Participate in cross-training activities to create understanding of other departmental roles.

Cost	Priority	Timeframe
$	High	Ongoing

$ = less than $25,000 $$ = $25,000–$100,000 $$$ = more than $100,000

How do we get there?

Align urban forest management policy with community expectations and promote efficiency within the Public Works Department.

Existing Policy 7: Prepare for emergency response to ensure accessibility for emergency responders and restoration of regular operations.

Performance Measure: Recovery following storm or emergency events.

Rationale: Storm and emergency events can impact on city trees, which can result in disruption in normal city operations and obstructed mobility for emergency response crews. However, with planning, recovery from these events can happen more efficiently and quickly.

Risk: Inability to restore regular operations and slower emergency response times.

Benefit: Improved response during emergency or storm events.

Objective:

Restore operations and public safety as efficiently and as quickly as possible following storm or other emergency events.

Cost	Priority	Timeframe
$	High	Ongoing

Action:

1. Distribute standard operating procedures for emergency response to on-call staff and contractors.
    a. Provide specific trainings to ensure preparedness.
    b. Establish clear criteria for determining need for subcontractor assistance.
2. Establish relief duty periods for staff responding to emergency or storm events.
3. Identify priority zones through GIS mapping.
4. Review process for handling emergency calls and high call volumes during emergency response and identify improvements.
    a. Establish a matrix of the number and type of calls per hour that trigger a call for additional staff and/or contractor support.

$ = less than $25,000 $$ = $25,000–$100,000 $$$ = more than $100,000

Align urban forest management policy with community expectations and promote efficiency within the Public Works Department.

Existing Policy 8: Maintain a fire safe community.

Performance Measure: Improved defensible spaces around structures and reduction in ladder fuels.

Rationale: California has had historic fires over the last decade. Many of these fires were in urban areas. Tracy has identified areas that are vulnerable to fire. To reduce the risk of living in the wildland urban interface, the City is working to mediate the potential fire hazards that exist.

Risk: Given the right conditions and lack of premeditated response to fire, fire is a risk to the community. Fire can result in devastating losses to property and life.

Benefit: Reduced vulnerability to fire.

Objective:

Focus fire mitigation efforts on Tracy Hills and other areas of vulnerability.

Action:

1. Reduce ladder fuels in proximity to structures.
2. Plant trees so as to not interfere with emergency response.

Cost	Priority	Timeframe
$	High	Ongoing

$ = less than $25,000 $$ = $25,000–$100,000 $$$ = more than $100,000

How do we get there?

Monitoring and Measuring Results

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

Annual Review

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

Resource Analysis

With the Resource Analysis, values on structure, annual benefits, replacement value, and benefit versus investment ratios Tracy has a baseline against which future progress and improvements to health (condition), species diversity, annual benefits, and overall resource value can be measured. A strategy of the UFMP is to complete this analysis every five years to illustrate progress and success towards Plan goals. A five-year Resource Analysis review is a possible way to monitor progress on efforts to increasing diversity through the creation of a diversified list of tree species appropriate for a variety of different spaces and landscapes.

Canopy Analysis

With the recent Urban Tree Canopy Assessment, Tracy has a baseline tree canopy for the entire urban forest, which allows for continued monitoring of trends in the canopy cover on private property.

State of the Community Forest Report

The purpose of the report is to provide structural and functional information about the urban forest (including the municipal forest) and recommend strategies for its proactive management, protection, and growth.

Community Satisfaction

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

Reporting

Completion of this Plan is the first step towards achieving the vision for Tracy's urban forest. Continual monitoring, analysis, and revisions will help forest managers keep stakeholders informed and engaged. By organizing data into specific components (for example; Urban Forest Reports, Community Satisfaction Surveys), it will be possible to revise specific areas of weakness and buttress areas of strength. Revisions to the Plan should occur with major events, such as newly discovered pests or diseases, or significant policy and regulation changes. A complete formal revision should occur in unison with major municipal projects, such as the comprehensive Master Plan. It is important to remember that Tracy's UFMP is a living document that should adapt to new conditions.

Appendices

Appendix A: Terms and Definitions

American National Standards Institute (ANSI)

A Federation of United States industry sectors (e.g. businesses, professional societies and trade associations, standards developers, government agencies, institutes, and consumer/ labor interest groups) that coordinates the development of the voluntary consensus standards system.

American Public Works Association (APWA)

An organization that supports professionals who operate, improve, or maintain public works infrastructure by advocating to increase awareness, and providing education, credentialing, as well as other professional development opportunities.

Arboriculture

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

Best Management Practices (BMP)

Management practices and processes used when conducting forestry operations, implemented to promote environmental integrity.

Capital Improvement Projects (CIP)

Infrastructure projects and equipment purchases identified by a government in order to maintain or improve public resources. Projects such as (1) constructing a facility, (2) expanding, renovating, replacing, or rehabilitating an existing facility, or (3) purchasing major equipment are identified, and then purchasing plans and development schedules are developed.

Climate Action Plan (CAP)

Government lead initiatives to decrease greenhouse gas emissions and prepare for the impacts of climate change.

Community Urban Forest

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

Diameter Breast Height (DBH)

The diameter of the tree when measured at 1.4 meters (4.5 feet) above ground.

Drip Line Area

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

Dutch Elm Disease (DED)

A wilt disease of elm trees caused by plant pathogenic fungi. The disease is either spread by bark beetles or tree root grafts.

Emerald Ash Borer (EAB)

The common name for Agrilus planipennis, an emerald green wood boring beetle native to northeastern Asia and invasive to North America. It feeds on all species of ash.

Greenhouse Gas (GHG)

A gas that traps heat in Earth's atmosphere.

Geographic Information System (GIS)

Computer-based tools designed to increase the organization and understanding of spatial or geographic data. Many different kinds of data can be displayed on one map for visualization and interpretation.

Integrated Pest Management (IPM)

Using pest and environmental information to determine if pest control actions are warranted. Pest control methods (e.g. biological control, habitat manipulation, cultural control, plant resistance, and chemical control) are chosen based on economic and safety considerations.

International Society of Arboriculture (ISA)

An international nonprofit organization that supports professionals in the field of arboriculture by providing professional development opportunities, disseminating applicable research findings, and promoting the profession.

i-Tree

A state-of-the-art, peer-reviewed software suite from the USDA Forest Service that provides urban and rural forestry analysis and benefits assessment tools.

Migratory Bird Treaty Act (MBTA)

A United States federal law adopted to protect migratory birds.

Natural Area

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

Open Space

A defined area of undeveloped land that is open to the public. The land can include native or naturalized trees and vegetation.

Plant Health Care (PHC)

A program that consists of (1) routinely monitoring landscape plant health and (2) individualized plant management recommendations in order to maintain or improve the vitality, appearance, and safety of trees and other plants.

Personal Protective Equipment (PPE)

Equipment worn to enhance workplace safety and minimize the risk to physical hazards (e.g. gloves, hard harts, bodysuits, and foot, eye, or ear protection).

Appendices

Appendix A: Terms and Definitions

Private Tree

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

Public Tree

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

Right Tree, Right Place

Careful planning for the planting of a tree. Considerations for whether a tree is the right tree and whether it is planted in the right place, include: mature height, canopy spread, deciduous/evergreen, form/shape, growth rate, soil requirements, light requirements, water requirements, fruit debris, and hardiness zone.

Street Tree

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

Structural and Training Pruning

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

Tree Canopy

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

Tree City USA

A program through the Arbor Day Foundation that advocates for green urban areas through enhanced tree planting and care.

Tree Risk Assessment Qualified (TRAQ)

An International Society of Arboriculture qualification. Upon completion of this training, tree care professionals demonstrate proficiency in assessing tree risk.

Urban Forest

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

Urban Forest Management Plan (UFMP)

A document that provides a comprehensive information, recommendations, and timelines to guide for the efficient and safe management of a city's tree canopy. The Plan uses adaptive management model to provide reasoned and transparent calls to action from an inventory of existing resources.

Urban Forestry

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

Urban Tree Canopy Assessment (UTC)

A document based off of GIS mapping data that provides a birds-eye view of the entire urban forest and establishes a tree canopy baseline of known accuracy. The UTC helps managers understand the quantity and distribution of existing tree canopy, potential impacts of tree planting and removal, quantified annual benefits trees provide to the community, and benchmark canopy percent values.

Wildfire Urban Interface (WUI)

A transition zone where homes are located on the edge of fire prone areas, and are at an increased risk of personal injury or property damage resulting from a wildfire.

Appendix B: References

Akbari, H., D. Kurn, et al. 1997. Peak power and cooling energy savings of shade trees. Energy and Buildings 25:139–148.

Avocado: Polyphagous Shot Hole Borer and Kuroshio Shot Hole Borer. 2017. UC Pest Management Guidelines. UC IPM: Statewide Integrated Pest Management Program. Retrieved from: http://ipm.ucanr.edu/PMG/r8302011.html

CAL FIRE Urban and Community Forestry CCI Grant Awards 2016/2017. Retrieved on 5 June 2019. Retrieved from: http://calfire.ca.gov/grants/downloads/UrbanForestry/2016_2017/CAL%20FIRE%20UCF%20CCI%20Grant%20Awards%20Master%20Sheet%2016_17.pdf

California Government Code, Title 1, Division 4, Chapter 8, Section 3100. 2016. California Legislative Information. Retrieved from: https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?sectionNum=3100.&lawCode=GOV

Clark JR, Matheny NP, Cross G, Wake V. 1997. A Model of Urban Forest Sustainability. J Arbor 23(1):17-30.

Compliance Offset Protocol Urban Forest Projects. 2011. California Environmental Protection Agency: Air Resources Board. Retrieved from: https://www.arb.ca.gov/regact/2010/capandtrade10/copurbanforestfin.pdf

Cranshaw, Dr. Whitney. 2018. Quality Time with Scale Insects (and Spider Mites?). Colorado State University. 63rd Annual Shade Tree Conference, Topeka, KS Presentation. Retrieved from: https://webdoc.agsci.colostate.edu/bspm/InsectInformation/Talks2018/QTScaleInsects.pdf

Distribution of PSHB/FD and KSHB/FD in California. 2019. University of California Agriculture and Natural Resources. Retrieved from: https://ucanr.edu/sites/pshb/Map/

Dwyer, et al. Assessing the Benefits and Costs of the Urban Forest. Journal of Arboriculture 18(5): September 1992.

Ellison, D. et al. 2017. Trees, forests and water: Cool insights for a hot world. Global Environmental Change. Volume 43. Pages 51-61. ISSN 09593780.https://doi.org/10.1016/j.gloenvcha.2017.01.002. Retrieved from: http://www.sciencedirect.com/science/article/pii/S0959378017300134

Emergency Response Plans. 2014. Department of Homeland Security. Retrieved from: fema.gov

Fernández-Juricic, Esteban. 2001. Avifaunal use of Wooded Streets in an Urban Landscape. Conservation Biology. Volume 14, Issue 2, pages 513-521. Retrieved from: https://onlinelibrary.wiley.com/doi/abs/10.1046/j.1523-1739.2000.98600.x

Gilstad-Hayden et al. 2015. Greater tree canopy cover is associated with lower rates of both violent and property crime in New Haven, CT. Landscape and Urban Planning. Volume 143.

Pages 248-253. ISSN 0169-2046. https://doi.org/10.1016/j.landurbplan.2015.08.005.Retrieved from: http://www.sciencedirect.com/science/article/pii/S0169204615001607

Grafton-Cardwel, Dr., Daugherty, Dr., Jetter, Dr., & Johnson, R. (2019). ACP/HLB Distribution and Management. University of California, Division of Agriculture and Natural Resources. Retrieved from https://ucanr.edu/sites/ACP/

Greenhouse Gases' Effect on the Climate. 2018. U.S. Energy Information Administration. Retrieved from: https://www.eia.gov/energyexplained/index.php?page=environment_how_ghg_affect_climate

Appendices

Appendix B: References

Haddad, et al. 2015. Habitat fragmentation and its lasting impact on Earth ecosystems. Science Advances. 1. e1500052. 10.1126/sciadv.1500052.

Heisler GM. 1986. Energy Savings with Trees. J Arbor 12(5):113–125.

Heisler GM., and DeWalle, O.R. 1968. "Effects of windbreak structure on wind flow: Agriculture Ecosystems and Environments, 22123, pp. 41-69.

Hilton, Chris. 2017. Two-Minute Takeaway: What is Urban Tree Canopy? https://www.washingtonnature.org/fieldnotes/2017-science-two-minute-takeaway-what-is-tree-canopy

Jennings, V.; Gaither, C.J. Approaching Environmental Health Disparities and Green Spaces: An Ecosystem Services Perspective. Int. J. Environ. Res. Public Health 2015, 12, 1952-1968.

Kottek, M., Grieser, J., Beck, C., Rudolf, B. & Rubel, F. (2006). World map of the Köppen-Geiger climate classification updated. Meteorol. Zeitschrift, 15, 259–263.

Kuo, F.E. and Sullivan, W.C., 2001. Environment and crime in the inner city: Does vegetation reduce crime? Environment and behavior, 33(3), pp.343-367.

Leff, Michael. 2016. The Sustainable Urban Forest: A Step-by-Step Approach. Davey Institute and USDA Forest Service. http://www.itreetools.org/resources/content/Sustainable_Urban_Forest_Guide_14Nov2016.pdf

Lyle, J.T., 1996. Regenerative design for sustainable development. John Wiley & Sons.

McPherson, E.G., N. van Doorn, and J. de Goede, The State of California's Street Trees. 2015, Pacific Southwest Research Station, U.S. Forest Service: Davis, CA.

Matsuoka, Rodney. 2010. Student performance and high school landscapes: Examining the links. Landscape and Urban Planning. 97. 273-282

McDonald et al. 2016. Planting Healthy Air: A global analysis of the role of urban trees in addressing particulate matter pollution and extreme heat. The Nature Conservancy. Retrieved from: 2002https://thought-leadershipproduction.s3.amazonaws.com/2016/10/28/17/17/50/0615788b-8eaf-4b4f-a02a8819c68278ef/20160825_PHA_Report_FINAL.pdf

McPherson, E. 1994. Cooling urban heat islands with sustainable landscapes. In R. Platt, r. Rowntree, & P. Muick (Eds.), The ecological city (pp. 151–171). Amherst; University of Massachusetts Press.

McPherson, E. and J. R. Simpson. 2010. The tree BVOC index. Elsevier. Environmental Pollution. 159. 2088–2093. Retrieved from: https://www.fs.fed.us/psw/publications/mcpherson/psw_2011_mcpherson006.pdf can be measured through surveys and evidenced by public support for realizing the objectives of the Plan. Community satisfaction can also be gauged by the level of engagement and support for forestry programs.

Menning and Stephens. 2007. Fire Climbing in the Forest: A Semiquantitative, Semiquantitative Approach to Assessing Ladder Fuel Hazards. Society of American Foresters. West. J. Appl. For 22(2). Retrieved from: https://nature.berkeley.edu/stephenslab/wpcontent/uploads/2015/04/Menning-Stephens-Ladder-fuels-WJAF-07.pdf

Miller, R. W. 1988. Urban Forestry: Planning and Managing Urban Greenspaces. New Jersey: Prentice Hall.

Parke, J. L., and S. Lucas. 2008. Sudden oak death and ramorum blight. The Plant Health Instructor. DOI: 10.1094/PHI-I-2008-0227-01

Pena JCdC, Martello F, Ribeiro MC, Armitage RA, Young RJ, et al. (2017) Street trees reduce the negative effects of urbanization on birds. PLOS ONE 12(3): e0174484.https://doi.org/10.1371/journal.pone.0174484

Perry, E.J. 2006. Mistletoe Management. IPM Education and Publications, University of California Statewide IPM Program. Retrieved from: http://ipm.ucanr.edu/PMG/PESTNOTES/pn7437.html

Planning the Urban Forest: Ecology, Economy, and Community Development. 2009. American Planning Association. Edited by Schwab, James. Retrieved from: https://planning-org-uploadedmedia.s3.amazonaws.com/legacy_resources/research/forestry/pdf/555.pdf

Prologis. Prologis International Park of Commerce. 2019. Retrieved from: https://www.prologis.com/industrial-logistics-warehouse-space/california/tracy/prologis-international-park-commerce

Radeloff et al. 2005. The Wildland-Urban Interface in the United States. Ecological applications. 15(3). Pp. 799–805. Retrieved from: https://www.fs.fed.us/pnw/pubs/journals/pnw_2005_radeloff001.pdf

Raywood Ash Canker and Decline. 2019. UC Integrated Statewide Pest Management Program. Retrieved from: http://ipm.ucanr.edu/PMG/GARDEN/PLANTS/DISEASES/ashdieback.html

Salmon, T. P. 2009. http://ipm.ucanr.edu/PMG/PESTNOTES/pn7433.html

Threlfall, Caragh & Williams, Nicholas & Hahs, Amy & J. Livesley, Stephen. 2016. Approaches to urban vegetation management and the impacts on urban bird and bat assemblages. Landscape and Urban Planning. 153. 28-39. 10.1016/j.landurbplan.2016.04.011.

Tracy Magazine. 2017. Town Square Publications. Retrieved from: http://local.townsquarepublications.com/california/tracy/chamber-benefits.html

Tracy History. 2018. Tracy Historical Museum. West Side Pioneer Association. Retrieved from: http://tracymuseum.org/tracy-history/

Troy, Austin; Grove, J. Morgan; O'Neil-Dunne, Jarlath. 2012. The relationship between tree canopy and crime rates across an urban-rural gradient in the greater Baltimore region. Landscape and Urban Planning. 106: 262-270.

Xiao, Q., McPherson, E.G., Simpson, J.R., Ustin, S.L. 1998. Rainfall Interception by Tracy's Urban Forest. Journal of Arboriculture. 24(4): 235-244.

Appendices

Appendix C: Industry Standards

ANSI Z133 Safety Standard, 2017

Reviews general safety, electrical hazards, use of vehicles and mobile equipment, portable power hand tools, hand tools and ladders, climbing, and work procedures.

ANSI A300

ANSI A300 standards represent the industry consensus on performing tree care operations. The standards can be used to prepare tree care contract specifications.

ANSI A300 Pruning Standard-Part 1, 2017

ANSI A300 Soil Management-Part 2, 2011

ANSI A300 Support Systems Standard-Part 3, 2013

ANSI A300 Construction Management Standard-Part 5, 2012

ANSI A300 Transplanting Standard-Part 6, 2012

ANSI A300 Integrated Vegetation Management Standard-Part 7, 2012

ANSI A300 Root Management Standard-Part 8, 2013

ANSI A300 Tree Risk Assessment Standard a Tree Failure-Part 9, 2017

ANSI A300 Integrated Pest Management-Part 10, 2016

Includes guidelines for implementing IPM programs, including standards for Integrated Pest Management, IPM Practices, tools and equipment, and definition.

Best Management Practices (BMPs)

Integrated Pest Management, Second Edition, P. Eric Wiseman and Michael J. Raupp, 2016

Provides a comprehensive overview of the basic definitions, concepts, and practices that pertain to landscape Integrated Pest Management (IPM). The publication provides specific information for designing, planning, and implementing an IPM program as part of a comprehensive Plant Health Care (PHC) management system, including topics such as:

- IPM concepts and definitions
- Action thresholds
- Monitoring tools and techniques
- Preventive tactics
- Control tactics
- Documentation and recordkeeping

Integrated Vegetation Management, Second Edition, Randall H. Miller, 2014

A guide to the selection and application of methods and techniques for vegetation control for electric rights-of-way projects and gas pipeline rights-of-way. Topics included: safety, site evaluations, action thresholds, evaluation and selection of control methods, implementing control methods, monitoring treatment and quality assurance, environmental protection, tree pruning and removal, and a glossary of terms.

Managing Trees During Construction, Second Edition, Kelby Fite and E. Thomas Smiley, 2016

Describes tree conservation and preservation practices that help to protect selected trees throughout the construction planning and development process so that they will continue to provide benefits for decades after site disturbance, including planning phase, design phase, pre-construction phase, construction phase, and post-construction phase.

Root Management, Larry Costello, Gary Watson, and Tom Smiley, 2017

Recommended practices for inspecting, pruning, and directing the roots of trees in urban environments to promote their longevity, while minimizing infrastructure conflicts.

Special companion publication to the ANSI A300 Part 8: Tree, Shrub, and Other Woody Plant Management–Standard Practices (root Management)

Tree Planting, Second Edition, Gary Watson, 2014

Provides processes for tree planting, including site and species selection, planting practices, post-planting pruning, and early tree care. Other topics included are time of planting, nursery stock: types, selection, and handling, preparing the planting hole, planting practices, root loss and new root growth, redevelopment of root structure, pruning, palms, after planting, final inspection, and a glossary of terms.

Tree Inventories, Second Edition, Jerry Bond, 2013

Provides considerations for managing large numbers of trees considered as individuals rather than groups and serves as a guide for making informed decisions that align with inventory goals with needs and resources, including inventory goals and objectives, benefits and costs, types, work specifications, and maintaining inventory quality.

Tree Risk Assessment, Second Edition, E. Thomas Smiley, Nelda Matheny, and Sharon Lilly, 2017

A guide for assessing tree risk as accurately and consistently as possible, to evaluate that risk, and to recommend measures that achieve an acceptable level of risk, including topics: risk assessment basics, levels and scope of tree risk assessment, assessing targets, sites, and trees, tree risk categorization, risk mitigation: preventive and remedial actions, risk reporting, tree related conflicts that can be a source of risk, loads on trees, structural defects and conditions that affect likelihood of failure, response growth, description of selected types of advanced tree risk assessments.

Tree Shrub Fertilization, Third Edition, E. Thomas Smiley, Sharon Lilly, and Patrick Kelsey, 2013

Aides in the selection and application of fertilizers for trees and shrubs, including: Essential elements, determining goals and objectives of fertilization, soil testing and plan analysis, fertilizer selection, timing, application, application area, rates, storage and handling of fertilizer, sample fertilizer contract for commercial/ municipal clients.

Soil Management, Bryant Scharenbroch, E. Thomas Smiley, and Wes Kocher, 2014

Focuses on the protection and restoration of soil quality that support trees and shrubs in the urban environment, including goals of soil management, assessment, sampling, and analysis, modifications and amendments, tillage, conservation, and a glossary of terms.

Utility Pruning of Trees, Geoffrey P. Kempter, 2004

Describes the current best practices in utility tree pruning based on scientific research and proven methodology for the safe and reliable delivery of utility services, while preventing unnecessary injury to trees. An overview of safety, tools and equipment, pruning methods and practices, and emergency restoration are included.

Appendices

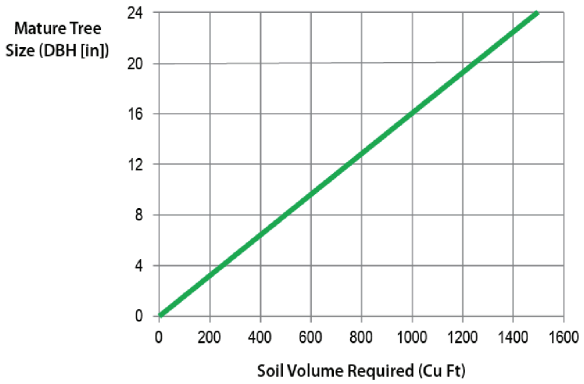
Appendix D:
Tree Risk Decision Flow Chart

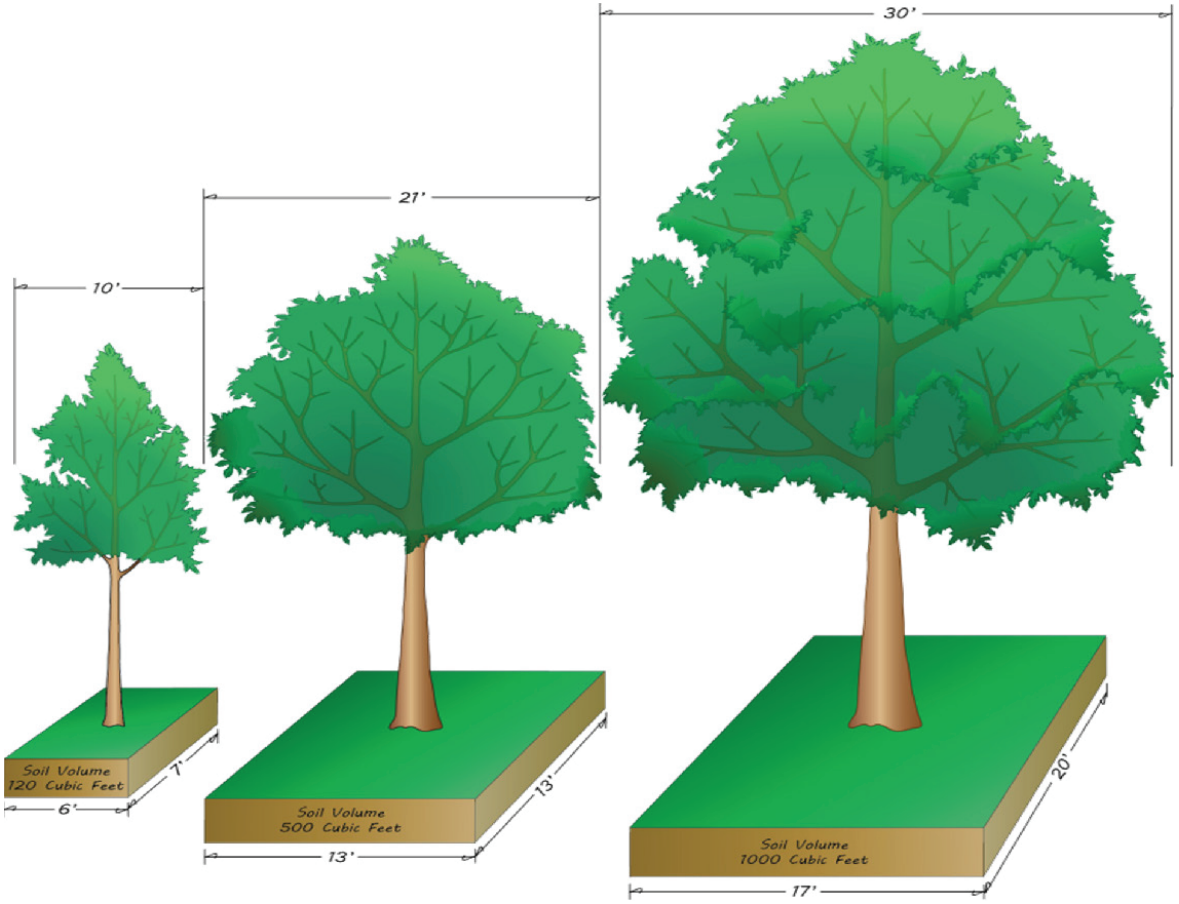
1. Resident or city staff recognizes a risk
    a. If tree is a city street tree, then, proceed to step 2.
    b. If tree is a private tree, then proceed to step 4.
    c. If tree is located on undeveloped property, then proceed to step 5.
2. The tree is a city tree. The City Arborist will conduct a limited visible assessment of the tree identified as a concern.
    a. City Arborist determines risk can be mitigated through pruning. City Arborist addresses concern immediately when possible or schedules safety mitigation work within fourteen (14) days. If work cannot be addressed immediately, City Arborist must take precautions to protect public safety (including signage and barriers to restrict foot traffic and parking within the target zone of the safety concern).
    b. City Arborist requires additional assessment to determine if risk can be mitigated through pruning, proceed to step 3.
    c. City Arborist determines risk cannot be mitigated through pruning, proceed to address safety risk immediately when possible or schedule safety mitigation work within fourteen (14) days. If work cannot be addressed immediately, City Arborist must take precautions to protect public safety (including signage and barriers to restrict foot traffic and parking within the target zone of the safety concern).

3. City Arborist conducts an aerial assessment.
    a. City Arborist determines risk can be mitigated through pruning. City Arborist addresses concern immediately when possible or schedules safety mitigation work within fourteen (14) days. If work cannot be addressed immediately, City Arborist must take precautions to protect public safety (including signage and barriers to restrict foot traffic and parking within the target zone of the safety concern).
    b. City Arborist determines risk cannot be mitigated through pruning, proceed to address safety risk immediately when possible or schedules safety mitigation work within fourteen (14) days. If work cannot be addressed immediately, City Arborist must take precautions to protect public safety (including signage and barriers to restrict foot traffic and parking within the target zone of the safety concern).
4. Tree is a private tree. City Arborist will conduct a limited visible assessment of the private tree identified as a concern.
    a. City Arborist determines that there is no risk to public safety and no action is required.
    b. City Arborist determines that the tree poses a risk to public safety and proceeds to notify the property owner of their violation and require mediation measures to be conducted within fourteen (14) days at the property owners' expense.
5. Tree is located on undeveloped property. City Arborist will conduct a limited visible assessment of the private tree identified as a concern.
    a. City Arborist determines that there is no risk to public safety and no action is required.
    b. City Arborist determines that there is no immediate risk to public safety but requires mediation measures as a condition for an approval for any building permit.
    c. City Arborist determines that the tree poses a risk to public safety and proceeds to notify the property owner of their violation and require mediation measures to be conducted within fourteen (14) days at the property owners' expense.

Appendix E:
Soil Volume and Tree Stature

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





Appendices

Appendix F: Indicators of a Sustainable Urban Forest

Indicators of a Sustainable Urban Forest

	Assessed Performance Level		
The Trees	Low	Medium	High
Urban Tree Canopy		x	
Equitable Distribution		x	
Size/Age Distribution			x
Condition of Public Trees - Streets, Parks		x	
Condition of Public Trees - Natural Areas		x	
Trees on Private Property			x
Species Diversity		x	
Climate Resilience/Suitability		x	
Space and Soil Volume	x		
The Players			
Neighborhood Action		x	
Large Private & Institutional Landholder Involvement	x		
Green Industry Involvement	x		
City Department/Agency Cooperation			x
Funder Engagement	x		
Utility Engagement		x	
Developer Engagement		x	
Public Awareness		x	
Regional Collaboration	x		
The Management Approach			
Tree Inventory			x
Canopy Assessment			x
Management Plan			x
Risk Management Program		x	
Maintenance of Publicly-Owned Trees (ROWs)			x
Planting Program			x
Tree Protection Policy		x	
City Staffing and Equipment		x	
Funding		x	
Disaster Preparedness & Response			x
Communications			x
Totals	5	14	10

A Sustainable Urban Forest Indicators: The Trees

Indicators of a Sustainable Urban Forest	Overall Objective or Industry Standard	Performance Levels		
		Low	Medium	High
Urban Tree Canopy	"Achieve the desired tree canopy cover according to goals set for the entire city and neighborhoods. Alternatively, achieve 75% of the total canopy possible for the entire city and in each neighborhood."	"Canopy is decreasing. - AND/OR - No canopy goals have been set."	Canopy is not dropping, but not on a trajectory to achieve the established goal.	Canopy goal is achieved, or well on the way to achievement.
Location of Canopy (Equitable Distribution)	Achieve low variation between tree canopy and equity factors citywide by neighborhood. Ensure that the benefits of tree canopy are available to all, especially for those most affected by these benefits.	Tree planting and public outreach and education is not determined by tree canopy cover or benefits.	Tree planting and public outreach and education is focused on neighborhoods with low tree canopy.	Tree planting and public outreach and education is focused in neighborhoods with low tree canopy and a high need for tree benefits.
Age of Trees (Size and Age Distribution)	"Establish a diverse-aged population of public trees across the entire city and for each neighborhood. Ideal standard: 0-8" DBH: 40% 9-17" DBH: 30% 18-24" DBH: 20% Over 24" DBH: 10%"	"No current information is available on size. - OR - Age distribution is not proportionally distributed across size classes at the city level."	Size classes are evenly distributed at the city level, though unevenly distributed at the neighborhood level.	Age distribution is generally aligned with the ideal standard diameter classes at the neighborhood level.
Condition of Publicly-Owned Trees (trees managed intensively)	Possess a detailed understanding of tree condition and potential risk of all intensively-managed, publicly-owned trees. This information is used to direct maintenance actions.	No current information is available on tree condition or risk.	Information from a partial or sample or inventory is used to assess tree condition and risk.	Information from a current, GIS-based, 100% complete public tree inventory is used to indicate tree condition and risk.
Condition of Publicly-Owned Natural Areas (trees managed extensively)	Possess a detailed understanding of the ecological structure and function of all publicly-owned natural areas (such as woodlands, ravines, stream corridors, etc.), as well as usage patterns.	No current information is available on tree condition or risk.	Publicly-owned natural areas are identified in a sample-based "natural areas survey" or similar data.	Information from a current, GIS-based, 100% complete natural areas survey is utilized to document ecological structure and function, as well as usage patterns.
Trees on Private Property	Possess a solid understanding of the extent, location and general condition of trees on private lands.	No data is available on private trees.	Current tree canopy assessment reflects basic information (location) of both public and private canopy combined.	Detailed information available on private trees. Ex. bottom-up sample-based assessment of trees.
Diversity	Establish a genetically diverse population of publicly-owned trees across the entire city and for each neighborhood. Tree populations should be comprised of no more than 30% of any family, 20% of any genus, or 10% of any species.	"No current information is available on species. - OR - Fewer than five species dominate the entire tree population citywide."	No species represents more than 20% of the entire tree population citywide.	No species represents more than 10% of the entire tree population citywide.
Climate Resilience/ Suitability	Establish a tree population suited to the urban environment and adapted to the overall region. Suitable species are gauged by exposure to imminent threats, considering the "Right Tree for the Right Place" concept and invasive species.	"No current information is available on species suitability. - OR - Less than 50% of trees are considered suitable for the site."	50% to 75% of trees are considered suitable for the site.	More than 75% of trees are considered suitable for the site.
Space and Soil Volume	Establish minimum street tree soil volume requirements to ensure there is adequate space and soil for street trees to thrive. Minimum soil volumes by mature size: 1000 cubic feet for large trees; 600 cubic feet for medium trees; 300 cubic feet for small trees.	Minimum street tree soil volumes have not been established.	Minimum street tree soil volume has been established based on mature size of tree.	Minimum street tree soil volumes have been established and are required to be adhered to for all new street tree planting projects.

A Sustainable Urban Forest Indicators: The Players

Indicators of a Sustainable Urban Forest	Overall Objective or Industry Standard	Performance Levels		
		Low	Medium	High
Neighborhood Action	Citizens understand, cooperate, and participate in urban forest management at the neighborhood level. Urban forestry is a neighborhood-scale issue.	Little or no citizen involvement or neighborhood action.	Some active groups are engaged in advancing urban forestry activity, but with no unified set of goals or priorities.	The majority of all neighborhoods are organized, connected, and working towards a unified set of goals and priorities.
Large Private & Institutional Landholder Involvement	Large, private, and institutional landholders embrace citywide goals and objectives through targeted resource management plans.	Large private land holders are unaware of issues and potential influence in the urban forest. No large private land management plans are currently in place.	Education materials and advice is available to large private landholders. Few large private landholders or institutions have management plans in place.	Clear and concise goals are established for large private land holders through direct education and assistance programs. Key landholders and institutions have management plans in place.
Green Industry Involvement	The green industry works together to advance citywide urban forest goals and objectives. The city and its partners capitalize on local green industry expertise and innovation.	Little or no involvement from green industry leaders to advance local urban forestry goals.	Some partnerships are in place to advance local urban forestry goals, but more often for the short-term.	Long-term committed partnerships are working to advance local urban forestry goals.
City Department and Agency Cooperation	All city departments and agencies cooperate to advance citywide urban forestry goals and objectives.	Conflicting goals and/or actions among city departments and agencies.	Informal teams among departments and agencies are communicating and implementing common goals on a project-specific basis.	Common goals and collaboration occur across all departments and agencies. City policy and actions are implemented by formal interdepartmental and interagency working teams on all city projects.
Funder Engagement	Local funders are engaged and invested in urban forestry initiatives. Funding is adequate to implement citywide urban forest management plan.	Little or no funders are engaged in urban forestry initiatives.	Funders are engaged in urban forestry initiatives at minimal levels for short-term projects.	Multiple funders are fully engaged and active in urban forestry initiatives for short-term projects and long-term goals.
Utility Engagement	All utilities are aware of and vested in the urban forest and cooperates to advance citywide urban forest goals and objectives.	Utilities and city agencies act independently of urban forestry efforts. No coordination exists.	Utilities and city agencies have engaged in dialogues about urban forestry efforts with respect to capital improvement and infrastructure projects.	Utilities, city agencies, and other stakeholders integrate and collaborate on all urban forestry efforts, including planning, site work, and outreach/education.
State Engagement	State departments/agencies are aware of and vested in the urban forest and cooperates to advance citywide urban forest goals and objectives.	State departments/agencies and City agencies act independently of urban forestry efforts. No coordination exists.	State department/agencies and City agencies have engaged in dialogues about urban forestry efforts with respect to capital improvement and infrastructure projects.	State departments/agencies, City agencies, and other stakeholders integrate and collaborate on all urban forestry efforts, including planning, site work, and outreach/education.
Public Awareness	The general public understands the benefits of trees and advocates for the role and importance of the urban forest.	Trees are generally seen as a nuisance, and thus, a drain on city budgets and personal paychecks.	Trees are generally recognized as important and beneficial.	Trees are seen as valuable infrastructure and vital to the community's well-being. The urban forest is recognized for the unique environmental, economic, and social services its provides to the community.
Regional Collaboration	Neighboring communities and regional groups are actively cooperating and interacting to advance the region's stake in the city's urban forest.	Little or no interaction between neighboring communities and regional groups.	Neighboring communities and regional groups share similar goals and policy vehicles related to trees and the urban forest.	Regional urban forestry planning, coordination, and management is widespread.

A Sustainable Urban Forest Indicators: The Management Approach

Indicators of a Sustainable Urban Forest	Overall Objective or Industry Standard	Performance Levels		
		Low	Medium	High
Tree Inventory	Comprehensive, GIS-based, current inventory of all intensively-managed public trees to guide management, with mechanisms in place to keep data current and available for use. Data allows for analysis of age distribution, condition, risk, diversity, and suitability.	No inventory or out-of-date inventory of publicly-owned trees.	Partial or sample-based inventory of publicly-owned trees, inconsistently updated.	Complete, GIS-based inventory of publicly-owned trees, updated on a regular, systematic basis.
Canopy Assessment	Accurate, high-resolution, and recent assessment of existing and potential city-wide tree canopy cover that is regularly updated and available for use across various departments, agencies, and/or disciplines.	No tree canopy assessment.	Sample-based canopy cover assessment, or dated (over 10 years old) high resolution canopy assessment.	High-resolution tree canopy assessment using aerial photographs or satellite imagery.
Management Plan	Existence and buy-in of a comprehensive urban forest management plan to achieve city-wide goals. Re-evaluation is conducted every 5 to 10 years.	No urban forest management plan exists.	A plan for the publicly-owned forest resource exists but is limited in scope, acceptance, and implementation.	A comprehensive plan for the publicly owned forest resource exists and is accepted and implemented.
Risk Management Program	All publicly-owned trees are managed for maximum public safety by way of maintaining a city-wide inventory, conducting proactive annual inspections, and eliminating hazards within a set timeframe based on risk level. Risk management program is outlined in the management plan.	Request-based, reactive system. The condition of publicly-owned trees is unknown.	There is some degree of risk abatement thanks to knowledge of condition of publicly-owned trees, though generally still managed as a request-based reactive system.	There is a complete tree inventory with risk assesment data and a risk abatement program in effect. Hazards are eliminated within a set time period depending on the level of risk.
Maintenance Program of Publicly-Owned Trees (trees managed intensively)	All intensively-managed, publicly-owned trees are well maintained for optimal health and condition in order to extend longevity and maximize benefits. A reasonable cyclical pruning program is in place, generally targeting 5 to 7 year cycles. The maintenance program is outlined in the management plan.	Request-based, reactive system. No systematic pruning program is in place for publicly-owned trees.	All publicly-owned trees are systematically maintained, but pruning cycle is inadequate.	All publicly-owned trees are proactively and systematically maintained and adequately pruned on a cyclical basis.
Maintenance Program of Publicly-Owned Natural Areas (trees managed extensively)	The ecological structure and function of all publicly-owned natural areas are protected and enhanced while accommodating public use where appropriate.	No natural areas management plans are in effect.	Only reactive management efforts to facilitate public use (risk abatement).	Management plans are in place for each publicly-owned natural area focused on managing ecological structure and function and facilitating public use.
Planting Program	Comprehensive and regular y updated tree protection ordinance with enforcement ability is based on community goals. The benefits derived from trees on public and private property are ensured by the enforcement of existing policies.	Tree establishment is ad hoc.	Tree establishment is consistently funded and occurs on an annual basis.	Tree establishment is directed by needs derived from a tree inventory and other community plans and is sufficient in meeting canopy cover objectives.
Tree Protection Policy	Establish a tree population suited to the urban environment and adapted to the overall region. Suitable species are gauged by exposure to imminent threats, considering the "Right Tree for the Right Place" concept and invasive species.	No tree protection policy.	Policies are in place to protect trees, but the policies are not well-enforced or ineffective.	Protections policies ensure the safety of trees on public and private land. The policies are enforced and supported by significant deterrents and shared ownership of city goals.
City Staffing and Equipment	Adequate staff and access to the equipment and vehicles to implement the management plan. A high level urban forester or planning professional, strong operations staff, and solid certified arborist technicians.	Insufficient staffing levels, insufficiently-trained staff, and/or inadequate equipment and vehicle availability.	Certified arborists and professional urban foresters on staff have some professional development, but are lacking adequate staff levels or adequate equipment.	Multi-disciplinary team within the urban forestry unit, including an urban forestry professional, operations manager, and arborist technicians. Vehicles and equipment are sufficient to complete required work.
Funding	Appropriate funding in place to fully implement both proactive and reactive needs based on a comprehensive urban forest management plan.	Funding comes from the public sector only, and covers only reactive work.	Funding levels (public and private) generally cover mostly reactive work. Low levels of risk management and planting in place.	Dynamic, active funding from engaged private partners and adequate public funding are used to proactively manage and expand the urban forest.
Disaster Preparedness & Response	A disaster management plan is in place related to the city's urban forest. The plan includes staff roles, contracts, response priorities, debris management and a crisis communication plan. Staff are regularly trained and/or updated.	No disaster response plan is in place.	A disaster plan is in place, but pieces are missing and/or staff are not regularly trained or updated.	A robust disaster management plan is in place, regularly updated and staff is fully trained on roles and processes.
Communication	Effective avenues of two-way communication exist between the city departments and between city and its citizens. Messaging is consistent and coordinated, when feasible.	No avenues are in place. City departments and public determine on an ad-hoc basis the best messages and avenues to communicate.	Avenues are in place, but used sporadically and without coordination or only on a one-way basis.	Avenues are in place for two way communication, are well-used with targeted, coordinated messages.

CITY OF TRACY
ENVIRONMENTAL SUSTAINABILITY COMMISSION MEETING
October 24, 2024

AGENDA ITEM 7.B

REQUEST

STAFF REQUESTS THAT THE ENVIRONMENTAL SUSTAINABILITY COMMISSION REVIEW AND APPROVE AN UPDATE TO THE 2024 ENVIRONMENTAL SUSTAINABILITY COMMISSION WORKPLAN WITH ACTION ITEMS FROM PRIOR MEETINGS

EXECUTIVE SUMMARY

The commission and public make recommendations each meeting that are moved forward and approved for submission to the Environmental Sustainability Commission (ESC) annual workplan. This item requests that the ESC review, discuss, and approve updates to the ESC workplan for October 24, 2024.

DISCUSSION

There was no action taken with the workplan from the September 2024 ESC meeting due to necessity to end the meeting for lack of quorum prior to the item being discussed. Staff added one action item to the TBD tab of the workplan from the September 26th meeting, Item 7.B, and a staff item to the November 14, 2024, meeting to select and create the 2025 Meeting Calendar dates.

RECOMMENDATION

The Environmental Sustainability Commission review and approve an update to the 2024 Environmental Sustainability Commission workplan with action items from prior meetings.

Prepared by: Stephanie Reyna-Hiestand, Assistant Director of Utilities
Reviewed by: Carla Sorich, Executive Assistant

ATTACHMENT

A - 2024 Environmental Sustainability Commission Workplan for October 2024

Attachment A

MEETING SCHEDULED DATE	WORKPLAN ITEMS	ITEM REQUESTED MEETING DATE	COUNCIL STRATEGIC PRIORITY RELATION	TASKS/ACTION	ASSIGNMENT / SUBCOMMITTEE	TIMELINE	STATUS
OCTOBER 24, 2024	SAP AD-HOC COMMITTEE - REPORT		Good Governance	Informational Item	ESC	monthly	on-going
	ESC WORKPLAN FOR CY 2024		Good Governance	Action - Review and Approve	ESC	monthly	on-going
NOVEMBER 14, 2024	2025 CALENDER OF MEETING DATES		Good Governance	Action - Review and Approve	ESC	YEARLY	on-going
	SAP AD-HOC COMMITTEE - REPORT		Good Governance	Informational Item	ESC	monthly	on-going
	ESC WORKPLAN FOR CY 2024		Good Governance	Action - Review and Approve	ESC	monthly	on-going
	MULTI-GENERATIONAL RECREATION CENTER - SUSTAINABLE PRACTICES	OCTOBER 26, 2023	Quality of Life Good Governance	Informational Item	Richard Joaquin	One-Time	
DECEMBER 26, 2024 - **cancelled**							

COMMISSION MEETING ACTION DATE	COMMISSION REQUESTS - TBS	STATUS	ESC MEETING DATE
11/27/2023	CITY SUSTAINABLE PRACTICES - STANDARDS FOR DUAL USE BASINS, RECYCLED WATER USE, IRRIGATION	REQUESTING INFO FROM ENGINEERING/PARKS	TBD
1/25/2024	PLANNING DIVISION - GENERAL INFORMATION ON ZONING, CEQA, ETC	REQUESTING INFORMATION FROM DIRECTOR EBBS	
1/25/2024	AVA ENERGY AND CITY PARTNERSHIP PRESENTATION	RESEARCHING WHICH DEPARTMENT WILL PROVIDE THE PRESENTATION	
2/22/2024	INFORMATIONAL ITEM ON INITIATIVES THAT THE CITY IS CURRENTLY WORKING ON REGARDING ENVIRONMENTAL SUSTAINABILITY	TOO BROAD A TOPIC - NEED TO CLARIFY W CAO - MULTIPLE DEPARTMENTS/DIVISIONS	
6/27/2024	INFORMATIONAL ITEM FROM VALLEY LINK AND ACE ON SPECIFIC PLANS FOR TRACY. ALSO, ROUTING PLANS.	REACHING OUT TO FIND THE RIGHT CONTACT PERSON	