

CITY OF SAN RAMON **CLIMATE ACTION PLAN**



August 23, 2011

San Ramon Climate Action Plan

San Ramon, California

Prepared for:



City of San Ramon
Planning/Community Development Department
Planning Services Division
2222 Camino Ramon
San Ramon, CA 94583
925.973.2560

Contact: Mr. Lauren Barr, Senior Planner

Consultant to the City:

Michael Brandman Associates
Bishop Ranch 3
2633 Camino Ramon, Suite 460
San Ramon, CA 94583
925.830.2733

Contact: David Mitchell, Project Manager

Project Number: 24910012



August 23, 2011

TABLE OF CONTENTS

Section 1: Executive Summary 1
 1.1 - Climate Action Plan Purpose 1

Section 2: Introduction and Purpose 5
 2.1 - City of San Ramon 5
 2.2 - Purpose..... 6
 2.3 - Climate Change Science..... 12
 2.4 - California Regulatory Context 14

Section 3: Emission Inventory 17
 3.1 - Emission Inventory Overview 17
 3.2 - San Ramon Inventory 18
 3.3 - Reduction Target..... 25

Section 4: Climate Action Strategies 27
 4.1 - Development Scenarios 27
 4.2 - Land Use and Transportation Strategies 27
 4.3 - Transportation Infrastructure and Facilities 42
 4.4 - Energy Conservation and Alternative Energy 55
 4.5 - Regional Cooperation 62
 4.6 - Role of Existing Development 65
 4.7 - Government Operations 66
 4.8 - Emission Reduction Estimates..... 69
 4.9 - Reductions from State Scoping Plan Measures..... 76

Section 5: Implementation, Monitoring, and Funding 83
 5.1 - Implementation Plan and Monitoring Program 83
 5.2 - Monitoring Program..... 93
 5.3 - Funding 95

Section 6: Climate Change Adaptation 97
 6.1 - Wildfires 97
 6.2 - General Plan Policies 99
 6.3 - Water..... 100
 6.4 - Agriculture 104
 6.5 - Emergency Preparedness..... 105
 6.6 - Other Potential Impacts..... 106
 6.7 - CAP Implementation Strategies 107

Section 7: Glossary of Terms and Acronyms 109

Section 8: Document References 113

Appendix A: Detailed Emission Inventory

Appendix B: CAPCOA CEQA and Climate Change Mitigation Measure Summary

Appendix C: General Plan Policy List

LIST OF TABLES

Table 1: City of San Ramon Greenhouse Gas Emissions Summary 2

Table 2: California Greenhouse Gas Emissions Inventory in 2006 by Sector 17

Table 3: City of San Ramon Community Business as Usual Emissions 21

Table 4: City of San Ramon 2020 Emissions Detail 23

Table 5: City of San Ramon Government Business as Usual Emissions 24

Table 6: General Plan 2030 Chapter Titles 29

Table 7: Strategies For Existing Development 65

Table 8: Vehicle Miles Traveled at Selected Bay Area Communities in 2006 70

Table 9: Emission Reduction Potential for San Ramon’s Development Areas 73

Table 10: 2020 Community Greenhouse Gas Emission Reductions from State
Regulations and AB 32 Measures 81

LIST OF FIGURES

Figure 1: Regional Location Map 7

Figure 2: Proposed General Plan Land Use Map 9

Figure 3: The Greenhouse Effect 13

Figure 4: Global Atmospheric Concentration of CO₂ 14

Figure 5: California and Contra Costa County Greenhouse Gas Emissions 14

Figure 6: San Ramon Community Greenhouse Gas Business as Usual Emissions 22

Figure 7: San Ramon Government Greenhouse Gas Business as Usual Emissions 24

Figure 8: How Climate Change Impacts a Watershed 101

SECTION 1: EXECUTIVE SUMMARY

The City of San Ramon (City) has prepared a Climate Action Plan as its primary strategy for ensuring that the buildout of the General Plan 2030 will not conflict with the implementation of Assembly Bill 32 – the Global Warming Solutions Act of 2006. Assembly Bill (AB) 32 requires California to reduce statewide greenhouse gas emissions to 1990 levels by the year 2020. This Climate Action Plan (CAP) is designed to reduce community related and City operations related greenhouse gas emissions to a degree that would not hinder or delay implementation of AB 32.

1.1 - Climate Action Plan Purpose

The purpose of this Climate Action Plan (CAP) is to:

- Outline a course of action for the City government and the community of San Ramon to reduce greenhouse gas emissions 15 percent below 2008 levels by the year 2020 and adapt to effects of climate change, and
- Provide clear guidance to City staff regarding when and how to implement key provisions of the CAP.

The earth's natural warming process is known as the "greenhouse effect." Certain atmospheric gases act as an insulating blanket for solar energy to keep the global average temperature in a suitable range. Scientists studying the rise in global temperatures during the late twentieth century believed that natural variability alone does not account for that rise. Rather, human activity has increased emissions of carbon dioxide and other forms of greenhouse gases resulting in an enhanced greenhouse effect. Human-related emissions have been growing to unprecedented levels since the Industrial Revolution and appear to be accelerating the climate change process. Increased levels of greenhouse gases in the atmosphere can cause shifts in weather patterns and changes to traditional precipitation and temperature levels. In California, it is predicted that climate change could cause sea level rise, decrease the amount of snow in the Sierra snowpack, increase flooding, increase wildfires, and other impacts.

Emissions Inventory

As shown in Table 1, in a "business as usual" scenario, emissions are anticipated to increase from 2008 levels in 2020 and 2030. A business as usual scenario examines the impact of growth without accounting for the strategies within this CAP or the benefits of state regulations and programs that reduce greenhouse gas emissions. The CAP includes emission reduction targets based on the methodologies provided in the Bay Area Air Quality Management (BAAQMD) CEQA Air Quality Guidelines.

The BAAQMD CEQA Air Quality Guidelines provide three alternative reduction approaches. The first requires a 15-percent reduction from current emissions (2008 in this case). The second requires plans to meet an emission efficiency below 6.6 metric tons of carbon dioxide equivalents (MTCO₂e) per service population per year. The third approach is based on demonstrating that the plan reduces emissions to 1990 levels by 2020. That approach is difficult to implement because of insufficient data available to develop a reasonably accurate 1990 inventory. Therefore, the CAP does not use that approach. The CAP includes another threshold approach based on consistency with California Air Resources Board (CARB) Scoping Plan targets for land use-related sources. That approach requires a 26-percent reduction in land use-related emissions compared with business as usual by 2020 accounting for reductions that will be achieved by the state regulations and reduction programs for greenhouse gas emissions coupled with reductions achieved by the City through its development decisions and local reduction programs. With the reductions shown in this CAP, by the year 2020, emissions from new development are reduced by more than 15 percent below 2008 levels. The CAP also shows that the City has a plan efficiency below 6.6 MTCO₂e per service population per year and reductions in the CAP when combined with reductions from state regulations and programs will achieve the 26-percent reduction target from the 2020 business as usual inventory showing consistency with state targets.

Table 1: City of San Ramon Greenhouse Gas Emissions Summary

Inventory	Greenhouse Gas Emissions (Metric Tons CO ₂ e)		
	2008	2020	2030
Community Business as Usual Emissions	652,615	716,843	808,634
Community Emissions with Reductions	—	520,113	—
Greenhouse Gas Emission 15% Target	—	554,723	—
2020 Service Population Target (MTCO ₂ e per Service Population)	—	6.6	—
San Ramon 2020 Emissions (MTCO ₂ e per Service Population)	—	5.5	—
Do emissions exceed targets?	—	No	—
City Government Emissions	4,619	5,591	6,400
Notes: MTCO ₂ e = metric tons of carbon dioxide equivalents SP = service population (residents + employment): 2008: 106,565, 2020: 130,284, 2030: 150,800 The greenhouse gas reduction target for 2020 emissions is 15% below 2008 business as usual emissions; the SP target is from the Bay Area Air Quality Management District's guidelines. BAAQMD and CARB have not developed targets for 2030. City government emissions are a subset of community emissions Source: Data compiled by Michael Brandman Associates using the ICLEI Clean Air and Climate Protection 2009 Software, Version 2.2.1			

Climate Action Plan Strategy

The CAP strategy is primarily based upon the land use, transportation, and conservation policies that are part of the General Plan 2030, recent specific plans, and major development plans in the City. The concept is that design, density, and pattern of land uses impacts the amount people drive and the options available for using less polluting and energy-consuming modes of transportation such as walking, bicycling, and transit. The plans also promote energy efficiency in buildings, government operations, and through more efficient water use. Implementation of these plans helps to ensure that the City will be developed in ways that produces fewer greenhouse gas emissions. The CAP strategy includes programs and measures that apply to both existing and new development within the City. In addition, the changes in land use pattern and transportation infrastructure that will result from implementation of the General Plan 2030 will improve the transportation options for all residents of the City. The CAP strategy and its content are consistent with a “qualified” Greenhouse Gas Reduction Strategy pursuant to current Bay Area Air Quality Management District recommendations.

This CAP identifies policies within the City of San Ramon General Plan that would decrease the City’s emissions of greenhouse gases. This CAP also lists Implementation Strategies that add more details and specific actions to the General Plan policies and clarify how the reductions would occur. This CAP demonstrates that the General Plan policies and CAP strategies would reduce emissions to the reduction target. The CAP includes strategies in the following categories:

- Land use: higher-density, mixed-use, transit-oriented, pedestrian-oriented, and compact development
- Transportation: provision of transit facilities, pedestrian connections, bicycle infrastructure, traffic calming, use of low emission vehicles, transportation demand management, end of trip facilities, and parking measures
- Energy conservation
- Water conservation
- Waste reduction and recycling
- Regional cooperation

The strategies listed above will be implemented in new development areas as projects are built in compliance with General Plan policies, development standards, conditions of approval, and CEQA mitigation measures. Existing residents and businesses will be subject to statewide greenhouse gas regulations and to existing and new citywide and regional educational and incentive programs for energy and water conservation, and waste reduction and recycling. Construction of transportation infrastructure supportive of walking, bicycling, and transit use will be accomplished in new development areas, but also in existing areas

when facilities are upgraded or rebuilt. Creating new and redeveloped high-density, pedestrian- and transit-oriented development provides destinations for the entire community that are supportive of alternative transportation modes. The CAP builds on the City's history of implementing innovative and effective environmental and conservation programs to successfully achieve its objectives.

In order to ensure that the CAP strategy is implemented on schedule and targets are achieved, this CAP sets out an implementation and monitoring framework. The CAP recognizes that technologies to reduce greenhouse gases and regulatory efforts related to climate change are rapidly evolving and provides flexibility to adapt to changing circumstances.

Cities with Climate Action Plans, that are consistent with the state and regional AB 32 and SB 375 reduction targets, can use their CAP as the basis for determining if projects would result in significant climate change impacts under CEQA. The San Ramon CAP is intended to fulfill this function. The BAAQMD has reviewed the CAP and identified enhancements that have been incorporated into the document.

SECTION 2: INTRODUCTION AND PURPOSE

The Climate Action Plan is the City's primary strategy for ensuring that the buildout of the General Plan 2030 will not conflict with the implementation of Assembly Bill 32 – the Global Warming Solutions Act of 2006 and its goal of reducing California's greenhouse gas emissions to 1990 levels by the year 2020. The Climate Action Plan (CAP) provides strategies and implementation actions that will reduce community related and City operations-related greenhouse gas emissions by amounts that are consistent with AB 32 goals. The CAP is a companion document to the General Plan 2030 and implements the General Plan's greenhouse gas reduction policies.

This section provides a discussion of the environmental and regulatory context and the intended purpose and function of the CAP.

2.1 - City of San Ramon

The City of San Ramon ("City") is located in Contra Costa County within the Bay Area Air Basin and is bordered by the Town of Danville, the City of Dublin, and unincorporated lands in Contra Costa and Alameda counties, as shown in Figure 1 and Figure 2.

The population of the City of San Ramon has grown significantly since incorporation in 1983. The City's population more than doubled in the 25 years between 1984 and 2009, growing at a compound annual growth rate of 4.1 percent. In 2008, the planning area population was estimated at approximately 66,413 and is projected to increase to approximately 92,000 in 2030. The Dougherty Valley is expected to absorb the largest amount of growth. The City also expects significant growth in infill and redevelopment areas.

Bay Area Air Quality Management District

The City of San Ramon is within the jurisdiction of the Bay Area Air Quality Management District (BAAQMD). The BAAQMD's jurisdiction includes all of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, and Santa Clara counties, and the southern portions of Solano and Sonoma counties. The BAAQMD's responsibilities in improving air quality in the region include preparing plans for attaining and maintaining air quality standards, adopting and enforcing rules and regulations, issuing permits for stationary sources of air pollutants, inspecting stationary sources and responding to citizen complaints, monitoring air quality and meteorological conditions, awarding grants to reduce mobile emissions, implementing public outreach campaigns, and assisting local governments in addressing climate change.

The City's Role in Reducing Emissions

The City's focus is on emission sources within its regulatory authority, which are mainly related to land use and the local transportation system. To some extent, the City can influence activities that provide greenhouse gas reductions such as water conservation and solid waste diversion and recycling. The City can require feasible mitigation measures for new projects as a Lead Agency under the California Environmental Quality Act (CEQA).

2.2 - Purpose

This Climate Action Plan (CAP) has been designed to support these primary functions:

- Outline a course of action for the City government and the community of San Ramon to reduce greenhouse gas emissions 15 percent below 2008 levels by the year 2020 and adapt to effects of climate change
- Provide clear guidance to City staff regarding when and how to implement key provisions of the CAP.

The CAP addresses both City emissions (such as emissions from City vehicles) and community emissions (such as emissions from the electricity generated to power residences within the City). The CAP is a companion to the General Plan 2030 that builds on the General Plan's framework with more specific actions that will be applied to achieve emission reduction targets consistent with California legislation. The terms Climate Action Plan and Greenhouse Gas Reduction Plan are often used interchangeably. Climate Action Plan (abbreviated as CAP) is used for this document.

The CAP follows a series of guiding principles to ensure that it is consistent with the City's values, objectives, and economy.

- The CAP will focus on strategies that meet multiple City objectives and enhance the quality of life and well-being of City residents.
- CAP strategies that provide an economic return will receive a higher priority than strategies that increase costs for the City, businesses, or residents.
- The CAP will not duplicate strategies and programs that are better handled by other agencies.
- The CAP recognizes that federal, state, and other agency requirements set for local government regarding greenhouse gas reductions and climate change are evolving, so strategies and targets must be adaptable to changing conditions.
- CAP implementation and monitoring will use existing data collection and reporting systems to achieve the maximum technologically feasible and cost-effective reduction to greenhouse gases.



Source: Census 2000 Data, The CaSIL, MBA GIS 2010.

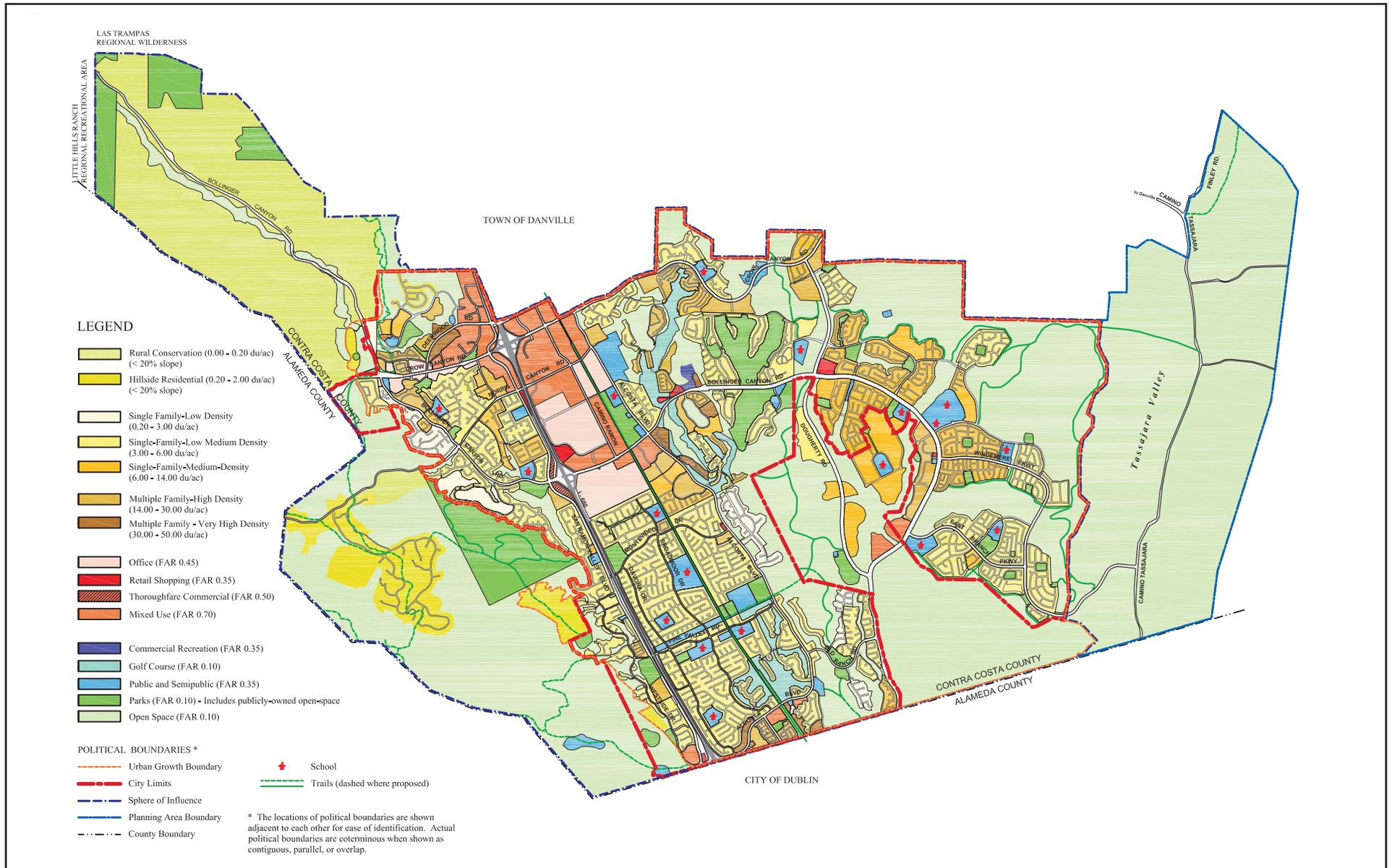


Michael Brandman Associates

24910012 • 03/2010 | 1_regional.mxd



Figure 1
Regional Location Map



Source: San Ramon General Plan 2030, January 2011.



Michael Brandman Associates

24910012 • 01/2011 | 2_proposed_GP_land_use.cdr



Figure 2
Proposed General Plan Land Use Map

Qualified Greenhouse Gas Reduction Strategy

This CAP meets the requirements of a “qualified” Greenhouse Gas Reduction Strategy, according to the guidance in the BAAQMD Air Quality Guidelines adopted in June 2010 and comments received on the CAP in a BAAQMD letter dated July 6, 2011. The BAAQMD Air Quality Guidelines indicate that a project under CEQA would result in a less than significant impact regarding greenhouse gases if it complies with a qualified Greenhouse Gas Reduction Strategy, emits less than 1,100 metric tons of carbon dioxide equivalents (MTCO₂e) per year, or emits less than 4.6 MTCO₂e per service population per year (includes residents and employees).

This CAP incorporates all required components and elements identified for a “qualified Greenhouse Gas Reduction Strategy” as described in the BAAQMD Air Quality Guidelines, which include:

- A greenhouse gas inventory for current year and forecast for 2020 (and for 1990 if the reduction goal is based on 1990 emission levels).
- An adopted Greenhouse Gas Reduction Goal for 2020 for the jurisdiction from all sources (existing and future) which is at least one of the following: 1990 emission levels, 15 percent below 2008 emission levels, or a plan efficiency of 6.6 metric tons of carbon dioxide equivalents per service population per year. The service population approach is based on the community emissions divided by the sum of the population and employment in the City, resulting in no greater than 6.6 MTCO₂e per service population per year. For San Ramon, a reduction target based on 15 percent below 2008 is more stringent, so the CAP demonstrates compliance with both approaches. Another target approach that uses a 26.2-percent reduction below 2020 business as usual forecasts to demonstrate consistency with CARB Scoping Plan targets was not included in the final BAAQMD Guidelines, but is included here for comparison purposes.
- Identification of feasible reduction measures to reduce emissions for 2020 to the identified target.
- Application of relevant reduction measures included in the AB 32/CARB Climate Change Scoping Plan that are within the jurisdiction of the local land use authority (such as building energy efficiency, etc.).
- Quantification of the reduction effectiveness of each of the feasible measures identified including disclosure of calculation method and assumptions.
- Identification of implementation steps and financing mechanisms to achieve the identified goal by 2020.
- Procedures for monitoring and updating the greenhouse gas inventory and reduction measures at least twice before 2020 or at least every five years.

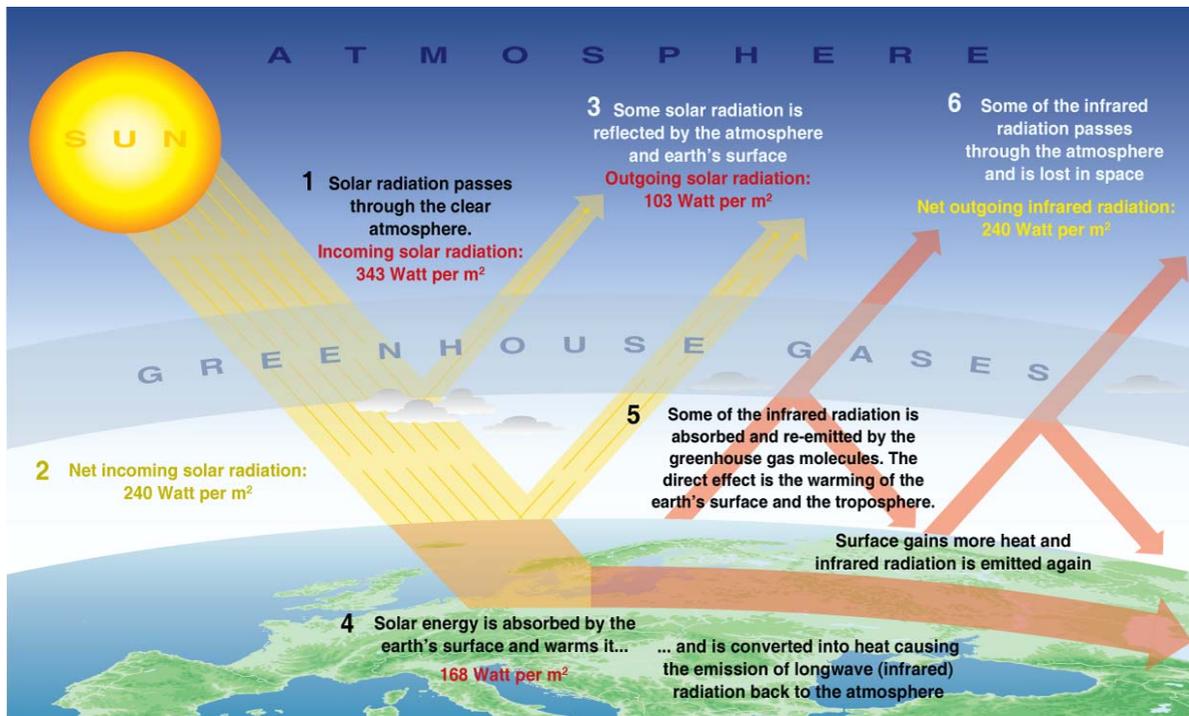
- Identification of responsible parties for implementation.
- Schedule of implementation.
- Certified California Environmental Quality Act (CEQA) document, or equivalent process.

2.3 - Climate Change Science

Gases that trap heat in the atmosphere are referred to as greenhouse gases. The effect is analogous to the way a greenhouse retains heat, as shown in Figure 3.

Greenhouse gases include carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), sulfur hexafluoride (SF₆), hydrofluorocarbons (HFC) and perfluorocarbons (PFC). Natural processes and human activities emit greenhouse gases. The presence of greenhouse gases in the atmosphere regulates the earth's temperature. Without the natural heat trapping effect of greenhouse gas, the earth's surface would be about 34 degrees Centigrade cooler. Carbon dioxide concentrations in the atmosphere have steadily increased over time. As shown in Figure 4, global atmospheric concentration of CO₂ (carbon dioxide) data prior to 1958 are from ice core measurements, and post-1958 data are from the Mauna Loa measurement site in Hawaii. A growing number of scientific analyses indicate that rising levels of greenhouse gases in the atmosphere are contributing to climate change. Important scientific questions remain about how much warming will occur, how fast it will occur, and how the warming will affect the rest of the climate system, including precipitation patterns and storms (EPA 2009).

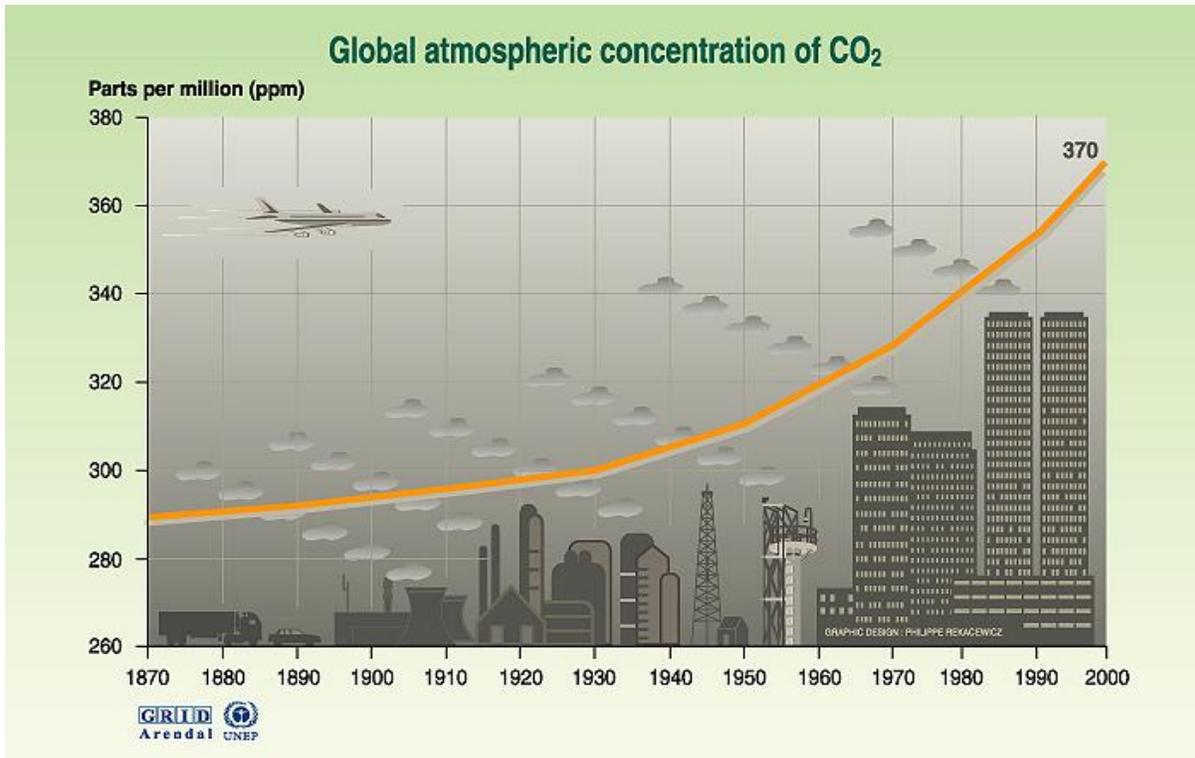
Figure 3: The Greenhouse Effect



Greenhouse gases have varying global warming potential and atmospheric lifetimes. Carbon dioxide, the reference gas for global warming potential, has a global warming potential of one. The calculation of the carbon dioxide equivalent (CO₂e) is a consistent methodology for comparing greenhouse gas emissions, since it normalizes various greenhouse gas emissions to a consistent metric. Methane's warming potential of 21 indicates that methane has a 21 times greater warming affect than carbon dioxide on a molecule per molecule basis. A carbon dioxide equivalent is the mass emissions of an individual greenhouse gas multiplied by its global warming potential. Emissions are typically shown in metric tons of carbon dioxide equivalents (MTCO₂e) or a million times that, million metric tons of carbon dioxide equivalents (MMTCO₂e).

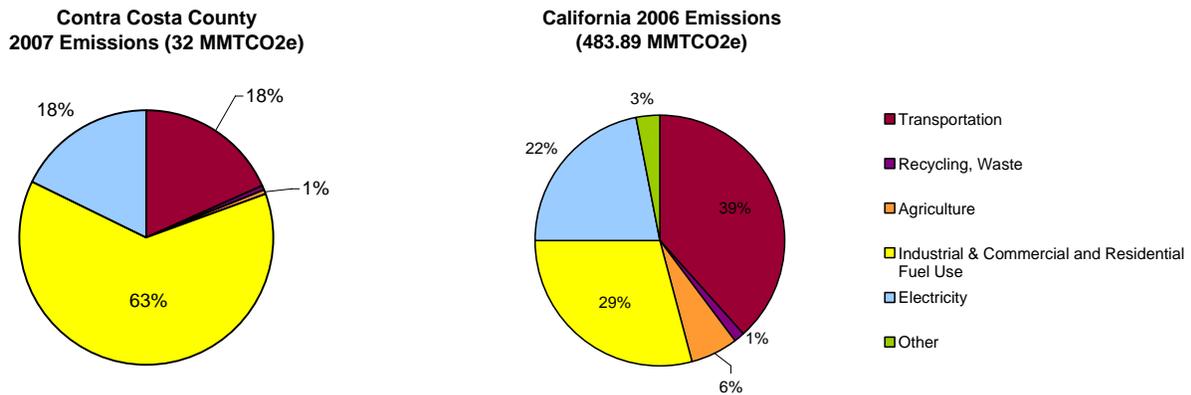
Greenhouse gas emissions in California in 2006 were approximately 483.89 MMTCO₂e. The major source of emissions in California in 2006 was from transportation, as shown in the pie charts. In 2007, Contra Costa County had emissions of 32 MMTCO₂e in 2007, with industrial and commercial (oil refineries and natural gas combustion) and residential fuel use (from natural gas combustion) being the main source.

Figure 4: Global Atmospheric Concentration of CO₂



Sources: TP Whorf Scripps, Mauna Loa Observatory, Hawaii, institution of oceanography (SIO), university of California La Jolla, California, United States, 1999

Figure 5: California and Contra Costa County Greenhouse Gas Emissions



2.4 - California Regulatory Context

California has adopted a wide variety of regulations aimed at reducing the State’s greenhouse emissions. While state actions alone cannot stop climate change, the adoption and implementation of this legislation demonstrates California’s leadership in addressing this critical challenge. Key legislation pertaining to the State’s reduction targets are described below.

AB 32. The California State Legislature enacted AB 32, the California Global Warming Solutions Act of 2006. AB 32 requires that greenhouse gases emitted in California be reduced to 1990 levels by the year 2020. “Greenhouse gases” as defined under AB 32 include carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), sulfur hexafluoride (SF₆), hydrofluorocarbons (HFC), and perfluorocarbons (PFC). The California Air Resources Board (CARB) is the state agency charged with monitoring and regulating sources of greenhouse gases.

The CARB approved the Climate Change Scoping Plan in December 2008. The CARB Climate Change Scoping Plan contains measures designed to reduce the State’s emissions to 1990 levels by the year 2020. Local governments must achieve reductions through land use measures that will be substantially dependent on the General Plan for success. Statewide, the CARB expects to target local governments with reducing greenhouse gas emissions by 5 MMTCO₂e by 2020.

Executive Order S-3-05. California Governor Arnold Schwarzenegger announced on June 1, 2005, through Executive Order S 3-05, the following reduction targets for greenhouse gas emissions:

- By 2010, reduce greenhouse gas emissions to 2000 levels;
- By 2020, reduce greenhouse gas emissions to 1990 levels;
- By 2050, reduce greenhouse gas emissions to 80 percent below 1990 levels.

Executive Order S-13-08 directs the Governor’s Office of Planning and Research, in cooperation with the California Resources Agency, to provide land use planning guidance related to sea level rise and other climate change impacts. The order also directs the California Resources Agency to develop a State Climate Adaptation Strategy by June 30, 2009 and to convene an independent panel to complete the first California Sea Level Rise Assessment Report.

Senate Bill (SB) 375. SB 375 aligns regional transportation planning efforts, regional greenhouse gas reduction targets, and affordable housing allocations. Metropolitan Planning Organizations are required to adopt a Sustainable Communities Strategy, which allocates land uses in the Metropolitan Planning Organization’s Regional Transportation Plan. Qualified projects consistent with an approved SCS or Alternative Planning Strategy and categorized as “transit priority projects” would receive incentives under new provisions of the California Environmental Quality Act (CEQA).

For additional information regarding greenhouse gases, climate change, and the current regulatory context for climate change, please refer to the City of San Ramon General Plan 2030 Air Quality and Greenhouse Gas Emissions Element Background Report.

SECTION 3: EMISSION INVENTORY

This section describes the process of developing a greenhouse gas emission inventory and provides an inventory of the sources of greenhouse gas emissions for San Ramon.

3.1 - Emission Inventory Overview

Greenhouse gas inventories consider a wide range of human activities. Estimating the amount of greenhouse gases generated by these activities requires using a multiplicity of data sources and a diverse set of methodologies. Emission inventories are, by nature, the reflection of the best available data and the most applicable methods at the time of their compilation. As data grow and understanding develops, the inventory can be updated and improved.

Emissions inventories are organized by source categories or sectors. The State of California organizes its emission inventory by the following sectors: transportation, electricity, commercial and residential, industry, recycling and waste, high global warming potential gases, and agriculture. This inventory provides emission estimates for all of the sectors except for agriculture and industry. San Ramon has very limited agriculture and industrial sources and the emissions from energy use from these sources are included in the commercial sector. The inventory is based on the emissions of a number of greenhouse gases. Although carbon dioxide (CO₂) is the largest contributor to climate change, AB 32 also defines the following as greenhouse gases: methane (CH₄), nitrous oxide (N₂O), hexafluoride (SF₆), hydrofluorocarbons (HFC), and perfluorocarbons (PFC). The emissions of each gas are standardized by the global warming potential in comparison to CO₂ and is referred to as CO₂ equivalent or CO₂e.

California Emission Inventory

A comparison of major sources of greenhouse gas emissions at the state and county levels illustrates the scale of emissions. The most current year available was used for each inventory summary. A summary of California's greenhouse gas inventory for 2006 is provided in Table 2.

Table 2: California Greenhouse Gas Emissions Inventory in 2006 by Sector

Scoping Plan Sector	2006 Emission (Millions of Metric Tons of CO ₂ Equivalent/Year)	Percentage of Inventory
Transportation	185.77	38.4
Electric Power	105.92	21.9
Commercial and Residential Fuel Use	44.37	9.2

Table 2 (cont.): California Greenhouse Gas Emissions Inventory in 2006 by Sector

Scoping Plan Sector	2006 Emission (Millions of Metric Tons of CO ₂ Equivalent/Year)	Percentage of Inventory
Industrial Fuel Use	96.05	19.9
Recycling and Waste	6.31	1.3
High Global Warming Potential Gases	15.15	3.1
Agriculture	30.13	6.2
Forestry	0.19	0.0
Total Emissions	483.87	100.0
Notes: Sequestration of emissions from forestry activities is not included. Emission categories are as defined in the CARB Scoping Plan. Source: California Greenhouse Gas Inventory for 2000-2006 by Category as Defined in the CARB Climate Change Scoping Plan (CARB 2008).		

3.2 - San Ramon Inventory

This assessment presents the estimated greenhouse gas emissions generated in the City of San Ramon for calendar year 2008, as well as the projected San Ramon emissions for calendar years 2020 and 2030. The inventory for the year 2020 is based on an interpolation of General Plan 2030 buildout data assuming steady growth each year. See Appendix A for supporting documentation for the emission inventories.

Summary of Emissions

Greenhouse gas emissions produced within San Ramon in 2008 were estimated to be 573,293 MTCO₂e. Projected emissions for 2020 are 624,271 MTCO₂e. Projected emissions for 2030 are 758,749 MTCO₂e. The 2008 emissions are considered the baseline inventory year. The 2020 and 2030 emissions are considered future year business as usual inventories that account for growth but not planned regulations and mitigation measures that may be applied in the future. When normalized by population, total annual emissions within the planning area equate to 8.6 MTCO₂e per resident in 2008, 7.8 MTCO₂e per resident in 2020, and 8.2 MTCO₂e per resident in 2030.

Methods

This assessment includes emissions attributable to all land within the City of San Ramon Planning Area. Therefore, the San Ramon Planning Area is considered the organizational boundary for the assessment. The assessment includes emission inventories for five main sectors of emission sources: electricity, natural gas, solid waste, refrigerants, and

transportation sources. Therefore, these sectors are considered the operational boundary for the assessment.

Emissions in 2008 were calculated using data from calendar year 2008, when available. When data from 2008 was unavailable, data from other years were used as a proxy. Year 2030 projections assume that overall buildout outlined in the San Ramon General Plan 2030 Update would occur. Year 2030 projections also assume a business-as-usual trajectory for generation and emission of greenhouse gases in the City. Year 2020 business as usual projections are interpolated from 2008 and 2030 emissions.

Detailed information regarding the methodology used to develop the community inventory is contained within Appendix A. There is currently no published guidance for preparing a community inventory. Emissions data was estimated using processes and emission factors provided in the spreadsheets contained in Appendix A as well as ICLEI's Clean Air and Climate Protection (CACP) model.

On-Road Vehicles

On-road vehicles include gasoline and diesel passenger automobiles, light-duty trucks (and sports utility vehicles), and heavy-duty vehicles. The Metropolitan Transportation Commission (MTC) provided the vehicle miles traveled (VMT) for 2008, 2020, and 2030 from the latest regional transportation model (Model One) adjusted by the Bay Area Simplified Simulation of Travel, Energy and Greenhouse Gases (BASSTEGG) share of household VMT for San Ramon and for higher population projections from the San Ramon General Plan 2030 Update. The VMT estimates include MTC estimates of commercial related travel including trucking based on San Ramon's share of regional travel. The vehicle-miles-traveled data was entered into the CACP model to estimate the greenhouse gas emissions.

Electricity and Natural Gas

Electricity-related emissions refers to the emissions from power plants that generate electricity used in the City. Electricity is used for lighting, electronics, and appliances. Natural gas emissions refer to the emissions generated when natural gas is burned. Natural gas is used for heating clothes dryers and water heaters, and for natural gas kitchen stoves.

PG&E provided electricity and natural gas emissions data for 2008. PG&E provides estimates for residential and non-residential energy use. The non-residential category includes both commercial and industrial use. PG&E was not able to provide Direct Access Electricity usage (power from a provider other than PG&E but delivered with PG&E power lines) because of regulations prohibiting disclosure to ensure customer privacy. Note that the ICLEI CACP model does not include utility-specific emissions factors, so the emissions data provided by PG&E was used, since it most accurately reflects the emissions from the power generation facilities that serve the City. Emissions for future years were forecast by

assuming that household growth was proportional to the increase in residential emissions and square footage of non-residential growth was proportional to the increase in commercial emissions projected for the 2030 General Plan buildout.

Solid Waste Generated

Solid waste generated by residents, employees, and visitors in the City are sent to a landfill outside of the City, where the trash produces greenhouse gas emissions through decomposition processes. The majority of the City's waste (the franchised portion) goes to the Vasco Road Landfill in Alameda County. The Vasco Road Landfill has a methane collection system but does not produce electricity with the captured methane. Alameda County estimates the Vasco Road Landfill's methane capture rate at 75 percent. Prior to 2010, San Ramon sent about 8,000 tons per year to landfills to be used as Alternative Daily Cover (ADC). While this counts as diversion by the State, it is buried in the landfill and produces methane. Currently, the City sends all green waste (mixed with food scraps) to be composted. Most of the City's ADC was formerly used at the Altamont Landfill in Alameda County. Altamont has a methane recovery system, and it captures 75 percent of the methane and uses it to create electricity, which is sold to the PG&E grid.

The California Department of Resources Recycling and Recovery maintains records of waste generated by the City. Waste generation for future years was estimated from per capita waste in 2008. The CACP model used to calculate emissions from waste generation assumes no emission capture or power generation from the waste, providing the emissions for the business as usual case.

Energy Use: Water

Emissions in this category include emissions from the electricity required to pump water. The emissions are generated using generalized factors for water-related energy use in California.

Refrigerants

In some cases, high global warming potential gases that do not deplete ozone in the upper atmosphere have been substituted for ozone depleting substances (ODS) with lower global warming potential in refrigeration and manufacturing processes. ODS are being phased out pursuant to the Montreal Protocol because they are gases that cause chemical destruction of the ozone in the stratosphere (a layer of air in the upper atmosphere). Ozone in the stratosphere is good because it absorbs ultraviolet radiation, which can cause skin cancer, cataracts, and other health problems in humans. Stratospheric ozone is not to be confused with ozone in the troposphere (the layer of air that we breathe), where it becomes an air pollutant that results in health effects.

ODS substitutes can be released into the atmosphere when they leak out of refrigeration and air conditioning equipment contained in stationary and mobile applications. ODS

substitutes are also used in solvent cleaning, foam production, sterilization, fire suppressants, and aerosols. Emissions of ODS substitutes consisted of 2.9 percent of California's greenhouse gas inventory in 2008 and are anticipated to increase to 7.5 percent by 2020. The large increase is due to the growing use of ODS substitutes to replace ODS gases.

Residential units and commercial/industrial square footage in the City was used to estimate the number of refrigeration and air conditioning systems within the City. The emissions from those systems were then estimated using emission factors from the CARB and the United States Environmental Protection Agency. The ODS emissions in California in 2008 were estimated to be 13.89 MMTCO₂e (CARB 2010), which is 0.37 MTCO₂e per person. This emission rate applied to the City's population in 2008 of 66,413 yields 24,572 MTCO₂e, which is approximately what was estimated using the methods described in Appendix A.

Results

Emissions were estimated with the ICLEI CACP model supplemented by emission factors and protocols from CARB and other agencies. Using protocol guidelines, the process used to perform this greenhouse gas inventory is as follows:

1. Set organizational boundaries
2. Set operational boundaries
3. Identify sources of emissions
4. Collect data on emissions for a representative period of time
5. Calculate greenhouse gas emissions from data using data-specific emission factors
6. Create an inventory of CO₂e emissions that is complete and transparent

The organizational boundary for the community emission inventory is the City of San Ramon planning area. Figure 2 displays the regional location and San Ramon boundary. The emissions by sector for the years 2008, 2020, and 2030 are presented in Table 3.

The emissions are presented graphically in Figure 6. Note that the City's government emissions are included within the community emissions inventory.

Table 3: City of San Ramon Community Business as Usual Emissions

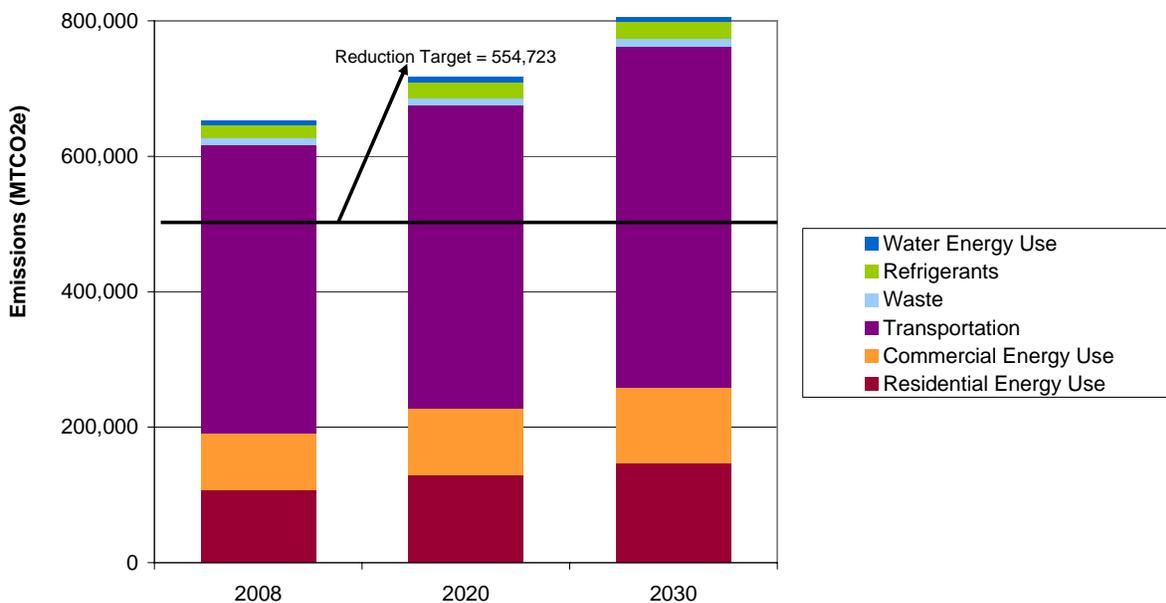
Community Sector	Greenhouse Gas Emissions (MTCO ₂ e)		
	2008	2020	2030
Energy Use: Residential	106,420	128,812	147,471
Energy Use: Commercial/Industrial	85,006	99,272	111,161
Transportation	426,161	447,153	502,901

Table 3 (cont.): City of San Ramon Community Business as Usual Emissions

Community Sector	Greenhouse Gas Emissions (MTCO ₂ e)		
	2008	2020	2030
Waste	8,862	10,726	12,280
Refrigerants	19,104	22,333	25,034
Energy Use: Water	7,063	8,547	9,787
Total	652,615	716,843	808,634
Population	66,413	80,386	92,031
Total Emissions per Capita	9.8	8.9	8.8
Employment	40,152	49,898	58,769
Service Population	106,565	130,284	150,800
Emissions per Service Population	6.1	5.5	5.4

Notes:
MTCO₂e represents metric tons of carbon dioxide equivalent, which accounts for the global warming potential of greenhouse gases such as methane and nitrous oxide.
Sources: Data compiled by Michael Brandman Associates using the ICLEI Clean Air and Climate Protection 2009 Software, Version 2.2.1. Refrigerant and Water Energy Use emissions are estimated as described in spreadsheets contained in Appendix A.

Figure 6: San Ramon Community Greenhouse Gas Business as Usual Emissions



As shown in Table 4, the City of San Ramon’s 2020 emissions are reduced below the target of 15 percent below 2008 levels.

Table 4: City of San Ramon 2020 Emissions Detail

Community Sector	2020 Emissions (MTCO ₂ e)	Percentage of Inventory
Electricity Use: Residential	53,947	7.5
Electricity Use: Commercial/Industrial	60,756	8.5
Natural Gas Use: Residential	74,865	10.4
Natural Gas Use: Commercial/Industrial	38,516	5.4
Transportation: Automobiles and Light Duty Trucks	377,070	52.6
Transportation: Heavy Duty Diesel Trucks	70,083	9.8
Waste	10,726	1.5
Refrigerants	22,333	3.1
Energy Use: Water	8,547	1.2
Total Business as Usual Emissions	716,843	100.0
Reductions from Statewide Measures	-187,096	26.3
Reductions from New Development between 2008 and 2020	-9,634	2.2
2020 Community Emissions with Reductions	520,113	—
Target: 2008 Emissions Minus 15%	554,723	—
2020 Service Population Emissions (MTCO₂e/SP/Year)	4.0	—
Target: Service Population (MTCO₂e/SP/Year)	6.6	—
Are 2020 Emissions below targets?	Yes	—
Notes: MTCO ₂ e represents metric tons of carbon dioxide equivalent, which accounts for the global warming potential of greenhouse gases such as methane and nitrous oxide. Reductions from Statewide Measures is calculated as shown in Table 9. Reductions from new development = 15 percent of new development emissions (the difference in business as usual emissions between 2008 and 2020). 2020 service population is 130,284. Source: Data compiled by Michael Brandman Associates using the ICLEI Clean Air and Climate Protection 2009 Software, Version 2.2.1.		

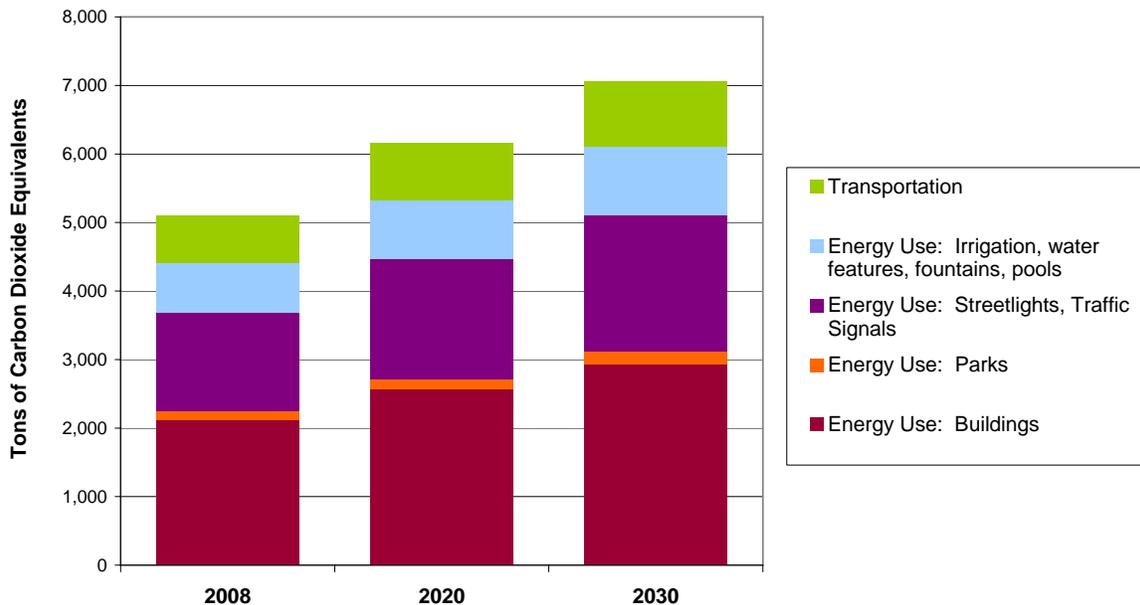
Table 5 provides the greenhouse gas emission inventory for City of San Ramon government operations. Emissions from government operations are dominated by electricity and natural gas consumption in City buildings, streetlights, and other City operations. Figure 7 graphically illustrates the emissions from each major San Ramon government source category.

Table 5: City of San Ramon Government Business as Usual Emissions

Government Sector	Greenhouse Gas Emissions (tons CO ₂ e)		
	2008	2020	2030
Energy Use: Buildings	2,115	2,560	2,931
Energy Use: Parks	131	159	182
Energy Use: Streetlights, Traffic Signals	1,444	1,748	2,001
Energy Use: Irrigation, water features, fountains, pools	716	867	992
Transportation	685	829	949
Total tons CO₂e	5,091	6,163	7,055
Total metric tons CO₂e	4,619	5,591	6,400

Notes:
 CO₂e represents the carbon dioxide equivalent, which accounts for the global warming potential of greenhouse gases such as methane and nitrous oxide. The emissions in metric tons are converted from tons by multiplying by 0.9072.
 Source: Data compiled by Michael Brandman Associates using the ICLEI Clean Air and Climate Protection 2009 Software, Version 2.2.1 for the year 2008. Data for 2020 and 2030 are interpolated based on a 21 percent population growth in 2020 and 39 percent population growth in 2030 compared with 2008 levels.

Figure 7: San Ramon Government Greenhouse Gas Business as Usual Emissions



3.3 - Reduction Target

The City examined reduction target approaches being considered by other local agencies and the Bay Area Air Quality Management District (BAAQMD). The BAAQMD offers several approaches that vary based on the starting point for determining reductions. The basic concept is that a jurisdiction would provide reductions for the source categories over which it has jurisdiction that are at least as great as the reductions required to meet the State's goal of reducing emissions to 1990 levels by 2020. The authority to control emissions from many of these sources is shared by multiple jurisdictions. In those cases, it is appropriate to allocate a portion of the reduction target to each jurisdiction. For example, the State's fuel and vehicle efficiency regulations will reduce mobile source emissions, but the County can also provide mobile source reductions through land use patterns and transportation system designs that reduce vehicle trips and miles traveled. The BAAQMD has proposed several options, including a "service population" approach that is based on the community emissions divided by the sum of the population and employment in the City of 6.6 MTCO_{2e} per service population per year and a 15-percent reduction from 2008 emissions. The City is using a target of a 15-percent reduction from 2008 emissions, but it also demonstrates compliance with the service population approach.

The CARB Climate Change Scoping Plan states, "The 2020 goal was established to be an aggressive, but achievable, mid-term target, and the 2050 greenhouse gas emissions reduction goal represents the level some scientists believe is necessary to reach levels that will stabilize climate" (page 4). The year 2020 goal of AB 32 corresponds with the mid-term target established by S-3-05, which aims to reduce California's fair-share contribution of greenhouse gases in 2050 to levels that will stabilize the climate. The goal of the Governor's Executive Order of reducing emissions by 80 percent below 1990 levels by the year 2050 is not addressed in this analysis. However, the effects of the CAP strategies by the General Plan 2030 buildout year were addressed to show the benefits of implementing San Ramon's progressive land use plan over a twenty-year period. To obtain the 2050 goal, substantial emission reductions would need to occur in California, such as a conversion to alternative energy generation, conversion to electric and/or zero emission motor vehicles, and substantial changes to land use patterns and transportation. The objective of this CAP is to provide San Ramon's contribution to achieving the initial target and to provide the framework for future reductions as technology advances.

The analysis also demonstrates consistency with the CARB Climate Change Scoping Plan reduction targets in 2020. The two largest sources over which the City has jurisdiction, mobile sources and new building construction, will see substantial emission reductions from state regulations on fuel efficiency in motor vehicles and energy efficiency in buildings. If state reductions were not counted, future year emissions would be greatly overstated. The CARB Climate Change Scoping Plan only calls for an incremental reduction in excess of the actions in the Scoping Plan measures to achieve the 2020 target. Regional transportation

measures, transit improvements, transportation demand management enhancements, and voluntary energy retrofits will provide reductions to all existing and new development.

If a project chooses to rely on compliance with this CAP to result in a less than significant impact, the project must demonstrate a 15-percent reduction. The CAP strategy provides an average reduction of 15 percent from all development that will occur in implementing the General Plan. Reductions from new development only apply to a portion of the overall community inventory. Therefore, the impact of these reductions on the community inventory depends on the amount new development that occurs between the base year and the future years. By 2020, the General Plan forecasts a 21-percent increase in population compared to 2008 in the planning area. However, lower growth rates in regional vehicle miles traveled and related transportation emissions due to the recession result in a projected 9.8-percent emission inventory increase between 2008 and 2020. Therefore, 9.8 percent of the 2020 emissions inventory will benefit from the measures implemented by new development during that timeframe. This will reduce San Ramon's 2020 Community Inventory by 1.5 percent ($0.098 \times 0.15 = 0.015$ or 1.5 percent). By 2030, the business as usual emission inventory will have increased by 23.9 percent compared with 2008, and new development will provide a 2.3-percent reduction in the community inventory ($0.098 \times 0.239 = 0.023$ or 2.3 percent).

Based on the analysis conducted in preparing the CAP, an overall reduction of 27.6 percent will be achieved, including the benefits from new development and statewide measures compared with business as usual in 2020. This demonstrates consistency with the CARB Climate Change Scoping Plan target for development related sources of 26.2 percent in 2020. The project reductions may be achieved through land use related measures such as increased density (e.g., multi-story buildings, multi-family housing, and small lot single family), pedestrian and transit-oriented development, support for alternative transportation modes, and measures that reduce energy consumption through improved energy efficiency in buildings, water conservation, and waste reduction. Voluntary programs will also provide reductions from existing homes and businesses that install energy saving retrofits and solar photovoltaic systems. No reduction was claimed for voluntary measures.

SECTION 4: CLIMATE ACTION STRATEGIES

The CAP strategy will be implemented through policies, regulations, programs, and cooperation with other agencies. The City has already adopted specific plans and development plans that are consistent with the goals, policies, and strategies of the CAP. Development that is consistent with an approved Development Plan or Specific Plan meeting the CAP criteria shall also be deemed consistent with the CAP. Development outside of Plan areas that requires no discretionary approvals shall comply with all applicable regulations and will be encouraged to take voluntary measures to reduce greenhouse gas emissions. Projects that require a discretionary approval shall be reviewed to ensure that design features and operational measures are included that reduce greenhouse gas emissions by at least 15 percent.

4.1 - Development Scenarios

1. Projects developed within a CAP compliant Development Plan or Specific Plan that meet all applicable design criteria and mitigation measures will be deemed consistent with the CAP.
2. Projects developed outside a CAP compliant Development Plan or Specific Plan but not requiring a discretionary approval shall comply with all applicable regulations. No consistency determination is required, but the City will keep track of building permit data to take credit for voluntary measures implemented by the projects.
3. Projects developed outside a CAP compliant Specific Plan area and requiring a discretionary land use approval will be reviewed to ensure all feasible CAP measures for the type of project are implemented.
4. Projects that amend a CAP compliant Specific Plan will be required to demonstrate that they will achieve the maximum technological feasible and cost-effective reductions to greenhouse gases such that the project will not result in a significant impact in achieving CAP targets.

4.2 - Land Use and Transportation Strategies

As described in the previous section, the City's emission inventory is dominated by motor vehicle emissions. The City has control over the emissions from its government fleet vehicles through its purchasing decisions, but no control over the emissions from other vehicles that operate and pass through the City. However, the City's authority over land use provides opportunities to influence the amount people drive and their choice of travel mode. In planning circles, this has been called the land use, transportation, air quality connection. The General Plan 2030 includes numerous policies that promote development that encourage walking, bicycling, transit use, carpooling, and transportation demand management (TDM). (See Appendix C for a list of applicable policies.) As projects are

developed that are consistent with these policies, the emissions associated with the projects can be substantially lower than emissions under a business as usual scenario.

General Plan Connections

The CAP strategy builds on the City of San Ramon General Plan 2030. The City has included the Air Quality and Greenhouse Gas Element as part of the General Plan 2030 to provide a bridge that inter-connects with other General Plan Elements. Air quality is



City Center Aerial View Illustration

impacted by many aspects of our built environment and the lifestyle choices we make.

This connection is based on the idea that the design, density, and pattern of land uses impact the amount people drive and the options available for using less polluting and energy-consuming modes of transportation such as carpooling, walking, bicycling, and transit. The City Center project incorporates these ideas with its dense, walkable, mixed-

use design, and access to a complete array of transportation options. Policies in the following elements have connections to air quality and greenhouse gas emissions:

- The policies of the Land Use Element with connections to air quality and greenhouse gas emissions are those supporting compact development, density near transit, pedestrian orientation, and design supportive of walking and bicycling.
- The Traffic and Circulation Element lays out the policies for developing the transportation system in a way that is consistent with and accommodates the growth planned in the Land Use Element. Traffic and Circulation Element policies with air quality benefits include those that promote the development of a multi-modal transportation system and complete streets, and that prevent excessive traffic congestion. More specifically, policies encourage designs that provide direct pedestrian connections, complete sidewalks, safe and comfortable bicycle paths, and routes connecting frequently accessed destinations with residences to help increase use of transit, walking, and bicycling.
- The Economic Development Element encourages Transportation Demand Management and transit as means to solve workforce transportation issues that affect economic development, but it also impacts air quality and the traffic circulation system.

- The Housing Element provides policies and programs that support energy conservation in new and renovated housing and in affordable housing that allow people to live closer to work.
- The Growth Management Element, Open Space and Conservation Element and the Public Facilities and Utilities Element contain policies that promote reduced emissions through compact development, energy savings related to water conservation, and reclaimed water use.

The General Plan policies that support each CAP strategy are provided as part of the CAP descriptions and are identified by their corresponding policy number. Table 6 provides the General Plan chapter number and title to help identify the source of the policy.

Table 6: General Plan 2030 Chapter Titles

Chapter Number	Element Title
1	Introduction
2	Economic Development
3	Growth Management
4	Land Use
5	Traffic and Circulation
6	Parks and Recreation
7	Public Utilities
8	Open Space and Conservation
9	Safety
10	Noise
11	Housing
12	Air Quality

This section is divided into four strategy categories with more detailed strategies under each category. A brief description is provided for each category, and each strategy is followed by existing City actions, and the General Plan policies that support the strategy. Finally, information regarding potential emission reductions is provided for each strategy. The emission reduction estimates are from a summary of potential mitigation measures for projects and plans included as an appendix to the California Air Pollution Control Officers Association (CAPCOA) document, CEQA and Climate Change. A copy of the mitigation measure list is provided as Appendix B of the CAP. The CAPCOA appendix includes a table of measures with emission reductions and the source of the estimate for each measure. The CAPCOA measures are identified as Measure D-1, Measure D-2, Measure T-1, and so on, to reference the source of the estimate. CAPCOA issued a new document

in August 2010, Quantifying Greenhouse Gas Mitigation Measures, which provides additional and refined quantification methods and documentation. The methods and ranges of effectiveness presented in the document are similar to those found in Appendix B and are used in this section to identify ranges of effectiveness. Project-level analyses that quantify greenhouse gas emission reductions should consider the methodologies presented in the CAPCOA document and utilize those in which data are available to allow their use. In addition, a new modeling tool is under development by the South Coast Air Quality Management District that will incorporate many of the quantification methodologies, which may also be utilized to assist in local greenhouse gas analysis at the project level.

Land Use Strategies

The City currently has four primary growth areas that will be the focus of development over the next 20 years. The City, through existing and proposed Specific Plans and development



City Center Conceptual Illustration
Source: City of San Ramon

approvals, has adopted standards to guide development in these areas. The plans set the stage for growth to be mixed use and transit- and pedestrian-oriented, which will lower vehicle miles traveled and greenhouse gas emissions.

The City Center project, approved in 2007, will have residential and a pedestrian-oriented retail area with a “downtown feel.” The City Center project will create a unique neighborhood atmosphere, as it will blend community gathering, living, shopping,

working, and dining experiences. The project’s public plazas and pedestrian-friendly streetscapes will provide for a new kind of retail experience in San Ramon. The City Center project includes a new transit center that will provide additional multi-modal transportation options.

The Dougherty Valley Village Center, approved in 2003, is also a pedestrian-oriented retail area where vehicular and transit linkages converge. It will include retail and office space that is adjacent to current civic uses such as the Dougherty Valley Community Center and Library, Diablo Valley College (San Ramon campus), and high-density residential. The retail experience here is expected to be a synergy of mixed-uses with areas that provide for small and large seasonal outdoor events such as jazz festivals.

The North Camino Ramon Specific Plan (NCRSP), which is currently being developed, will offer additional retail opportunities to meet the needs of San Ramon’s residents and business community. Complementing the City Center project, the NCRSP would provide

opportunities for neighborhood and regional retail and vertical and horizontal mixed-use development in proximity to new and existing jobs. Preparation of the NCRSP includes a comprehensive fiscal analysis to ensure the plan's viability and success.

The Crow Canyon Specific Plan (CCSP) provides a vision for an area of San Ramon that is currently underutilized, but has the potential to develop into an active, mixed-use district for the community. The purpose of the Plan is to guide the evolution of this 128-acre office and service commercial area in a way that will encourage coordinated development that is responsive to citywide and regional objectives, as well as to local and neighborhood considerations. The goal is to create a new pedestrian-oriented, mixed-use community that includes concentrated commercial and residential uses, while maintaining viable limited/light industrial and service commercial uses.

Other development will occur in subdivisions and commercial developments that have already been approved and are partially built out. Those projects will comply with mitigation measures that were adopted at the time of approval, development agreements, and applicable regulations. These projects will be encouraged to provide energy efficiency above requirements and to include measures that reduce vehicle trips and miles traveled.

The General Plan 2030 buildout is expected to accommodate the following growth between 2008 and 2030:

- Population Increase: 25,618 people
- Jobs: 18,657
- Housing Units: 9,559 dwelling units
- Non-Residential Development: 5,057,600 square feet

This new growth represents City's best opportunity for reducing average vehicle miles traveled per person in the community. As the City is developed and redeveloped, it will not only provide benefits to the people living in the new development, but it will produce synergistic effects on the existing development. The following describes the City's strategy as supported by the General Plan and Specific Plans that will guide how this growth occurs over the next 20 years.

Increased Development Density

Increased density and more compact development place people closer to destinations that can be accessed by walking or bicycling, and they increase the potential for high-quality transit service.

Strategy LU-1 Increase the average development density by 10 percent by 2020.

Existing City Measures

The City expects that residential density from new development will increase as the percentage of multi-family development increases over time. The existing housing stock as of 2008 consisted of 62 percent single-family detached, 11 percent single-family attached, and 26 percent multi-family housing units. The 2020 General Plan Housing Element indicated that sites are available to accommodate 3,987 single-family homes compared with 5,772 multi-family homes. Buildout of these units consistent with densities allowed by the General Plan would increase the percentage of multi-family units in San Ramon by 10 percent to 36 percent. The Housing Opportunity Site Analysis in the Housing Element indicates that most of the single-family sites would be developed at a density of 6.7 dwelling units per acre or greater with very limited large-lot development. The multi-family housing would be developed at densities of 16.9 to 45.0 dwelling units per acre. With increasing emphasis on more compact, single-family development and increased amounts of multi-family development, a 10-percent increase in density seems feasible. The General Plan 2030 and the Specific Plans described earlier also emphasize increasing non-residential densities through higher floor area ratios (building multistory structures), use of structured parking, and mixed-use development.

General Plan Policies

Policy Number	General Plan Policy
2.3-I-10	Continue to refine development standards that allow for better utilization of sites already developed for employment uses (e.g., through height and/or floor area ratio increases in combination with structured parking).
4.6-I-21	Promote incentives that will provide for density and FAR bonuses for mixed-use development that includes amenities for public benefit, such as workforce housing, pedestrian-oriented facilities (outdoor seating, plazas, weather protection, transit waiting areas), historic preservation, cultural facilities, public art and water features, and open space preservation.
8.5-I-2	Encourage developers to explore Transfer of Development Rights (TDRs) in conjunction with project review to cluster residential development and preserve open space, ridgelines, and creek corridors.
11.1-I-8	Encourage construction of second dwelling units within single-family residential neighborhoods

Emission Reduction Potential: Studies on the impact of density indicate that a doubling residential density across a metropolitan area may lower vehicle miles traveled by 5 to 12 percent (CAPCOA Measure D-4 [see Appendix B]).

Mixed Use Development

Mixed-use development is defined as development that combines housing, commercial, retail, civic and office uses, placing these key community elements and destinations close to one another, that is, within a short walk, bike ride, or transit stop. Benefits of mixed-use development include increased pedestrian activity and social interaction by bringing key destinations closer together (NHDES 2008).

Strategy LU-2 Encourage mixed use development in new development and redevelopment areas.

Existing City Measures

The City Center Project and draft North Camino Ramon Specific Plan areas encourage mixed-use development with areas devoted to residential over commercial businesses and



Vertical Mixed Use
Source: City of San Ramon

to high-density residential within walking distance of jobs and commercial services. The plans encourage vertical mixed use (projects with residential over commercial uses) and horizontal mixed uses (projects with residential uses adjacent or within a short walking distance of commercial uses).

The City Center project is located within a Priority Development Area (PDA) as defined by the FOCUS program. The FOCUS program is an incentive-based effort to encourage more housing and to improve

communities adjacent to transit. PDAs are locally identified, infill development opportunity areas within existing communities. They are generally areas of at least 100 acres where there is local commitment to developing more housing along with amenities and services to meet the day-to-day needs of residents in a pedestrian-friendly environment served by transit. FOCUS is an initiative of four regional agencies: the Association of Bay Area Governments (ABAG), the Bay Area Air Quality Management District (BAAQMD), the Bay Conservation and Development Commission (BCDC), and the Metropolitan Transportation Commission (MTC)—in partnership with congestion management agencies, transit providers, and local governments throughout the Bay Area. FOCUS is supported in part by a Regional Blueprint Planning Grant from the State of California.

In addition, the North Camino Ramon Specific Plan is a potential PDA. Once the Specific Plan is approved, the North Camino Ramon project area will become eligible to pursue Planned PDA status. A Planned PDA can then pursue additional grant and funding opportunities associated with the FOCUS program.

General Plan Policies

Policy Number	General Plan Policy
2.3-I-14	Encourage retail development in mixed-use areas to accommodate local and regional demand.
2.3-I-15	Implement the approved City Center project into a cultural, recreational, and vibrant mixed-use lifestyle center.
2.3-I-18	Prepare and develop the North Camino Ramon Specific Plan (NCRSP) area into a fiscally balanced, transit-oriented mixed-use area that provides for neighborhood and regional retail opportunities lacking in San Ramon and vertical and horizontal mixed-use development in proximity to new and existing jobs.
4.6-I-18	Allow for a mix of complementary office uses and commercial service businesses in commercial service areas that is balanced and encourages economic vitality.
4.6-I-19	Promote the revitalization and infill development in existing retail shopping centers, which are identified as mixed-use centers on the General Plan Diagram, to provide opportunities for housing and other compatible non-retail uses.
4.6-I-20	Continue to refine design standards for mixed-use development that will result in a high quality pedestrian-scaled environment, with one-to-four story buildings, integrated parking, street front windows and entries, and public and private open space or as provided under a separate Specific Plan process.
4.6-I-21	Promote incentives that will provide for density and FAR bonuses for mixed-use development that includes amenities for public benefit, such as workforce housing, pedestrian-oriented facilities (outdoor seating, plazas, weather protection, transit waiting areas), historic preservation, cultural facilities, public art and water features, and open space preservation.
4.6-I-22	Allow for the revitalization and intensification of infill sites within the Bishop Ranch Business Park, consistent with FAR limitations
4.6-I-23	Permit a diverse mix of complementary uses within Bishop Ranch to better meet the daily needs of workers and to reduce the need to travel by automobile. Complementary uses shall be consistent with site zoning, compatible with the primary use and shall not adversely affect the traffic-carrying capacity of adjacent streets.
5.6-I-7	Encourage new development to include a mix of uses and Complete Streets concepts that will allow people to walk and bike between destinations and reduce the amount of automobile vehicle miles traveled.
7.3-I-4	Encourage the development of a variety of housing and recreational opportunities for senior citizens close to City services and facilities, including transportation.
7.3-I-5	Encourage the location of appropriate childcare facilities in residential areas and ensure that such operations are compatible with their surroundings.
11.1-I-7	Offer financial and regulatory incentives to promote a combination of residential, retail, and office uses in areas designated for mixed-use development.
11.4-I-2	Promote a combination of residential, retail, and office uses in areas designated for mixed use.

Emission Reduction Potential: Mixed-use development can provide reductions ranging from 3 to 9 percent, depending on the mix of uses within the project and the associated pedestrian environment. Mixed-use development that is also infill can reduce emissions by 3 to 30 percent (CAPCOA Measures D-9, D-10, and D-12 [see Appendix B]).

Transit Oriented Development

Transit Oriented Development (TOD) refers to residential and commercial centers designed



Multi-Modal Transit Center
Source: City of San Ramon

to maximize access by transit and nonmotorized transportation, and with other features to encourage transit ridership. A typical TOD has a rail or bus station at its center, surrounded by relatively high-density development, with progressively lower density spreading outwards one-quarter to one-half mile, which represents pedestrian scale distances (Victoria Transport Policy Institute 2010).

Strategy LU-3 Increase transit orientation in new development and redevelopment areas near current and planned transit facilities.

Existing City Measures

The City is considering relocating the existing transit center to the NCRSP and has included a multimodal transit center in the plans for the City Center project site. This will provide for a transit-oriented environment serving the major new development areas and jobs centers in the City. The City Center project and the NCRSP are transit-oriented. Although the existing transit system relies on buses to provide connections to the BART system and the Altamont Commuter Express, over the long term, there may be opportunities to provide other forms of transit to the City. The General Plan 2030 includes a policy to encourage the use of the Interstate 680 corridor for future connections to BART or for a light rail line.



Bus at Multi-Model Transit Center
Source: Michael Brandman Associates

General Plan Policies

Policy Number	General Plan Policy
2.3-I-18	Prepare and develop the North Camino Ramon Specific Plan (NCRSP) area into a fiscally balanced, transit-oriented mixed-use area that provides for neighborhood and regional retail opportunities lacking in San Ramon and vertical and horizontal mixed-use development in proximity to new and existing jobs.
3.4-I-6	Locate future transit uses, such as light rail or BART, in the I-680 right-of-way.
5.6-I-4	Preserve options for future public transit and alternative transportation uses when designing improvements for roadways such as Bollinger Canyon Road Corridor within Dougherty Valley.
5.6-I-16	Explore opportunities for the location or relocation of a transit center to North Camino Ramon Specific Plan Area to better geographically balance the public transit needs for the City.
5.6-I-19	Encourage infill and Transit Oriented Development (TOD) concepts as a vehicle miles traveled reduction strategy for existing and proposed development.

Emission Reduction Potential: Transit Oriented Development can reduce emissions by 1 to 40 percent. Factors influencing the effectiveness include the type of transit serving the site, the frequency of service, the development density of the site, and the pedestrian connections and environment (CAPCOA Measure D-2 [see Appendix B]).

Pedestrian Oriented Development

Encouraging people to walk, rather than drive, to local destinations requires the integration of safe, human-scale pedestrian access throughout sites. In subdivisions, pedestrian



Pedestrian-Oriented Commercial Development
Source: Michael Brandman Associates

opportunities may be provided in the form of sidewalks throughout a development or walkways linking new development with existing destinations. Within commercial developments, pedestrians should be separated from vehicular traffic through the use of walkways and landscaped buffers that promote a sense of safety and visual appeal that

encourage people to walk. Pedestrian circulation should consider not only

movement within a site or development, but also access to adjoining development. Increased use of pedestrian walkways between adjoining developments improves traffic safety by allowing people to walk instead of driving to nearby land uses, thereby reducing

the number of vehicles turning into and out of streets and commercial driveways along public roads (NHDES 2008).

Strategy LU-4 Increase pedestrian orientation in new development and redevelopment areas.

Existing City Measures

The City Center and North Camino Ramon projects are both pedestrian-oriented designs. The City Center project reflects the City’s desire for a downtown and was supported under the previous General Plan 2020, Zoning Ordinance, and Economic Development Strategic Plan. The approved project consists of 2,076,884 square feet of pedestrian/bicycle friendly, mixed use, transit-oriented development.

The NCRSP will create a long-range plan that embodies the smart growth principles for a live-work, transit-oriented, pedestrian and bicycle friendly neighborhood with a sense of identity and will meet the future needs of San Ramon residents.

In 2006, the City adopted the Crow Canyon Specific Plan as a tool to build on previous enhancement efforts and create a new vision for the 128-acre office and service commercial area. The Crow Canyon Specific Plan vision is to create a new pedestrian-oriented, mixed-use community with concentrated commercial and residential uses, while maintaining viable light industrial and service commercial uses wishing to remain.

General Plan Policies

Policy Number	General Plan Policy
2.3-I-18	Prepare and develop the North Camino Ramon Specific Plan (NCRSP) area into a fiscally balanced, transit-oriented mixed-use area that provides for neighborhood and regional retail opportunities lacking in San Ramon and vertical and horizontal mixed-use development in proximity to new and existing jobs.
3.4-I-6	Locate future transit uses, such as light rail or BART, in the I-680 right-of-way.
4.8-I-5	Encourage the linkage and integration of new development with existing neighborhoods by means of Complete Streets networks, open space areas, parks, and pathways as a means of enhancing pedestrian and bicycle connections.
5.6-I-17	Encourage “Park Once” concepts as a vehicle miles traveled reduction strategy for mixed-use, commercial, and public facilities through the integration of common design features and shared parking concepts including but not limited to Parking Benefit Districts.
5.6-I-19	Encourage infill and Transit Oriented Development (TOD) concepts as a vehicle miles traveled reduction strategy for existing and proposed development.

Emission Reduction Potential: Pedestrian Oriented Development can reduce emissions by 0.4 to 1.0 percent. Factors influencing walking for making trips include completeness of sidewalks and pedestrian paths, the safety of the walking route from passing traffic, and providing visual interest along the route. Distance to potential walking destinations is the most important factor. Most people will not choose to walk distances greater than one-half mile (CAPCOA Measure D-2 [see Appendix B]).

Jobs/Housing Balance and Affordable Housing

Areas with an ideal jobs/housing balance have adequate employment opportunities at all income levels for the residents of the community and adequate housing opportunities to



High Density Employment Center
Source: Michael Brandman Associates

allow employees to live in the same community where they work. Areas with high housing costs can result in employees making long commutes to access more affordable housing.

Providing a housing mix that includes units that meet the State's definition of affordable housing will allow more workers in the community to live near to where they work.

Strategy LU-5 Provide additional workforce housing opportunities in the City to improve the jobs housing balance and to reduce commute distances.

Existing City Measures

The City of San Ramon is a major regional employment center with 40,112 jobs in the planning area in 2009. The planning area population in 2009 was 66,413. The City's largest jobs center, Bishop Ranch, provides employment for about 30,000 people. The jobs/housing ratio was estimated at 1.24 jobs per employed resident in 2009. The significant residential growth provided by the General Plan 2030 and relatively flat jobs growth is expected to result in a nearly balanced ratio of 1.05 by 2030. Affordable housing is an issue in San Ramon as is the case with most of the Bay Area. The City growth areas include opportunities for more multi-family and mixed use development that will provide better affordability.

General Plan Policies

Policy Number	General Plan Policy
2.3-I-6	Encourage housing for San Ramon's resident workforce to improve the match between local employment and local workers.
3.1-I-3	Provide a variety of diverse housing options to accommodate the local employment base, including public service employees.
3.1-I-4	Allocate the number of new housing units according to the City's ability to provide public services and housing needs through the use of adopted performance standards. Refer to Table 3.2-1.
3.1-I-5	Use growth management policies to encourage the construction of workforce housing necessary to meet local housing needs.
3.6-G-1	Promote the opportunity to both work and live in San Ramon through implementation of the Housing Element.
3.6-I-1	Develop and implement housing programs that emphasize the availability of housing for people who work in local jobs.
3.6-I-2	Evaluate the impact of proposed General Plan Amendments on the availability of job and housing opportunities.
3.6-I-3	Prepare a biennial report on the implementation of actions outlined in the Housing Element, for submittal to Contra Costa Transportation Authority as part of the biennial Growth Management Program Compliance Checklist. The report will demonstrate reasonable progress by illustrating how San Ramon has adequately planned to meet the existing and projected housing needs through the adoption of land use plans and regulatory systems which provide opportunities for, and do not unduly constrain, housing development.
4.6-I-10	Provide a wide range of housing opportunities for current and future residents
11.1-G-1	Provide a diversity of housing types and affordability levels within San Ramon to meet the needs of community residents.
11.1-I-3	Facilitate the development of affordable housing throughout the community through use of financial and/or regulatory incentives, where feasible.
11.1-I-4	Negotiate with developers to ensure a portion of future residential development is affordable to extremely low, very low, low, and moderate income households.
11.1-I-5	Maintain a variety of housing types that complements the employment opportunities within the community and encourages a jobs/housing balance.
11.1-I-18	Require commercial development to contribute to the supply of workforce housing through new construction, partnerships with non-profit affordable housing providers, or payment of linkage fees; exempt mixed use development projects from this policy as they are already subject to the 25 percent affordable housing requirement.

Emission Reduction Potential: The reduction from jobs housing balance improvements occur when people live closer to their jobs, reducing the trip length and miles traveled each day for their commute. Estimating the benefit from jobs housing balance is complicated by factors such as housing type preferences, spouse employment location, and job skills mismatches. The regional traffic model accounts for VMT reductions related to jobs

location. Affordable housing provides a reduction of 0.4 percent to 6.0 percent (CAPCOA Measure D-7 [see Appendix B]).

Compact Development

Compact development is a general term for growth patterns that increase density, are contiguous to existing development, and are efficiently served by public infrastructure. Policies that promote infill, redevelopment, mixed use, and higher overall densities promote compact development. Policies that discourage development on hillsides, natural open space areas, and farmland also encourage more compact development.

Strategy LU-6 Promote compact development by protecting open space and hillsides and encouraging infill and redevelopment of underutilized parcels in urbanized areas.

Existing City Measures

The City General Plan 2030 provides strong protections for open space areas adjacent to the community and does much to foster increased density, infill, mixed use. The City is fortunate to have outstanding open space resources that provide logical limits to urban development to the west of the City. San Ramon has preserved steep hillsides and ridges in the area. West of the City, undeveloped land, including peaks rising 1,400 feet above the valley floor, form an impressive backdrop for San Ramon. Several specific plans throughout the City (Westside, Dougherty Valley, and Northwest) reflect the importance of open space protection in the City by setting aside a significant amount of their respective plan areas as open space. There are more than 3,500 acres of open space within the City limits, including



Bishop Ranch Park
Source: East Bay Regional Parks District

portions of Dougherty Valley, set aside as a condition of development approval, much of which is located on the open ridges and hills that ring the valley.

The General Plan 2030 reduces the area where growth will be allowed and focuses on infill and mixed-use development in new growth areas.

General Plan Policies

Policy Number	General Plan Policy
2.3-I-17	Pursue alternative funding sources to secure and maintain open space and park facilities in San Ramon.
3.1-G-1	Manage the City’s growth in a way that balances existing and planned transportation facilities, protection of open space and ridgelines, provision of diverse housing options, and the preservation of high quality community facilities and services.
3.1-I-2	Work with Contra Costa County and appropriate agencies to preserve, protect and enhance open space and ridgelines within the City’s Planning Area, and to establish contiguous open space areas along the edges of San Ramon.
3.1-I-7	Allow urban development only within the City’s Urban Growth Boundary (see Implementing Policies 4.6-I-1 through 4.6-I-5) and only in accord with a plan for full urban services (police, fire, parks, water, sanitation, streets and storm drainage) to which all providers are committed.
8.3-G-1	Acquire, preserve, and maintain open space and its natural resources for future generations.
8.3-G-2	Strengthen the City’s partnership with East Bay Regional Parks District, Contra Costa County, other jurisdictions and private organizations to expand the ridgeline and hillside open space system in the City’s Planning Area.
8.3-I-13	Develop viewshed criteria to determine how to manage views of the natural hillsides surrounding San Ramon.
8.3-I-14	Develop and adopt regulations for the protection and preservation of hillsides, creeks, and ridgelines.
8.4-G-1	Expand the ridgeline and hillside open space system in the City’s Planning Area by joint efforts with East Bay Regional Parks District, Contra Costa County and nonprofit trustee agencies.
8.4-I-1	Confer with appropriate agencies and organizations in the creation of an institutional framework and financing mechanisms necessary to acquire additional ridgeline areas and agricultural lands, and to preserve, restore, and manage important open space.
8.4-I-2	Encourage developers to explore Transfer of Development Rights (TDRs) in conjunction with project review to cluster residential development and preserve open space, ridgelines, and creek corridors.
8.4-I-6	Use open space in new development to create buffers that delineate the edge of urban areas.
8.4-I-10	Continue planning and managing ridgelines, agricultural lands, and open space acquired by the City or other Open Space areas through the Geologic Hazard Abatement District(s) and the Dougherty Valley Open Space Management Plan.
8.4-I-11	Provide incentives for clustering of allowable residential use on infill open space sites to avoid unnecessary grading and site development inconsistent with Plan policies for open space and resource conservation.

Policy Number	General Plan Policy
11.4-I-1	Utilize the Urban Growth Boundary as a tool to focus the provision of diverse housing options within proximity to the local employment base, community services, and public transportation opportunities.

Emission Reduction Potential: Compact development provides emission reductions by reducing travel distances and promoting higher density development that generates fewer vehicle trips. Increasing density can result in emission reductions of 1 to 12 percent (CAPCOA Measure D4).

4.3 - Transportation Infrastructure and Facilities

Transit Facilities

Transit facilities include items such as bus stops, lighting, bus turnouts, multimodal transfer centers, and information kiosks. These facilities increase the convenience of using transit and minimize impacts on traffic flow from buses re-entering the roadway.

Strategy T-1 Provide transit facilities and services that improve transit mode share.

Existing City Measures

The City requires new developments to provide transit facilities at strategic locations. The City works in cooperation with transit providers to identify the best locations and the appropriate support facilities to maximize transit use. The City has an existing multi-modal transit center and has proposed a new regional transit facility in the City Center area. The San Ramon Transit Center, located along the Iron Horse Trail at the corner of Executive Parkway and Camino Ramon, provides commuters with 54 parking spaces to meet a carpool, vanpool, or bus. Bike lockers are available to lease on a monthly basis, and bike racks are available on a first-come first-serve basis.

General Plan Policies

Policy Number	General Plan Policy
3.3.I-7	Support regional and local neighborhood transit options to reduce the use of the automobile and maintain acceptable traffic levels of service.
3.4-I-3	Cooperate with regional and local service providers and other jurisdictions to promote local and regional public transit service.
3.4-I-4	Support local feeder transit service to and from current and future regional transit lines.
3.4-I-5	Preserve options for future transit use when designing improvements for roadways.

Policy Number	General Plan Policy
3.4-I-6	Locate future transit uses, such as light rail or BART, in the I-680 right-of-way.
5.6-I-1	Cooperate with regional and local service providers and other jurisdictions to promote local and regional public transit service in San Ramon as part of a multimodal and Complete Streets strategy.
5.6-I-3	Encourage additional local bus or other public transportation service providers to and from regional transit lines. Bus service or other public transportation services should be included under the Initial Level of Development as part of the Dougherty Valley area. The City shall consistently strive to improve the transit service to and from San Ramon including the annexed areas of Dougherty Valley.
5.6-I-4	Preserve options for future public transit and alternative transportation uses when designing improvements for roadways such as Bollinger Canyon Road Corridor within Dougherty Valley.
5.6-I-5	Support future transit uses within the I-680 corridor right-of-way.
5.6-I-9	Encourage employers and commercial complexes to emphasize public transit services or private alternatives to the single-occupant vehicle.
5.6-I-10	Work with transit providers to situate transit stops at convenient and safe locations.
5.6-I-11	Promote increased transit ridership through the use of Transportation Management Associations and other employer-based transit programs, equip buses with bike racks, and making transit information readily accessible.
5.6-I-15	Work with local transit providers to increase and expand weekend transit service.
5.6-I-16	Explore opportunities for the location or relocation of a transit center to North Camino Ramon Specific Plan Area to better geographically balance the public transit needs for the City.

Emission Reduction Potential: Transit support facilities can reduce emissions by 1 to 2 percent by increasing walking and bicycling (CAPCOA Measure T-7).

Pedestrian Connections

Pedestrian connections can be improved through the construction of sidewalks and



Pedestrian Connection with Housing, Park, and Commercial
 Source: Michael Brandman Associates

pedestrian paths connecting frequently accessed destinations such as schools and shopping areas with housing and restaurant and commercial services with office developments. Another example is the removal of barriers to walking, such as the construction of pedestrian bridges over busy streets. Enhancing the pedestrian experience by providing adequate width for side-by-side walking, shade, and visual interest should be a part of all pedestrian projects.

Strategy T-2 Provide pedestrian connections in new and existing development to improve pedestrian mobility and accessibility.

Existing City Measures

The City's current development standards require projects to include pedestrian improvements. The City Center and North Camino Ramon projects are designed with the pedestrian in mind. As part of roadway improvement projects, the City can identify pedestrian routes located along roads that can be upgraded to include sidewalks on both sides where they are not currently present.

Policy Number	General Plan Policy
5.7-I-9	Require roadway improvement projects to minimize both temporary and permanent reductions in bicycle and pedestrian mobility and/or accessibility.
5.7-I-10	Work with neighboring jurisdictions to ensure that continuity in bicycle and pedestrian networks is provided at jurisdictional boundaries.
5.7-I-11	Work with Caltrans and other appropriate agencies to improve bicycle and pedestrian mobility and safety at freeway crossings.
5.7-I-12	Promote educational efforts about traffic laws and safe practices for all modes of transportation.
5.3-G-1	Encourage transportation facilities that consider the users' safety and allow for all modes of travel based on local conditions and needs of the community.
5.3-I-1	Develop Complete Streets Guidelines that establish local review and assessment criteria and encourage development of a multimodal transportation network to meet community needs.
5.3-I-2	Implement Complete Streets principles, as appropriate, for new roadway design and significant roadway rehabilitation.
5.3-I-4	Encourage Complete Streets concepts as a vehicle-miles-traveled (VMT) and greenhouse gas reduction strategy.

Emission Reduction Potential: Areas with good pedestrian connection and access can reduce emissions by 1 to 10 percent by increasing walking and bicycling (CAPCOA Measure T-5).

Bicycle Infrastructure

Bicycle facilities that provide clearly marked lanes on roadways or separate bike paths and trails can increase the safety of cyclists and encourage increased use of this mode of travel. The City has an extensive system of bike paths, lanes, and trails. Incomplete bicycle networks, narrow choke points on roadways, and freeway interchanges create barriers to cycling.

Cyclists have a wide range of abilities and travel at different speeds. Some prefer off-road paths and trails completely separated from traffic and may travel at relatively slow speeds. The Tri-Valley area is also home to many cyclists that are capable of traveling at fast speeds and are comfortable riding with traffic. On-road bike lanes often provide the fastest, most direct route and experience fewer conflicts with pedestrians and family riders.

Strategy T-3 Provide a safe and well-connected system of bicycle paths, lanes, and trails to increase bicycle use.

Existing City Measures



Bicycle and Pedestrian Path
Source: City of San Ramon

The General Plan 2030 includes numerous policies supporting and improving on the City's bicycle infrastructure of all types to serve cyclists of all abilities. Bicycling and walking are key elements of San Ramon's circulation system. The City has an extensive network of bikeways, sidewalks, and trails that enhance neighborhood accessibility and help to reduce reliance on the automobiles. The City's local bicycle and pedestrian network is a key component

of the Countywide Bicycle and Pedestrian Plan. In June 2009, CCTA released a draft revision to the 2003 Countywide Bicycle and Pedestrian Plan for public comment. The Draft Plan builds on local plans and, once adopted, will create a countywide policy document for the management of bicycle and pedestrian circulation.

In 2007, the City of San Ramon—in coordination with Contra Costa County, CCTA, the Town of Danville, and East Bay Regional Park District—developed the San Ramon Valley Iron Horse Trail Bicycle Pedestrian Corridor Concept Plan. The Plan studied the feasibility of constructing bicycle/pedestrian overcrossings along the Iron Horse Trail as an alternative to the at-grade crossings at Sycamore Valley, Crow Canyon, and Bollinger Canyon Roads. The primary goal in the implementation of these overcrossings would be to:

- Improve pedestrian and bicyclist safety
- Improve traffic flow on trails and streets
- Facilitate alternative means of transportation
- Increase recreational opportunities
- Facilitate healthier lifestyles
- Cultivate appreciation of the natural world

The Corridor Concept Plan established the basic scope and feasibility and is the first step in the process of evaluating and implementing pedestrian overcrossings at the proposed San Ramon locations. To move these projects forward, it will be necessary to secure additional funding for development of improvement plans and ultimately construction of the projects.

The Iron Horse Trail provides access to Central Park, the Bishop Ranch Business Park, Iron Horse Middle School, Montevideo Elementary School, Walt Disney Elementary School California High School, and residential neighborhoods. The trail will be linked to the City Center project and is anticipated to serve as an important corridor within the North Camino Ramon Specific Plan. The San Ramon Valley Iron Horse Trail Bicycle and Pedestrian Corridor Concept Plan includes overcrossing proposals to improve movement along the Iron Horse Trail, minimize delays and improve safety for cyclists and pedestrians at major arterials. Future development proposals along the trail corridor should identify connection points and amenities (benches, landscaping, signage, etc.) as appropriate.

General Plan Policies

Policy Number	General Plan Policy
2.3-I-13	Encourage and facilitate non-motorized means of transportation to business areas.
3.4-I-7	Improve and expand the bicycle routing system in San Ramon.
5.7-G-1	Encourage bicycling and walking as alternatives to driving consistent with Complete Streets concepts.
5.7-I-1	Establish a network of on- and off-street bicycle routes to encourage their safe use for commute, recreational, and other trips. Improve and expand bicycle routes for commuters in San Ramon.
5.7-I-2	Develop bicycle routes that provide access to regional employment centers, shopping centers, public facilities, transit centers, schools and parks.
5.7-I-3	Continue to emphasize the Iron Horse Trail as a major north-south route for non-motorized transportation by improving connectivity and enhancing amenities for bicyclists and pedestrians.
5.7-I-5	Continue to promote and implement through the development review process, continuous circulation facilities within Bishop Ranch Business Park, commercial districts, and residential neighborhoods to enhance connectivity and promote pedestrian and bicycle modes of transportation consistent with Complete Streets concepts.
5.7-I-7	Adopt a local or regional Bicycle Master Plan that considers sources of statewide funding for bicycle programming.
5.7-I-8	Implement the San Ramon Valley Iron Horse Trail Corridor Concept Plan by refining the design alternatives and pursue funding through grants, public/private partnerships and other funding sources as appropriate.
5.7-I-9	Require roadway improvement projects to minimize both temporary and permanent reductions in bicycle and pedestrian mobility and/or accessibility.

Policy Number	General Plan Policy
5.7-I-10	Work with neighboring jurisdictions to ensure that continuity in bicycle and pedestrian networks is provided at jurisdictional boundaries.
5.7-I-11	Work with Caltrans and other appropriate agencies to improve bicycle and pedestrian mobility and safety at freeway crossings.
5.7-I-12	Promote educational efforts about traffic laws and safe practices for all modes of transportation.

Emission Reduction Potential: Cities with the best bicycling conditions have achieved bicycle mode shares of 10 to 25 percent. More typically, cities achieve mode shares of 1 to 2 percent. The Bay Area had a bicycling mode share for all trips of 1.5 percent in 2000. Contra Costa County had a bicycling mode share of less than 1 percent in 2000 (MTC 2005). A doubling of bicycling to 2 percent should be feasible, especially in new pedestrian- and bicycle-oriented areas of the City.

Traffic Calming

Traffic calming refers to various design features and strategies intended to reduce vehicle traffic speeds and volumes on a particular roadway. Traffic calming policies and/or projects can range from educational efforts such as increased signage to minor modifications of an individual street to a more comprehensive redesign of a road network. Traffic calming changes streetscape design to give greater emphasis to pedestrians, cyclists, and residents. Infrastructure projects often involve reallocating road space to increase the portion of right-of-way devoted to bicycle lanes, sidewalks, and greenspace. Some features, such as wider sidewalks and improved crosswalks, support universal design objectives (making transportation systems accommodate people with disabilities and other special needs). Street reclaiming emphasizes action by neighborhood residents to change the way their streets are perceived and used to better accommodate nonmotorized activities (Victoria Transport Policy Institute 2010).

Traffic calming can result in lower air pollutant emissions, when measures smooth traffic flow or reduce queuing and associated engine idling and accelerations. Traffic calming measures that enhance safety for pedestrians and bicyclists can encourage greater use of these modes for more trips and can reduce motor vehicle emissions

Strategy T-4 Use traffic calming measures to improve traffic flow, pedestrian orientation, and bicycle use.

Existing City Measures

The City currently operates several programs that help to calm traffic. The Residential Traffic Calming (RTC) Program is the most extensive program. The objectives for the San Ramon RTC Program are:

1. Single point of contact for residents concerned about traffic calming issues
2. Increase awareness on the part of residents and drivers about their obligation to be good neighbors when driving through residential neighborhoods
3. Enhance pedestrian, bicycle, and vehicle traffic safety on neighborhood streets
4. Increase quality of life for residents, including reduced traffic noise, decreased air pollution, etc.

General Plan Policies

Policy Number	General Plan Policy
5.1-I-6	Implement the following transportation programs: the Transportation Demand Management Program (TDM Program), Street Smarts Traffic Safety Program, the Residential Traffic Calming Program, the Safe Routes to School Program, TRAFFIX Program and the Engineering Services Department's Traffic Engineering component.
5.1-I-7	Implement a School Traffic Calming Program to address access and safety issues on streets adjacent to schools in San Ramon.
5.5-I-1	Implement residential traffic calming measures, as warranted, and police enforcement to mitigate speeding and other traffic impacts in residential areas of the City.

Emission Reduction Potential: Traffic calming can reduce emissions by 1 to 10 percent by increasing walking and bicycling (CAPCOA Measure T-8).

Electric Vehicles and Low Emission Vehicles

Electric vehicles and alternative fueled vehicles produce less greenhouse gas emissions than their gasoline and diesel powered counterparts. The City can encourage their use through its example and by providing supportive infrastructure such as battery charging stations.

Neighborhood electric vehicles (NEV) are street-legal, low-speed (25 to 30 miles per hour) passenger vehicles that can operate on local streets. Developments designed with EV

accessibility in mind may have separate travel lanes for EVs similar to bike lanes or have low speed limits that allow the NEV to drive with other vehicle traffic.

Strategy T-5 Increase the use of low and zero emission vehicles.

Existing City Measures

Alternative Fuel Vehicles for Municipal Operations: San Ramon has been adding alternative fuel vehicles to its fleet since 1999. The San Ramon Public Services Department utilizes a fleet of 16 compressed natural gas (CNG)-powered pick-up trucks to assist in maintaining public parks, streets, drainage, signals, lights, facilities, and landscaping. These trucks are fueled by CNG stations located at the Public Services Corporation yard. The Public Services Department also utilizes six electric-powered golf carts/gem cars for park maintenance operations. The department is investigating other alternative fuels, such as biodiesel, and it purchased a gas/electric hybrid pickup truck in 2009.

In addition, of the 14 vehicles that the City’s franchised garbage hauler uses to collect residential and commercial garbage, recyclables, and yard trimmings in San Ramon are CNG-powered. The franchise agreement allows the City to require that the hauler utilize additional alternative fuel collection vehicles as its older diesel vehicles are gradually replaced.

Natural gas vehicle fuel provides lower emissions than gasoline and diesel, including a 25-percent reduction in greenhouse gases (EPA 2003).

Areas of the City with speed limits below 25 miles per hour could be candidates for neighborhood electric vehicle (NEV) use. Additional research is needed to determine if actions by the City are warranted to promote the use of NEVs.

General Plan Policies

Policy Number	General Plan Policy
12.6-I-2	City fleet vehicle operators shall be encouraged to develop and maintain a fiscally sound inventory and priority schedule to replace or convert existing conventional fuel vehicles with clean fuel vehicles as new vehicles are purchased and existing vehicles are retired from service.

Emission Reduction Potential: Electric vehicles produce about 77 percent less greenhouse gas emissions per mile than a similar gasoline powered vehicle, including emissions associated with the electrical power generation. NEV accessibility can reduce emissions by 0.5 to 1.5 percent by encouraging the use of these vehicles for short neighborhood trips (CAPCOA Measure D-6).

Transportation Demand Management

Office complexes with large numbers of employees at a single site can achieve substantial reductions in vehicle trips and greenhouse gas emissions through the use of Transportation Demand Management (TDM) measures. The term “TDM” refers to measures designed to reduce automobile traffic in order to improve air quality and reduce traffic congestion. These measures include public transit, telecommuting, compressed workweeks, carpooling, vanpooling, walking, bicycling, and incentives to increase the use of these alternatives. TDM has become increasingly important in maintaining acceptable traffic levels of service in the Tri-Valley and elsewhere in the Bay Area.

Strategy T-6 Improve the effectiveness of existing Transportation Demand Management Programs and ensure that new developments with large employee concentrations implement TDM Programs.

Existing City Measures

San Ramon has long recognized the need to reduce the use of single-occupant vehicles to achieve improved traffic levels of service and regional air quality. Since 1989, the City’s TDM program has demonstrated the ability to maintain one of the lowest drive-alone rates of all Contra Costa County jurisdictions and has a high number of vanpools with a San Ramon destination. The City’s TDM Program receives guidance from the Transportation Demand Management Advisory Committee consisting of local business representatives. The committee provides a unique opportunity for the public and private sectors to work together toward the common goal of reducing traffic congestion and improving air quality.

Transportation Management Associations: Privately implemented Transportation Management Associations (TMAs) are an important part of San Ramon’s transportation strategy. One award-winning example is the Bishop Ranch TMA. Sunset Development has taken a leadership role in the formation of an award-winning TMA comprised of employers in Bishop Ranch. In addition, Sunset Development has addressed the transit needs of the Bishop Ranch commuters and surrounding area. The Bishop Ranch Transportation Management Association has enhanced traffic flow, reduced traffic, and eased employee commuting. Notable achievements include:

- A 33-percent reduction in daily vehicle traffic to Bishop Ranch and a 40-percent reduction in peak-hour traffic
- More than \$2 million in transit passes distributed annually to Bishop Ranch employees
- More than 230,000 annual passenger trips on the Bishop Ranch Express Buses

- Elimination of approximately 11,000 cars annually from the roads through use of the various transportation services available (express buses, carpools, vanpools, trains/light rail, biking, and walking)

The “drive-alone” rate for California is approximately 85 percent. By contrast, the Bishop Ranch tenant drive-alone rate is just 65 percent. This success has been recognized nationally, regionally, and locally, and has been acclaimed as the best transportation program offered by a business park in the United States.

The Bishop Ranch Transportation Center offers services and detailed analysis for Bishop Ranch customers and prospects, including:

- Express buses connecting Bishop Ranch’s San Ramon campus with Bay Area public transit
- Employee commute planning
- Employment base review
- Relocation assistance referrals
- Commute shed analysis
- Personalized commute planning assistance
- Free bus passes connecting to the BART rail service worth approximately \$1,000 per year per employee
- Incentive programs*
- Access to the Guaranteed Ride Home program ticket sales for Bay Area public transportation*
- Commuter alerts

* Incentive programs (carpool, vanpool, and guaranteed ride home are funded in part by the City of San Ramon/511 Contra Costa, and the Bay Area Air Quality Management District.

The City will use Bishop Ranch as the model for other large developments to follow for their transportation demand management programs.

General Plan Policies

Policy Number	General Plan Policy
2.3-I-12	Promote and encourage public transit, carpool and vanpool opportunities into San Ramon’s business areas including Bishop Ranch, Crow Canyon business area, and the San Ramon Valley Boulevard business area.
3.3-G-1	Maintain acceptable traffic level-of-service on City streets and roadways through implementation of Transportation Demand Management (TDM), Growth Management, the Capital Improvement Program, and traffic engineering operational measures.

Policy Number	General Plan Policy
3.4-G-1	Utilize Transportation Demand Management (TDM) strategies to reduce total vehicle trips on San Ramon streets, and to contribute to regional air quality improvement and effective growth management.
3.4-I-1	Continue to implement the City's TDM Program to reduce trip generation.
3.4-I-2	Work with 511 Contra Costa, other jurisdictions and agencies to coordinate the City's TDM Program with regional TDM programs and activities.
5.1-I-6	Implement the following transportation programs: the Transportation Demand Management Program (TDM Program), Street Smarts Traffic Safety Program, the Residential Traffic Calming Program, the Safe Routes to School Program, TRAFFIX Program and the Engineering Services Department's Traffic Engineering component.
5.2-I-5	Emphasize regional transportation demand management and trip reduction strategies as alternatives to improvements to existing facilities and the construction of new facilities.
5.3-I-3	Coordinate the implementation of Complete Streets concepts, as appropriate, with ongoing transportation and congestion relief programs such as the TDM Program, Street Smarts Traffic Safety Program, Residential Traffic Calming Program, Safe Routes to School Program and TRAFFIX Program.
5.4-I-7	Minimize congestion on arterials by fully implementing the policies in the Complete Streets, Transportation Demand Management, and Transit section of the Circulation Element.
5.6-G-2	Encourage trip reduction measures in an effort to reduce vehicle miles traveled improve air quality and reduce greenhouse gas emissions.
5.6-I-2	Encourage and assist major employers and commercial complexes to reduce the number of single-occupant vehicles by participating in the City's TDM programs.
5.6-I-6	Work with other jurisdictions and agencies to coordinate the City's TDM programs with regional plans that are aimed at reducing traffic congestion and improving air quality.
5.6-I-8	Support alternative public transportation programs and obtain funding for new TDM projects or programs.
5.6-I-13	Work with the San Ramon Valley Unified School District and other appropriate agencies and organizations to reduce vehicle trips through the provision of transit programs and promoting carpooling, bicycling, and walking.

Emission Reduction Potential: Transportation Demand Management measures are designed to reduce employee trips. Emission reductions range from 1 percent to as high as 28 percent. Locations with the best combination of transit and pedestrian orientation including high-frequency transit service would achieve the highest reduction (CAPCOA Measure T-19).

End of Trip Facility Measures

End of trip facilities include items such as showers and lockers for people who bicycle to work, secure bike parking, onsite services (dry cleaning, cafeterias) to reduce trips for

errands and lunch. These facilities help to increase the effectiveness of transportation demand management programs.

Strategy T-7 Require projects to provide facilities that make travel by bicycle and transit more convenient.

Existing City Measures

Bike racks and lockers are available at the San Ramon Transit Center, the Bollinger Canyon Road and San Ramon Valley Park and Ride lot, and the Sycamore Park and Ride lot in Danville. Bike lockers are covered; secured; and can be rented monthly, quarterly, or yearly. A new parking lot with commuter parking and bike lockers is scheduled to open in the Dougherty Valley in late 2010. Bike racks are available on a first-come, first-served basis.

General Plan Policies

Policy Number	General Plan Policy
5.7-I-4	Require bicycle parking, storage and other support facilities as part of any new office and retail developments and public facilities.

Emission Reduction Potential: End of trip facilities can reduce emissions by 1 to 5 percent. This measure would require implementing multiple items at an employment site or multi-family development to achieve the highest reductions (CAPCOA Measures T-2 and T-3).

Parking Measures

The supply and cost of parking can significantly change people’s choice of travel mode. The design of parking facilities can have substantial impact on pedestrian orientation and compact development. Relatively small parking fees can cause significant travel impacts and provide significant reductions in vehicle travel (Victoria Transport Policy Institute 2010). Use of parking structures consumes less land for parking and makes walking distances shorter, thus encouraging walking between uses. Surface parking lots placed behind buildings or in shared civic parking facilities create a more pedestrian-oriented streetscape.

Strategy T-8 Use parking facility designs and parking management to reduce vehicle trips.

Existing City Measures

The Bishop Ranch development includes structured parking in some portions of the complex. The City Center project is intended to make that area more pedestrian-oriented.

Structured parking is one measure proposed for the City Center to improve pedestrian orientation.



Park and Ride Lot
Source: Caltrans

The City has park and ride lots available for area commuters. These lots are available for commuters to meet carpools, vanpools, and buses. The Bollinger Canyon Road/San Ramon Valley Park & Ride provides 100 parking spaces. The Park and Ride lot located at the northeastern corner

of I-680/Sycamore Valley Road interchange provides approximately 240 parking spaces,

a bus transfer station, and a carpool staging area. A new joint-use, 56-space park and ride lot and dog park in Dougherty Valley is anticipated to be completed in late 2010.

General Plan Policies

Policy Number	General Plan Policy
5.6-I-12	Coordinate with Caltrans and transit providers to identify and implement park and ride lots with convenient access to public transit.
5.6-I-14	Consider the construction of public parking facilities in the City Center, North Camino Ramon Specific Plan, or other commercial areas to serve projected parking demand, while carefully balancing the need for adequate parking against the desire to minimize traffic growth and create a pedestrian/bicycle friendly environment using Complete Streets design concepts.
5.6-I-17	Encourage “Park Once” concepts as a vehicle miles traveled reduction strategy for mixed use, commercial, and public facilities through the integration of common design features and shared parking concepts including but not limited to Parking Benefit Districts.
5.6-I-18	Encourage shared parking facilities and parking reductions for compatible land uses to minimize excessive parking to reduce inefficient use of land, unnecessary pavement and stormwater runoff, and encouraged alternative transportation and reductions in Vehicle miles traveled.

Emission Reduction Potential: Parking measures are highly effective at reducing vehicle trips and increasing average vehicle ridership. Parking measures can achieve reductions from 1 percent to as high as 30 percent, depending on the availability of other transportation options, the distance to transit, the quality of transit, and the cost of parking (CAPCOA Measure T-9).

Strategy T-9 Provide vehicle support infrastructure to encourage use of low and zero emission vehicles

Existing City Measures

Infrastructure that improves the convenience of using low-emission and alternative-fuel vehicles is important for encouraging wider adoption of these technologies. Providing convenient access to electric vehicle charging stations and tire stations for inflating tires to optimal pressures are two examples. The City currently has compressed natural gas (CNG) fueling capability for its fleet.

Electric vehicle charging stations partially funded by 511 Contra Costa have been installed in several Contra Costa County cities to encourage the use of plug-in electric vehicles. San Ramon will consider charging stations in new City projects and where appropriated as part of the design review process.

General Plan Policies

Policy Number	General Plan Policy
5.6-I-8	Support alternative public transportation programs and obtain funding for new TDM projects or programs.
12.6-I-5	Construct infrastructure and facilities that encourages the use of alternative modes of travel, including a safe and comprehensive bicycle and pedestrian system that connects all parts of the City.
12.7-G-1	Minimize air emissions and potential climate change impacts related to energy consumption in government operations and land use activities.

Emission Reduction Potential: Electric vehicles produce about 77 percent fewer greenhouse gas emissions compared with gasoline-powered vehicles accounting for California electricity generation emissions. Charging facilities reduce concern about running out of power on the return trip, thereby encouraging their use. Keeping tires inflated to manufacturers’ specifications improves the rolling efficiency of the vehicle and would reduce fuel consumption by about 0.6 percent. CARB has adopted tire inflation regulations that require tires to be checked at each service. Conveniently located tire stations will encourage individuals to keep tires inflated between services (CAPCOA Measure E11 [see Appendix B]).

4.4 - Energy Conservation and Alternative Energy

Energy Efficiency in New Buildings and Facilities

Energy consumption in buildings and facilities is the second largest source of greenhouse gases in the City’s emission inventory. Improving energy efficiency in new and existing

buildings and facilities provides one of the most cost-effective strategies for reducing greenhouse gases, because the energy savings can pay for the cost of the upgrades and retrofits over time.

The California Strategic Energy Plan contains the very ambitious goal of making all new homes zero net energy consuming homes by 2020 and all commercial buildings net zero energy consuming by 2030. The State's plan defines net zero energy buildings as buildings that over the course of a year produce as much power as they consume. This is achieved by making the building as energy efficient as possible and providing onsite or nearby renewable power generation with solar panels or wind generators. The plan relies on voluntary and mandatory actions to achieve the goal. The State would strengthen Title 24 energy efficiency standards every few years and would include voluntary tiers that exceed the mandatory requirements. The plan anticipates voluntary participation in constructing buildings that exceed Title 24 by 35 percent better than the 2005 standard by 2012, and by 55 percent better by 2016. The Strategic Energy Plan states that cities and counties can lead by example by embracing energy efficiency in their facilities.

Strategy E-1 Increase the use of energy conservation features, renewable sources of energy and low-emission equipment in new and existing development projects within the City.

Existing City Measures

The City currently recommends the use of the Green Building Guidelines for all residential projects. The Green Building Guidelines were developed through a partnership among local developers, architects, contractors, green building experts, and staff of the Alameda County Waste Management Authority and Recycling Board with input from Contra Costa County communities. The Guidelines offer:

- Cost-effective suggestions to minimize construction-related waste, create healthier and more durable homes, reduce operating costs for homeowners, and support local manufacturers and suppliers of resource-efficient building materials.
- Methods to reduce the impacts of building in Contra Costa County communities; including solid waste management, water conservation, energy efficiency and resource conservation.

The City enforces Title 24 standards in its role as building official. The City reviews all building plans for compliance and City Building Inspectors ensure that buildings are constructed to code.

San Ramon Municipal Code Title B, Division B6, Chapter XIII and related Construction and Demolition Debris Program Guidelines require building and demolition permit applicants and authorized haulers of construction and demolition debris to re-use, recycle, compost, or otherwise divert from landfill disposal at least 50 percent of the debris generated by covered projects within the City of San Ramon.

The City will be constructing new civic buildings as part of the City Center project. The City has committed to achieving energy efficiency goals as measure by a Leadership in Energy and Environmental Design (LEED) Silver rating for the project. LEED is an internationally recognized green building certification system that rates buildings by a broad array of sustainability measures.

In 2009, San Ramon completed replacing all incandescent traffic signal heads with LED lamps in order to conserve energy and reduce greenhouse gas emissions. In 2009, the City tested four LED streetlights. San Ramon intends to convert all streetlights to LED or other available energy-efficient technology as funding allows. During 2011, the City will convert approximately 600 high-pressure sodium (HPS) streetlight fixtures to LED replacements. San Ramon will also seek to convert all parking lot lighting at city parks and facilities to LED, induction, or other energy-efficient lighting technologies. San Ramon is working with developers in the Dougherty Valley to request that any new streetlights that are installed are fitted with LED lamps.

General Plan Policies

Policy Number	General Plan Policy
11.4-G-1	Promote energy conserving practices in the location, construction, renovation, and maintenance of San Ramon’s housing units.
11.4-I-3	Allow minor variations in building setbacks and/or solar orientation during Plan Review to increase energy efficiency of new housing units.
11.4-I-4	Enforce the State’s energy conservation standards for new residential construction and renovations to existing structures.
11.4-I-5	Encourage innovative designs to maximize passive energy efficiencies, while retaining compatibility with surrounding neighborhoods.
11.4-I-6	Disseminate information and support efforts by public utilities to encourage home conservation practices.
12.7-I-1	Increase the use of energy conservation features, renewable sources of energy and low-emission equipment in new and existing development projects within the City.
12.7-I-2	Encourage the use of solar-ready roofs into residential and commercial development. New residential development should include proper solar orientation (south-facing roof area sloped at 20° to 55° from the horizontal), clear access on the south sloped roof (no chimneys, heating vents, plumbing vents, etc.), electrical conduit installed for solar electric system wiring, plumbing installed for solar hot water systems, and space provided for a solar hot water storage tank. Roofs for commercial development should be designed to maximize potential area available

Policy Number	General Plan Policy
	for solar panels and provide electrical conduit to support future installation.
12.7-I-3	Promote urban forestry projects that shade buildings homes, streets, pedestrian walkways, and urban core areas to reduce surface and ambient temperatures and reduce energy required for cooling.
12.7-I-6	Support ongoing efforts with the Green Affordable Housing Coalition (GAHC), building industry, water and utility districts and the BAAQMD to promote enhanced energy conservation and sustainable building standards for new construction.
12.7-I-7	Work with local water and energy utilities and the building industry to develop or revise City design standards relating to solar orientation water use, landscaping, use of cool paving surfaces, parking lot shading and such other measures oriented towards reducing energy demand

Emission Reduction Potential: Energy conservation measures reduce emissions proportionately with the percentage improvement in energy efficiency. Buildings that are 20 percent more efficient than required by regulation would achieve a 20-percent reduction in emissions from electrical generation.

Water Conservation and Reuse

Water and energy are integrally tied to California's economy. The Energy Commission estimates that approximately 19 percent of all electricity and 30 percent of non-power plant natural gas (i.e., natural gas not used to generate electricity) used in California is for the conveyance, treatment, distribution, and end use of water. Alternatively, 21 percent of the state's electricity is generated by clean hydropower (CAT Report 2008).

In general, when a unit of water is saved, so too is the energy required to move, treat, deliver, use, and dispose of that unit of water. Strategies for this sector address issues such as water recycling, water end use conservation and efficiency, reducing the energy required for water systems and using renewable energy in that system where practical. Location, elevation, water source, water use sector, water application, quality and energy source, among other factors, are factors that should be considered when addressing the water-energy interface (CAT Report 2008).

East Bay Municipal Utility District (EBMUD) and Dublin San Ramon Services District (DSRSD) provide potable water service to San Ramon. EBMUD generally serves the northern, western, and central portions of San Ramon, while DSRSD serves all of the Dougherty Valley, with the exception of the Gale Ranch Phase 1 Development.

Strategy E-2 Reduce energy use from the transport and treatment of water.**Existing City Measures**

EBMUD has a comprehensive Water Conservation Program in place that includes both supply- and demand-side measures, including audits, incentives, optimal management practices, wastewater and landscape regulations, education programs, support activities, metering, and leak detection and pipe replacement. EBMUD also recommends that local cities require water conservation measures as a standard feature in the design and construction of proposed development projects.

In 2006, state legislation (AB 1881, Laird, 2006) required the Department of Water Resources to adopt an updated Model Water Efficient Landscape Ordinance (MWELO). In 2009, the State Department of Water Resources adopted an updated model ordinance, which became effective January 1, 2010. As a result, the City of San Ramon requires new development and remodels of existing landscapes meeting the size criteria of the ordinance to meet the State Model Water Efficient Landscape Ordinance in an effort to conserve landscape water use.

Water reclamation can also significantly reduce water demand and storage requirements. Reclaimed water is used most effectively for irrigating areas such as parks, greenbelts, golf courses, roadway medians, and front yards. The EBMUD and DSRSD have provided an increasing amount of recycled water throughout their service area within San Ramon. Additionally, groundwater has the potential to reduce demand on municipal supplies, although the characteristics of the aquifer and its water table in the San Ramon Planning Area are variable.

San Ramon has been trying to do its part since 1989, when the City began installing a computerized irrigation management system that can be adjusted to water automatically based on weather conditions and can be centrally monitored by Public Services staff. In addition, at least half of the City's parks are on recycled water for irrigation use. Descriptions of initiatives and programs that reduce water are provided below.

Upcoming water conservation changes by the City in response to the recent drought conditions include:

- Reduce watering in landscaping and turf areas by at least 10 percent.
- Defer annual color plantings in parks and medians.
- Reduce washing down of hardscape such as tennis courts and sidewalks.
- Use slow release fertilizers to maintain a steady growth habit.

- Install water savings devices in city facilities such as low-flow showerheads, faucet aerators.
- Reduce frequency of vehicle washing for city vehicles.

General Plan Policies

Policy Number	General Plan Policy
4.8-I-12	Encourage attractive, drought-tolerant landscaping on private property that is suitable for San Ramon's climate.
8.6-G-1	Promote the implementation of water quality and conservation programs and measures by San Ramon employers, residents, and public agencies.
8.6-I-1	Require new development projects to implement indoor water conservation and demand management measures.
8.6-I-2	Require new development projects to implement outdoor water conservation and demand management measures.
8.6-I-3	New development in areas where recycled water service exists or is planned shall be plumbed with "purple pipe" and other measures necessary to accommodate non-potable water service.
8.6-I-4	Require new development to meet the State Model Water Efficient Landscape Ordinance (MWELO).
8.6-I-5	Collaborate with DERWA (Dublin San Ramon Services District and East Bay Municipal Utilities District Recycled Water Authorities) to expand the recycled water distribution system in an efficient and timely manner.
12.7-I-4	Initiate and sustain on-going efforts with local water agencies utility providers and developers to establish and implement voluntary incentive-based programs to encourage the use of energy and water efficient designs and equipment in new and existing development projects within the City.
12.7-I-5	Reduce water use and related energy use by using reclaimed water for landscaping where appropriate financially feasible and allowed by water quality regulations. Require new development areas that will be served with recycled water to be plumbed with a "purple pipe" system to facilitate the future use of recycled water.

Emission Reduction Potential: Water conservation will achieve emission reductions equivalent to the percentage of water pumping and treatment that is avoided. Water recycling consumes additional energy from treatment; however, treatment is often required to meet water quality regulations and so the energy use in that case would occur anyway. Achieving the State's goal of 20-percent reduction in water consumption by 2020 would result in a 20 percent reduction in greenhouse gas emissions from the electricity sector.

Waste Reduction and Recycling

When organic materials, construction materials and other municipal solid wastes are discarded, they end up in landfills. Increasing waste diversion from landfills and recycling

materials will significantly reduce greenhouse gas emissions. Furthermore, use of composted organic materials provides additional benefits. Currently, the State is mandated to divert a minimum of 50 percent of its waste from going to landfills. Diverting more organics/biomass and other waste from landfill disposal and turning them into marketable products will reduce greenhouse gas emissions associated with the manufacture of new products and the methane (CH₄) emissions from waste in landfills. This will help us continue toward a Zero Waste California.

Strategy E-3 Improve the City's recycling and source reduction programs to make continued progress in minimizing waste.

Existing City Measures

The City has operated a variety of recycling programs beginning with curbside recycling in 1989. For more details regarding these programs, see the Air Quality Element Background Report. The City has instituted the following programs:

- 1989 Curbside Recycling Program
- 1990 Home Composting Program
- 1990 City Facilities, Events, and Venues Recycling Program
- 1991 Volume-Based Garbage Rates
- 1992 Commercial Recycling Program
- 1995 Composting of Residential Yard Trimmings
- 2006 Multi-Family Dwelling Recycling Program
- 2007 Construction and Demolition Debris Recycling Ordinance
- 2010 Residential Food Scraps and Soiled Paper Composting Collection
- 2011 Residential On-call Door-to-Door Household Hazardous Waste Collection

The City's 2009 solid waste disposal rate of 3.3 pounds per person per day easily beat California Department of Resources Recycling and Recovery's (CalRecycle's) limit of no more than 5.7 pounds per person per day. San Ramon beat the requirement by over 42 percent. The City is studying potential measures regarding the use of plastic bags and Styrofoam food containers as part of its efforts to further reduce solid waste.

The City has adopted regulations to reduce the release of chlorofluorocarbons (CFCs) into the atmosphere from activities within the City of San Ramon. Municipal Code Title B Regulations, Chapter III Ozone-Depletion Control regulates these compounds. Article 1 prohibits the use of CFC-processed food packaging, and Article 2 regulates the use and recycling of CFCs in refrigeration or air conditioning units in buildings and motor vehicles, fire extinguishers, and building insulation.

General Plan Policies

Policy Number	General Plan Policy
7.5-G-1	Manage solid waste so that State goals are exceeded and the best possible service is provided to the citizens and businesses of San Ramon.
7.5-I-2	Provide and promote opportunities to reduce waste in all sectors of San Ramon, including residential, commercial, non-profit, government, and educational sectors.
7.5-I-3	Develop a consumer friendly, convenient, affordable options for community-serving recycling services
7.5-I-4	Through the development review process encourage the provision of convenient recyclable material storage locations
7.5-I-5	Comply with State requirements for proper handling and storage of solid waste, recyclables, and hazardous materials, diversion of solid waste from landfills, and provision of programs to make these activities feasible.
7.5-I-6	Ensure that solid waste programs effectively address community needs and issues.
7.5-I-7	Provide options for the safe disposal of hazardous waste and materials.
7.5-I-8	Encourage solid waste diversion (e.g. waste prevention, reuse, recycling, and composting).
7.5-I-9	Require new development projects to comply with the Municipal Code's construction and demolition debris diversion requirements.
7.5-I-10	Provide convenient recycling opportunities at large public events and venues.
7.5-I-11	Promote public and private efforts to recycle electronic waste.
12.7-I-8	Provide recycling programs for construction and demolition debris, and for commercial and/or community recycling of plastic, paper, green waste, and food waste to reduce energy consumption and greenhouse gas emissions.
12.8-I-6	Require businesses to minimize emissions of ozone-depleting compounds.

Emission Reduction Potential: Waste reduction and recycling provide emission reductions from lower transport emissions for trips to the landfill, lower methane emissions from the decomposition of organic matter in the landfill, and from energy savings from using recycled materials compared to mining, and processing virgin materials into products. The reductions are calculated using the EPA's Waste Reduction Model (WARM). Modeling of the City's emission savings from its existing programs are 32,539 metric tons CO₂e per year.

4.5 - Regional Cooperation

Measures and programs that impact greenhouse gas emissions are often operated at the regional level. Many modes of transportation operate at the regional level, because people travel throughout the region. The regional roadway network, the bus system, and the Bay Area Rapid Transit (BART) system are examples. The City also relies on regional providers for some services such as water and wastewater treatment (East Bay Municipal Utility

District (EBMUD) and Dublin San Ramon Services District (DSRSD). Regional cooperation provides a venue for sharing knowledge and resources to help address a variety of issues, including climate change and greenhouse gas emissions.

Strategy R-1 Participate in regional programs and initiatives that reduce greenhouse gas emissions.

Existing City Measures

The City is very active in regional transportation planning programs and initiatives with facets that impact greenhouse gas emissions.

- Contra Costa Transportation Authority (CCTA)
- Southwest Area Transportation Committee (SWAT)
- Tri-Valley Transportation Council (TVTC)
- Tri-Valley Air Quality Resource Group
- Metropolitan Transportation Commission (MTC)
- 511 Contra Costa
- Association of Bay Area Governments (ABAG)
- Bay Area Air Quality Management District (BAAQMD)
- Bay Area Recycling Outreach Coalition (BayRoc)

The Tri-Valley Transportation Council (TVTC) includes the cities of San Ramon, Dublin, Pleasanton, and Livermore; the Town of Danville; and Alameda and Contra Costa counties. Founded in 1991, the TVTC completed the Tri-Valley Transportation Plan/Action Plan for Routes of Regional Significance in 1995 and the Plan was updated in 2009. The Plan establishes shared traffic service objectives and presents a list of 11 high-priority transportation improvement projects to ease regional traffic congestion.

Contra Costa Transportation Authority (CCTA) and the four sub-regional transportation planning committees, including the Southwest Area Transportation Planning Committee (SWAT), provides oversight of the County's Measure J Program. With the passage of Measure C in 1998, Contra Costa voters approved a half-cent sales tax to fund transportation improvements in Contra Costa County. Measure C expired in 2009 and was replaced with Measure J that was approved by Contra Costa County voters in 2004. In addition to the sales tax, Measure J includes a far-reaching Growth Management Program (GMP) component, which requires that local jurisdictions consider regional transportation conditions when planning for developments. Measure J became effective April 1, 2009 and includes funding for a mix of projects and programs, including the continuation of the Growth

Management Program component. Funds under Measure J became available in July 2009 and will be in place for the next 25 years.

General Plan Policies

Policy Number	General Plan Policy
3.1-I-6	Join with and encourage other jurisdictions to participate in regional transportation planning programs
3.5-G-1	Participate in regional cooperative and multi-jurisdictional transportation planning for the maintenance of regional mobility and air quality standards as required by the Measure J Growth Management Program and the Contra Costa Congestion Management Plan (CMP).
3.5-I-1 5.2-I-1	Continue to develop and implement Action Plans for Routes of Regional Significance, in cooperation with the Southwest Area Transportation Committee (SWAT), the Contra Costa Transportation Authority (CCTA), and the Tri-Valley Transportation Council (TVTC).
3.5-I-2 5.2-I-2	Continue to implement the Tri-Valley Transportation Action Plan through participation in the Tri-Valley Transportation Council (TVTC).
3.5-I-3	Participate in programs to mitigate regional traffic congestion, including implementation of regional and sub-regional traffic impact fees on new development.
3.5-I-5	Continue to address the impacts of land use decisions on regional and local transportation facilities by applying the Contra Costa Transportation Authority (CCTA) travel demand model and technical procedures during project analysis. Additionally, help maintain CCTA's travel demand modeling system by providing information on proposed improvements to the transportation system and future developments and long-range plans within San Ramon.
3.5-I-6	Participate in the Contra Costa Transportation Authority conflict resolution process as needed to resolve disputes related to the development and implementation of Action Plans and other Growth Management Program.
5.2-I-5	Emphasize regional transportation demand management and trip reduction strategies as alternatives to improvements to existing facilities and the construction of new facilities.
5.2-I-7	Support regional air quality objectives through effective management of the City's transportation system.
5.6-I-6	Work with other jurisdictions and agencies to coordinate the City's TDM programs with regional plans that are aimed at reducing traffic congestion and improving air quality.
11.1-I-15	Work with neighboring jurisdictions in the Tri-Valley area to develop affordable housing.
12.8-I-4	Work with other local and regional governments to assess federal and state programs and their impact on greenhouse gas emissions and mitigation efforts.

Emission Reduction Potential: No reductions were taken for regional cooperation. Regional cooperation improves the effectiveness of other measures.

4.6 - Role of Existing Development

The CAP strategies described above are implemented in two ways. New development projects are proposed and constructed consistent with the General Plan and the CAP. Existing residents and businesses comply with regulations that apply to everyone and participate in new and existing programs and measures. The strategies that apply directly and indirectly to existing development are shown in Table 7.

Table 7: Strategies For Existing Development

Strategy	How It Applies
Measures That Apply to Existing Development	
Transportation Demand Management	TDM is implemented at existing and new businesses and can reduce trips from new and existing housing.
Expanded Transit Service	Improved transit service will encourage increased ridership from new and existing development.
Improved Transit Stations	Transit stations service a wider community area that includes new and existing development.
Traffic Calming Retrofits	Traffic calming designs can be retrofitted on existing roads or built in new development.
Complete Streets Program	Complete streets connect existing and new areas.
Parking Management	Parking management at new and existing employment centers encourages trip reductions from all residential development.
Energy Retrofits	Educational and incentive programs encourage existing residents and business owners to install energy retrofits providing large benefits in older structures.
Bicycle and Pedestrian Improvements on Existing Roads	Bicycle paths and lanes can be retrofitted on existing roads and sidewalks and pedestrian paths can connect existing neighborhoods with appropriate destinations.
Bicycle Parking Facilities	Bicycle parking can be added to existing businesses if needed to satisfy demand by employees and customers.
Water Conservation Programs	Educational and incentive programs encourage existing residents and businesses to conserve water.
Recycled Water Use in Existing Parks	Recycled water can be piped to any area retrofitted or initially developed with a “purple pipe” system to distribute recycled water.
Recycling Programs	Operational programs such as recycling apply to all residents and businesses in the City.
Electric Vehicle Charging	Charging stations can be installed in existing development as a retrofit or in new development.
Neighborhood Electric Vehicles	Feasibility in existing neighborhoods will depend on the street design and safety considerations.

Table 7 (cont.): Strategies For Existing Development

Strategy	How It Applies
Measures That Apply to New Development but Indirectly Benefit Existing Development	
Transit- and Pedestrian-Oriented Development	Transit and pedestrian oriented development provides destinations that encourage transit use from existing development and walking once people arrive.
Mixed Use Development	Mixed-use development creates a more walkable environment conducive to transit use for trips from existing development.
Compact Development	Making the City more compact shortens average trip lengths for residents and creates more opportunities for transit.

Implementation

Information is provided throughout the CAP strategy section regarding the existing regulations and programs that implement strategies for existing development. Examples of regulatory measures that directly affect existing development include the State Model Water Efficient Landscape Ordinance, which requires water conservation measures during remodeling, and mandatory recycling programs for certain materials. Residents and businesses in the City have access to numerous energy and water conservation incentive and rebate programs. The City will monitor the effectiveness of its strategies over time. If progress is insufficient to meet the targets, the City will consider the development of additional mandatory programs that apply to existing development.

Emission Reduction Potential

Emissions from existing development are projected to be approximately 26 percent lower than business as usual by 2020. Emission reductions projected from existing development will be achieved through compliance with state and local regulations and voluntary measures. It should be recognized that everyone who purchases new vehicles, buys motor fuels, uses electricity, and pays taxes to support voluntary incentive and educational programs is contributing to greenhouse gas reductions. Ratepayers fund utility rebates and taxpayers fund tax incentives. The CAP does not attempt to quantify reductions from voluntary programs. Insufficient data is available to separate the benefits of voluntary efforts from statewide regulations that reduce emissions from the same sources.

4.7 - Government Operations

The following strategies apply to activities directly under the responsibility of the City such as civic buildings, street and traffic lighting, the government vehicle fleet, and employee programs that reduce greenhouse gas emissions.

Building Energy Efficiency

The City's buildings make up a substantial portion of the government emission inventory. Reductions can be achieved when new buildings are constructed or remodeled. The City has replaced aging heating, ventilation, and cooling systems with more efficient systems and installed energy management systems in four city facilities and will continue this practice as old systems are replaced. Some specific measures include:

- The City plans to build a new City Hall that will meet LEED Silver standards for energy efficiency and sustainability
- Install high efficiency heating, ventilation and cooling equipment when building new buildings and replacing obsolete units
- Install high efficiency lighting fixtures in new and remodeled City buildings
- Install energy management systems in new and remodeled buildings

Energy Savings from Traffic and Street Lighting

The City will replace lighting fixtures with more efficient LED or other technology whenever possible. The City has received a federal Energy Efficiency and Conservation Block Grant to replace streetlights with LED lights. The City completed replacement of all traffic lights with LED fixtures in 2009. According to a report prepared by PG&E, Phase II LED luminaires provided power savings of 36 percent compared to high-pressure sodium luminaires and the newer Phase III LED luminaires provided 52 percent savings (PG&E 2008).

Low-Emission City Fleet Vehicles

The City operates vehicles used by the police for maintenance and other purposes. Most vehicles in the fleet are gasoline- and diesel-powered. The City currently operates vehicles powered by compressed natural gas. The City will replace vehicles with the lowest emission technology that fulfills the work requirements and that is cost-effective, as the current fleet reaches the end of its useful life. The City anticipates that all vehicles in its vehicle fleet will be replaced by the 2020 CAP target date.

The City contracts with Waste Management, Inc. for waste hauling services. Nine of the 14 vehicles that the City's franchised garbage hauler uses to collect residential and commercial garbage, recyclables, and yard trimmings in San Ramon are CNG-powered. The franchise agreement allows the City to require that the hauler utilize additional alternative fuel collection vehicles as its older diesel vehicles are gradually replaced.

Green Purchasing

The City makes purchases typical for City government operations such as vehicles, computers, paper, and materials required to maintain the City's infrastructure. Specific actions to enhance the City's purchasing include:

- Purchase equipment certified under the Energy Star program whenever cost-effective versions are available that meet all operational requirements.
- Purchase materials with high recycled content whenever products are available that meet operational requirements and do not result in additional maintenance or excessive costs.

Water Conservation

The City has implemented water saving measures at most public parks, and other landscaped areas maintained by the City. The following actions will further improve the City's water conservation efforts:

- The City will use additional recycled water in public landscaped areas as more supplies become available.
- The City will continue to install higher efficiency irrigation systems, precision sprinklers, and drip irrigation where the landscaping permits these systems and budget allows.
- The City will replace existing water-intensive landscape installations (e.g., turf in medians) with more water-efficient alternatives where feasible.

See the Air Quality and Greenhouse Gas Element Background Report for additional information regarding City programs.

Urban Forestry

The City of San Ramon was recently awarded the title of Tree City USA by the National Arbor Day Foundation. Staff is currently working to categorize and catalog all of the City's trees. Trees provide shade that can reduce the urban heat island effect caused when pavement and other open surfaces absorb solar radiation and re-radiate heat to the surrounding environment. The shade can reduce energy required for cooling. The General Plan 2030 includes the following policy to encourage urban forestry projects in new development:

Policy 12.7-3 Promote urban forestry projects that shade buildings, homes, streets, pedestrian walkways, and urban core areas to reduce surface and ambient temperatures and reduce energy required for cooling.

Green Business Program

The City's Green Business Program is designed to provide public recognition to businesses that maintain compliance with all environmental regulations and demonstrate a commitment to conserving resources and preventing pollution. Twenty-six San Ramon businesses have been recognized by Contra Costa County's Bay Area Green Business Program.

4.8 - Emission Reduction Estimates

Implementing the strategies described earlier in this section are expected to provide emission reductions that are adequate to meet the City's target reduction of 15 percent compared to current 2008 emissions or 26 percent compared to business as usual by 2020 and achieve an emission efficiency below 6.6 MTCO₂e per service population per year by 2020. The following information provides an analysis that demonstrates that the reductions are feasible. The analysis is not intended to provide definitive project level emission assessments, but to provide assurance that when the City implements its General Plan policies and CAP strategies, the targets will be achieved. The CAP provides a mechanism to track progress in implementing the CAP that will help to identify problems early and to provide corrective actions needed to keep on target.

Potential Land Use Related Emission Reductions

The heart of the City's strategy is to develop and redevelop the City to make it a more vibrant, pedestrian-oriented, mixed-use community that served by high-quality transit service to reduce emissions from vehicle travel. The City has done a great deal to set this strategy in motion. All Specific Plans, Development Plans, the 2020 General Plan, and the new General Plan 2030 promote this strategy. As described earlier, the City will concentrate on infill and redevelopment within the existing planning areas of the City. Development within the City's primary growth areas will occur under design guidelines and development plans that ensure that more people will be living and working in places that provide greater transportation options.

Land use and transportation strategies cannot be looked at in isolation. Providing a high-density housing development that is not adjacent to necessary and compatible service and uses and with no transit service will generate limited reductions. Place high-density housing within walking distance of high-quality transit service and frequently accessed destinations, and the reductions in travel are substantial. A year 2000 study of differences in VMT by Robert Cervero found that the vehicle miles traveled in urban development with a strong pedestrian environment and good transit service is 50 percent lower than produced by suburban communities without these amenities (Cervero 2000). According to the Caltrans Statewide Transit Oriented Development Study (Caltrans 2008), TOD can lower annual household rates of driving by 20 to 40 percent for those living, working, and/or shopping

near transit stations. It is important to consider this wide range of differences in travel when attempting to predict the effect of the City's land use strategy on future travel.

San Ramon is currently in the middle to upper range of Bay Area communities in terms of its VMT per household. Table 8 provides a comparison of VMT per household at select Bay Area communities to illustrate the differences. The urban cities have VMT rates that are one third to one half of those in the more suburban communities. The significance of this information for San Ramon is that it shows the large potential for reducing VMT as it pursues its strategy of increasing development densities and becomes more pedestrian- and transit-oriented. Comparison of San Ramon with the more urban San Francisco, Berkeley, and Emeryville shows that VMT per capita is 30 to 50 less in those cities than in San Ramon.

Table 8: Vehicle Miles Traveled at Selected Bay Area Communities in 2006

City	VMT per Household	VMT per Capita	Average Household Size
Emeryville	16.09	9.41	1.71
San Francisco	19.37	8.49	2.28
Berkeley	24.72	11.41	2.17
Walnut Creek	36.79	17.42	2.11
San Ramon	47.97	18.22	2.63
Danville	55.79	19.64	2.82
Byron	62.54	23.09	2.71

Notes:
 Association of Bay Area Governments (ABAG) estimates for San Ramon for 2008 indicate an average household size of 2.81.
 Source: MTC Bay Area Simplified Simulation of Transportation Energy and Greenhouse Gases (2009).

The City's role as a regional employment center has resulted in high employment densities, especially in Bishop Ranch with its 30,000 employees. This provides an environment conducive to successful Transportation Demand Management (TDM) programs. Although the City is currently only served by bus transit, the City's TDM programs, including the Bishop Ranch TDM has achieved 33-percent reduction in daily vehicle traffic to Bishop Ranch and a 40-percent reduction in peak-hour traffic through a variety of measures such as rideshare, vanpools, transit, bicycling, alternative work schedules, and walking. As the City Center project and the proposed North Camino Ramon Specific Plan are implemented, the existing TDM programs implemented by San Ramon and the Bishop Ranch TMA can be expected to be even more effective, and the redeveloped areas near Bishop Ranch can be expected to achieve even greater reductions in travel through implementation of TDM measures.

The General Plan 2030 Land Use Element identifies the plan subareas that will absorb the growth predicted for the City. Some of the areas are nearly built out and will see very little development. The majority of growth since 2000 has related to housing and population resulting from annexations of Dougherty Valley development. As development has extended to the city limits, San Ramon accommodated further growth by annexing new areas, such as Henry and Thomas Ranches in the Westside, Faria Preserve in the Northwest, and Windemere and portions of Gale Ranch in Dougherty Valley. Eventually, when the remaining unincorporated portions of Dougherty Valley are developed, they too will be annexed and added to the list of new areas within the City.

With little vacant land remaining for new development within the city limits, San Ramon abides by two basic philosophies to accommodate future growth. The first is the continued annexation of adjacent unincorporated areas within the Urban Growth Boundary (UGB) into the City to accommodate any future housing needs, support the regional employment base, and meet demand for municipal services. The second is to focus new growth inward through the intensification of land use density by encouraging infill and redevelopment projects within the existing urban areas defined by the UGB. The previous smart growth General Plan 2020 embraced this philosophy through the creation of mixed-use districts to accommodate both commercial and residential uses as well as a continuing commitment to regional programs such as the Association of Bay Area Governments (ABAG) FOCUS Program.

Land Use and Transportation Strategy to Meet a 15-Percent Reduction Target

As described earlier, the development pattern, density, and transportation system have a great impact on the amount people drive. This applies to the different development areas within San Ramon that have different patterns and transportation options and so will vary in their ability to achieve emission reductions. The reductions presented here are based primarily on information assembled by California Air Pollution Control Officers Association (CAPCOA) in its document, CEQA and Climate Change. The document provides emission reduction estimates for many land use and transportation measures. This analysis uses the reductions presented by CAPCOA and the characteristics of development planned for San Ramon to show the reductions that are possible here.

The mixed-use, infill, transit-oriented developments would have travel reductions well in excess of 15 percent. Suburban developments with limited transit service and commercial services nearby are not likely to approach a 15-percent reduction. Recognizing this variability in land use pattern and that the future citizens of San Ramon will desire a variety of housing and commercial opportunities, this analysis proposes a four-level approach to achieving an overall reduction of 15 percent in transportation emissions. The four levels correspond to growth areas identified in the General Plan that reflect this variety.

The Civic Center and proposed NCRSP represent the area with the highest potential reductions that can exceed 15 percent by a large margin. The Dougherty Valley Specific Plan and the Crow Canyon Specific Plan area represent areas with strong pedestrian and transit orientation that would achieve at least 15 percent. The Northwest Specific Plan represents a more suburban area with benefits from clustering development and providing services nearby that would achieve a 10-percent reduction. The more rural Westside Specific Plan represents an area that can achieve an 8-percent reduction. Specific development projects within these plan areas will vary in their ability to reduce transportation-related emissions, due to their proximity to transit and bicycle facilities, surrounding uses, development density, and business type. However, the overall community target of a 15-percent reduction would be achieved assuming that an equal amount of development would occur in each of the four levels. The City cannot predict how the market forces for different development types will affect the eventual buildout. For this reason, the CAP implementation will be monitored for progress.

Table 9 lists the characteristics that result in emission reductions and the range of potential reductions. The table provides percentage reductions in emissions corresponding to four categories of development described above in terms of the level of reductions possible as high, medium-high, medium-low, and low. The percentage assigned is based on a qualitative assessment of the characteristics of the development in the plan areas described above. Many of the CAPCOA measures provide ranges of effectiveness. The reduction levels identified below reflect the land use and transportation factors that have been shown in the studies used for the CAPCOA reduction estimates to impact the effectiveness of the measure. Individual projects may achieve higher or lower percentage reductions depending on the location of the project with relation to transit facilities and project design features. The numbers shown in Table 8 represent a reasonable expectation of average reductions that can be achieved in the different development areas.

Energy Conservation and Alternative Energy Strategy to Meet a 15-percent Reduction Target

Energy efficiency provides reductions through several strategies described earlier. These include building energy efficiency, lighting efficiency, water use efficiency, and alternative energy use. Factors affecting the ability of an individual project to achieve a reduction in excess of regulations include the design and intended use of the building, and the location of the building.

Table 9: Emission Reduction Potential for San Ramon’s Development Areas

Factors	Characteristics	Potential Emission Reduction (Percent)				
		Range	High	Medium High	Medium Low	Low
Land Use Factors	Mixed-use with housing, jobs, and commercial services within walking distance.	3–9 ¹	3	2	0	0
	Pedestrian oriented with traffic calming features, gridded street system, and good connections with the other land uses in the area.	1–10 ¹	2	1	1	1
	Transit oriented development with a major transit hub or center within 0.25 mile	1–40 ²	4	1	1	0
	High density housing and high floor area ratio (FAR) office and commercial development	1–40 ¹	5	3	2	1
	Affordable housing component included in residential development	0.4–6 ¹	2	2	1	1
Transportation Factors	The site has frequent transit service (at least 10-minute headways during commute hours)	5 ¹	3	2	1	1
	The site is served by a system of bicycle paths and lanes that provide access to most locations in the City	1–10 ¹	2	1	1	1
	The businesses in the development offer high quality transportation demand management (TDM) programs.	1–28 ¹	5	2	2	1
	The development uses parking structures with parking fees, shared parking, and parking lots located to preserve pedestrian orientation.	1–30 ¹	4	2	1	1
	Total Reductions			30	16	10

Notes:
 Mixed use, transit oriented, infill projects = high; transit and pedestrian oriented suburban projects = medium high; suburban development with limited higher density development, some pedestrian orientation and less frequent transit service = medium low; low-density development in rural areas and cluster development without transit service and limited pedestrian opportunities = low. The percent reductions represent generalized amounts that can vary based on individual project characteristics.

Sources:
¹ CAPCOA 2008; Caltrans 2002
² Transit-Oriented Development Study: Factors for Success in California

Building Energy Efficiency

Energy efficiency standards in buildings have prescriptive elements that specify standards for individual building components and overall building performance standards. The construction materials, amount of windows, and type of roof and foundation all have an effect on energy consumption. For example, in order to meet the Title 24 standards, a building with just a few windows may not need high technology energy efficient windows to meet the standard, while a building with many windows would need to provide high-efficiency windows to meet the standard. This flexibility allows architects to design buildings of all types that can meet the standards without imposing excessive costs. As Title 24 has become more stringent over the years, technology has advanced to the point that most building designs can still achieve the higher efficiency requirements.

The most recent amendments to Title 24 went into effect in January 2010. They are anticipated to reduce greenhouse gas emissions by 396,520 tons per year statewide. The State revises Title 24 every 3 years to identify changes that can provide additional cost-effective energy efficiency improvements. The California Energy Commission (CEC) encourages local governments to adopt local ordinances that go beyond Title 24. The ordinances must demonstrate to CEC that they will achieve energy reductions at least as great as Title 24 and are cost-effective.

The Public Utility Commission's 2008 Strategic Energy Plan includes a goal for residential buildings to be zero net energy consumers by 2020 and for commercial buildings to be zero net energy consumers by 2030. Zero net energy is a general term applied to a building with a net energy consumption of zero over a typical year. To cope with fluctuations in demand, zero energy buildings are typically envisioned as connected to the grid, exporting electricity to the grid when there is a surplus, and drawing electricity when not enough electricity is being produced. The zero net energy goal will be implemented with a combination of revisions to Title 24 to make the efficiency standards increasingly stringent and with voluntary tiers that could be implemented at the local level through policies, programs, ordinances and incentives.

The CAP strategy for energy efficiency provides support for the State's zero net energy goal with the implementation action that would require new development projects to achieve energy efficiencies that are at least 15 percent more stringent than Title 24. This would ensure that the energy sector of the CAP emission inventory is consistent with the CAP target. The City will review this level of reductions as part of its annual review of CAP implementation and may revise the reductions if additional reductions are feasible or if the 15-percent reductions prove to be infeasible.

Water Use Efficiency

Conserving water reduces greenhouse gases through savings in energy used to transport and pump water from its source and from water treatment.

San Ramon will achieve reductions through several different strategies. These include requirements for new development to achieve water efficiency improvements consistent with the State's 20-percent target by 2020, implementation of the State's Model Water Efficient Landscape Ordinance (MWELo) that will achieve a 20-percent reduction in water used for landscaping, and expansion of the use of recycled water for landscaping. A 20-percent reduction in water use will result in a 20-percent reduction in energy used to transport and treat water.

The San Ramon Valley Recycled Water Program is administered by a joint powers authority DSRSD-East Bay MUD Recycled Water Authority (DERWA). The first phase of the program was completed in 2006 and provides 23 sites, including greenbelts, parks, and schools, with a total of 700,000 gallons per day of recycled water. When completed, the program will supply approximately 2 million gallons per day (mgd) to parts of San Ramon, Danville, and Blackhawk. Future plans identify a network of recycled water lines serving the Bishop Ranch office park. Full implementation will provide a 342-percent increase in recycled water use over current conditions.

Energy savings from recycled water use are more difficult to determine. The water treatment process to create recycled water requires additional energy. However, if one assumes that the treatment would be required for water quality purposes, then the energy from treatment energy use would not be considered. The differential in energy used to treat and transport fresh water to San Ramon compared with treating and transporting recycled water has not been estimated. This strategy will be examined at a later date.

Based on the 20-percent water savings from new development and from the implementation of the Model Water Efficient Landscape Ordinance, the CAP will exceed the 15-percent target for this sector.

Alternative Energy Use

Alternative energy includes solar photovoltaic generation systems, solar water heating systems, and alternative fuels for transportation. Solar systems generate zero operational emissions. Compressed natural gas (CNG) produces 25 percent fewer greenhouse gas emissions than an equivalent vehicle powered by gasoline or diesel.

The energy savings from the use of solar is included in the overall 15-percent reduction in energy use from new development. Solar implemented at existing homes and commercial buildings is counted as a state reduction for the Million Solar Roofs program.

The City operates a number of CNG vehicles. As City fleet vehicles are replaced, the City will determine the appropriate fuel and power source for the vehicle that achieves the maximum technological feasible and cost-effective reduction to greenhouse gases. Currently, no reductions from alternative fuels are included in the CAP targets.

Solid Waste Reductions

New development in the City will participate in the residential and commercial recycling programs that are available to all residents and businesses. The City currently exceeds the state per capita disposal rate by 42 percent. The City's Construction and Demolition Debris Ordinance requires projects to divert at least 50 percent of waste from construction/demolition/remodel activities. The City anticipates that its current programs will result in continued improvements in rates of recycling of at least 15 percent by 2020.

Emission Reduction Commitment Summary by Emission Inventory Sector

- | | |
|--------------------------------|---------------------|
| ▪ Transportation Sources | 15 percent |
| ▪ Residential | 15 percent |
| ▪ Commercial Energy Use | 15 percent |
| ▪ Water Treatment and Transfer | 20 percent |
| ▪ Solid Waste | 15 percent |
| ▪ Overall Reduction from 2008 | At least 15 percent |

4.9 - Reductions from State Scoping Plan Measures

The future year inventories provided in Section 3 do not include reductions from state measures that will go into effect prior to the inventory 2020 target year and the General Plan 2030 buildout year. California has a very aggressive program that was adopted in the AB 32/CARB Climate Change Scoping Plan in 2008. Many of the measures have already been adopted as state regulations and others are scheduled for adoption by 2012. The following describes the state greenhouse gas reduction strategy and provides emission reduction estimates for the state strategies. Also provided is an estimate of the reductions that the state regulations will have on sources in the San Ramon emissions inventory.

Key elements of California's strategy for reducing its greenhouse gas emissions to 1990 levels by 2020 include:

- Expanding and strengthening existing energy efficiency programs as well as building and appliance standards
- Achieving a statewide renewable energy mix of 33 percent

- Developing a California cap-and-trade program that links with other Western Climate Initiative partner programs to create a regional market system
- Establishing targets for transportation-related greenhouse gas emissions for regions throughout California and pursuing policies and incentives to achieve those targets (SB 375)
- Adopting and implementing measures pursuant to existing state laws and policies, including California's clean car standards, goods movement measures, and the Low Carbon Fuel Standard
- Creating targeted fees, including a public goods charge on water use, fees on high global warming potential gases, and a fee to fund the administrative costs of the State's long-term commitment to AB 32 implementation

The CARB Climate Change Scoping Plan identifies measures designed to reach the State's 2020 target and provides emission reduction estimates for each measure. The following describes the primary statewide measures that apply to development related emissions in San Ramon:

- **Motor Vehicles - Pavley Standards:** The EPA recently granted the waiver for California for its greenhouse gas emission standards for motor vehicles. The Pavley I (AB 1493) regulation, which has already been adopted by CARB, requires greenhouse gas emission reductions from passenger cars and light trucks up to the 2016 model year. This regulation is expected to provide 27.7 MMTCO₂e of emission reductions in 2020. The Pavley I standards are expected to reduce total emissions for automobiles and light trucks by 17.2 percent relative to the business as usual scenario (without Pavley or corporate average fuel economy) by the year 2020. CARB is currently developing standards for passenger vehicles model year 2017 and later that is being referred to as Pavley II. That regulation will also provide reductions by 2020. The new standards will follow up on the existing standards that reach maximum stringency in 2016. The CARB Climate Change Scoping Plan indicates that the Pavley II standards will achieve additional emission reductions of 4.1 MMTCO₂e by 2020. The Pavley I and II standards are expected to reduce total emissions for automobiles and light trucks by 19.7 percent relative to the business as usual scenario (without Pavley or corporate average fuel economy) by the year 2020.
- **Motor Vehicles - Low Carbon Fuel Standard (LCFS):** CARB adopted a new regulation in December 2009 to implement the LCFS. The regulation is a discrete early action measure under AB 32 and implements Governor Schwarzenegger's Executive Order S-01-07. The regulation will reduce greenhouse gas emissions by reducing the carbon intensity of transportation fuels used in California by an average of 10 percent by the year 2020. The CARB Climate Change Scoping Plan estimates this regulation will provide 15 MMTCO₂e of emission reductions in 2020. The LCFS

is expected to reduce total emissions from passenger vehicles and heavy-duty trucks by 7.2 percent. A 7.2-percent reduction from business as usual emissions for passenger vehicles and heavy-duty trucks is taken for this regulation.

- **Motor Vehicles - Passenger Vehicle Efficiency:** CARB identified several measures that would further reduce tailpipe greenhouse gas emissions from passenger vehicles by increasing vehicle efficiency. These measures include ensuring proper tire inflation and using solar-reflective automotive paint and window glazing (cool car standards). The CARB Climate Change Scoping Plan estimates these regulations will provide 1.44 MMTCO₂e of emission reductions in 2020. These measures are expected to reduce total emissions from passenger vehicles by 2.8 percent. Details regarding the current status of these initiatives is provided below:
 - CARB approved a regulation that requires California's automotive maintenance industry to check the tire pressure of every vehicle they service in March 2009. A properly inflated tire helps to reduce fuel greenhouse gas emissions by reducing tire-rolling resistance.
 - In June 2009, CARB approved the cool car standards, which cut greenhouse gases by reducing heat gain in automobile interiors. The cool car standards begin phasing in with the 2012 model year. The regulation requires that passenger cars, pickup trucks, and sport utility vehicles be equipped with windows that reduce the amount of heat that enters vehicles from solar radiation. Less heat inside vehicles will allow air conditioning units to be downsized or used less, thereby increasing fuel economy and reducing the amount of greenhouse gases emitted by vehicles when they are in use.
 - Additional measures that would further reduce tailpipe greenhouse gas emissions from passenger vehicles by increasing vehicle efficiency include low friction oil and a tire tread program. The CARB Climate Change Scoping Plan estimates these regulations will provide 3.1 MMTCO₂e of emission reductions in 2020. The combined benefit of these measures is expected to reduce total emissions from passenger vehicles by 2.8 percent.
- **Motor Vehicles, Heavy Duty Truck Vehicle Efficiency (Aerodynamic Efficiency):** CARB approved this regulation in December 2008. This measure requires existing trucks/trailers to be retrofitted with the best available technology and/or CARB-approved technology. Technologies that reduce greenhouse gas emissions and improve the fuel efficiency of trucks may include devices that reduce aerodynamic drag and rolling resistance. The requirements apply to California and out-of-state registered trucks that travel to California. The 2020 estimated greenhouse gas emission reductions are about 0.93 MMTCO₂e. This regulation is expected to reduce total emissions from heavy-duty trucks by 2.9 percent.
- **Natural Gas Energy Efficiency:** The CARB Climate Change Scoping Plan Energy Efficiency measure includes a number of actions that reduce energy consumption of

- both natural gas and electricity through improvements in building and appliance efficiency and through efficiency in combustion of the natural gas. Examples of efficiency improvements include the use of condensing heaters; tankless, gas-fired, on-demand heaters; and other super efficient, gas-fired heating appliances that will replace less efficient water and space heaters by attrition as they fail. The 2020 emission reductions from this measure are 4.3 MMTCO₂e or 9.4 percent of the inventory for this source category.
- **Renewable Energy Portfolio Standard:** CEC estimates that about 12 percent of California's retail electric load is currently met with renewable resources. Renewable energy includes (but is not limited to) wind, solar, geothermal, small hydroelectric, biomass, anaerobic digestion, and landfill gas. California's current Renewables Portfolio Standard (RPS) was intended to increase that share to 20 percent by 2010. Increased use of renewables will decrease California's reliance on fossil fuels, thus reducing emissions of greenhouse gases from the Electricity sector. Based on Governor Schwarzenegger's call for a statewide 33-percent RPS, the CARB Climate Change Scoping Plan anticipates that California will have 33 percent of its electricity provided by renewable resources by 2020, and includes the reduction of greenhouse gas emissions based on this level. San Ramon is served by Pacific Gas and Electric (PG&E). Based on the 2007 renewables portfolio, reaching the 33 percent target would result in an 18.4-percent reduction by 2020 in the City of San Ramon.
 - **Electrical Efficiency:** The CARB Climate Change Scoping Plan lists twelve strategies to maximize energy efficiency that are expected to achieve a savings of up to 40,000 gigawatt-hours of electricity by 2020. The CARB Climate Change Scoping Plan estimates reductions from electrical efficiency measures would reduce emissions from this source category by 15.2 MMTCO₂e by 2020. With the implementation of the strategies, emission reductions of 15.7 percent would be achieved from this source category.
 - Cross Cutting Strategy for Buildings
 - "Zero Net Energy" Buildings
 - Standards Strategies
 - More stringent building codes and appliance standards
 - Broader standards for new types of appliances and for water efficiency
 - Improved compliance and enforcement for existing standards
 - Voluntary efficiency and green building targets beyond mandatory codes for Existing Buildings
 - Voluntary and mandatory whole-building retrofits for existing buildings
 - Innovative financing to overcome first-cost and split incentives for energy efficiency, onsite renewables, and high efficiency distributed generation
 - Improved Utility Program Strategies
 - More aggressive utility programs to achieve long-term savings

- Other Strategies
 - Water system and water use efficiency and conservation measures
 - Local government programs that lead by example and tap local authority planning, development, and code compliance
 - Additional Industrial and Agricultural Efficiency Efforts
 - Providing real time energy information to help consumers conserve and optimize energy performance.
- **Million Solar Roofs:** As part of Governor Arnold Schwarzenegger's Million Solar Roofs Program, California has set a goal to install 3,000 megawatts of new, solar capacity by 2017 - moving the state toward a cleaner energy future and helping lower the cost of solar systems for consumers. The Million Solar Roofs Program is a ratepayer-financed incentive program aimed at transforming the market for rooftop solar systems by driving down costs over time. Created under Senate Bill 1 (Murray, Chapter 132, Statutes of 2006), Million Solar Roofs builds on previous ratepayer-funded programs and provides up to \$3.3 billion in financial incentives that decline over time.
- **Waste–Landfill Methane:** The Scoping Plan measure “Landfill Methane Control Measure” would reduce 1.5 MMTCO₂e in California, which is 17.6 percent of the 8.5 MMTCO₂e emissions for the “Landfill” sector, according to the CARB 2020 Forecast (CARB 2010).
- **Refrigerants, Regulations:** On December 9, 2009, the CARB adopted the Management of High Global Warming potential Refrigerants for Stationary Sources in the California Code of Regulations. Beginning in 2011, the rule will require leak inspection, repairs, required service practices, and recordkeeping for large commercial and industrial systems that use more than 50 pounds of refrigerant for a single unit, about the equivalent of the refrigerant found in 100 household refrigerators. The emission reduction percentage was estimated based on varying leak emission rates as shown in the appendix and is shown in Table 10.

Table 10 shows emission reductions that CARB predicts for state regulations that implement AB 32 along with the scaled reductions that will apply to sources in the City of San Ramon.

Table 10: 2020 Community Greenhouse Gas Emission Reductions from State Regulations and AB 32 Measures

End Use Sector	California Regulations and Measures	Reduction from 2020 BAS Inventory (%)	Percentage of 2020 San Ramon Inventory (%)	Scaled Emission Reduction Credit (%)
On-road passenger/light truck transportation	AB 1493 Pavley	19.7	52.6	10.4
	Passenger Vehicle Efficiency	2.8	52.6	1.5
	LCFS	7.2	52.6	3.8
On-road heavy/medium duty transportation	LCFS	7.2	9.8	0.7
On-road heavy duty transportation	Heavy Duty Efficiency	2.9	9.8	0.3
Natural gas (residential)	Energy Efficiency Measures	9.5	10.4	1.0
Natural gas (non-residential)			5.4	0.5
Refrigerants	Refrigerant Management	48.5	3.1	1.5
Electricity (excluding cogeneration)	Renewable Portfolio Standard	21.0	16.0	3.4
	Solar Roofs	1.5	16.0	0.2
Electricity	Energy Efficiency Measures	15.7	16.0	2.5
Solid Waste	Waste - Landfill Methane	17.6	1.5	0.3
Total Reductions from Statewide Measures in San Ramon				26.1
Notes: AB = Assembly Bill; LCFS = Low Carbon Fuel Standard; BAS = business as usual; Scaled Emission Reduction Credit = Reduction for 2020 Inventory percentage multiplied by the End Use Sector percentage. Source of California Regulations and Measures: Bay Area Air Quality Management District. California Environmental Quality Act Air Quality Guidelines, June 2010 (Table D-4), with the exception of refrigerants and waste, which are estimated as discussed in the text above this table and in Appendix A.				

Projects within approved Specific Plan areas, development plans, and other new discretionary projects undergoing CEQA review are expected to provide reductions of 15 percent beyond those required by state regulation and programs to be consistent with this CAP. The CAP business as usual inventory is projected to increase 9.8 percent by 2020. Therefore, a 15-percent reduction from all new development will provide an overall reduction of 1.5 percent by 2020. When added to the reductions anticipated from state measures and programs (26.1 percent), the CAP would provide a reduction of 27.6 percent and a plan efficiency of 4.0 metric tons of CO₂e per service population per year, which exceeds the BAAQMD threshold for demonstrating that the CAP meets CARB Climate Change Scoping Plan targets of 6.6 MTCO₂e per service population per year.

SECTION 5: IMPLEMENTATION, MONITORING, AND FUNDING

This section directs the effective implementation of the CAP by City staff and other stakeholders. This section also describes potential funding sources.

State Government Code Section 65400 requires the City to prepare and submit an annual report on the status of the General Plan and progress in its implementation to the City Council, the Governor's Office of Planning and Research, and the Department of Housing and Community Development. This suggests that the CAP be designed so that it can be monitored, updated, and its effectiveness measured on an annual basis towards meeting a target for reduction of greenhouse gas emissions through buildout of the General Plan 2030.

5.1 - Implementation Plan and Monitoring Program

This subsection provides matrices detailing the essential action steps, a timetable for implementation, responsible departments or divisions, progress indicators, and targets.

The following is a list of City departments with responsibilities for CAP implementation and a brief description of their divisions and functions:

- The Administrative Services Department is responsible for providing a variety of services to other departments and the public. The Department consists of four divisions: the Finance Division, the Information Technology Division, the Employee Services Division, and the Central Services Division.
- The Economic Development Department is responsible for activities that protect, improve, and diversify the San Ramon economy. It is also responsible for addressing the City's affordable housing problems and the Redevelopment Agency, which focuses its efforts on the economic and physical blight in specific project areas within the City.
- The Engineering Services Division is responsible for the administration and implementation of the Capital Improvement Program (CIP), the federally mandated Stormwater Pollution Control Program, managing and coordinating the City's Geographic Information System (GIS) Enterprise Server and application developments, traffic engineering, and the review and inspection of development projects.
- The Planning/Community Development Department is responsible for the following divisions and programs: Building and Safety Services, Planning Services, and Transportation Services.
- The Public Services Department is responsible for the Street Maintenance Services, Lighting and Landscaping District Maintenance, and Solid Waste Services functions.

Strategy LU-1 Increase the average development density of new development by 10 percent by 2020.

CAP Implementation Action		Timetable	Responsibility
LU-1.1	Develop consistent with the design criteria of the City Center Project	Ongoing	Planning Services
LU-1.2	Select a development pattern and site design for the NCRSP that allows higher densities and Floor Area Ratios (FAR)	Ongoing	Planning Services
LU-1.3	Provide incentives to developers that propose affordable, higher density development such as density bonuses, FAR increases.	Ongoing	Planning Services
Progress Indicator		Target	
LU-A	Compare density of completed projects with City average for similar development types	5 percent by 2015, 10 percent by 2020	

Strategy LU-2 Encourage mixed use development in new development and redevelopment areas.

CAP Implementation Action		Timetable	Responsibility
LU-2.1	Develop new growth areas in accordance with the design criteria of the Dougherty Valley Community Center and City Center Project	Ongoing	Planning Services
LU-2.2	Include transit oriented development design criteria in the NCRSP that is currently under development	Ongoing	Planning Services
LU-2.3	Require transit oriented designs and features when developers submit site plans for project near major transit hubs or future multimodal transit facilities	Ongoing	Planning Services
LU-2.4	Review the City’s design guidelines to identify additional measures that will improve opportunities mixed use development	By June 30, 2012	Planning Services
Progress Indicator		Target	
LU-B	Development plans received meeting the applicable criteria	100% of those received for City review	

Strategy LU-3 Increase transit orientation in new development and redevelopment areas near current and planned transit facilities.

CAP Implementation Action		Timetable	Responsibility
LU-3.1	Develop new growth in accordance with the design criteria of the Dougherty Valley Community Center and San Ramon City Center	Ongoing	Planning Services
LU-3.2	Include transit oriented development design criteria in the NCRSP that is currently under development	Ongoing	Planning Services
LU-3.3	Encourage transit oriented designs and features when developers submit site plans for project near major transit hubs or future multimodal transit facilities.	Ongoing	Planning Services
LU-3.4	Review the City’s design guidelines to identify additional measures that will improve transit orientation and transit use.	By June 30, 2012	Planning Services
Progress Indicator		Target	
LU-C	Development plans received meeting the applicable criteria	100% of those received for City review	

Strategy LU-4 Increase pedestrian orientation in new development and redevelopment areas.

CAP Implementation Action		Timetable	Responsibility
LU-4.1	Develop new growth in accordance with the design criteria of the Dougherty Valley Village Center and San Ramon City Center Project	Ongoing	Planning Services
LU-4.2	Include pedestrian oriented design criteria in the NCRSP that is currently under development	Ongoing	Planning Services
LU-4.3	Encourage pedestrian oriented designs and features when developers submit site plans	Ongoing	Planning Services
LU-4.4	Review the City’s design guidelines to identify additional measures that will improve pedestrian access and use	By June 30, 2012	Planning Services
Progress Indicator		Target	
LU-D	Development plans received meeting the applicable criteria	100% of those received for City review	

Strategy LU-5 Provide additional workforce housing opportunities in the City to improve the jobs housing balance and to reduce commute distances.

CAP Implementation Action		Timetable	Responsibility
LU-5.1	The General Plan 2030 and approved San Ramon City Center Project include a higher percentage of multifamily development compared to single-family development that will provide more affordable housing in the City.	Ongoing	Planning Services
LU-5.2	Provide incentives for projects that include workforce/affordable housing	June 30, 2012	Planning Services
Progress Indicator		Target	
LU-D	Development plans received meeting the applicable criteria and meet City affordable housing requirements.	100% of those received for City review	

Strategy LU-6 Promote compact development by protecting open space and hillsides and encouraging infill and redevelopment of underutilized parcels in urbanized areas.

CAP Implementation Action		Timetable	Responsibility
LU-5.1	Follow General Plan policies regarding protection of open space and viewsheds when reviewing annexation and development requests.	Ongoing	Planning Services
Progress Indicator		Target	
LU-D	Development plans received meeting the applicable criteria	100% of those received for City review	

Strategy T-1 Provide transit facilities and services that improve transit mode share

CAP Implementation Action		Timetable	Responsibility
T-1.1	Follow General Plan policies regarding transit facilities when approving new development projects	Ongoing	Planning/Community Development
Progress Indicator		Target	
T-A	Development plans received meeting the applicable General Plan policies	100% of those received for City review	

Strategy T-2 Provide pedestrian connections in new and existing development to improve pedestrian mobility and accessibility

CAP Implementation Action		Timetable	Responsibility
T-2.1	Follow the City’s development ordinances regarding the provision of pedestrian infrastructure.	Ongoing	Planning/Community Development Public Services Engineering Services
T-2.2	Upgrade pedestrian infrastructure when roadways are reconstructed or expanded and right-of-way is available including the Iron Horse Trail overcrossing at Bollinger Canyon Road.	Ongoing	Planning/Community Development Public Services Engineering Services
Progress Indicator		Target	
T-B	Development plans received meeting the applicable design standards. Reconstruction projects include pedestrian infrastructure improvements.	100% of those received for City review	

Strategy T-3 Provide a safe and well-connected system of bicycle paths, lanes, and trails to increase bicycle use.

CAP Implementation Action		Timetable	Responsibility
T-3.1	Implement the General Plan policies regarding bicycle infrastructure as development projects are proposed.	Ongoing	Planning/Community Development Public Services Engineering Services
T-3.2	Continue to pursue funding for projects that improve connections and safety of the City’s bicycle system	Ongoing	Planning/Community Development Public Services Engineering Services
Progress Indicator		Target	
T-C	Development plans received meeting the applicable General Plan policies. Success in receipt of funding.	100% of those received for City review Success in grant applications is not predictable, but the City should apply for all grants with a realistic opportunity of success.	

Strategy T-4 Use traffic calming measures to improve traffic flow, pedestrian orientation, and bicycle use.

CAP Implementation Action		Timetable	Responsibility
T-4.1	Follow General Plan policies regarding traffic calming	Ongoing	Planning/Community Development Engineering Services
T-4.2	Continue to operate the City’s existing traffic calming programs	Ongoing	Transportation Services Engineering Services
Progress Indicator		Target	
T-D	Development plans received meeting the applicable General Plan policies. Implementation of traffic calming requests under the existing program	100% of those received for City review Traffic calming measures in existing areas is dependent on funding availability and the number of requests received.	

Strategy T-5 Increase the use of low and zero emission vehicles.

CAP Implementation Action		Timetable	Responsibility
T-5.1	Follow General Plan policies regarding City fleet vehicle purchases	Ongoing	All Departments
T-5.2	When vehicles in the City fleet are retired, replace the vehicles with the cleanest technology that can effectively perform all required functions at a reasonable cost.	Ongoing	All Departments
Progress Indicator		Target	
T-E	Compare EPA mileage rating of existing vehicles with new vehicles.	15 percent improvement in vehicle fuel efficiency with new purchases	

Strategy T-6 Improve the effectiveness of existing Transportation Demand Management Programs and ensure that new developments with large employee concentrations implement TDM Programs.

CAP Implementation Action		Timetable	Responsibility
T-6.1	Follow General Plan policies regarding Transportation Demand Management for projects with large concentrations of employees.	Ongoing	Planning/Community Development
T-6.2	Continue to operate the City’s TDM Program for City employees.	Ongoing	Transportation Services
T-6.3	Provide infrastructure supporting TDM such as the Norris Canyon High Occupancy Vehicle (HOV) project.	Ongoing	Transportation Services Engineering Services
Progress Indicator		Target	
T-F	Development proposals received that propose TDM Employee participation in TDM	100 percent of applicable projects include TDM Increase participation in TDM by 15 percent by 2020	

Strategy T-7 Require projects to provide facilities that make travel by bicycle and transit more convenient.

CAP Implementation Action		Timetable	Responsibility
T-7.1	Follow General Plan policies regarding bicycling support facilities.	Ongoing	Planning/Community Development
T-7.2	Require end of trip facilities for projects that are implementing TDM programs.	Ongoing	Planning/Community Development
Progress Indicator		Target	
T-G	Development plans received meeting the applicable General Plan policies.	100% of applicable projects received for City review	

Strategy T-8 Encourage the use of parking facility designs and parking management to reduce vehicle trips.

CAP Implementation Action		Timetable	Responsibility
T-8.1	Follow General Plan and Specific Plan policies regarding parking facility design and operation.	Ongoing	Planning/Community Development
T-8.2	Consider alternative parking strategies to encourage carpooling and alternative transportation modes	Ongoing	Planning/Community Development
Progress Indicator		Target	
T-H	Development plans received meeting the applicable General Plan policies. Each large mixed use, transit oriented provides an analysis of parking management with development plans.	100% of applicable projects received for City review City reviews 100% of development proposals	

Strategy T-9 Provide vehicle support infrastructure to encourage use of low- and zero-emission vehicles.

CAP Implementation Action		Timetable	Responsibility
T-9.1	Identify potential locations for battery recharge stations and request grant funds to pay for installation.	June 30, 2012	Planning/Community Development Engineering Services Public Services
T-9.2	Consider locating tire inflation stations in suitable public locations	June 30, 2012	Planning/Community Development Engineering Services Public Services
Progress Indicator		Target	
T-H	Report to City Council regarding feasibility and potential locations. Funding secured.	Determine feasibility within one year. Install one or more stations by 2013, if determined feasible.	

Strategy E-1 Increase the use of energy conservation features, renewable sources of energy, and low-emission equipment in new and existing development projects within the City.

CAP Implementation Action		Timetable	Responsibility
E-1.1	Follow General Plan policies regarding energy conservation when approving new development.	Ongoing	Planning/Community Development
E-1.2	Require new residential and commercial development to achieve energy efficiency improvements consistent with State targets of 15 percent compared to Title 24 standards.	Ongoing	Building and Safety Services
E-1.3	Increase the effectiveness of City Building inspection programs to improve compliance with Title 24.	June 30, 2012	Building and Safety Services
E-1.4	Track State initiatives regarding net zero energy consumption and will encourage installation of solar or other yet to be determined technologies that prove to be cost-effective.	Ongoing	Planning/Community Development
E-1.5	Construct new City buildings to meet energy reduction targets and to incorporate solar design elements where feasible	Ongoing	Planning/Community Development Engineering Services Public Services

Progress Indicator		Target
E-A	Development plans received meeting the applicable criteria Building Dept. completes review of inspection program	100% of those received for City review Program upgrade recommendations submitted to City Council

Strategy E-2 Reduce energy use from the transport and treatment of water.

CAP Implementation Action		Timetable	Responsibility
E-2.1	Follow General Plan policies regarding water conservation and recycled water use.	Ongoing	Planning/Community Development Public Services
E-2.2	Achieve the State target of a 20 percent reduction in water consumption by 2020.	Ongoing	Planning/Community Development Public Services
E-2.3	Implement the State Model Water Efficient Landscape Ordinance (MWELo).	January 1, 2011	Planning/Community Development Public Services
Progress Indicator		Target	
E-B	Development plans received meeting the applicable criteria Water consumption statistics from water providers MWELo completed	100% of those received for City review 20% reduction from new development MWELo Adopted by City Council	

Strategy E-3 Improve the City’s recycling and source reduction programs to make continued progress in minimizing waste.

CAP Implementation Action		Timetable	Responsibility
E-3.1	Follow General Plan policies regarding waste reduction, recycling, and reuse	Ongoing	Public Services
E-3.2	Refine the City purchasing procedures to identify more high quality products with high recycled content.	June 30, 2011	Administration Services
E-3.3	Continue to improve per capita solid waste rates with the ultimate goal of becoming a zero waste community.	Ongoing	Public Services

Progress Indicator		Target
E-C	Development plans received meeting the applicable criteria Increase purchasing of recycled content materials Per capita waste rate	100% of those received for City review Develop a list of items for potential purchase MWELo Adopted by City Council

Strategy R-1 Participate in regional programs and initiatives that reduce greenhouse gas emissions.

CAP Implementation Action		Timetable	Responsibility
R-1.1	Follow General Plan policies regarding regional cooperation	Ongoing	All Departments
R-1.2	Continue to actively participate in regional organizations.	Ongoing	All Departments
R-1.3	Assign staff as needed to participate in organization meetings	Ongoing	All Departments
Progress Indicator		Target	
E-C	Participation in organizations identified in the General Plan	100% participation in identified regional initiatives with appropriate staff attendance	

5.2 - Monitoring Program

As part of the annual report to the City Council on progress in implementing the General Plan, staff will report on benchmarks achieved that implement goals, objectives, and policies having air quality, climate change, and sustainability benefits. The City will use its Geographic Information System to provide up-to-date land use and development data and tracking for other metrics or quantitative measures of success. Appropriate benchmarks and the means to track them will be developed within 12 months of adoption of the CAP and will be adjusted over time to respond to changing conditions and lessons learned. The following benchmarks are proposed:

Land Use Benchmarks

- Summary of building permits for new construction issued during the previous year
- The amount of residential development approved in new subdivisions and parcel maps
- The average density of new development approved during the previous year
- Progress in improving the jobs/housing balance in the City
- Inventory of vacant land by designation including change from previous year

Transportation and Circulation Benchmarks

- SB 375 Sustainable Communities Strategies implementation status report
- Transit ridership statistics
- Transit route expansions and changes to service frequency
- New lane miles of roads built by functional classification
- Progress in implementing congestion relief projects
- TDM program participation
- Bay Area Air Quality Management District program cost-effectiveness calculations
- Updates in vehicle miles traveled used by MTC in making Transportation Conformity findings for transportation plans

Energy Conservation Benchmarks

- Compile results of Title 24 Compliance Reports to show amount achieved over standards
- Status report on achieving landfill recycling and diversion targets
- Progress achieved on water conservation programs and projects
- Progress achieved on water reuse projects

Climate Action Plan Implementation

The CAP will require City staff to take a series of actions to ensure that the policies and implementation measures are accomplished in a timely manner. The following actions should be initiated within the first year after adoption of the CAP:

First Year Actions

- Assign a CAP Coordinator.
- Set up a CAP Implementation Committee to assign Department responsibilities for providing specific information under their purview:
 - Building Services Division - building statistics, energy reports
 - Planning Services Division - subdivision data
 - Transportation Division – TDM program data and air district vehicle emission data
 - Fleet Manager - low emission vehicle purchases
 - Administrative Services Department - capital improvements/energy retrofits/budget
 - Engineering Services Department - Geographic Information Systems - tracking and mapping land use changes/prepare new reports as needed

- Public Services Department - Solid Waste - recycling and waste diversion statistics
- Redevelopment Agency - Low-income energy conservation program
- Other - to be determined
- Participate in SB 375 Regional Targets process with MTC and ABAG.
- Coordinate with transit agencies on transit issues.
- Compile first progress report as a section/chapter of the Annual General Plan Implementation Report.
- Identify program improvements and new programs that the City can pursue.
- Obtain technical assistance from the Air District to assist the City in developing uniform monitoring and reporting procedures and incorporate existing air district TDM related programs.
- Develop a fee/cost recovery program to implement the monitoring and reporting.

Long-Term Actions

Long-term milestones (approximately every 5 years) include the following actions:

- Review land use and transportation data collected from the previous 5 years for comparison with regional transportation goals.
- Analyze completed projects to determine if the CAP targets are being achieved and propose revisions or additional programs if needed.
- Update the CAP to reflect changes in state regulations and CAP programs.

5.3 - Funding

This subsection describes potential funding sources and strategies that would cover costs related to the CAP measures. Implementation will require a combination of possible strategic public funding by the City, regional government agencies, and state and federal governments to provide capital projects, incentives, outreach/education, and new regulations necessary to achieve CAP objectives. Funding sources are not identified for all actions. However, state and regional grants are available to assist with funding the more expensive strategies. The City can partner with private companies. The City can also partner with the County and other jurisdictions for joint programs. Many of the measures could be self-financing if properly designed and implemented.

The vast majority of reductions from the CAP strategy are obtained through conditions on new development. Although energy efficiency improvements can increase construction costs, these improvements result in savings due to reduced energy costs for the homeowners and building owners. The City is sensitive to actions that increase the initial

costs of development and has chosen a moderate goal of 15 percent improvement in energy efficiency from new development compared with Title 24 requirements that would limit costs.

The other main source of reductions in the CAP is from implementing the City's General Plan land use strategy. The City believes that the land use strategy will result in lower costs, due to more efficient provision of infrastructure and services to the new development. The land use strategy is also consistent with regional transportation initiatives that reduce vehicle travel and reduce long-term transportation infrastructure investment needs.

The City has applied for a grant to continue its program to replace existing conventional traffic lights with energy saving LED fixtures. The utilities all manage incentive programs that provide rebates and assistance to consumers purchasing energy efficiency upgrades for homes and businesses. These programs are expected to continue in the future.

The Transportation Fund for Clean Air (TFCA) is a Bay Area Air Quality Management District (BAAQMD) grant program funded by a surcharge on motor vehicles registered in the Bay Area. The purpose of the TFCA program is to provide grants to support Bay Area projects that will decrease motor vehicle emissions and thereby improve air quality. TFCA funds are allocated in two categories: (1) 60 percent Regional Funds and (2) 40 percent Program Manager funds. The 60 percent Regional Funds are allocated competitively and funds a wide range of project types, including the purchase or lease of clean air vehicles; shuttle and feeder bus service to train stations; ridesharing programs to encourage carpool and transit use; bicycle facility improvements such as bike lanes, bicycle racks, and lockers; arterial management improvements to speed traffic flow on major arterials; smart growth projects; and projects that enhance the availability of transit information. The 40 percent Program Manager funds are allocated by each Congestion Management Agency (CMA) and funds a wide range of projects and programs including shuttle and feeder bus service to train stations; ridesharing programs to encourage carpool and transit use; bicycle facility improvements such as bike lanes, bicycle racks, and lockers.

SECTION 6: CLIMATE CHANGE ADAPTATION

Despite efforts to reduce greenhouse gas emissions, greenhouse gases can remain in the atmosphere for hundreds of years. Therefore, it is probable that climate change impacts will still be observed. The impacts vary dependant upon the region. In California, climate change may result in a decreased water supply, sea level rise, increased wildfires, to name a few. In order to manage these impacts, the City's vulnerability to these impacts is assessed and strategies have been developed to adapt to the projected changes.

Climate change adaptation refers to efforts that respond to the impacts of climate change, such as adjustments in natural or human systems to actual or expected climate changes to minimize harm or take advantage of opportunities.

Goal: Protect City of Ramon residents and resources from negative climate change impacts.

Determining potential future impacts from climate change is an evolving process. The 2009 California Climate Adaptation Strategy provides a proactive foundation for an ongoing adaptation process within California for the sectors with the greatest risks. The document provides strategies for state and local governments to adapt to climate change (CNRA 2009). By incorporating applicable strategies as CAP Implementation Strategies, the City is taking a proactive approach to ensure that impacts to the City are minimized.

The following represent the main risks from climate change that could be experienced in the City of San Ramon. The General Plan policies that would decrease the risks to the City are presented as well as new CAP implementation strategies that would further reduce risks and protect City residents and resources from potential impacts from climate change.

6.1 - Wildfires

The San Ramon Valley Fire Protection District provides fire protection services to the incorporated and unincorporated portions of San Ramon.

The risk of both urban and wildland fires exists in the San Ramon Planning Area. The hazards related to wildland fires are related to a combination of factors including winds, temperatures, humidity levels, fuel moisture content of vegetation and topography. The risk to the community is increased in some areas because of the combustibility of building materials including roofs, adequacy of access roads, water supply duration, and pressure and maintenance of flammable vegetation surrounding structures.

Fire hazards in San Ramon are usually created by increases in the number of homes adjoining open space; therefore, much of the threat of wildland fires is due to open

grasslands abutting residential developments. Many neighborhoods within the City are located in remote regions and are surrounded by grasslands, such as the development shown in the photograph. As San Ramon continues to expand, more of these wildland urban interface areas are created. This situation creates extreme fire hazards, and San Ramon is committed to planning development, with the help of fire protection agencies, that minimizes the risk of fire to the greatest extent possible.



San Ramon Wildland Urban Interface Area
Source: Matt Jalbert

Because of an extended dry season with low humidity, San Ramon has many days where fire danger is critical. Within the City, fuel loading is light and wildfire hazard is moderate, except in areas adjacent to the City where steep woodland slopes and rolling grassy hills create high to extreme hazards. Areas in and around San Ramon representing the greatest risk are the Dougherty Valley and Tassajara Valley areas to the east of the City Limit and the wildland areas at the Planning Area's western edge and northwestern corner.

New development has the potential to create increased fire hazards caused by interactions between open grassland and dense residential development. Therefore, projected development in the City's Planning Area will likely require the construction of fire suppression services facilities for new subareas and compliance with General Plan policies intended to minimize this potential impact. The budgeting and timing of such construction should be considered with respect to safety and the pace of new development. Moreover, community design techniques that allow optimal fire services response time should remain a priority.

Wildfire occurrence in California was modeled under a range of future climate and development scenarios. A summary of that modeling follows.

Substantial increases in wildfire are anticipated for most scenarios, although the range of outcomes is large and increases with time. The increase in wildfire area burned associated with the higher emissions pathway (Special Report on Emissions Scenarios [SRES A2]) is



San Ramon Valley Fire Protection District
Source: San Ramon Valley Fire Protection District

substantial, with increases statewide ranging from 57 percent to 169 percent by 2085, and increases exceeding 100 percent in most of the forest areas of Northern California in every SRES A2 scenario by 2085 (Westerling et al. 2009).

Maps were created utilizing this modeling data by CalAdapt (2010). The area in which the Eastside Specific Plan area is located is associated with a “very high” fire threat and a “very high” fire threat to people. Review of

the maps indicates that, based on the potential for climate change, the danger of wildfires may be between 0.4 and 1.2 times more than in the historical period.

According to the California Department of Forestry and Fire Protection (2010), in California in 2009, there were 8,291 fires with 93,296 acres burned. In 2008, there were 5,744 fires with 390,615 acres burned.

The following General Plan policies would reduce wildfire risks to the City. Note that policies marked with a “G” are guiding policies and policies with an “I” are implementation policies.

6.2 - General Plan Policies

- 3.1-I-7 Allow urban development only within the City’s Urban Growth Boundary (see Implementing Policies 4.6-I-1 through 4.6-I-5) and only in accord with a plan for full urban services (police, fire, parks, water, sanitation, streets and storm drainage) to which all providers are committed.
- 3.2-I-1 Adopt “Findings of Consistency” that ensure new projects will comply with the City’s performance standards through its development review process.
- 7.6-G-1 Collaborate with the San Ramon Valley Fire Protection District to deliver a high level of public protection services that protect life, property, and the environment.
- 7.6-I-1 Continue to coordinate with the San Ramon Valley Fire Protection District to provide adequate fire protection facilities and services to meet the needs of the community.

- 7.6-I-2 Seek input from the San Ramon Valley Fire Protection District to ensure that fire protection measures are identified during the development review process.
- 9.5-G-1 Minimize the risks to lives, property, and natural environment due to fire hazards.
- 9.5-I-1 Require site design features, which are based on a wildfire risk assessment, and fire retardant building materials to reduce the risk of fire within the City.
- 9.5-I-2 Require the completion of a Fire Protection Plan for new development adjacent to a Fire Hazard Area in order to determine which mitigation measures are appropriate to minimize fire hazard.
- 9.5-I-3 Work with the Fire Protection District on planning for a new training facility at an appropriate location where neighborhood impacts would be mitigated.
- 9.5-I-4 Require sprinklers in new homes located more than 1.5-miles from a fire station.
- 9.5-I-5 Require sprinklers in all mixed use development to protect residential uses from non-residential uses, which typically pose a higher fire risk.

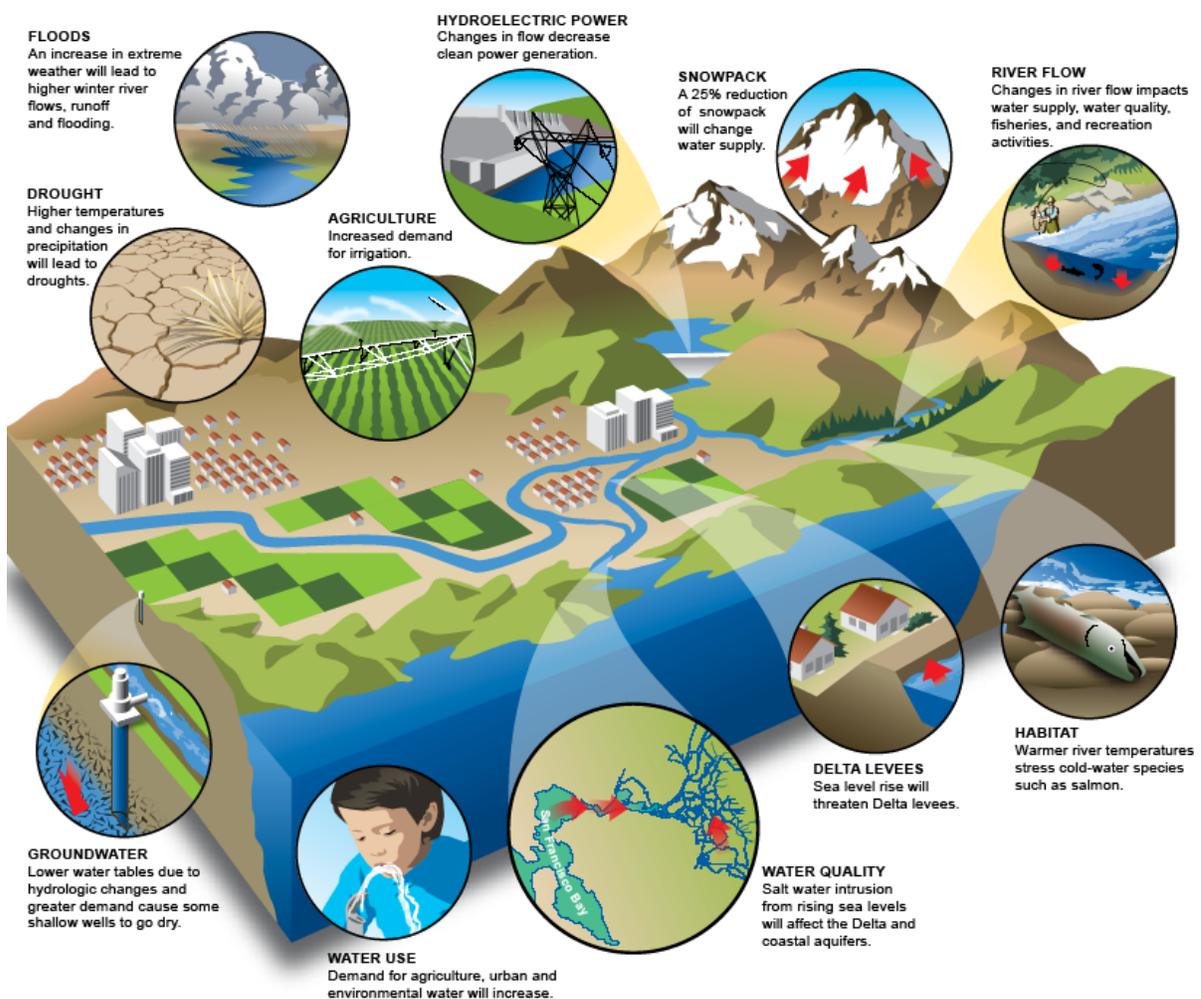
6.3 - Water

A vast network of man-made reservoirs and aqueducts captures and transports water throughout the state from northern California rivers and the Colorado River. The current distribution system relies on Sierra Nevada snowpack to supply water during the dry spring and summer months. Rising temperatures, potentially compounded by decreases in precipitation, could severely reduce spring snowpack, increasing the risk of summer water shortages. East Bay Municipal Utility District (EBMUD) and Dublin San Ramon Services District (DSRSD) provide potable water service to San Ramon. EBMUD generally serves the northern, western, and central portions of San Ramon, while DSRSD serves the majority of Dougherty Valley. The EBMUD obtains approximately 90 percent of its water supply from the Mokelumne River watershed in Alpine, Amador, and Calaveras counties in the Sierra Nevada Mountains. The remaining 10 percent are provided by local runoff collected in its five terminal reservoirs (EBMUD 2009).

Figure 8 shows how climate change can impact a watershed. One of the potential impacts of climate change is a loss of natural snowpack, particularly the Sierra Nevada snowpack. Snowmelt provides an annual average of 15 million acre-feet of water, released between April and July each year (Department of Water Resources 2008). The California Department of Water Resources projects that the Sierra snowpack will experience a 25 to 40 percent reduction from its historic average by 2050. Climate change is also anticipated to bring warmer storms that result in less snowfall at lower elevations, reducing the total snowpack.

Changes in precipitation patterns are expected to cause increased flooding. For the purposes of federal flood insurance, the Federal Emergency Management Agency has traditionally used the 100-year flood event, which refers to the level of flood flows that has a 1-percent chance of being exceeded in any single year. As California’s hydrology changes, what is currently considered a 100-year flood may strike more often, leaving many communities at greater risk. Moreover, as peak flows and precipitation change over time, climate change calls into question assumptions of “stationarity” that is used in flood-related statistical analyses like the 100-year flood.

Figure 8: How Climate Change Impacts a Watershed



The California Department of Water Resources (2008) recommends that local governments implement land use policies that decrease flood risk. These following recommendations are included as CAP implementation policies where applicable and feasible.

- Local land use agencies should update General Plans to address increased flood risks posed by climate change. General Plans should consider an appropriate risk tolerance and planning horizon for each locality.
- Local governments should site new development outside of undeveloped floodplains unless the floodplain has at least a sustainable, 200-year level of flood protection.
- Local governments should use low-impact development techniques to infiltrate and store runoff.
- Local governments should include flood-resistant design requirements in local building codes. State, federal, and local agencies should develop conjunctive use management plans that integrate floodplain management, groundwater banking, and surface storage. Such plans could help facilitate system reoperation and provide a framework for the development of local projects that are beneficial across regions.
- Local land use agencies should adopt ordinances that protect the natural functioning of groundwater recharge areas.

The City of San Ramon obtains a portion of its water from the State Water Project, which obtains part of its water from Sierra snowpack. Therefore, the City may be vulnerable to a decreased water supply. The City can adapt to potential decreases in water supply by reducing water use, which are outlined in the following General Plan policies.

GENERAL PLAN POLICIES

- 3.1-I-7 Allow urban development only within the City's Urban Growth Boundary (see Implementing Policies 4.6-I-1 through 4.6-I-5) and only in accord with a plan for full urban services (police, fire, parks, water, sanitation, streets and storm drainage) to which all providers are committed.
- 3.2-I-1 Adopt "Findings of Consistency" that ensure new projects will comply with the City's performance standards through its development review process.
- 8.8-G-1 Promote the implementation of water quality and conservation programs and measures by San Ramon employers, residents, and public agencies.
- 8.8-I-1 Require new development projects to implement indoor water conservation and demand management measures.
- 8.8-I-2 Require new development projects to implement outdoor water conservation and demand management measures.
- 8.8-I-3 New development in areas where recycled water service exists or is planned shall be plumbed with "purple pipe" and other measures necessary to accommodate non-potable water service.

Note that the San Ramon Valley Recycled Water Program currently serves recycled water to more than 270 locations in Dublin and San Ramon. Customers include the cities of Dublin and San Ramon, the Dublin Unified School District, the San Ramon Valley Unified School District, Dublin Ranch Golf Club, and the Bridges Golf Club at Gale Ranch. In a 12-month period in 2007 and 2008, the program provided 817 million gallons of recycled water to Dublin and San Ramon (Dublin San Ramon Services District 2008).

- 8.8-I-4 Require new development to meet the State Model Water Efficient Landscape Ordinance (MWELO).
- 8.8-I-5 Collaborate with DERWA (Dublin San Ramon Services District and East Bay Municipal Utilities District Recycled Water Authorities) to expand the recycled water distribution system in an efficient and timely manner.
- 8.8-I-6 Continue implementation of the City of San Ramon Stormwater Program to reduce storm water pollution, provide public education, and to protect the water quality of the City's local creeks and streams.
- 8.8-I-7 Promote the protection of groundwater resources by collaborating with agencies that monitor and oversee clean-up efforts at existing sources of pollution.

As precipitation falls in the form of rain rather than snow with greater storm intensity, high frequency flood events are projected to increase. There is currently no known literature that suggests an increase in flooding from climate change in the San Ramon area; however, it is possible that there could be changing weather patterns that would result in heavy downpours of rain in the area, which could cause flooding. In addition, the potential for increased wildfires resulting from climate change could increase floods following fire. The City of San Ramon General Plan contains the following policies, which would reduce flooding impacts.

GENERAL PLAN POLICIES

- 8.4-G-1 Acquire, preserve, and maintain open space and its natural resources for future generations.
- 8.4-I-2 Enhance San Ramon's creeks and riparian corridors by requiring preservation or replacement of riparian vegetation, as appropriate and in conformity with regulatory requirements.
- 8.4-I-9 Consider alternatives to culverting or channelization of waterways during all stages of the review process.
- 8.4-I-11 Continue participation in the Contra Costa Clean Water Program to control stormwater pollution and protect the quality of the City's waterways.
- 8.4-I-12 Monitor the condition of waterways within the City limits and take proactive measures to prevent degradation.

- 9.4-G-1 Protect the community from risks to lives and property posed by flooding and stormwater runoff.
- 9.4-I-1 Eliminate hazards caused by local flooding through improvements and ongoing maintenance to the storm drain system and/or creek corridors.
- 9.4-I-2 Require new development to prepare hydrologic studies to assess storm runoff impacts on the local and subregional storm drainage systems and/or creek corridors.
- 9.4-I-3 Require new development to provide a funding mechanism for ongoing maintenance of detention basins and other stormwater control measures. Maintenance may be by the City under contract, or by a private entity.
- 9.4-I-4 Establish landscape and maintenance guidelines for required detention basins to ensure that such facilities achieve a look and quality that is consistent with the landscape of San Ramon and applicable regulatory requirements.
- 9.4-I-5 Maintain flood insurance rate maps and post for public education.
- 9.4-I-6 Explore new funding mechanisms for enhancing the riparian environment and converting, where possible, flood control channels back to a more natural setting while keeping the existing uses and maintaining sufficient carrying capacity of the channels.
- 9.4-I-7 All new developments shall not increase runoff to the 100-year peak flow in the City's flood control channels or to local creeks and shall be substantially equal to pre-development conditions. All new storm water systems shall be in compliance with the requirements of the City's storm water discharge permit with the Regional Water Quality Control Board.
- 9.4-I-8 New development shall be required to locate buildings above the 100-year floodplain to minimize potential flood damages.

6.4 - Agriculture

Between 2000 and 2008, incremental changes from Non-irrigated Farmland and Other Lands to Urban Land had occurred, consistent with the General Plan 2030 and adopted Specific Plans.



Grazing Land

Source: East Bay Regional Parks District

General Plan 2030 Figure 8-4 identifies 162 acres of land in the San Ramon Planning Area mapped as Prime Farmland (127 acres) and Unique Farmland (35 acres). Farmland of Local Importance (3,054 acres) and other non-farmland are included as "Other Land."

Within the Tassajara Valley, grazing is the primary agricultural activity. However, dry

field crops (oats, wheat, barley, and hay), walnuts, olives, and grapes are also produced in small quantities.

The following General Plan policies would help to decrease impacts to agricultural resources within the City.

GENERAL PLAN POLICIES

- 3.1-I-7 Allow urban development only within the City's Urban Growth Boundary (see Implementing Policies 4.6-I-1 through 4.6-I-5) and only in accord with a plan for full urban services (police, fire, parks, water, sanitation, streets and storm drainage) to which all providers are committed.
- 4.6-I-1 Establish an Urban Growth Boundary (UGB) to the year 2030, as shown on the General Plan Diagram that limits the extent of urban development and services within the San Ramon Planning Area. Amendments to the Urban Growth Boundary greater than 30 acres require City voter approval.
- 8.7-G-1 Encourage the continuation of appropriate agricultural activities within the City's Planning Area, while being cognizant that such uses may transition to non-agricultural uses in the future.
- 8.7-I-1 If Important Farmland is proposed to be converted to non-agricultural use, require evaluation to determine significance of conversion impacts. If the conversion is found to be significant, require mitigation to offset such impacts.
- 8.7-I-2 Process development applications involving land encumbered by Williamson Act contracts only if three years or less prior to expiration/cancellation of the contract.
- 8.7-I-3 Minimize land use conflicts between agricultural and urban uses through site planning techniques.
- 8.7-I-4 Explore opportunities with East Bay Regional Park District (EBRPD), other government agencies, or private organizations to set aside and manage undeveloped lands as open space that are contiguous and sufficient in size to allow continued agricultural uses.
- 8.7-I-5 Designate land for rural conservation along the west side of Bollinger Canyon Road near the Las Trampas Regional Wilderness in order to preserve visual open space, to provide opportunities for horse-keeping and part-time ranching, and to maintain compatibility with adjoining agricultural uses.

6.5 - Emergency Preparedness

In the event of a wildfire, flood, or some other emergency, the City has taken steps to include emergency management procedures. The General Plan contains the following policies that would ensure that the City is well prepared for an emergency:

GENERAL PLAN POLICIES

- 9.1-G-1 Maintain the City's Emergency Operations Plan as the guide for emergency management in San Ramon.
- 9.1-I-1 Maintain and update the City's Emergency Operations Plan, as required by State and Federal laws, to minimize the risk to life and property of seismic and geologic hazards, hazardous materials and waste, and fire.
- 9.1-I-2 In collaboration with other agencies, maintain and disseminate emergency preparedness information.
- 9.1-I-3 Coordinate regular exercises and drills with emergency organizations. Provide training opportunities for all City staff to be adequately trained to State and Federal requirements.

The City participates in a Joint Powers Agreement (JPA) Citizen Corps Council program as encouraged by Federal Emergency Management Agency (FEMA) in collaboration with the San Ramon Valley Fire Protection District, San Ramon Valley Unified School District, and Town of Danville. The joint program conducts an annual emergency preparedness community fair, provides a Community Emergency Response Team (CERT) program, and conducts regular trainings and drills with interested residents and businesses. Public education and emergency preparedness information are shared between the agencies for common dissemination to the public, consistent with the "be ready" federal and state campaigns.

6.6 - Other Potential Impacts

Other climate change impacts include sea level rise and energy supply disruptions. Sea level rise would not impact San Ramon, as the City is located at least 300 feet above sea level. According to Moser et al. (2009), sea levels are likely to increase by up to 35 inches by the year 2100, depending on the magnitude of climate warming.

Climate change could increase extreme conditions such as heat waves. Higher temperatures could increase the frequency, duration, and intensity of conditions favorable to ozone formation by 75 to 85 percent (California Energy Commission 2006). More severe heat could result in a greater risk of people suffering from death from dehydration, heat stroke/exhaustion, heart attack, stroke, and respiratory distress. Most development includes the installation of air conditioning units, which would help to prevent severe, heat-related illness, but which results in additional energy use. Increased heat could cause energy demand increases and possible supply disruptions. Energy efficiency measures as discussed in the Climate Action Strategies section would help to offset increased energy usage and decrease potential heat related health risks.

6.7 - CAP Implementation Strategies

The following CAP Implementation Actions will help to implement the General Plan policies listed above.

CAP Implementation Strategy		Timetable	Responsibility
ADAPT-1	New projects shall assess the significance of increased wildfires, decreased water supply, changes in agriculture, increased flooding, and any other potential impacts from climate change in California Environmental Quality Act documents.	Ongoing	Planning Services
ADAPT-2	Create an outreach and/or rebate program that encourages businesses and residents to construct graywater and rainwater collection systems on their properties. A minimum of one City employee should have appropriate training regarding these systems to help interested parties develop systems (see City of Santa Rosa for example).	Before December 31, 2011	Public Services/ Engineering Services
ADAPT-3	Developers shall provide an assessment of a project's potential impacts on the local and subregional storm drainage systems, so that the City can determine appropriate mitigation to ensure that system capacity and peak flow restrictions are not exceeded.	Ongoing	Engineering Services
ADAPT-4	To reduce flood peaks, reduce sedimentation, temporarily store floodwaters, recharge aquifers and restore environmental flows, flood management should be integrated with watershed management on open space, agricultural, wildlife areas, and other low-density lands.	Ongoing	Engineering Services
ADAPT-5	Low-impact development techniques should be used in new development to infiltrate and store runoff.	Ongoing	Engineering Services Planning Services

The following targets will help to keep the General Plan policy implementation.

Targets		Responsibility
1	Increase the number of structures in the City with graywater and/or rainwater collection systems by 15% from 2008 levels by the year 2020.	Public Services Engineering Services Planning Services
2	Increase recycled water use by 15% from 2008 levels by the year 2015. Increase recycled water use by 30% from 2008 levels by the year 2020.	Public Services Engineering Services Planning Services

SECTION 7: GLOSSARY OF TERMS AND ACRONYMS

$\mu\text{g}/\text{m}^3$	micrograms per cubic meter
AB	Assembly Bill
BAAQMD	Bay Area Air Quality Management District
CARB	The California Air Resources Board: A part of the California Environmental Protection Agency, an organization that reports directly to the Governor's Office in the Executive Branch of California State Government. The mission of the CARB is to promote and protect public health, welfare, and ecological resources through the effective and efficient reduction of air pollutants while recognizing and considering the effects on the economy of the State.
CEQA	The California Environmental Quality Act: A California statute passed in 1970 to institute a statewide policy of environmental protection.
CO_2	Carbon dioxide: A naturally occurring gas and a by-product of burning fossil fuels and biomass other industrial processes. It is the reference gas against which other greenhouse gases are measured and therefore has a global warming potential of 1.
CH_4	Methane: An extremely effective absorber of radiation with a global warming potential of 21, though its atmospheric concentration is less than carbon dioxide and its lifetime in the atmosphere is brief (10 to 12 years).
C_2F_6	Hexafluoroethane: A colorless, odorless gas that is relatively inert. The mixture is nonflammable and nontoxic, though asphyxiation may occur because of displacement of oxygen.
CAP	Climate Action Plan: A description of the policies and measures that a local government will take to reduce greenhouse gas emissions and achieve its emissions reduction targets. Most plans include a timeline, a description of financing mechanisms, and an assignment of responsibility to departments and staff. In addition to direct greenhouse gas reduction measures, most plans also incorporate public awareness and education efforts.
CAPCOA	California Air Pollution Control Officers Association: A non-profit association of the air pollution control officers from all 35 local air quality agencies throughout California. CAPCOA was formed in 1976 to promote clean air and to provide a forum for sharing of knowledge, experience, and information among the air quality regulatory agencies around the State. The Association promotes unity and efficiency, and strives to encourage consistency in methods and practices of air pollution control. It is an organization of air quality professionals—leaders in their field.

Climate Change	The statistically significant variation either in the mean state of the climate or in its variability, persisting for an extended period (typically decades or longer). Climate change may be due to natural internal processes or external forcings, or to persistent anthropogenic changes in the composition of the atmosphere or in land use.
Complete Streets	A concept required by Assembly Bill 1358, the California Complete Streets Act of 2008. The law requires cities and counties to include complete streets policies as part of their general plans so that roadways are designed to safely accommodate all users, including bicyclists, pedestrians, transit riders, children, older people, and disabled people, as well as motorists.
EMFAC	EMission FACtors Model: A model used to calculate emission rates from all motor vehicles, such as passenger cars to heavy-duty trucks, operating on highways, freeways, and local roads in California. EMFAC2007 is the most recent version of this model.
EPA	United States Environmental Protection Agency. The mission of EPA is to protect human health and to safeguard the natural environment—air, water and land—upon which life depends.
Greenhouse Gas	A gas that absorbs infrared radiation in the atmosphere. Greenhouse gases as defined by AB 32 include carbon dioxide (CO ₂), methane (CH ₄), nitrous oxide (N ₂ O), hydrofluorocarbons (HFC), perfluorocarbons (PFC), and sulfur hexafluoride (SF ₆).
HFC	Hydrofluorocarbons: Synthetic chemicals that are used as a substitute for CFCs.
ICLEI	International Council for Local Environmental Initiatives: A membership association of local governments committed to advancing climate protection and sustainable development.
IPCC	Intergovernmental Panel on Climate Change: The leading body for the assessment of climate change, established by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) to provide the world with a clear scientific view on the current state of climate change and its potential environmental and socio-economic consequences.
LCFS	Low Carbon Fuel Standard: Executive Order S-1-07, issued on January 18, 2007, which calls for a reduction of at least 10 percent in the carbon intensity of California's transportation fuels by 2020.
LED	Light Emitting Diode: An electronic device that emits light when an electrical current is passed through it.
LEED	Leadership in Energy and Environmental Design: An internationally recognized green building certification system, providing third-party verification that a building or community was designed and built using strategies aimed at improving performance across all the metrics that

	matter most: energy savings, water efficiency, CO ₂ emissions reduction, improved indoor environmental quality, and stewardship of resources and sensitivity to their impacts.
MTCO ₂ e	Metric tons of carbon dioxide equivalents: a measure of greenhouse gas emissions
MMTCO ₂ e	Million metric tons of carbon dioxide equivalents: a measure of greenhouse gas emissions
N ₂ O	Nitrous oxide. Also known as laughing gas; a colorless greenhouse gas.
NO _x	Nitrogen oxides (oxides of nitrogen): Compounds including a variety of gases including nitric oxide and nitrogen dioxide. NO _x are primarily created from the combustion process and are a major contributor to smog and acid rain formation and secondary particulate formation.
PFC	Perfluorocarbon: Two common PFCs are tetrafluoromethane (CF ₄) and hexafluoroethane (C ₂ F ₆).
ROG	Reactive organic gas: A photochemically reactive chemical gas composed of non-methane hydrocarbons that may contribute to the formation of smog. ROG is sometimes referred to as volatile organic compounds (VOCs).
SB	Senate Bill
SF ₆	Sulfur hexafluoride: An inorganic, odorless, colorless, nontoxic, nonflammable gas. It also has the highest global warming potential of any gas evaluated (23,900).
SP	Service Population: The combined total of residents and employment in a community. The BAAQMD developed an efficiency-based metric for CAPs that uses the community greenhouse gas inventory divided by the service population to determine if a CAP is consistent with state greenhouse gas reduction targets. Plans demonstrating an efficiency of 6.6 metric tons CO ₂ e per service population or lower are considered to have less than significant cumulative greenhouse gas impacts.
TDM	Transportation Demand Management is the application of strategies and policies to reduce travel demand through reduction in single-occupancy private vehicle use.
URBEMIS	URBan EMISsions Model: URBEMIS 2007 version 9.2.4 estimates air pollution emissions, including the greenhouse gas CO ₂ , from a wide variety of land use projects.

SECTION 8: DOCUMENT REFERENCES

Document References

Bay Area Air Quality Management District (BAAQMD). May 2011. California Environmental Quality Act Air Quality Guidelines.

CalAdapt Google Earth Project. 2010. Potential Changes in Wildfire Regimes in California. Website: www.climatechange.ca.gov/visualization/fire.html. Accessed March 16, 2010.

California Air Pollution Control Officers Association (CAPCOA). August 2010. Quantifying Greenhouse Gas Mitigation Measures. Website: www.capcoa.org.

California Air Pollution Control Officers Association (CAPCOA). January 2008. CEQA & Climate Change, Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to the California Environmental Quality Act. Website: www.capcoa.org.

California Air Resources Board. October 28, 2010. Forecast by Scoping Plan Categories. Website: <http://www.arb.ca.gov/cc/inventory/data/forecast.htm>. Accessed February 24, 2011.

California Air Resources Board. October 28, 2010. Scoping Plan Measures Implementation Timeline. Accessed February 24, 2011. Website: www.arb.ca.gov/cc/scopingplan/sp_measures_implementation_timeline.pdf.

California Air Resources Board. May 12, 2010. California Greenhouse Gas Inventory for 2000-2008 – by Category as Defined in the Scoping Plan. Website: http://www.arb.ca.gov/cc/inventory/data/tables/ghg_inventory_scopingplan_00-08_2010-05-12.pdf. Accessed February 24, 2011.

California Air Resources Board. December 2008. Climate Change Scoping Plan, a framework for change. Accessed March 24, 2010. Website: www.arb.ca.gov/cc/scopingplan/document/scopingplandocument.htm. California Climate Action Registry. January 2009. General Reporting Protocol, Version 3.1. Website: www.climateregistry.org/resources/docs/protocols/grp/GRP_3.1_January2009.pdf.

California Department of Forestry and Fire Protection. 2010. Number of Fires and Acres. Website: http://cdfdata.fire.ca.gov/incidents/incidents_stats?year=2009. Accessed March 16, 2010.

California Energy Commission, California Climate Change Center. July 2006. Our Changing Climate, Accessing the Risks to California. CEC-500-2006-077. Website: www.energy.ca.gov/2006publications/CEC-500-2006-077/CEC-500-2006-077.PDF.

California Natural Resource Agency (CNRA). 2009. 2009 Climate Change Adaptation Strategy. Website: <http://www.energy.ca.gov/2009publications/CNRA-1000-2009-027/CNRA-1000-2009-027-F.PDF>. Accessed May 4, 2010.

- Department of Water Resources, the Resources Agency, State of California. Managing an Uncertain Future, Climate Change Adaptation Strategies for California's Water. October 2008. Website: www.water.ca.gov/climatechange/docs/ClimateChangeWhitePaper.pdf.
- Dublin San Ramon Services District. December 2008. Report of Operations. Website: http://www.derwa.org/pdf/DERWA_2008Report_of_OperationsFINAL.pdf.
- East Bay Municipal Utility District. October 2009. Water Supply Management Program 2040 Plan. Website: www.ebmud.com/sites/default/files/pdfs/WSMP-2040-Main-Document-October-2009.pdf.
- Moser, Susie, Guido Franco, Sarah Pittiglio, Wendy Chou, Dan Cayan. 2009. The Future Is Now: An Update on Climate Change Science Impacts and Response Options for California. California Energy Commission, PIER Energy-Related Environmental Research Program. CEC-500-2008-071. Website: www.energy.ca.gov/2008publications/CEC-500-2008-071/CEC-500-2008-071.PDF. Accessed March 16, 2010.
- New Hampshire Department of Environmental Services. Innovative Land Use Planning Techniques: A Handbook for Sustainable Development. October 2008. Website: http://des.nh.gov/organization/divisions/water/wmb/repp/innovative_land_use.htm. Accessed March 24, 2010.
- Pacific Gas and Electric Company. Emerging Technologies Program. LED Street Lighting, Phase III Continuation. Oakland, CA. November 2008.
- United States Environmental Protection Agency: EPA. Climate Change – Science, State of Knowledge. Website: <http://www.epa.gov/climatechange/science/stateofknowledge.html>. Last updated September 28, 2009.
- Victoria Transport Policy Institute. TDM Encyclopedia. Website: <http://www.vtpi.org/tdm/>. Accessed March 22, 2010.
- Westerling, A.L, B.P. Bryant, H.K. Priesler, H.G. Hidalgo, T. Das, and S.R. Shrestha. California Climate Change Center. Climate Change, Growth and California Wildfire. Website: www.energy.ca.gov/2009publications/CEC-500-2009-046/CEC-500-2009-046-F.PDF. Accessed March 16, 2010.

Figure and Photograph References

- Cover: Large photo by Grant Gruber, Michael Brandman Associates, March 23, 2010. From left to right: Iron Horse Hills Trail from www.ironhorsecorridor.org; Ride the Bus from The County Connection, www.cccta.org; Solar Power in San Ramon from www.skypowersystems.com; Muirlands at Windemere from www.rent.com; Houses in San Ramon from www.ci.san-ramon.ca.us.
- Section 2.4, Global Atmospheric Concentrations of CO₂: UNEP/GRID-Arendal. Global atmospheric concentration of CO₂. UNEP/GRID-Arendal Maps and Graphics Library. 2000. Website: <http://maps.grida.no/go/graphic/global-atmospheric-concentration-of-co2>. Accessed March 12, 2010.

- Section 2.4, The Greenhouse Gas Effect: UNEP/GRID-Arendal. Greenhouse effect. UNEP/GRID-Arendal Maps and Graphics Library. 2002. Website: <http://maps.grida.no/go/graphic/greenhouse-effect>. Accessed March 12, 2010.
- Section 2.4, California Statewide 2006 Emissions: Prepared by Michael Brandman Associates, data from California Air Resources Board. California Greenhouse Gas Inventory for 2000-2006 by Category as Defined in the Scoping Plan. Last updated March 13, 2009.
- Section 2.4, Contra Costa County 2007 Emissions: Prepared by Michael Brandman Associates, data from Bay Area Air Quality Management District. Source Inventory of Bay Area Greenhouse Gas Emissions. December 2008 (Table M). Note that the figure, "Transportation," contains off-road equipment and transportation sources. Website: http://hank.baaqmd.gov/pln/documents/regionalinventory2007_003_000_000_000.pdf.
- Section 4.2, City Center Aerial View Illustration. City of San Ramon. City Center Project, Website: <http://www.ci.san-ramon.ca.us/citycenter/images/citycenter.pdf>, accessed March 30, 2010.
- Section 4.2, City Center Conceptual Illustration, City of San Ramon, City Center Project. Website: <http://www.ci.san-ramon.ca.us/citycenter/images/citycenter.pdf>. Accessed March 30, 2010.
- Section 4.2, Vertical Mixed Use Photo, City of San Ramon, North Camino Ramon Specific Plan Concepts Workshop Presentation, December 1, 2009.
- Section 4.2, Multi-Modal Transit Center Photo, City of San Ramon, North Camino Ramon Specific Plan Concepts Workshop Presentation, December 1, 2009.
- Section 4.2, Bus at Multi-Modal Transit Center Photo, Michael Brandman Associates, March 30, 2010.
- Section 4.2, Pedestrian-Oriented Commercial Development Photo, San Ramon Marketplace Shopping Center, Michael Brandman Associates, March 30, 2010.
- Section 4.2, High Density Employment Center Photo, Bishop Ranch, Michael Brandman Associates, 2010.
- Section 4.2, Bishop Ranch Park Photo, East Bay Regional Parks District, website: <http://www.ebparks.org/parks/bishop>. Accessed March 30, 2010.
- Section 4.3, Pedestrian Connections with Housing, Park, and Commercial Photo, Michael Brandman Associates, 2006.
- Section 4.3 Bicycle and Pedestrian Path Photo, City of San Ramon, North Camino Ramon Specific Plan Concepts Workshop Presentation, December 1, 2009.
- Section 4.3 Park and Ride Lot Photo, California Department of Transportation, Website: http://www.dot.ca.gov/dist4/highwayops/parkandride/lotphotospdf/bollinger_photo.pdf. Accessed March 30, 2010.

Section 5, Wildland Fire Photograph: San Ramon Valley Fire Protection District. Wildland 2004-2007 Photo Gallery. Website: www.firedepartment.org.

Section 5, San Ramon Wildland Urban Interface Area: Photograph by Matt Jalbert. Website: www.exuberance.com. Accessed March 18, 2010.

Section 5, Grazing Land: East Bay Municipal Parks District. Website: <http://www.ebparks.org/parks/sycamore>. Accessed on March 30, 2010.

Section 5, How Climate Change Impacts a Watershed: Department of Water Resources, the Resources Agency, State of California. Managing an Uncertain Future, Climate Change Adaptation Strategies for California's Water. October 2008. Website: www.water.ca.gov/climatechange/docs/ClimateChangeWhitePaper.pdf.

Appendix A: Detailed Emission Inventory

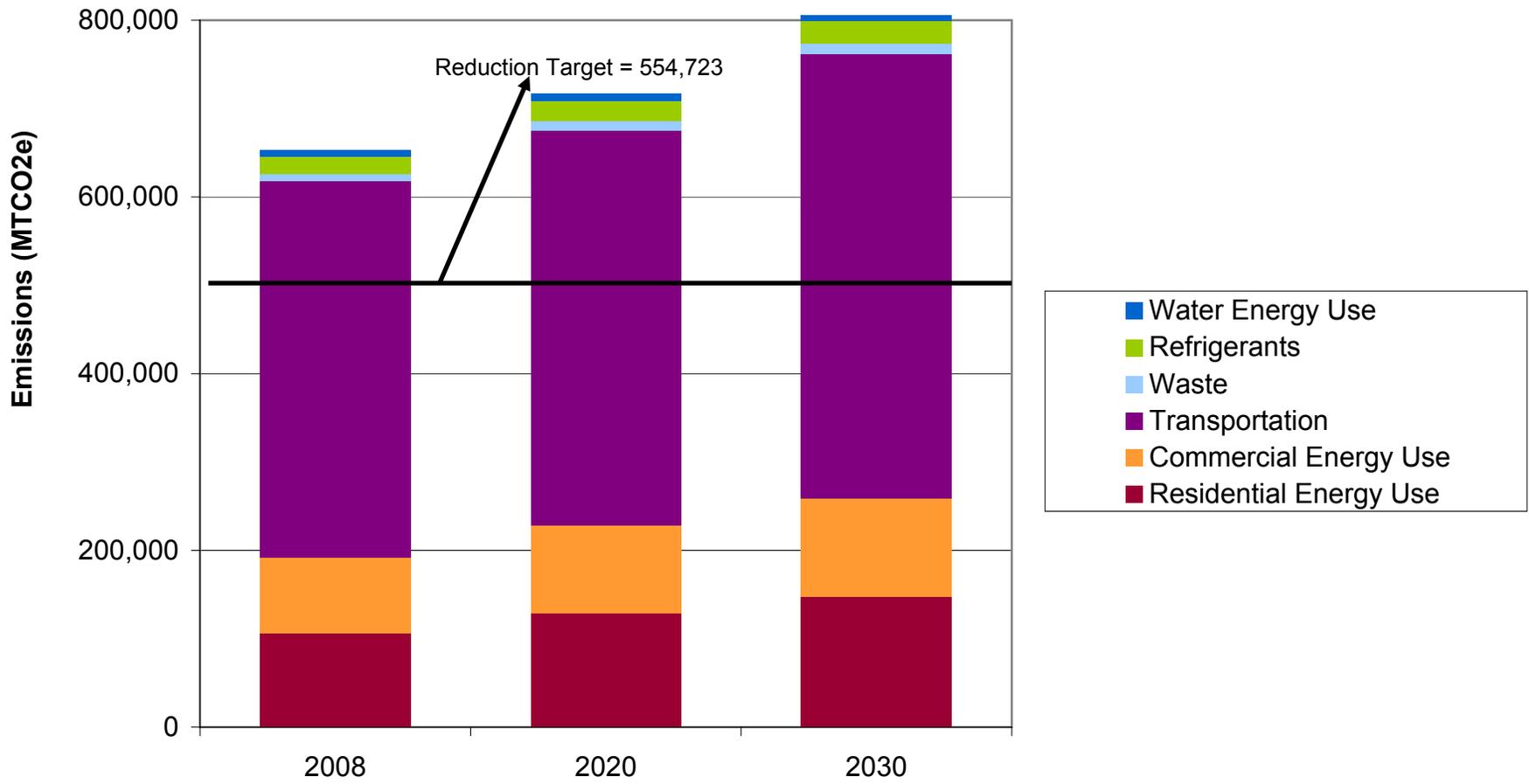
Results

Community: City of San Ramon, Business as Usual

Prepared by Michael Brandman Associates

6/30/2011

Emissions (tons CO2e) from CACP Output	Percent Emissions					
	2008	2020	2030	2008	2020	2030
Electricity Use: Residential	49,128	59,465	68,079	6.8	7.5	7.6
Electricity Use: Commercial	57,346	66,971	74,991	8.0	8.5	8.4
Natural Gas Use: Residential	68,178	82,523	94,477	9.5	10.4	10.6
Natural Gas Use: Commercial	36,355	42,456	47,541	5.1	5.4	5.3
Transportation: Automobiles, Light Duty Trucks	399,530	415,642	467,461	55.5	52.6	52.4
Transportation: Heavy Duty Diesel Trucks	70,224	77,252	86,883	9.8	9.8	9.7
Waste	9,768	11,823	13,536	1.4	1.5	1.5
Refrigerants	21,058	24,618	27,595	2.9	3.1	3.1
Energy Use: Water	7,786	9,421	10,788	1.1	1.2	1.2
Total	719,373	790,171	891,351	100.0	100.0	100.0
Emissions (metric tons CO2e)						
Electricity Use: Residential	44,569	53,947	61,761	6.8	7.5	7.6
Electricity Use: Commercial	52,024	60,756	68,032	8.0	8.5	8.4
Natural Gas Use: Residential	61,851	74,865	85,710	9.5	10.4	10.6
Natural Gas Use: Commercial	32,981	38,516	43,129	5.1	5.4	5.3
Transportation: Automobiles, Light Duty Trucks	362,454	377,070	424,081	55.5	52.6	52.4
Transportation: Heavy Duty Diesel Trucks	63,707	70,083	78,820	9.8	9.8	9.7
Waste	8,862	10,726	12,280	1.4	1.5	1.5
Refrigerants	19,104	22,333	25,034	2.9	3.1	3.1
Energy Use: Water	7,063	8,547	9,787	1.1	1.2	1.2
Total	652,615	716,843	808,634	100.0	100.0	100.0
Increase from 2008		9.8%	23.9%			
Community Sector (metric tons CO2e)						
Residential Energy Use	106,420	128,812	147,471	16.3	18.0	18.2
Commercial Energy Use	85,005	99,272	111,161	13.0	13.8	13.7
Transportation	426,161	447,153	502,901	65.3	62.4	62.2
Waste	8,862	10,726	12,280	1.4	1.5	1.5
Refrigerants	19,104	22,333	25,034	2.9	3.1	3.1
Water Energy Use	7,063	8,547	9,787	1.1	1.2	1.2
Total	652,615	716,843	808,634	100.0	100.0	100.0
Population	66,413	80,386	92,031			
Employment	40,152	49,898	58,769			
Service Population	106,565	130,284	150,800			
Total emissions per capita	9.8	8.9	8.8			
Total emissions per service population	6.1	5.5	5.4			
15% below 2008 emissions	554,723					
Difference between 2008 and 2020 emissions	64,228					
Reductions from new development	9,634					
Reductions from statewide measures	187,096					
2020 community emissions with reductions	520,113					
2020 emissions with reductions/SP	4.0					



Summary of ICLEI Model Input Data

Community: City of San Ramon, Business as Usual

Prepared by Michael Brandman Associates

6/30/2011

Variable	2008	2020	2030
Population (San Ramon)	66,413	80,386	92,031
Residential Units	24,781	29,995	34,340
Percent increase from 2008		21%	39%
Non Residential Square Feet	16,436,441	19,195,132	21,494,041
Percent increase from 2008		17%	31%

CACP Tab	Group/Emission Source	Details	2008	2020	2030	
Residential	Residential	Electricity (tons CO2)	49,128	59,465	68,079	
		Natural Gas (tons CO2)	68,178	82,523	94,477	
Commercial	Commercial	Electricity (tons CO2)	57,346	66,971	74,991	
		Natural Gas (tons CO2)	36,355	42,456	47,541	
Transportation (vehicle miles)	Passenger/Light Duty, Gasoline	Passenger Cars Alt. Method	387,793,187	427,343,035	480,621,234	
		Light Trucks Alt. Method	274,275,545	302,248,074	339,930,291	
	Passenger/Light Duty, Diesel	Passenger Cars Alt. Method	1,410,157	1,553,975	1,747,714	
		Light Trucks Alt. Method	4,230,471	4,661,924	5,243,141	
	Heavy Duty, Gasoline	Heavy duty vehicles Alt. Method	14,101,570	15,539,747	17,477,136	
		Heavy Duty, Diesel	Heavy duty vehicles all MYs	23,267,591	25,640,582	28,837,274
Waste	Planning Area Waste	Amount of Waste (tons)	48,537	58,749	67,260	
		Waste Disposal Technology	Managed Landfill			
		Paper Products	21.0%	21.0%	21.0%	
		Food Waste	14.6%	14.6%	14.6%	
		Plant Debris	6.9%	6.9%	6.9%	
		Wood/Textiles	21.8%	21.8%	21.8%	
		Other	35.7%	35.7%	35.7%	
Other	Energy Use: Water Transport	Carbon Dioxide (tons)	7,751	9,382	10,741	
		Methane (tons)	0.32	0.39	0.45	
		Nitrous Oxide (tons)	0.09	0.10	0.12	
Other	Refrigerants	R-404A Blend (tons)	1.02	1.17	1.30	
		R-410A Blend (tons)	10.28	12.06	13.54	

Notes:

- CACP = ICLEI's Clean Air and Climate Protection Software 2009. Version 2.2.1b, April 2010.

- 2020 population, residential units, and non residential square feet interpolated from 2008 and 2030 values

- Electricity and natural gas for 2008 is from PG&E (see spreadsheet); note that PG&E reported emissions in metric tonnes of CO2e; for input into the model, the emissions were divided by 0.9072 to obtain tons.

- Electricity and natural gas for 2020 and 2030 are calculated as a percent increase in residential units or non residential square feet from 2008. For example, residential electricity for 2020 is the 2008 emissions plus the 2008 emissions multiplied by the percent increase in residential units (21%).

Vehicle Miles Traveled

Community: City of San Ramon, Business as Usual

Prepared by Michael Brandman Associates

6/30/2011

	2008	2020	2030
Passenger Vehicles Annual VMT	669,590,240	737,879,711	829,873,493
Percent increase HDT truck VMT	5.3%	5.3%	5.3%
HDT truck VMT	35,488,283	39,107,625	43,983,295
Total VMT	705,078,523	776,987,336	873,856,788

Percent of total

	EMFAC Output:	Adjusted:
Gasoline		
Automobiles	55.64%	55.0%
Light duty trucks	39.73%	38.9%
Heavy duty trucks	1.97%	2.0%
Diesel		
Automobiles	0.22%	0.2%
Light duty trucks	0.61%	0.6%
Heavy duty trucks	1.84%	3.3%
Total	100.00%	100.0%

VMT

Gasoline			
Automobiles	387,793,187	427,343,035	480,621,234
Light duty trucks	274,275,545	302,248,074	339,930,291
Heavy duty trucks	14,101,570	15,539,747	17,477,136
Diesel			-
Automobiles	1,410,157	1,553,975	1,747,714
Light duty trucks	4,230,471	4,661,924	5,243,141
Heavy duty trucks	23,267,591	25,640,582	28,837,274
Total	705,078,523	776,987,336	873,856,788

Notes:

VMT = vehicle miles traveled; HDT = heavy duty truck

- Source of passenger vehicle VMT: see next spreadsheet, "Vehicle Miles Traveled Analysis for Passenger Vehicles"

- Percent of total is based on percentages from EMFAC2007 (see other spreadsheet), Burden, Contra Costa Average. Obtained the percentage of each vehicle category for each year. Automobiles include LDA and MY. Light duty trucks include LDT-1, LDT-2, MDV. Heavy duty trucks include LHDT-1, LHDT-2, MHDT, HHDT, OBUS, SBUS, UB, and MH. Note that the EMFAC percentages were adjusted so that the heavy duty truck VMT matched the 5.3% heavy duty truck VMT

- Note: The California Department of Transportation California Public Road Data (<http://www.dot.ca.gov/hq/tsip/hpms/datalibrary.php>) indicates that San Ramon has 484,430 daily VMT (equates to 176,816,950 annual VMT), which is less than the VMT used for this analysis. The Department of Transportation data is only VMT on the roads within the City.

- Source for percent HDT Truck VMT (5.3%): MTC personal communication, February 18, 2011.

Vehicle Miles Traveled Analysis for Passenger Vehicles

Community: City of San Ramon, Business as Usual

Prepared by Michael Brandman Associates

Dated April 7, 2011

	2006	2008	2020	2030
San Ramon BASSTEGG HH VMT Share of Region	1.0111%	1.0153%	1.0409%	1.2348%
Current Model One 9 - County EMFAC				
Pass Vehs VMTs X 1,000	145,889.67	147,049.00	154,005.00	165,864.33
Percent increase from 2008			4.52%	11.34%
San Ramon Pass Vehs Daily VMT x 1000	1475.05	1493.04	1603.07	2048.09
Percent increase from 2008			6.86%	27.10%
Unadjusted San Ramon Pass Vehs				
Annual VMTs X 1,000	538,392.33	544,959.37	585,119.45	747,553.87
Percent increase from 2008			6.86%	27.10%
Interpolated 2020 Population using GP buildout	52975	66413	80386	92031
Percent increase from 2008			21.04%	38.57%
Percent increase from 2006		25.37%		
Unadjusted VMT per Capita	27.84	22.48	19.94	22.25
Annual VMT Increase 2008 to 2030		202,594.49		
Avg Annual VMT Increase		9208.84		

VMT Adjusted to Account for Model One Regional VMT and General Plan Population Projections

	2006	2008	2020	2030	2035
BASSTEGG Daily Household Regional VMT	95,456,619	96,473,992	107,665,093	115,335,031	119,170,000
BASSTEGG San Ramon Daily VMT	965,134	978,098	1,120,706	1,251,625	1,317,085
BASSTEGG Regional Population	7,159,008	7,234,834	8,068,922	8,709,705	9,030,096
BASSTEGG Population for San Ramon	53,084	53,972	63,744	72,859	77,416
GP Population for San Ramon	52,975	66,413	80,386	92,031	
Difference in Population GP vs. BASSTEGG	-109	12,441	16,642	19,172	
Per Capita Based on BASSTEGG Population	18.18	18.12	17.58	17.18	
BASSTEGG San Ramon VMT adj/w GP Population	963,152	1,203,551	1,413,295	1,580,983	
Annual VMT (daily x 365)	351,550,569	439,296,040	515,852,652	577,058,883	
Share of BASSTEGG Regional	1.0090%	1.2475%	1.3127%	1.3708%	
Current Model One Daily Regional Passenger VMT	145,889,670	147,049,000	154,005,000	165,864,330	
San Ramon Adjusted Daily HH VMT (Model One)	1,472,019	1,834,494	2,021,588	2,273,626	
San Ramon HH VMT Annual	537,286,958	669,590,240	737,879,711	829,873,493	
VMT Per Capita	27.8	27.6	25.1	24.7	
San Ramon Annual Truck VMT 5.3 %	28,476,209	35,488,283	39,107,625	43,983,295	
San Ramon Total HH and Trucks	565,763,167	705,078,523	776,987,336	873,856,788	
Increase from 2008			10.20%	23.94%	

- Note: In order to account for differences in BASSTEGG population and General Plan population, San Ramon's regional share of VMT was adjusted upward proportional with the difference in population. 2006 to 2008 increase was due to annexation of developed area. 2008 and 2030 are interpolated.

EMFAC Output and Analysis
Community: City of San Ramon, Business as Usual
 Prepared by Michael Brandman Associates
 2/23/2011

Title : San Ramon
 Version : Emfac2007 V2.3 Nov 1 2006
 Run Date : 2011/02/23 16:29:48
 Scen Year: 2008 -- All model years in the range 1965 to 2008 selected
 Season : Annual
 Area : Contra Costa County
 I/M Stat : Enhanced Interim (2005)
 Emissions: Tons Per Day

	LDA-NCAT	LDA-CAT	LDA-DSL	LDA-TOT	LDT1-NCAT	LDT1-CAT	LDT1-DSL	LDT1-TOT	LDT2-NCAT	LDT2-CAT	LDT2-DSL	LDT2-TOT	MDV-NCAT	MDV-CAT	MDV-DSL	MDV-TOT
Vehicles	8035	399570	1690	409295	2970	97685	4102	104757	1423	151347	449	153218	267	57365	236	57868
VMT/1000	136	12893	39	13068	67	3295	131	3494	32	5454	13	5500	6	2247	8	2260
Trips	32383	2522900	9498	2564790	12197	610378	25496	648072	5945	962390	2681	971016	1180	367584	1485	370250
%Vehicles	1.0%	51.0%	0.2%	52.3%	0.4%	12.5%	0.5%	13.4%	0.2%	19.3%	0.1%	19.6%	0.0%	7.3%	0.0%	7.4%
%VMT	0.5%	49.6%	0.1%	50.2%	0.3%	12.7%	0.5%	13.4%	0.1%	21.0%	0.0%	21.1%	0.0%	8.6%	0.0%	8.7%
%Trips	0.6%	49.0%	0.2%	49.8%	0.2%	11.8%	0.5%	12.6%	0.1%	18.7%	0.1%	18.8%	0.0%	7.1%	0.0%	7.2%

	LHDT1-NCAT	LHDT1-CAT	LHDT1-DSL	LHDT1-TOT	LHDT2-NCAT	LHDT2-CAT	LHDT2-DSL	LHDT2-TOT	MHDT-NCAT	MHDT-CAT	MHDT-DSL	MHDT-TOT	HHDT-NCAT	HHDT-CAT	HHDT-DSL	HHDT-TOT
Vehicles	47	5729	2366	8141	43	2290	1920	4253	188	1057	3831	5076	33	309	2631	2974
VMT/1000	1	259	108	369	1	83	74	158	1	43	214	258	0	29	405	434
Trips	1552	189434	29757	220743	1433	75731	24147	101311	8583	48293	107418	164294	1523	14122	13316	28961
%Vehicles	0.0%	0.7%	0.3%	1.0%	0.0%	0.3%	0.2%	0.5%	0.0%	0.1%	0.5%	0.6%	0.0%	0.0%	0.3%	0.4%
%VMT	0.0%	1.0%	0.3%	1.4%	0.0%	0.3%	0.2%	0.6%	0.0%	0.2%	0.8%	1.0%	0.0%	0.1%	1.6%	1.7%
%Trips	0.0%	3.7%	0.6%	4.3%	0.0%	1.5%	0.5%	2.0%	0.2%	0.9%	2.1%	3.2%	0.0%	0.3%	0.3%	0.6%

	OBUS-NCAT	OBUS-CAT	OBUS-DSL	OBUS-TOT	SBUS-NCAT	SBUS-CAT	SBUS-DSL	SBUS-TOT	UB-NCAT	UB-CAT	UB-DSL	UB-TOT	MH-NCAT	MH-CAT	MH-DSL	MH-TOT
Vehicles	7	234	112	353	21	126	2563	2710	0	107	305	412	346	4870	666	5882
VMT/1000	0	12	6	17	1	5	103	109	0	13	36	49	3	55	8	67
Trips	315	10699	3135	14149	84	504	10254	10842	0	428	1218	1646	35	487	67	588
%Vehicles	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.3%	0.0%	0.0%	0.0%	0.1%	0.0%	0.6%	0.1%	0.8%
%VMT	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.4%	0.4%	0.0%	0.0%	0.1%	0.2%	0.0%	0.2%	0.0%	0.3%
%Trips	0.0%	0.2%	0.1%	0.3%	0.0%	0.0%	0.2%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

	MCY-NCAT	MCY-CAT	MCY-DSL	MCY-TOT	ALL-TOT	Summary	2008	Vehicles
Vehicles	21761	6301	0	28063	783004	Gasoline		
VMT/1000	167	58	0	225	26007	Automobiles	55.6%	435667
Trips	43519	12601	0	56120	5152780	Light duty trucks	39.7%	311057
						Heavy duty trucks	2.0%	15407
%Vehicles	2.8%	0.8%	0.0%	3.6%		Diesel		0
%VMT	0.6%	0.2%	0.0%	0.9%		Automobiles	0.2%	1690
%Trips	0.8%	0.2%	0.0%	1.1%		Light duty trucks	0.6%	4787
						Heavy duty trucks	1.8%	14394
						Total	100.0%	783002

Solid Waste

Community: City of San Ramon, Business as Usual

Prepared by Michael Brandman Associates

2/23/2011

Waste Composition

Paper Products	21.0%
Food Waste	14.6%
Plant Debris	6.9%
Wood/Textiles	21.8%
Other	35.7%
Total	100.0%

	2008	2020	2030
Waste generated (tons)	48,537	58,749	67,260
Population	66,413	80,386	92,031
Waste (tons/person/year)	0.731		

Notes:

- Source of waste composition: City of San Ramon Public Services Division, 2009.
- Source of waste generated for 2008: CalRecycle. Disposal Reporting System (DRS): Jurisdiction Disposal and Alternative Daily Cover Tons by Facility.
www.calrecycle.ca.gov/LGCentral/Reports/DRS/Destination/JurDspFa.aspx
- Source of waste generated for 2020 and 2030: Based on waste per person in 2008.

Fugitive Refrigerant Operating Emissions

Community: City of San Ramon, Business as Usual

Prepared by Michael Brandman Associates

Prepared on 3/20/10

	<u>2008</u>	<u>2020</u>	<u>2030</u>
Residences	24,781	29,995	34,340
Commercial/industrial square feet	16,436,441	19,195,132	21,494,041

Type of Unit	Units	Capacity of Unit (pounds)	Annual Leak Rate in percent of capacity	Emissions (pounds/year)	Emissions (tons/year)	Percent Emissions
Year 2008						
Refrigeration: Residential	24,781	1	0.5%	124	0.06	1%
Refrigeration: Commercial/Ind.	164	50	14%	1151	0.58	5%
Refrigeration: Grocery Stores	18	200	21%	756	0.38	3%
A/C: Residential	24,781	1	10%	2478	1.24	11%
A/C: Commercial (Unitary/Small)	3,287	50	11%	18080	9.04	80%
Total				22589	11.29	
Year 2020						
Refrigeration: Residential	29,995	1	0.5%	150	0.07	1%
Refrigeration: Commercial/Ind.	192	50	14%	1344	0.67	5%
Refrigeration: Grocery Stores	20	200	21%	840	0.42	3%
A/C: Residential	29,995	1	10%	3000	1.50	11%
A/C: Commercial (Unitary/Small)	3,839	50	11%	21115	10.56	80%
Total				26448	13.22	
Year 2030						
Refrigeration: Residential	34,340	1	0.5%	172	0.09	1%
Refrigeration: Commercial/Ind.	215	50	14%	1505	0.75	5%
Refrigeration: Grocery Stores	22	200	21%	924	0.46	3%
A/C: Residential	34,340	1	10%	3434	1.72	12%
A/C: Commercial (Unitary/Small)	4,299	50	11%	23643	11.82	80%
Total				29678	14.84	

- 1) Source for general methodology and residential A/C leak rates: U.S. Environmental Protection Agency, Climate Leaders. May 2008. Direct HFC and PFC Emissions from Use of Refrigeration and Air Conditioning Equipment. EPA430-K-03-004. www.epa.gov/stateply/documents/resources/mfgrfg.pdf
- 2) A/C = air conditioning. Global warming potential for refrigeration assumed to be R404a; for A/C assumed to be R410a
- 3) Source for units: Refrigeration and A/C for residential units assumes that each unit has one of each. Grocery stores for 2008 determined by a Yahoo! Local search within San Ramon and are increased by 2 per year. Refrigeration units for commercial and industrial assumed one unit per 100,000 square feet. A/C for commercial/industrial assumes one unit per 5,000 square feet.
- 4) Annual leak rate (for all except residential A/C) in percent of capacity and capacity: California Air Resources Board. Public Hearing Notice and Related Material. Appendix B, California Facilities and Greenhouse Gas Emissions Inventory – High-Global Warming Potential Stationary Source Refrigerant Management Program www.arb.ca.gov/regact/2009/gwprmp09/refappb.pdf. Leak rates are from Table 8. Capacity is from information on pages 3 and 4. Refrigeration for grocery stores "large centralized system" and refrigeration for commercial/ind - small refrigeration condensing units

Fugitive Refrigerant Operating Emissions

Community: City of San Ramon, With Regulations

Prepared by Michael Brandman Associates

Prepared on 3/20/10

	<u>2008</u>	<u>2020</u>	<u>2030</u>
Residences	24,781	29,995	34,340
Commercial/industrial square feet	16,436,441	19,195,132	21,494,041

Type of Unit	Units	Capacity of Unit (pounds)	Annual Leak Rate in percent of capacity	Emissions (pounds/year)	Emissions (tons/year)	Percent Emissions
Year 2008						
Refrigeration: Residential	24,781	1	0.5%	124	0.06	1%
Refrigeration: Commercial/Ind.	164	50	14%	1151	0.58	5%
Refrigeration: Grocery Stores	18	200	21%	756	0.38	3%
A/C: Residential	24,781	1	10%	2478	1.24	11%
A/C: Commercial (Unitary/Small)	3,287	50	11%	18080	9.04	80%
Total				22589	11.29	
Year 2020						
Refrigeration: Residential	29,995	1	0.5%	150	0.07	1%
Refrigeration: Commercial/Ind.	192	50	5%	480	0.24	4%
Refrigeration: Grocery Stores	20	200	10%	400	0.20	3%
A/C: Residential	29,995	1	10%	3000	1.50	22%
A/C: Commercial (Unitary/Small)	3,839	50	5%	9598	4.80	70%
Total with Reductions				13627	6.81	
Business as Usual					13.22	
Percent Reduction					48.5%	
Year 2030						
Refrigeration: Residential	34,340	1	0.5%	172	0.09	1%
Refrigeration: Commercial/Ind.	215	50	5%	537	0.27	4%
Refrigeration: Grocery Stores	22	200	10%	440	0.22	3%
A/C: Residential	34,340	1	10%	3434	1.72	22%
A/C: Commercial (Unitary/Small)	4,299	50	5%	10747	5.37	70%
Total				15330	7.67	

Note: This scenario, "with regulations," is the same as the business as usual case except that the annual leak rates for 2020 and 2030 have been reduced pursuant to the information in Table 8 from the document: California Air Resources Board. Public Hearing Notice and Related Material. Appendix B, California Facilities and Greenhouse Gas Emissions Inventory – High-Global Warming Potential Stationary Source Refrigerant Management Program www.arb.ca.gov/regact/2009/gwprmp09/refappb.pdf.

Water Conveyance, Treatment, Distribution

Community: City of San Ramon, Business as Usual

Prepared by Michael Brandman Associates

Prepared on 3/19/10

Electricity Requirements in Northern California

	kWh per million gallons
Water Supply, Conveyance	2,117
Water Treatment	111
Water Distribution	1,272
Wastewater Treatment	<u>1,911</u>
<i>Total</i>	<i>5,411</i>

Year 2008 Assumptions

Water Usage (gallons/day)	10,840,000
Water Usage (million gallons/year)	3957
Energy Usage (kWh)	21,409,163
Energy Usage (MWh)	21,409

Year 2008 Emissions

Greenhouse Gas	Electricity Emission Factor (pounds per MWh)	2008 Emissions (pounds/year)	2008 Emissions (tons/year)	2008 Per Capita Emissions
Carbon dioxide	724.12	15,502,803	7,751	0.12
Methane	0.0302	646.56	0.323	0.0000049
Nitrous oxide	0.0081	173.41	0.087	0.0000013

Emissions Based on Per Capita Emissions in 2008

Year	2008	2020	2030
Population	66413	80,386	92031
Carbon Dioxide Emissions	7751	9382	10741
Methane	0.323	0.391	0.448
Nitrous Oxide	0.087	0.105	0.120

Source for electricity emission factor:

California Climate Action Registry. General Reporting Protocol. Reporting Entity-Wide Greenhouse Gas Emissions. Version 3.1, January 2009. Table C.2.

www.climateregistry.org/resources/docs/protocols/grp/GRP_3.1_January2009.pdf

Source for electricity requirements:

Navigant Consulting, Inc. 2006. Refining Estimates of Water-Related Energy Use in California. California Energy Commission, PIER Industrial/Agricultural/Water End Use Energy Efficiency Program. CEC-500-2006-118. www.energy.ca.gov/pier/project_reports/CEC-500-2006-118.html

Source for 2008 and 2030 population estimates: City of San Ramon General Plan (2010). Year 2020 is interpolated from that data.

Source for water usage: City of San Ramon General Plan (2010).

RATE DATA ANALYSIS: DR3712 ELECTRIC GHG SUMMARY FOR SAN RAMON

Provided by: PG&E

TOTCITY	YEAR	CATEGORY	RES ELEC AVG(KWH)	RES ELEC USE(KWH)	RES ELEC CO2(metric tonnes)	RES ELEC CLIM USE(KWH)	RES ELEC CLIM(lbs)
SAN RAMON	2008	NONGOVENT	606	187,477,829	44,561	661,562	346,658
SAN RAMON	2008 (3)	COUNTY					
SAN RAMON	2008 (4)	CITY	337	32,396	8		
SAN RAMON	2008 (5)	DISTRICT					
Total				187,510,225	44,569		

TOTCITY	YEAR	CATEGORY	COM ELEC AVG(KWH)	COM ELEC USE(KWH)	COM ELEC CO2(metric tonnes)	COM ELEC CLIM USE(KWH)	COM ELEC CLIM(lbs)
SAN RAMON	2008	NONGOVENT	9,169	189,533,922	45,049	4,030,578	2,112,023
SAN RAMON	2008 (3)	COUNTY	13,093	438,601	104		
SAN RAMON	2008 (4)	CITY	4,446	14,165,908	3,367		
SAN RAMON	2008 (5)	DISTRICT	21,726	14,740,321	3,504		
Total				218,878,752	52,024		

RATE DATA ANALYSIS: DR3712 GAS GHG SUMMARY FOR SAN RAMON

Provided by: PG&E

TOTCITY	YEAR	CATEGORY	RES GAS AVG(THM)	RES GAS USE(THM)	RES GAS CO2(metric tonnes)	RES GAS CLIM USE(THM)	RES GAS CLIM(lbs)
SAN RAMON	2008	NONGOVENT	41	11,654,357	61,851	37,601	505,583
SAN RAMON	2008 (3)	COUNTY					
SAN RAMON	2008 (4)	CITY					
SAN RAMON	2008 (5)	DISTRICT					

TOTCITY	YEAR	CATEGORY	COM GAS AVG(THM)	COM GAS USE(THM)	COM GAS CO2(metric tonnes)	COM GAS CLIM USE(THM)	COM GAS CLIM(lbs)
SAN RAMON	2008	NONGOVENT	741	5,735,076	30,437	127,328	1,712,052
SAN RAMON	2008 (3)	COUNTY	74	891	5		
SAN RAMON	2008 (4)	CITY	1,109	177,583	942		
SAN RAMON	2008 (5)	DISTRICT	1,124	300,979	1,597		
Total				6,214,529	32,981		

Jurisdiction Disposal By Facility

With Reported Alternative Daily Cover (ADC) and Alternative Intermediate Cover (AIC)

Disposal during 2008 for San Ramon

Destination Facility	SWISNo	Qtr	Instate Ton	Transform Ton	Export Ton	Total ADC	Total AIC
Acme Landfill	07-AA-0002		250			71	
Altamont Landfill & Resource Recv`ry	01-AA-0009		1,168			7,565	
Azusa Land Reclamation Co. Landfill	19-AA-0013		21				
Bakersfield Metropolitan (Bena) SLF	15-AA-0273		1				
Foothill Sanitary Landfill	39-AA-0004		1				
Guadalupe Sanitary Landfill	43-AN-0015						
John Smith Road Class III Landfill	35-AA-0001		50				
Keller Canyon Landfill	07-AA-0032		876			66	
Kettleman Hills - B18 Nonhaz Codisposal	16-AA-0023		14				
Newby Island Sanitary Landfill	43-AN-0003		12				
North County Landfill	39-AA-0022						
Potrero Hills Landfill	48-AA-0075		1,399			12	
Recology Hay Road	48-AA-0002		3				
Recology Pacheco Pass	43-AA-0004						
Redwood Sanitary Landfill	21-AA-0001		20			6	
Simi Valley Landfill & Recycling Center	56-AA-0007		1				
Tri Cities Recycling & Disposal Fac	01-AA-0008					108	
Vasco Road Sanitary Landfill	01-AA-0010		36,499			222	
Zanker Material Processing Facility	43-AN-0001		72			72	
Zanker Road Class III Landfill	43-AN-0007		26			2	
Yearly Totals:			40,413.34			8,124.17	

Notes:

1. Disposal tonnage is subject to change due to revisions. Report is based upon information provided by County disposal reports.
2. AIC information was not collected prior to 2006.

Community Greenhouse Gas Emissions in 2008 Detailed Report

	CO ₂ (tons)	N ₂ O (lbs)	CH ₄ (lbs)	Equiv CO ₂ (tons)	(%)	Energy (MMBtu)
Residential						
<i>Electricity</i>						
Carbon Dioxide	49,128	0	0	49,128	6.8	0
<i>Subtotal Electricity</i>	49,128	0	0	49,128	6.8	0
<i>Natural Gas</i>						
Carbon Dioxide	68,178	0	0	68,178	9.5	0
<i>Subtotal Natural Gas</i>	68,178	0	0	68,178	9.5	0
Subtotal Residential	117,306	0	0	117,306	16.3	0
Commercial						
<i>Electricity</i>						
Carbon Dioxide	57,346	0	0	57,346	8.0	0
<i>Subtotal Electricity</i>	57,346	0	0	57,346	8.0	0
<i>Natural Gas</i>						
Carbon Dioxide	36,355	0	0	36,355	5.1	0
<i>Subtotal Natural Gas</i>	36,355	0	0	36,355	5.1	0
Subtotal Commercial	93,701	0	0	93,701	13.0	0
Transportation						
<i>Heavy Duty</i>						
Diesel	41,477	246	262	41,518	5.8	514,389
Gasoline	28,168	3,205	3,840	28,705	4.0	360,523
<i>Subtotal Heavy Duty</i>	69,646	3,451	4,101	70,224	9.8	874,912

Community Greenhouse Gas Emissions in 2008 Detailed Report

	CO ₂ (tons)	N ₂ O (lbs)	CH ₄ (lbs)	Equiv CO ₂ (tons) (%)		Energy (MMBtu)
<i>Passenger/Light Duty</i>						
Diesel	3,231	17	11	3,234	0.4	40,073
Gasoline	387,891	51,324	42,790	396,296	55.1	4,964,576
<i>Subtotal Passenger/Light Duty</i>	391,123	51,341	42,801	399,530	55.5	5,004,649
Subtotal Transportation	460,768	54,792	46,902	469,753	65.3	5,879,561
Waste						
<i>Planning Area Waste</i>						
				<i>Disposal Method - Managed Landfill</i>		
Paper Products	0	0	518,924	5,449	0.8	
Food Waste	0	0	204,213	2,144	0.3	
Plant Debris	0	0	54,690	574	0.1	
Wood or Textiles	0	0	152,460	1,601	0.2	
<i>Subtotal Planning Area Waste</i>	0	0	930,287	9,768	1.4	
Subtotal Waste	0	0	930,287	9,768	1.4	
Other						
<i>Energy Use: Water Transport</i>						
Carbon Dioxide	7,751	0	0	7,751	1.1	
Methane	0	0	640	7	0.0	
Nitrous Oxide	0	180	0	28	0.0	
<i>Subtotal Energy Use: Water T</i>	7,751	180	640	7,786	1.1	
<i>Refrigerants</i>						
R-404A Blend	0	0	0	3,325	0.5	
R-410A Blend	0	0	0	17,733	2.5	
<i>Subtotal Refrigerants</i>	0	0	0	21,058	2.9	
Subtotal Other	7,751	180	640	28,844	4.0	
Total	679,526	54,972	977,830	719,372	100.0	5,879,561

Community Greenhouse Gas Emissions in 2020

Detailed Report

	CO ₂ (tons)	N ₂ O (lbs)	CH ₄ (lbs)	Equiv CO ₂ (tons)	(%)	Energy (MMBtu)
Residential						
San Ramon, California						
<i>Electricity</i>						
Carbon Dioxide	59,465	0	0	59,465	7.5	0
<i>Subtotal Electricity</i>	59,465	0	0	59,465	7.5	0
<i>Natural Gas</i>						
Carbon Dioxide	82,523	0	0	82,523	10.4	0
<i>Subtotal Natural Gas</i>	82,523	0	0	82,523	10.4	0
Subtotal Residential	141,988	0	0	141,988	18.0	0
Commercial						
San Ramon, California						
<i>Electricity</i>						
Carbon Dioxide	66,971	0	0	66,971	8.5	0
<i>Subtotal Electricity</i>	66,971	0	0	66,971	8.5	0
<i>Natural Gas</i>						
Carbon Dioxide	42,456	0	0	42,456	5.4	0
<i>Subtotal Natural Gas</i>	42,456	0	0	42,456	5.4	0
Subtotal Commercial	109,427	0	0	109,427	13.8	0
Transportation						
San Ramon, California						
<i>Heavy Duty</i>						
Diesel	45,707	271	288	45,752	5.8	566,850
Gasoline	30,908	3,532	4,231	31,500	4.0	395,585
<i>Subtotal Heavy Duty</i>	76,615	3,803	4,520	77,252	9.8	962,435

Community Greenhouse Gas Emissions in 2020 Detailed Report

	CO ₂ (tons)	N ₂ O (lbs)	CH ₄ (lbs)	Equiv CO ₂ (tons) (%)		Energy (MMBtu)
<i>Passenger/Light Duty</i>						
Diesel	3,561	19	12	3,564	0.5	44,160
Gasoline	402,816	56,558	47,154	412,078	52.2	5,155,599
<i>Subtotal Passenger/Light Duty</i>	<i>406,377</i>	<i>56,577</i>	<i>47,166</i>	<i>415,642</i>	<i>52.6</i>	<i>5,199,759</i>
Subtotal Transportation	482,992	60,380	51,686	492,894	62.4	6,162,194
Waste						
San Ramon, California						
<i>Planning Area Waste</i>						<i>Disposal Method - Managed Landfill</i>
Paper Products	0	0	628,104	6,595	0.8	
Food Waste	0	0	247,178	2,595	0.3	
Plant Debris	0	0	66,196	695	0.1	
Wood or Textiles	0	0	184,537	1,938	0.2	
<i>Subtotal Planning Area Waste</i>	<i>0</i>	<i>0</i>	<i>1,126,016</i>	<i>11,823</i>	<i>1.5</i>	
Subtotal Waste	0	0	1,126,016	11,823	1.5	
Other						
San Ramon, California						
<i>Energy Use: Water Transport</i>						
Carbon Dioxide	9,382	0	0	9,382	1.2	
Methane	0	0	780	8	0.0	
Nitrous Oxide	0	200	0	31	0.0	
<i>Subtotal Energy Use: Water Tr</i>	<i>9,382</i>	<i>200</i>	<i>780</i>	<i>9,421</i>	<i>1.2</i>	
<i>Refrigerants</i>						
R-404A Blend	0	0	0	3,814	0.5	
R-410A Blend	0	0	0	20,804	2.6	
<i>Subtotal Refrigerants</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>24,618</i>	<i>3.1</i>	
Subtotal Other	9,382	200	780	34,039	4.3	
Total	743,789	60,580	1,178,482	790,171	100.0	6,162,194

Community Greenhouse Gas Emissions in 2030 Detailed Report

	CO ₂ (tons)	N ₂ O (lbs)	CH ₄ (lbs)	Equiv CO ₂ (tons)	(%)	Energy (MMBtu)
Residential						
San Ramon, California						
<i>Electricity</i>						
Carbon Dioxide	68,079	0	0	68,079	7.6	0
<i>Subtotal Electricity</i>	68,079	0	0	68,079	7.6	0
<i>Natural Gas</i>						
Carbon Dioxide	94,477	0	0	94,477	10.6	0
<i>Subtotal Natural Gas</i>	94,477	0	0	94,477	10.6	0
Subtotal Residential	162,556	0	0	162,556	18.2	0
Commercial						
San Ramon, California						
<i>Electricity</i>						
Carbon Dioxide	74,991	0	0	74,991	8.4	0
<i>Subtotal Electricity</i>	74,991	0	0	74,991	8.4	0
<i>Natural Gas</i>						
Carbon Dioxide	47,541	0	0	47,541	5.3	0
<i>Subtotal Natural Gas</i>	47,541	0	0	47,541	5.3	0
Subtotal Commercial	122,532	0	0	122,532	13.7	0
Transportation						
San Ramon, California						
<i>Heavy Duty</i>						
Diesel	51,406	305	324	51,457	5.8	637,520
Gasoline	34,761	3,972	4,759	35,427	4.0	444,904
<i>Subtotal Heavy Duty</i>	86,167	4,278	5,083	86,883	9.7	1,082,424

Community Greenhouse Gas Emissions in 2030 Detailed Report

	CO ₂ (tons)	N ₂ O (lbs)	CH ₄ (lbs)	Equiv CO ₂ (tons)	(%)	Energy (MMBtu)
<i>Passenger/Light Duty</i>						
Diesel	4,005	21	13	4,008	0.4	49,665
Gasoline	453,037	63,609	53,033	463,453	52.0	5,798,364
<i>Subtotal Passenger/Light Duty</i>	457,041	63,630	53,047	467,461	52.4	5,848,030
Subtotal Transportation	543,209	67,908	58,130	554,345	62.2	6,930,454
Waste						
San Ramon, California						
<i>Planning Area Waste</i>						<i>Disposal Method - Managed Landfill</i>
Paper Products	0	0	719,098	7,551	0.8	
Food Waste	0	0	282,987	2,971	0.3	
Plant Debris	0	0	75,786	796	0.1	
Wood or Textiles	0	0	211,271	2,218	0.2	
<i>Subtotal Planning Area Waste</i>	0	0	1,289,143	13,536	1.5	
Subtotal Waste	0	0	1,289,143	13,536	1.5	
Other						
San Ramon, California						
<i>Energy Use: Water Transport</i>						
Carbon Dioxide	10,741	0	0	10,741	1.2	
Methane	0	0	900	9	0.0	
Nitrous Oxide	0	240	0	37	0.0	
<i>Subtotal Energy Use: Water Tr</i>	10,741	240	900	10,788	1.2	
<i>Refrigerants</i>						
R-404A Blend	0	0	0	4,238	0.5	
R-410A Blend	0	0	0	23,357	2.6	
<i>Subtotal Refrigerants</i>	0	0	0	27,595	3.1	
Subtotal Other	10,741	240	900	38,382	4.3	
Total	839,038	68,148	1,348,172	891,351	100.0	6,930,454

**Appendix B:
CAPCOA CEQA and Climate Change
Mitigation Measure Summary**



Appendix B

Mitigation Measure Summary

**Table 16
Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective	Feasible (Yes/No)		Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments	
		Emissions Reduction/Score ²	Cost (Yes/No) ³	Technical ⁴	Logistical ⁵			
Transportation								
<i>Bicycle/Pedestrian/Transit Measures</i>								
MM T-1: Bike Parking	LD (C, M), I, SP, TP, AQP, RR, P/Mobile	1%-5%/High: CCAP presents combined % reductions for a range of mitigation measures (Dierkers et al. 2007). SMAQMD allocates combined reductions among individual measures (e.g., 2.5% reduction for all bicycle-related measures and one-quarter of 2.5% for each individual measure) (TIAX 2005, EDAW 2006, SMAQMD 2007). VTPI presents % reductions for showers and combined measures in the TDM encyclopedia (VTPI	Yes: Lockers (\$1,200-\$2,950, \$700/bike on average), Racks (\$70-\$2,000, \$70/bike on average).	Yes (Caltrans 2005, Dierkers et al. 2007, VTPI 2007)	Yes (Caltrans 2005, Dierkers et al. 2007, VTPI 2007)	Adverse: No Beneficial: CAPs, TACs	Caltrans, Portland Bicycle Master Plan (City of Portland 1998), CCAP Transportation Emissions Guidebook (Dierkers et al. 2007), SMAQMD Recommended Guidance for Land Use Emission Reductions (SMAQMD 2007), VTPI, CA air quality management and control districts, and cities/counties.	Nonresidential projects provide plentiful short- and long-term bicycle parking facilities to meet peak season maximum demand (e.g., one bike rack space per 20 vehicle/employee parking spaces).
MM T-2: End of Trip Facilities	LD (C, M), I, SP, TP, AQP, RR, P/Mobile		Yes	Yes (Caltrans 2005, Dierkers et al. 2007, VTPI 2007)	Yes (Caltrans 2005, Dierkers et al. 2007, VTPI 2007)	Adverse: No Beneficial: CAPs, TACs		Nonresidential projects provide “end-of-trip” facilities including showers, lockers, and changing space (e.g., four clothes lockers and one shower provided for every 80 employee parking spaces, separate facilities for each gender for projects with 160 or more employee parking spaces).
MM T-3: Bike-Parking at Multi-	LD (R, M), SP, AQP, RR,		Yes: Lockers (\$1,200-	Yes (Caltrans 2005,	Yes (Caltrans	Adverse: No Beneficial:		Long-term bicycle parking is provided at apartment

AG=Attorney General; ARB=California Air Resources Board; ASTM=American Society for Testing and Material; BAAQMD=Bay Area Air Quality Management District; BEES= Building for Environmental and Economic Sustainability; CA=California; Caltrans=California Department of Transportation; CAPs=Criteria Air Pollutants; CCAP=Center for Clean Air Policy; CF=Connectivity Factor; CIWMB=California Integrated Waste Management Board; CO= Carbon Monoxide; CO₂=Carbon Dioxide; DGS=Department of General Services; DOE=U.S. Department of Energy; DPF=Diesel particulate Filter; E85=85% Ethanol; EERE=Energy Efficiency and Renewable Energy; EOE=Encyclopedia of Earth; EPA=U.S. Environmental Protection Agency; ETC=Edmonton Trolley Coalition; EVs/CNG=Electric Vehicles/Compressed Natural Gas; FAR=Floor Area Ratio; GHG=Greenhouse Gas; ITE=Institute of Transportation Engineers; kg/m²=kilogram per square meter; km=Kilometer; lb=pound; LEED=Leadership in Energy and Environmental Design; M=Million; NA=Not Available; NEV=Neighborhood Electric Vehicle; NIST=National Institute of Standards and Technology; NO_x=Oxides of Nitrogen; NREL=National Renewable Energy Laboratory; N/S=North/South; PG&E=Pacific Gas and Electric; PM=Particulate Matter; SJVAPCD=San Joaquin Valley Air Pollution Control District; SMAQMD=Sacramento Metropolitan Air Quality Management District; SMUD=Sacramento Municipal Utilities District; SO_x=Sulfur Oxides; SRI=Solar Reflectance Index; TACs=Toxic Air Contaminants; TDM=Transportation Demand Management; TMA=Transportation Management Association; THC=Total Hydrocarbon; ULEV=Ultra Low Emission Vehicle; USGBC=U.S. Green Building Council; and VTPI=Victoria Transit Policy.

**Table 16
Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective	Feasible (Yes/No)		Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments
		Emissions Reduction/Score ²	Cost (Yes/No) ³	Technical ⁴	Logistical ⁵		
Unit Residential	P/Mobile	2007). JSA bases estimates on CCAP information (JSA 2004).	\$2,950, \$700/bike on average), Racks (\$70-\$2,000, \$70/bike on average).	Dierkers et al. 2007, VTPI 2007)	2005, Dierkers et al. 2007, VTPI 2007)	CAPs, TACs	complexes or condominiums without garages (e.g., one long-term bicycle parking space for each unit without a garage). Long-term facilities shall consist of one of the following: a bicycle locker, a locked room with standard racks and access limited to bicyclists only, or a standard rack in a location that is staffed and/or monitored by video surveillance 24 hours per day.
MM T-4: Proximity to Bike Path/Bike Lanes	LD (R, C, M), I, SP, TP, AQP, RR, P/Mobile		Yes	Yes (Caltrans 2005, Dierkers et al. 2007, VTPI 2007)	Yes (Caltrans 2005, Dierkers et al. 2007, VTPI 2007)	Adverse: No Beneficial: CAPs, TACs	Entire project is located within one-half mile of an existing/planned Class I or Class II bike lane and project design includes a comparable network that connects the project uses to the existing offsite facility. Project design includes a designated bicycle route connecting all units, on-site bicycle parking facilities, offsite bicycle facilities, site entrances, and primary building entrances to existing Class I or Class II bike lane(s) within one-half mile. Bicycle route connects to all streets contiguous with project site. Bicycle route has minimum conflicts with automobile parking and circulation

**Table 16
Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective	Feasible (Yes/No)		Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments
		Emissions Reduction/Score ²	Cost (Yes/No) ³	Technical ⁴			
							facilities. All streets internal to the project wider than 75 feet have Class II bicycle lanes on both sides.

AG=Attorney General; ARB=California Air Resources Board; ASTM=American Society for Testing and Material; BAAQMD=Bay Area Air Quality Management District; BEES= Building for Environmental and Economic Sustainability; CA=California; Caltrans=California Department of Transportation; CAPs=Criteria Air Pollutants; CCAP=Center for Clean Air Policy; CF=Connectivity Factor; CIWMB=California Integrated Waste Management Board; CO= Carbon Monoxide; CO₂=Carbon Dioxide; DGS=Department of General Services; DOE=U.S. Department of Energy; DPF=Diesel particulate Filter; E85=85% Ethanol; EERE=Energy Efficiency and Renewable Energy; EOE=Encyclopedia of Earth; EPA=U.S. Environmental Protection Agency; ETC=Edmonton Trolley Coalition; EVs/CNG=Electric Vehicles/Compressed Natural Gas; FAR=Floor Area Ratio; GHG=Greenhouse Gas; ITE=Institute of Transportation Engineers; kg/m²=kilogram per square meter; km=Kilometer; lb=pound; LEED=Leadership in Energy and Environmental Design; M=Million; NA=Not Available; NEV=Neighborhood Electric Vehicle; NIST=National Institute of Standards and Technology; NO_x=Oxides of Nitrogen; NREL=National Renewable Energy Laboratory; N/S=North/South; PG&E=Pacific Gas and Electric; PM=Particulate Matter; SJVAPCD=San Joaquin Valley Air Pollution Control District; SMAQMD=Sacramento Metropolitan Air Quality Management District; SMUD=Sacramento Municipal Utilities District; SO_x=Sulfur Oxides; SRI=Solar Reflectance Index; TACs=Toxic Air Contaminants; TDM=Transportation Demand Management; TMA=Transportation Management Association; THC=Total Hydrocarbon; ULEV=Ultra Low Emission Vehicle; USGBC=U.S. Green Building Council; and VTPI=Victoria Transit Policy.

**Table 16
Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective	Feasible (Yes/No)			Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments
		Emissions Reduction/Score ²	Cost (Yes/No) ³	Technical ⁴	Logistical ⁵			
MM T-5: Pedestrian Network	LD (R, C, M), I, SP, TP, AQP, RR, P/Mobile	1%-10%/High: CCAP presents combined % reductions for a range of mitigation measures (Dierkers et al. 2007). SMAQMD allocates 1% for each individual measure (TIAX 2005, EDAW 2006, SMAQMD 2007).	Yes	Yes (Dierkers et al. 2007, VTPI 2007)	Yes (Dierkers et al. 2007, VTPI 2007)	Adverse: No Beneficial: CAPs, TACs	CCAP Transportation Emissions Guidebook (Dierkers et al. 2007), SMAQMD Recommended Guidance for Land Use Emission Reductions (SMAQMD 2007), VTPI, CA air quality management and control districts, and cities/counties.	The project provides a pedestrian access network that internally links all uses and connects to all existing/planned external streets and pedestrian facilities contiguous with the project site. Project design includes a designated pedestrian route interconnecting all internal uses, site entrances, primary building entrances, public facilities, and adjacent uses to existing external pedestrian facilities and streets. Route has minimal conflict with parking and automobile circulation facilities. Streets (with the exception of alleys) within the project have sidewalks on both sides. All sidewalks internal and adjacent to project site are minimum of five feet wide. All sidewalks feature vertical curbs. Pedestrian facilities and improvements such as grade separation, wider sidewalks, and traffic calming are implemented wherever feasible to minimize pedestrian barriers. All site entrances provide pedestrian access.
MM T-6: Pedestrian	LD (R, C, M), I, SP, TP,		Yes	Yes (Dierkers et al. 2007,	Yes (Dierkers et	Adverse: No Beneficial:	Site design and building placement minimize barriers to	

**Table 16
Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective		Feasible (Yes/No)		Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments
		Emissions Reduction/Score ²	Cost (Yes/No) ³	Technical ⁴	Logistical ⁵			
Barriers Minimized	AQP, RR, P/Mobile			VTPI 2007)	al. 2007, VTPI 2007)	CAPs, TACs		pedestrian access and interconnectivity. Physical barriers such as walls, berms, landscaping, and slopes between residential and nonresidential uses that impede bicycle or pedestrian circulation are eliminated.
MM T-7: Bus Shelter for Existing/Planned Transit Service	LD (R, C, M), I, SP, TP, AQP, RR, P/Mobile	1%-2%/High: CCAP presents these % reductions (Dierkers et al., 2007). SMAQMD assigns from .25%-1%, depending on headway frequency (TIAX 2005, EDAW 2006, SMAQMD 2007).	Yes: \$15,000-\$70,000.	Yes (Dierkers et al. 2007, VTPI 2007)	Yes (Dierkers et al. 2007, VTPI 2007)	Adverse: No Beneficial: CAPs, TACs	CCAP Transportation Emissions Guidebook (Dierkers et al. 2007), SMAQMD Recommended Guidance for Land Use Emission Reductions (SMAQMD 2007), VTPI, City of Calgary (City of Calgary 2004), CA air quality management and control districts, and cities/counties.	Bus or streetcar service provides headways of one hour or less for stops within one-quarter mile; project provides safe and convenient bicycle/pedestrian access to transit stop(s) and provides essential transit stop improvements (i.e., shelters, route information, benches, and lighting).

AG=Attorney General; ARB=California Air Resources Board; ASTM=American Society for Testing and Material; BAAQMD=Bay Area Air Quality Management District; BEES= Building for Environmental and Economic Sustainability; CA=California; Caltrans=California Department of Transportation; CAPs=Criteria Air Pollutants; CCAP=Center for Clean Air Policy; CF=Connectivity Factor; CIWMB=California Integrated Waste Management Board; CO= Carbon Monoxide; CO₂=Carbon Dioxide; DGS=Department of General Services; DOE=U.S. Department of Energy; DPF=Diesel particulate Filter; E85=85% Ethanol; EERE=Energy Efficiency and Renewable Energy; EOE=Encyclopedia of Earth; EPA=U.S. Environmental Protection Agency; ETC=Edmonton Trolley Coalition; EVs/CNG=Electric Vehicles/Compressed Natural Gas; FAR=Floor Area Ratio; GHG=Greenhouse Gas; ITE=Institute of Transportation Engineers; kg/m²=kilogram per square meter; km=Kilometer; lb=pound; LEED=Leadership in Energy and Environmental Design; M=Million; NA=Not Available; NEV=Neighborhood Electric Vehicle; NIST=National Institute of Standards and Technology; NO_x=Oxides of Nitrogen; NREL=National Renewable Energy Laboratory; N/S=North/South; PG&E=Pacific Gas and Electric; PM=Particulate Matter; SJVAPCD=San Joaquin Valley Air Pollution Control District; SMAQMD=Sacramento Metropolitan Air Quality Management District; SMUD=Sacramento Municipal Utilities District; SO_x=Sulfur Oxides; SRI=Solar Reflectance Index; TACs=Toxic Air Contaminants; TDM=Transportation Demand Management; TMA=Transportation Management Association; THC=Total Hydrocarbon; ULEV=Ultra Low Emission Vehicle; USGBC=U.S. Green Building Council; and VTPI=Victoria Transit Policy.

**Table 16
Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective Emissions Reduction/Score ²	Cost (Yes/No) ³	Feasible (Yes/No)		Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments
				Technical ⁴	Logistical ⁵			
MM T-8: Traffic Calming	LD (R, C, M), I, SP, TP, AQP, RR, P/Mobile	1%-10%/High: CCAP presents combined % reductions for a range of mitigation measures (Dierkers et al. 2007). SMAQMD allocates .25%-1.0% for each individual measure depending on percent of intersections and streets with improvements (TIAX 2005, EDAW 2006, SMAQMD 2007).	Yes	Yes (Dierkers et al. 2007, VTPI 2007)	Yes (Dierkers et al. 2007, VTPI 2007)	Adverse: No Beneficial: CAPs, TACs	CCAP Transportation Emissions Guidebook (Dierkers et al. 2007), SMAQMD Recommended Guidance for Land Use Emission Reductions (SMAQMD 2007), VTPI, CA air quality management and control districts, and cities/counties.	Project design includes pedestrian/bicycle safety and traffic calming measures in excess of jurisdiction requirements. Roadways are designed to reduce motor vehicle speeds and encourage pedestrian and bicycle trips by featuring traffic calming features. All sidewalks internal and adjacent to project site are minimum of five feet wide. All sidewalks feature vertical curbs. Roadways that converge internally within the project are routed in such a way as to avoid "skewed intersections;" which are intersections that meet at acute, rather than right, angles. Intersections internal and adjacent to the project feature one or more of the following pedestrian safety/traffic calming design techniques: marked crosswalks, count-down signal timers, curb extensions, speed tables, raised crosswalks, raised intersections, median islands, tight corner radii, and roundabouts or mini-circles. Streets internal and adjacent to the project feature pedestrian safety/traffic calming measures such as on-street parking, planter strips with street trees,

**Table 16
Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective	Feasible (Yes/No)		Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments	
		Emissions Reduction/Score ²	Cost (Yes/No) ³	Technical ⁴				Logistical ⁵
							and chicanes/chokers (variations in road width to discourage high-speed travel).	
Parking Measures								
MM T-9: Paid Parking (Parking Cash Out)	LD (C, M), I, SP, TP, AQP, RR, P/Mobile	1%-30%/High: CCAP presents a range of 15%-30% reduction for parking programs (Dierkers et al. 2007). SMAQMD presents a range of 1.0%-7.2%, depending on cost/day and distance to transit (TIAX 2005, EDAW 2006, SMAQMD 2007). Shoupe presents a 21% reduction [\$5/day for commuters to downtown LA, with elasticity of -0.18 (e.g., if price increases 10%, then solo driving goes down by 1.8% more)] (Shoupe 2005). Urban Transit Institute	Yes: Vary by location and project size.	Yes (Dierkers et al. 2007, VTPI 2007)	Yes (Dierkers et al. 2007, VTPI 2007)	Adverse: No Beneficial: CAPs, TACs	CCAP Transportation Emissions Guidebook (Dierkers et al. 2007), SMAQMD Recommended Guidance for Land Use Emission Reductions (SMAQMD 2007), VTPI, CA air quality management and control districts, and cities/counties.	Project provides employee and/or customer paid parking system. Project must have a permanent and enforceable method of maintaining user fees for all parking facilities. The facility may not provide customer or employee validations. Daily charge for parking must be equal to or greater than the cost of a transit day/monthly pass plus 20%.

AG=Attorney General; ARB=California Air Resources Board; ASTM=American Society for Testing and Material; BAAQMD=Bay Area Air Quality Management District; BEES= Building for Environmental and Economic Sustainability; CA=California; Caltrans=California Department of Transportation; CAPs=Criteria Air Pollutants; CCAP=Center for Clean Air Policy; CF=Connectivity Factor; CIWMB=California Integrated Waste Management Board; CO= Carbon Monoxide; CO₂=Carbon Dioxide; DGS=Department of General Services; DOE=U.S. Department of Energy; DPF=Diesel particulate Filter; E85=85% Ethanol; EERE=Energy Efficiency and Renewable Energy; EOE=Encyclopedia of Earth; EPA=U.S. Environmental Protection Agency; ETC=Edmonton Trolley Coalition; EVs/CNG=Electric Vehicles/Compressed Natural Gas; FAR=Floor Area Ratio; GHG=Greenhouse Gas; ITE=Institute of Transportation Engineers; kg/m²=kilogram per square meter; km=Kilometer; lb=pound; LEED=Leadership in Energy and Environmental Design; M=Million; NA=Not Available; NEV=Neighborhood Electric Vehicle; NIST=National Institute of Standards and Technology; NO_x=Oxides of Nitrogen; NREL=National Renewable Energy Laboratory; N/S=North/South; PG&E=Pacific Gas and Electric; PM=Particulate Matter; SJVAPCD=San Joaquin Valley Air Pollution Control District; SMAQMD=Sacramento Metropolitan Air Quality Management District; SMUD=Sacramento Municipal Utilities District; SO_x=Sulfur Oxides; SRI=Solar Reflectance Index; TACs=Toxic Air Contaminants; TDM=Transportation Demand Management; TMA=Transportation Management Association; THC=Total Hydrocarbon; ULEV=Ultra Low Emission Vehicle; USGBC=U.S. Green Building Council; and VTPI=Victoria Transit Policy.

**Table 16
Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective	Feasible (Yes/No)		Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments	
		Emissions Reduction/Score ²	Cost (Yes/No) ³	Technical ⁴				Logistical ⁵
		presents a range of 1%-10% reduction in trips to central city sites, and 2%-4% in suburban sites (VTPI 2007).						
MM T-10: Minimum Parking	LD (R, C, M), I, SP, TP, AQP, RR, P/Mobile	1%-30%/High: CCAP presents a range of 15%-30% reduction for parking programs (Dierkers et al. 2007). SMAQMD presents a maximum of 6% (Nelson/Nygaard Consulting Associates, 2005, TIAX 2005, EDAW 2006).	Yes	Yes (Dierkers et al. 2007, VTPI 2007)	Yes (Dierkers et al. 2007, VTPI 2007), Note that in certain areas of the state, the minimum parking required by code is greater than the peak period parking demand for most land uses. Simply meeting minimum code requirements in these areas would not result in an emissions reduction.	Adverse: No Beneficial: CAPs, TACs	CCAP Transportation Emissions Guidebook (Dierkers et al. 2007), SMAQMD Recommended Guidance for Land Use Emission Reductions (SMAQMD 2007), VTPI, Governor's Office of Smart Growth (Annapolis, Maryland) (Zimbler), CA air quality management and control districts, and cities/counties.	Provide minimum amount of parking required. Once land uses are determined, the trip reduction factor associated with this measure can be determined by utilizing the ITE parking generation publication. The reduction in trips can be computed as shown below by the ratio of the difference of minimum parking required by code and ITE peak parking demand to ITE peak parking demand for the land uses multiplied by 50%. Percent Trip Reduction = 50 * [(min parking required by code – ITE peak parking demand)/ (ITE peak parking demand)]

**Table 16
Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective Emissions Reduction/Score ²	Cost (Yes/No) ³	Feasible (Yes/No)		Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments
				Technical ⁴	Logistical ⁵			
MM T-11: Parking Reduction Beyond Code/Shared Parking	LD (R, C, M), I, SP, TP, AQP, RR, P/Mobile	1%-30%/High: CCAP presents a range of 15%-30% reduction for parking programs (Dierkers et al. 2007). SMAQMD presents a maximum of 12% (Nelson/Nygaard, 2005, TIAX 2005, EDAW 2006).	Yes	Yes (Dierkers et al. 2007, VTPI 2007)	Yes (Dierkers et al. 2007, VTPI 2007)	Adverse: No Beneficial: CAPs, TACs		Provide parking reduction less than code. This measure can be readily implemented through a shared parking strategy, wherein parking is utilized jointly among different land uses, buildings, and facilities in an area that experience peak parking needs at different times of day and day of the week.
MM T-12: Pedestrian Pathway Through Parking	LD (R, C, M), I, SP, TP, AQP, RR, P/Mobile	1%-4%/Moderate: CCAP presents combined % reductions for a range of mitigation measures (Dierkers et al. 2007). SMAQMD allocates 0.5% reduction for this measure (TIAX 2005, EDAW 2006, SMAQMD 2007).	Yes	Yes (Dierkers et al. 2007, VTPI 2007)	Yes (Dierkers et al. 2007, VTPI 2007)	Adverse: No Beneficial: CAPs, TACs		Provide a parking lot design that includes clearly marked and shaded pedestrian pathways between transit facilities and building entrances.

AG=Attorney General; ARB=California Air Resources Board; ASTM=American Society for Testing and Material; BAAQMD=Bay Area Air Quality Management District; BEES= Building for Environmental and Economic Sustainability; CA=California; Caltrans=California Department of Transportation; CAPs=Criteria Air Pollutants; CCAP=Center for Clean Air Policy; CF=Connectivity Factor; CIWMB=California Integrated Waste Management Board; CO= Carbon Monoxide; CO₂=Carbon Dioxide; DGS=Department of General Services; DOE=U.S. Department of Energy; DPF=Diesel particulate Filter; E85=85% Ethanol; EERE=Energy Efficiency and Renewable Energy; EOE=Encyclopedia of Earth; EPA=U.S. Environmental Protection Agency; ETC=Edmonton Trolley Coalition; EVs/CNG=Electric Vehicles/Compressed Natural Gas; FAR=Floor Area Ratio; GHG=Greenhouse Gas; ITE=Institute of Transportation Engineers; kg/m²=kilogram per square meter; km=Kilometer; lb=pound; LEED=Leadership in Energy and Environmental Design; M=Million; NA=Not Available; NEV=Neighborhood Electric Vehicle; NIST=National Institute of Standards and Technology; NO_x=Oxides of Nitrogen; NREL=National Renewable Energy Laboratory; N/S=North/South; PG&E=Pacific Gas and Electric; PM=Particulate Matter; SJVAPCD=San Joaquin Valley Air Pollution Control District; SMAQMD=Sacramento Metropolitan Air Quality Management District; SMUD=Sacramento Municipal Utilities District; SO_x=Sulfur Oxides; SRI=Solar Reflectance Index; TACs=Toxic Air Contaminants; TDM=Transportation Demand Management; TMA=Transportation Management Association; THC=Total Hydrocarbon; ULEV=Ultra Low Emission Vehicle; USGBC=U.S. Green Building Council; and VTPI=Victoria Transit Policy.

**Table 16
Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective	Feasible (Yes/No)		Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments
		Emissions Reduction/Score ²	Cost (Yes/No) ³	Technical ⁴			
MM T-13: Off-Street Parking	LD (R, C, M), I, SP, TP, AQP, RR, P/Mobile	1%-4%/Moderate: CCAP presents combined % reductions for a range of mitigation measures (Dierkers et al. 2007). SMAQMD allocates a range of 0.1%-1.5% for this measure (TIAX 2005, EDAW 2006, SMAQMD 2007).	Yes	Yes (Dierkers et al. 2007, VTPI 2007)	Yes (Dierkers et al. 2007, VTPI 2007)	Adverse: No Beneficial: CAPs, TACs	Parking facilities are not adjacent to street frontage.
MM T-14: Parking Area Tree Cover	LD (R, C, M), I, SP, TP, AQP, RR, P/Mobile	Annual net CO ₂ reduction of 3.1 kg/m ² canopy cover/Moderate (McPherson 2001).	Yes: \$19 per new tree for CA, cost varies for maintenance, removal and replacement (McPherson 2001).	Yes	Yes	Adverse: VOCs Beneficial: CAPs, TACs	AG, State of CA Department of Justice (Goldberg 2007) and cities/counties (e.g., parking lot ordinances in Sacramento, Davis, and Los Angeles, CA). Provide parking lot areas with 50% tree cover within 10 years of construction, in particular low emitting, low maintenance, native drought resistant trees. Reduces urban heat island effect and requirement for air conditioning, effective when combined with other measures (e.g., electrical maintenance equipment and reflective paving material).
MM T-15: Valet Bicycle Parking	LD (C, M), SP, AQP, TP, RR, P/Mobile	NA/Low	Yes	Yes	Yes: Raley Field (Sacramento, CA)	Adverse: No Beneficial: CAPs, TACs	Raley Field (Sacramento, CA). Provide spaces for the operation of valet bicycle parking at community event “centers” such as amphitheatres, theaters, and stadiums.
MM T-16: Garage Bicycle Storage	LD (R, M), SP, AQP, TP, RR, P/Mobile	NA/Low	Yes: Less than \$200/multiple bike rack.	Yes	Yes	Adverse: No Beneficial: CAPs, TACs	City of Fairview, OR Provide storage space in one-car garages for bicycles and bicycle trailers.

**Table 16
Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective		Feasible (Yes/No)		Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments
		Emissions Reduction/Score ²	Cost (Yes/No) ³	Technical ⁴	Logistical ⁵			
MM T-17: Preferential Parking for EVs/CNG Vehicles	LD (C, M), I, SP, TP, AQP, RR, P/Mobile	NA/Low	Yes	Yes	Yes	Adverse: No Beneficial: CAPs, TACs	USGBC, CA air quality management and control districts and cities/counties (e.g., BAAQMD).	Provide preferential parking space locations for EVs/CNG vehicles.
MM T-18: Reduced/No Parking Fee for EVs/CNG Vehicles	LD (C, M), I, SP, TP, AQP, RR, P/Mobile	NA/Low	Yes	Yes	Yes	Adverse: No Beneficial: CAPs, TACs	Hotels (e.g., Argonaut in San Francisco, CA)	Provide a reduced/no parking fee for EVs/CNG vehicles.

AG=Attorney General; ARB=California Air Resources Board; ASTM=American Society for Testing and Material; BAAQMD=Bay Area Air Quality Management District; BEES= Building for Environmental and Economic Sustainability; CA=California; Caltrans=California Department of Transportation; CAPs=Criteria Air Pollutants; CCAP=Center for Clean Air Policy; CF=Connectivity Factor; CIWMB=California Integrated Waste Management Board; CO= Carbon Monoxide; CO₂=Carbon Dioxide; DGS=Department of General Services; DOE=U.S. Department of Energy; DPF=Diesel particulate Filter; E85=85% Ethanol; EERE=Energy Efficiency and Renewable Energy; EOE=Encyclopedia of Earth; EPA=U.S. Environmental Protection Agency; ETC=Edmonton Trolley Coalition; EVs/CNG=Electric Vehicles/Compressed Natural Gas; FAR=Floor Area Ratio; GHG=Greenhouse Gas; ITE=Institute of Transportation Engineers; kg/m²=kilogram per square meter; km=Kilometer; lb=pound; LEED=Leadership in Energy and Environmental Design; M=Million; NA=Not Available; NEV=Neighborhood Electric Vehicle; NIST=National Institute of Standards and Technology; NO_x=Oxides of Nitrogen; NREL=National Renewable Energy Laboratory; N/S=North/South; PG&E=Pacific Gas and Electric; PM=Particulate Matter; SJVAPCD=San Joaquin Valley Air Pollution Control District; SMAQMD=Sacramento Metropolitan Air Quality Management District; SMUD=Sacramento Municipal Utilities District; SO_x=Sulfur Oxides; SRI=Solar Reflectance Index; TACs=Toxic Air Contaminants; TDM=Transportation Demand Management; TMA=Transportation Management Association; THC=Total Hydrocarbon; ULEV=Ultra Low Emission Vehicle; USGBC=U.S. Green Building Council; and VTPI=Victoria Transit Policy.

**Table 16
Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective	Feasible (Yes/No)		Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments	
		Emissions Reduction/Score ²	Cost (Yes/No) ³	Technical ⁴				Logistical ⁵
<i>Miscellaneous Measure</i>								
MM T-19: TMA Membership	LD (R, C, M), I, SP, TP, AQP, RR, P/Mobile	1%-28%/High: CCAP presents a range of 3%-25% for TDMs with complementary transit and land use measures (Dierkers et al. 2007). VTPI presents a range of 6%-7% in the TDM encyclopedia (VTPI 2007). URBEMIS offers a 2%-10% range in reductions for a TDM that has 5 elements that are pedestrian and transit friendly and 1%-5% for 3 elements. SMAQMD presents a reduction of 5% (TIAX 2005, EDAW 2006, SMAQMD 2007).	Yes	Yes (Dierkers et al. 2007, VTPI 2007)	Yes (Dierkers et al. 2007, VTPI 2007)	Adverse: No Beneficial: CAPs, TACs	CA air quality management and control districts and cities/counties (e.g., SMAQMD).	Include permanent TMA membership and funding requirement. Funding to be provided by Community Facilities District or County Service Area or other nonrevocable funding mechanism. TDMs have been shown to reduce employee vehicle trips up to 28% with the largest reductions achieved through parking pricing and transit passes. The impact depends on the travel alternatives.
MM T-20: ULEV	LD (R, C, M), I, SP, TP, AQP, RR, P/Mobile	NA/Low	Yes: Higher than corresponding gasoline models.	Yes	Yes: Fueling stations might not be readily available depending on location. More than 900 E85 fueling	Adverse: No Beneficial: CAPs, TACs	DGS, CA air quality management and control districts and cities/counties (e.g., SMAQMD).	Use of and/or provide ULEV that are 50% cleaner than average new model cars (e.g., natural gas, ethanol, electric).

**Table 16
Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective	Feasible (Yes/No)		Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments
		Emissions Reduction/Score ²	Cost (Yes/No) ³	Technical ⁴			
					stations in the U.S., 5 in CA. Vehicles available in select regions only		
MM T-21: Flex Fuel Vehicles	LD (R, C, M), I, SP, TP, AQP, RR, P/Mobile	5466.97 lb GHG/year/Low (DOE Fuel Economy)	Yes: E85 costs less than gasoline per gallon, but results in lower fuel economy.	Yes	Yes: More than 900 E85 fueling stations in the U.S., 5 in CA. Vehicles available in select regions only	Adverse: Yes Issues with the energy intensive ethanol production process (e.g., wastewater treatment requirements). Beneficial: CAPs, TACs	DGS, CA air quality management and control districts and cities/counties (e.g., SJVAPCD). Use of and/or provide vehicles that utilize gasoline/ethanol blends (e.g., E85).
Design							
Commercial & Residential Building Design Measures							
MM D-1: Office/Mixed Use Density	LD (C, M), SP, TP, AQP, RR, P/Mobile	0.05%-2%/Moderate: This range is from SMAQMD, depending	Yes	Yes (VTPI 2007)	Yes (VTPI 2007)	Adverse: No Beneficial: CAPs, TACs	CA air quality management and control districts and cities/counties Project provides high density office or mixed-use proximate to transit. Project must provide

AG=Attorney General; ARB=California Air Resources Board; ASTM=American Society for Testing and Material; BAAQMD=Bay Area Air Quality Management District; BEES= Building for Environmental and Economic Sustainability; CA=California; Caltrans=California Department of Transportation; CAPs=Criteria Air Pollutants; CCAP=Center for Clean Air Policy; CF=Connectivity Factor; CIWMB=California Integrated Waste Management Board; CO= Carbon Monoxide; CO₂=Carbon Dioxide; DGS=Department of General Services; DOE=U.S. Department of Energy; DPF=Diesel particulate Filter; E85=85% Ethanol; EERE=Energy Efficiency and Renewable Energy; EOE=Encyclopedia of Earth; EPA=U.S. Environmental Protection Agency; ETC=Edmonton Trolley Coalition; EVs/CNG=Electric Vehicles/Compressed Natural Gas; FAR=Floor Area Ratio; GHG=Greenhouse Gas; ITE=Institute of Transportation Engineers; kg/m²=kilogram per square meter; km=Kilometer; lb=pound; LEED=Leadership in Energy and Environmental Design; M=Million; NA=Not Available; NEV=Neighborhood Electric Vehicle; NIST=National Institute of Standards and Technology; NO_x=Oxides of Nitrogen; NREL=National Renewable Energy Laboratory; N/S=North/South; PG&E=Pacific Gas and Electric; PM=Particulate Matter; SJVAPCD=San Joaquin Valley Air Pollution Control District; SMAQMD=Sacramento Metropolitan Air Quality Management District; SMUD=Sacramento Municipal Utilities District; SO_x=Sulfur Oxides; SRI=Solar Reflectance Index; TACs=Toxic Air Contaminants; TDM=Transportation Demand Management; TMA=Transportation Management Association; THC=Total Hydrocarbon; ULEV=Ultra Low Emission Vehicle; USGBC=U.S. Green Building Council; and VTPI=Victoria Transit Policy.

**Table 16
Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective	Feasible (Yes/No)		Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments	
		Emissions Reduction/Score ²	Cost (Yes/No) ³	Technical ⁴				Logistical ⁵
		on FAR and headway frequencies (Nelson/Nygaard Consulting Associates 2005, EDAW 2006, SMAQMD 2007).				(e.g., SMAQMD).	safe and convenient pedestrian and bicycle access to all transit stops within one-quarter mile.	
MM D-2: Orientation to Existing/Planned Transit, Bikeway, or Pedestrian Corridor	LD (R, C, M), I, SP, TP, AQP, RR, P/Mobile	0.4%-1%/Moderate: CCAP attributes a 0.5% reduction per 1% improvement in transit frequency (Dierkers et al. 2007). SMAQMD presents a range of 0.25%-5% (JSA 2005, EDAW 2006, SMAQMD 2007).	Yes	Yes (Dierkers et al. 2007)	Yes (Dierkers et al. 2007)	Adverse: No Beneficial: CAPs, TACs	CA air quality management and control districts and cities/counties (e.g., SMAQMD).	Project is oriented towards existing transit, bicycle, or pedestrian corridor. Setback distance between project and existing or planned adjacent uses is minimized or nonexistent. Setback distance between different buildings on project site is minimized. Setbacks between project buildings and planned or existing sidewalks are minimized. Buildings are oriented towards existing or planned street frontage. Primary entrances to buildings are located along planned or existing public street frontage. Project provides bicycle access to any planned bicycle corridor(s). Project provides pedestrian access to any planned pedestrian corridor(s).
MM D-3: Services Operational	LD (R, C, M), I, SP, TP, AQP, RR, P/Mobile	0.5%-5%/Moderate	Yes	Yes	Yes	Adverse: No Beneficial: CAPs, TACs	CA air quality management and control districts and cities/counties (e.g., SMAQMD).	Project provides on-site shops and services for employees.

**Table 16
Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective Emissions Reduction/Score ²	Feasible (Yes/No) Cost (Yes/No) ³	Secondary Effects (Yes/No)		Agency/Organization/Other ⁶	Description/Comments	
				Technical ⁴	Logistical ⁵			
MM D-4: Residential Density (Employ Sufficient Density for New Residential Development to Support the Use of Public Transit)	LD (R, M), SP, TP, AQP, RR, P/Mobile	1%-40%/High: #7, EPA presents a range of 32%-40% (EPA 2006). SMAQMD presents a range of 1%-12% depending on density and headway frequencies (Nelson/Nygaard Consulting Associates 2005, JSA 2005, EDAW 2006, SMAQMD 2007). Nelson/Nygaard presents a trip reduction formula: Trip Reduction = $0.6 * (1 - (19749 * ((4.814 + \text{households per residential acre}) / (4.814 + 7.14)))^{-0.639}) / 25914$.	Yes	Yes (VTPI 2007, Holtzclaw 2007)	Yes (VTPI 2007, Holtzclaw 2007)	Adverse: No Beneficial: CAPs, TACs	CA air quality management and control districts and cities/counties (e.g., SMAQMD).	Project provides high-density residential development. Transit facilities must be within one-quarter mile of project border. Project provides safe and convenient bicycle/pedestrian access to all transit stop(s) within one-quarter mile of project border.
MM D-5: Street Grid	LD (R, C, M), I, SP, TP, AQP, RR,	1%/Moderate: SMAQMD presents this % reduction (JSA	Yes	Yes (Dierkers et al. 2007, VTPI 2007)	Yes (Dierkers et al. 2007,	Adverse: No Beneficial: CAPs, TACs	CA air quality management and control districts and cities/counties	Multiple and direct street routing (grid style). This measure only applies to projects

AG=Attorney General; ARB=California Air Resources Board; ASTM=American Society for Testing and Material; BAAQMD=Bay Area Air Quality Management District; BEES= Building for Environmental and Economic Sustainability; CA=California; Caltrans=California Department of Transportation; CAPs=Criteria Air Pollutants; CCAP=Center for Clean Air Policy; CF=Connectivity Factor; CIWMB=California Integrated Waste Management Board; CO= Carbon Monoxide; CO₂=Carbon Dioxide; DGS=Department of General Services; DOE=U.S. Department of Energy; DPF=Diesel particulate Filter; E85=85% Ethanol; EERE=Energy Efficiency and Renewable Energy; EOE=Encyclopedia of Earth; EPA=U.S. Environmental Protection Agency; ETC=Edmonton Trolley Coalition; EVs/CNG=Electric Vehicles/Compressed Natural Gas; FAR=Floor Area Ratio; GHG=Greenhouse Gas; ITE=Institute of Transportation Engineers; kg/m²=kilogram per square meter; km=Kilometer; lb=pound; LEED=Leadership in Energy and Environmental Design; M=Million; NA=Not Available; NEV=Neighborhood Electric Vehicle; NIST=National Institute of Standards and Technology; NO_x=Oxides of Nitrogen; NREL=National Renewable Energy Laboratory; N/S=North/South; PG&E=Pacific Gas and Electric; PM=Particulate Matter; SJVAPCD=San Joaquin Valley Air Pollution Control District; SMAQMD=Sacramento Metropolitan Air Quality Management District; SMUD=Sacramento Municipal Utilities District; SO_x=Sulfur Oxides; SRI=Solar Reflectance Index; TACs=Toxic Air Contaminants; TDM=Transportation Demand Management; TMA=Transportation Management Association; THC=Total Hydrocarbon; ULEV=Ultra Low Emission Vehicle; USGBC=U.S. Green Building Council; and VTPI=Victoria Transit Policy.

**Table 16
Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective	Feasible (Yes/No)		Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments
		Emissions Reduction/Score ²	Cost (Yes/No) ³	Technical ⁴			
	P/Mobile	2005, EDAW 2006, SMAQMD 2007).				(e.g., SMAQMD).	with an internal CF ≥ 0.80 , and average of one-quarter mile or less between external connections along perimeter of project. [CF= # of intersections / (# of cul-de-sacs + intersections)]. Cul-de-sacs with bicycle/pedestrian through access may be considered “complete intersections” when calculating the project’s internal connectivity factor. External connections are bike/pedestrian pathways and access points, or streets with safe and convenient bicycle and pedestrian access that connect the project to adjacent streets, sidewalks, and uses. If project site is adjacent to undeveloped land; streets, pathways, access points, and right-of-ways that provide for future access to adjacent uses may count for up to 50% of the external connections. Block perimeter (the sum of the measurement of the length of all block sides) is limited to no more than 1,350 feet. Streets internal to the project should connect to streets external to the project whenever possible.

**Table 16
Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective	Feasible (Yes/No)		Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments	
		Emissions Reduction/Score ²	Cost (Yes/No) ³	Technical ⁴				Logistical ⁵
MM D-6: NEV Access	LD (R, C, M), SP, TP, AQP, RR, P/Mobile	0.5%-1.5%/Low: SMAQMD presents this % reduction (EDAW 2006, SMAQMD 2007).	Yes	Yes (Litman 1999, Sperling 1994)	Yes (Litman 1999, Sperling 1994)	Adverse: No Beneficial: CAPs, TACs	CA air quality management and control districts and cities/counties (e.g., SMAQMD).	Make physical development consistent with requirements for neighborhood electric vehicles. Current studies show that for most trips, NEVs do not replace gas-fueled vehicles as the primary vehicle.
MM D-7: Affordable Housing Component	LD (R, M), SP, TP, AQP, RR, P/Mobile	0.4%-6%/Moderate: SMAQMD presents this % reduction (Nelson/Nygaard Consulting Associates 2005, EDAW 2006, SMAQMD 2007).	Yes	Yes	Yes	Adverse: No Beneficial: CAPs, TACs	CA air quality management and control districts and cities/counties (e.g., SMAQMD).	Residential development projects of five or more dwelling units provide a deed-restricted low-income housing component on-site (or as defined in the code). Developers who pay into In-Lieu Fee Programs are not considered eligible to receive credit for this measure. The award of emission reduction credit shall be based only on the proportion of affordable housing developed on-site because in-lieu programs simply induce a net increase in development. Percentage reduction shall be calculated according to the following formula:

AG=Attorney General; ARB=California Air Resources Board; ASTM=American Society for Testing and Material; BAAQMD=Bay Area Air Quality Management District; BEES= Building for Environmental and Economic Sustainability; CA=California; Caltrans=California Department of Transportation; CAPs=Criteria Air Pollutants; CCAP=Center for Clean Air Policy; CF=Connectivity Factor; CIWMB=California Integrated Waste Management Board; CO= Carbon Monoxide; CO₂=Carbon Dioxide; DGS=Department of General Services; DOE=U.S. Department of Energy; DPF=Diesel particulate Filter; E85=85% Ethanol; EERE=Energy Efficiency and Renewable Energy; EOE=Encyclopedia of Earth; EPA=U.S. Environmental Protection Agency; ETC=Edmonton Trolley Coalition; EVs/CNG=Electric Vehicles/Compressed Natural Gas; FAR=Floor Area Ratio; GHG=Greenhouse Gas; ITE=Institute of Transportation Engineers; kg/m²=kilogram per square meter; km=Kilometer; lb=pound; LEED=Leadership in Energy and Environmental Design; M=Million; NA=Not Available; NEV=Neighborhood Electric Vehicle; NIST=National Institute of Standards and Technology; NO_x=Oxides of Nitrogen; NREL=National Renewable Energy Laboratory; N/S=North/South; PG&E=Pacific Gas and Electric; PM=Particulate Matter; SJVAPCD=San Joaquin Valley Air Pollution Control District; SMAQMD=Sacramento Metropolitan Air Quality Management District; SMUD=Sacramento Municipal Utilities District; SO_x=Sulfur Oxides; SRI=Solar Reflectance Index; TACs=Toxic Air Contaminants; TDM=Transportation Demand Management; TMA=Transportation Management Association; THC=Total Hydrocarbon; ULEV=Ultra Low Emission Vehicle; USGBC=U.S. Green Building Council; and VTPI=Victoria Transit Policy.

**Table 16
Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective	Feasible (Yes/No)		Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments
		Emissions Reduction/Score ²	Cost (Yes/No) ³	Technical ⁴			
							% reduction = % units deed-restricted below market rate housing * 0.04
MM D-8: Recharging Area	LD (R, M), SP, TP, AQP, RR, P/Mobile	NA/Low	Yes	Yes	Yes	Adverse: No Beneficial: CAPs, TACs	Provide residential buildings with a “utility” room or space for recharging batteries, whether for use in a car, electric lawnmower, other electric landscaping equipment, or even batteries for small items such as flashlights.
Mixed-Use Development Measures							
MM D-9: Urban Mixed-Use	LD (M), SP, TP, AQP, RR, P/Mobile	3%-9%/Moderate: SMAQMD presents this % reduction (TIAX 2005, EDAW 2006, SMAQMD 2007).	Yes	Yes (EPA 2006)	Yes (EPA 2006)	Adverse: No Beneficial: CAPs, TACs	CA air quality management and control districts and cities/counties (e.g., SMAQMD). Development of projects predominantly characterized by properties on which various uses, such as office, commercial, institutional, and residential, are combined in a single building or on a single site in an integrated development project with functional interrelationships and a coherent physical design.
MM D-10: Suburban Mixed-Use	LD (R, C, M), I, SP, TP, AQP, RR, P/Mobile	3%/Moderate: SMAQMD presents this % reduction (TIAX 2005, EDAW 2006, SMAQMD 2007).	Yes	Yes (EPA 2006)	Yes (EPA 2006)	Adverse: No Beneficial: CAPs, TACs	CA air quality management and control districts and cities/counties (e.g., SMAQMD). Have at least three of the following on site and/or offsite within one-quarter mile: Residential Development, Retail Development, Park, Open Space, or Office.
MM D-11: Other Mixed-Use	LD (R, M), SP, TP, AQP, RR, P/Mobile	1%/Moderate: SMAQMD presents this % reduction (TIAX 2005, EDAW	Yes	Yes (EPA 2006)	Yes (EPA 2006)	Adverse: No Beneficial: CAPs, TACs	CA air quality management and control districts and cities/counties (e.g., SMAQMD). All residential units are within one-quarter mile of parks, schools or other civic uses.

**Table 16
Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective	Feasible (Yes/No)		Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments	
		Emissions Reduction/Score ²	Cost (Yes/No) ³	Technical ⁴				Logistical ⁵
		2006, SMAQMD 2007).						
MM D-12: Infill Development	LD (R, C, M), I, SP, TP, AQP, RR, P/Mobile	3%-30%/High: Infill development reduces vehicle trips and VMT by 3% and 20%, respectively (Fehr & Peers 2007). CCAP identifies a site level VMT reduction range of 20%-30% (Dierkers et al. 2007).	Yes	Yes (Dierkers et al. 2007)	Yes (Dierkers et al. 2007)	Adverse: No Beneficial: CAPs, TACs	CA air quality management and control districts and cities/counties (e.g., SMAQMD).	Project site is on a vacant infill site, redevelopment area, or brownfield or greyfield lot that is highly accessible to regional destinations, where the destinations rating of the development site (measured as the weighted average travel time to all other regional destinations) is improved by 100% when compared to an alternate greenfield site.
Miscellaneous Measures								
MM D-13: Electric Lawnmower	LD (R, M), SP, AQP, RR, P/Area	1%/Low: SMAQMD presents this % reduction (EDAW 2006, SMAQMD 2007).	Yes	Yes	Yes	Adverse: No Beneficial: CAPs, TACs	CA air quality management and control districts and cities/counties (e.g., SMAQMD).	Provide a complimentary electric lawnmower to each residential buyer.

AG=Attorney General; ARB=California Air Resources Board; ASTM=American Society for Testing and Material; BAAQMD=Bay Area Air Quality Management District; BEES= Building for Environmental and Economic Sustainability; CA=California; Caltrans=California Department of Transportation; CAPs=Criteria Air Pollutants; CCAP=Center for Clean Air Policy; CF=Connectivity Factor; CIWMB=California Integrated Waste Management Board; CO= Carbon Monoxide; CO₂=Carbon Dioxide; DGS=Department of General Services; DOE=U.S. Department of Energy; DPF=Diesel particulate Filter; E85=85% Ethanol; EERE=Energy Efficiency and Renewable Energy; EOE=Encyclopedia of Earth; EPA=U.S. Environmental Protection Agency; ETC=Edmonton Trolley Coalition; EVs/CNG=Electric Vehicles/Compressed Natural Gas; FAR=Floor Area Ratio; GHG=Greenhouse Gas; ITE=Institute of Transportation Engineers; kg/m²=kilogram per square meter; km=Kilometer; lb=pound; LEED=Leadership in Energy and Environmental Design; M=Million; NA=Not Available; NEV=Neighborhood Electric Vehicle; NIST=National Institute of Standards and Technology; NO_x=Oxides of Nitrogen; NREL=National Renewable Energy Laboratory; N/S=North/South; PG&E=Pacific Gas and Electric; PM=Particulate Matter; SJVAPCD=San Joaquin Valley Air Pollution Control District; SMAQMD=Sacramento Metropolitan Air Quality Management District; SMUD=Sacramento Municipal Utilities District; SO_x=Sulfur Oxides; SRI=Solar Reflectance Index; TACs=Toxic Air Contaminants; TDM=Transportation Demand Management; TMA=Transportation Management Association; THC=Total Hydrocarbon; ULEV=Ultra Low Emission Vehicle; USGBC=U.S. Green Building Council; and VTPI=Victoria Transit Policy.

**Table 16
Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective		Feasible (Yes/No)		Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments
		Emissions Reduction/Score ²	Cost (Yes/No) ³	Technical ⁴	Logistical ⁵			
MM D-14: Enhanced Recycling/Waste Reduction, Reuse, Composting	LD (R, C, M), I, SP, AQP, RR, P/Stationary & Area	NA/Low	Yes	Yes	Yes: Association with social awareness.	Adverse: No Beneficial: CAPs, TACs	CIWMB	Provide infrastructure/education that promotes the avoidance of products with excessive packaging, recycle, buying of refills, separating of food and yard waste for composting, and using rechargeable batteries.
MM D-15: LEED Certification	LD (R, C, M), I, SP, AQP, RR, P/Stationary & Area	NA/Moderate	Yes: Receive tax rebates, incentives (e.g., EDAW San Diego office interior remodel cost \$1,700,000 for 32,500 square feet) (USGBC 2007)	Yes	Yes: More than 700 buildings of different certifications in CA (USGBC 2007).	Adverse: No Beneficial: CAPs, TACs	USGBC, CA air quality management and control districts and cities/counties (e.g., BAAQMD).	LEED promotes a whole-building approach to sustainability by recognizing performance in five key areas of human and environmental health: sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality.
MM D-16: Retro-Commissioning	LD (C, M), I, SP, AQP, RR, P/Stationary & Area	8%-10% reduction in energy usage/Moderate: (Mills et al. 2004)	Yes: Average \$0.28/square feet, varies with building size (Haasl and Sharp 1999).	Yes	Yes: 27 projects underway in CA, 21 more to be completed in 2007, mostly state buildings owned by DGS (DGS 2007).	Adverse: No Beneficial: CAPs, TACs	DGS, CA air quality management and control districts and cities/counties (e.g., BAAQMD).	The process ensures that all building systems perform interactively according to the contract documents, the design intent and the owner's operational needs to optimize energy performance.
MM D-17 Landscaping	LD (R, C, M), I, SP, AQP, RR,	NA/Low	Yes	Yes	Yes	Adverse: No Beneficial: CAPs, TACs	Alliance for the Chesapeake Bay, EPA Green Landscaping	Project shall use drought resistant native trees, trees with low emissions and high carbon

**Table 16
Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective		Feasible (Yes/No)		Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments
		Emissions Reduction/Score ²	Cost (Yes/No) ³	Technical ⁴	Logistical ⁵			
	P/Stationary & Area						Resources	sequestration potential. Evergreen trees on the north and west sides afford the best protection from the setting summer sun and cold winter winds. Additional considerations include the use of deciduous trees on the south side of the house that will admit summer sun; evergreen plantings on the north side will slow cold winter winds; constructing a natural planted channel to funnel summer cooling breezes into the house. Neighborhood CCR's not requiring that front and side yards of single family homes be planted with turf grass. Vegetable gardens, bunch grass, and low-water landscaping shall also be permitted, or even encouraged.
MM D-18: Local Farmers' Market	LD (M), SP/Mobile, Stationary, &	NA/Low	Yes	Yes	Yes: Associated with social	Adverse: No Beneficial: CAPs, TACs	Cities/counties (e.g., Davis, Sacramento)	Project shall dedicate space in a centralized, accessible location for a weekly farmers' market.

AG=Attorney General; ARB=California Air Resources Board; ASTM=American Society for Testing and Material; BAAQMD=Bay Area Air Quality Management District; BEES= Building for Environmental and Economic Sustainability; CA=California; Caltrans=California Department of Transportation; CAPs=Criteria Air Pollutants; CCAP=Center for Clean Air Policy; CF=Connectivity Factor; CIWMB=California Integrated Waste Management Board; CO= Carbon Monoxide; CO₂=Carbon Dioxide; DGS=Department of General Services; DOE=U.S. Department of Energy; DPF=Diesel particulate Filter; E85=85% Ethanol; EERE=Energy Efficiency and Renewable Energy; EOE=Encyclopedia of Earth; EPA=U.S. Environmental Protection Agency; ETC=Edmonton Trolley Coalition; EVs/CNG=Electric Vehicles/Compressed Natural Gas; FAR=Floor Area Ratio; GHG=Greenhouse Gas; ITE=Institute of Transportation Engineers; kg/m²=kilogram per square meter; km=Kilometer; lb=pound; LEED=Leadership in Energy and Environmental Design; M=Million; NA=Not Available; NEV=Neighborhood Electric Vehicle; NIST=National Institute of Standards and Technology; NO_x=Oxides of Nitrogen; NREL=National Renewable Energy Laboratory; N/S=North/South; PG&E=Pacific Gas and Electric; PM=Particulate Matter; SJVAPCD=San Joaquin Valley Air Pollution Control District; SMAQMD=Sacramento Metropolitan Air Quality Management District; SMUD=Sacramento Municipal Utilities District; SO_x=Sulfur Oxides; SRI=Solar Reflectance Index; TACs=Toxic Air Contaminants; TDM=Transportation Demand Management; TMA=Transportation Management Association; THC=Total Hydrocarbon; ULEV=Ultra Low Emission Vehicle; USGBC=U.S. Green Building Council; and VTPI=Victoria Transit Policy.

**Table 16
Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective		Feasible (Yes/No)		Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments
		Emissions Reduction/Score ²	Cost (Yes/No) ³	Technical ⁴	Logistical ⁵			
	Area							choice and public awareness.
MM D-19: Community Gardens	LD (M), SP/Mobile, Stationary, & Area	NA/Low	Yes	Yes	Yes: Associated with social choice and public awareness.	Adverse: No Beneficial: CAPs, TACs	Cities/counties (e.g., Davis)	Project shall dedicate space for community gardens.
Energy Efficiency/Building Component								
MM E-1: High-Efficiency Pumps	LD (R, C, M), SP, AQP, RR, P/Stationary & Area	NA/Low	Yes	Yes	Yes	Adverse: No Beneficial: CAPs, TACs	CA air quality management and control districts and cities/counties (e.g., BAAQMD).	Project shall use high-efficiency pumps.
MM E-2: Wood Burning Fireplaces/Stoves	LD (R, M), SP, AQP, RR, P/Stationary & Area	NA/Low: EDAW 2006	Yes	Yes	Yes	Adverse: No Beneficial: CAPs, TACs	CA air quality management and control districts and cities/counties (e.g., SMAQMD).	Project does not feature fireplaces or wood burning stoves.
MM E-3: Natural Gas Stove	LD (R, M), SP, AQP, RR, P/Stationary & Area	NA/Low: EDAW 2006	Yes: Cost of stove—\$350 (gas) and \$360 (electric) same brand, total yearly cost of \$42.17 as opposed to \$56.65 for electric (Saving Electricity 2006).	Yes	Yes	Adverse: No Beneficial: CAPs, TACs	CA air quality management and control districts and cities/counties (e.g., SMAQMD).	Project features only natural gas or electric stoves in residences.

**Table 16
Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective	Feasible (Yes/No)		Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments	
		Emissions Reduction/Score ²	Cost (Yes/No) ³	Technical ⁴				Logistical ⁵
MM E-4: Energy Star Roof	LD (R, C, M), I, SP, AQP, RR, P/Stationary & Area	0.5%-1%/Low: SMAQMD presents this % reduction (EDAW 2006, SMAQMD 2007).	Yes	Yes	Yes: 866 Energy Star labeled buildings in California (Energy Star 2007)	Adverse: No Beneficial: CAPs, TACs	CA air quality management and control districts and cities/counties (e.g., SMAQMD).	Project installs Energy Star labeled roof materials.
MM E-5: On- site Renewable Energy System	LD (R, C, M), I, SP, AQP, RR, P/Stationary & Area	1%-3%/Moderate: SMAQMD presents this % reduction (USGBC 2002 and 2005, EDAW 2006, SMAQMD 2007).	Yes	Yes (USGBC 2002 and 2005)	Yes (USGBC 2002 and 2005)	Adverse: No Beneficial: CAPs, TACs	CA air quality management and control districts and cities/counties (e.g., SMAQMD).	Project provides onsite renewable energy system(s). Nonpolluting and renewable energy potential includes solar, wind, geothermal, low-impact hydro, biomass and bio-gas strategies. When applying these strategies, projects may take advantage of net metering with the local utility.

AG=Attorney General; ARB=California Air Resources Board; ASTM=American Society for Testing and Material; BAAQMD=Bay Area Air Quality Management District; BEES= Building for Environmental and Economic Sustainability; CA=California; Caltrans=California Department of Transportation; CAPs=Criteria Air Pollutants; CCAP=Center for Clean Air Policy; CF=Connectivity Factor; CIWMB=California Integrated Waste Management Board; CO= Carbon Monoxide; CO₂=Carbon Dioxide; DGS=Department of General Services; DOE=U.S. Department of Energy; DPF=Diesel particulate Filter; E85=85% Ethanol; EERE=Energy Efficiency and Renewable Energy; EOE=Encyclopedia of Earth; EPA=U.S. Environmental Protection Agency; ETC=Edmonton Trolley Coalition; EVs/CNG=Electric Vehicles/Compressed Natural Gas; FAR=Floor Area Ratio; GHG=Greenhouse Gas; ITE=Institute of Transportation Engineers; kg/m²=kilogram per square meter; km=Kilometer; lb=pound; LEED=Leadership in Energy and Environmental Design; M=Million; NA=Not Available; NEV=Neighborhood Electric Vehicle; NIST=National Institute of Standards and Technology; NO_x=Oxides of Nitrogen; NREL=National Renewable Energy Laboratory; N/S=North/South; PG&E=Pacific Gas and Electric; PM=Particulate Matter; SJVAPCD=San Joaquin Valley Air Pollution Control District; SMAQMD=Sacramento Metropolitan Air Quality Management District; SMUD=Sacramento Municipal Utilities District; SO_x=Sulfur Oxides; SRI=Solar Reflectance Index; TACs=Toxic Air Contaminants; TDM=Transportation Demand Management; TMA=Transportation Management Association; THC=Total Hydrocarbon; ULEV=Ultra Low Emission Vehicle; USGBC=U.S. Green Building Council; and VTPI=Victoria Transit Policy.

**Table 16
Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective	Feasible (Yes/No)		Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments	
		Emissions Reduction/Score ²	Cost (Yes/No) ³	Technical ⁴				Logistical ⁵
MM E-6: Exceed Title 24	LD (R, C, M), I, GSP, AQP, RR, P/Stationary & Area	1%/Moderate: SMAQMD presents this % reduction (EDAW 2006, SMAQMD 2007).	Yes	Yes (PG&E 2002, SMUD 2006)	Yes (PG&E 2002, SMUD 2006)	Adverse: No Beneficial: CAPs, TACs	PG&E, SMUD, CA air quality management and control districts and cities/counties (e.g., SMAQMD).	Project exceeds title 24 requirements by 20%.
MM E-7: Solar Orientation	LD (R, C, M), I, SP, AQP, RR, P/Stationary & Area	0.5%/Low: SMAQMD presents this % reduction (EDAW 2006, SMAQMD 2007).	Yes	Yes	Yes	Adverse: No Beneficial: CAPs, TACs	CA air quality management and control districts and cities/counties (e.g., SMAQMD).	Project orients 75% or more of homes and/or buildings to face either north or south (within 30° of N/S). Building design includes roof overhangs that are sufficient to block the high summer sun, but not the lower winter sun, from penetrating south facing windows. Trees, other landscaping features and other buildings are sited in such a way as to maximize shade in the summer and maximize solar access to walls and windows in the winter.
MM E-8: Nonroof Surfaces	LD (R, C, M), I, GSP, AQP, RR, P/Stationary & Area	1.0%/Low: SMAQMD presents this % reduction (EDAW 2006, SMAQMD 2007).	Yes	Yes (USGBC 2002 and 2005)	Yes (USGBC 2002 and 2005)	Adverse: No Beneficial: CAPs, TACs	CA air quality management and control districts and cities/counties (e.g., SMAQMD).	Provide shade (within 5 years) and/or use light-colored/high-albedo materials (reflectance of at least 0.3) and/or open grid pavement for at least 30% of the site's nonroof impervious surfaces, including parking lots, walkways, plazas, etc.; OR place a minimum of 50% of parking spaces underground or covered by structured parking; OR use an open-grid pavement system (less than 50% impervious) for a minimum of

**Table 16
Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective		Feasible (Yes/No)		Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments
		Emissions Reduction/Score ²	Cost (Yes/No) ³	Technical ⁴	Logistical ⁵			
								50% of the parking lot area. The mitigation measure reduces heat islands (thermal gradient differences between developed and undeveloped areas to minimize impact on microclimate and human and wildlife habitats. This measure requires the use of patented or copyright protected methodologies created by the ASTM. The SRI is a measure of the constructed surface's ability to reflect solar heat, as shown by a small rise in temperature. It is defined so that a standard black (reflectance 0.05, emittance 0.90) is "0" and a standard white (reflectance 0.80, emittance 0.90) is 100. To calculate SRI for a given material, obtain the reflectance value and emittance value for the material. SRI is calculated according to ASTM E 1980-01. Reflectance is measured

AG=Attorney General; ARB=California Air Resources Board; ASTM=American Society for Testing and Material; BAAQMD=Bay Area Air Quality Management District; BEES= Building for Environmental and Economic Sustainability; CA=California; Caltrans=California Department of Transportation; CAPs=Criteria Air Pollutants; CCAP=Center for Clean Air Policy; CF=Connectivity Factor; CIWMB=California Integrated Waste Management Board; CO= Carbon Monoxide; CO₂=Carbon Dioxide; DGS=Department of General Services; DOE=U.S. Department of Energy; DPF=Diesel particulate Filter; E85=85% Ethanol; EERE=Energy Efficiency and Renewable Energy; EOE=Encyclopedia of Earth; EPA=U.S. Environmental Protection Agency; ETC=Edmonton Trolley Coalition; EVs/CNG=Electric Vehicles/Compressed Natural Gas; FAR=Floor Area Ratio; GHG=Greenhouse Gas; ITE=Institute of Transportation Engineers; kg/m²=kilogram per square meter; km=Kilometer; lb=pound; LEED=Leadership in Energy and Environmental Design; M=Million; NA=Not Available; NEV=Neighborhood Electric Vehicle; NIST=National Institute of Standards and Technology; NO_x=Oxides of Nitrogen; NREL=National Renewable Energy Laboratory; N/S=North/South; PG&E=Pacific Gas and Electric; PM=Particulate Matter; SJVAPCD=San Joaquin Valley Air Pollution Control District; SMAQMD=Sacramento Metropolitan Air Quality Management District; SMUD=Sacramento Municipal Utilities District; SO_x=Sulfur Oxides; SRI=Solar Reflectance Index; TACs=Toxic Air Contaminants; TDM=Transportation Demand Management; TMA=Transportation Management Association; THC=Total Hydrocarbon; ULEV=Ultra Low Emission Vehicle; USGBC=U.S. Green Building Council; and VTPI=Victoria Transit Policy.

**Table 16
Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective		Feasible (Yes/No)		Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments
		Emissions Reduction/Score ²	Cost (Yes/No) ³	Technical ⁴	Logistical ⁵			
								according to ASTM E 903, ASTM E 1918, or ASTM C 1549. Emittance is measured according to ASTM E 408 or ASTM C 1371. Default values for some materials will be available in the LEED-NC v2.2 Reference Guide.
MM E-9: Low-Energy Cooling	LD (C, M), I, SP, AQP, RR, P/Stationary & Area	1%-10%/Low: EDAW presents this percent reduction range (EDAW 2006).	Yes	Yes (USGBC 2002 and 2005)	Yes (USGBC 2002 and 2005)	Adverse: No Beneficial: CAPs, TACs	CA air quality management and control districts and cities/counties (e.g., SMAQMD).	Project optimizes building's thermal distribution by separating ventilation and thermal conditioning systems.
MM E-10: Green Roof	LD (R, C, M), I, SP, AQP, RR, P/Stationary & Area	1.0%/Moderate: SMAQMD presents this % reduction (EDAW 2006, SMAQMD 2007).	Yes	Yes (USGBC 2002 and 2005)	Yes (USGBC 2002 and 2005)	Adverse: Increased Water Consumption Beneficial: CAPs, TACs	CA air quality management and control districts and cities/counties (e.g., SMAQMD).	Install a vegetated roof that covers at least 50% of roof area. The reduction assumes that a vegetated roof is installed on a least 50% of the roof area or that a combination high albedo and vegetated roof surface is installed that meets the following standard: (Area of SRI Roof/0.75)+(Area of vegetated roof/0.5) >= Total Roof Area. Water consumption reduction measures shall be considered in the design of the green roof.
MM E-11: EV Charging Facilities	LD (C, M), SP, AQP, RR, P/Stationary & Area	NA/Low	Yes: \$500-\$5000/vehicle site (PG&E 1999)	Yes	Yes: 381 facilities in CA (Clean Air Maps 2007).	Adverse: No Beneficial: CAPs, TACs	DOE, EERE, CA air quality management and control districts and cities/counties (e.g., BAAQMD).	Project installs EV charging facilities.
MM E-12:	LD (R, C, M),	NA/Low: Increasing	Yes: Light	Yes	Yes: Apply	Adverse: No		Project provides light-colored

**Table 16
Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective	Feasible (Yes/No)		Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments
		Emissions Reduction/Score ²	Cost (Yes/No) ³	Technical ⁴			
Light-Colored Paving	I, SP, AQP, RR, P/Stationary & Area	the albedo of 1,250 km of pavement by 0.25 would save cooling energy worth \$15M per year.	colored aggregates and white cement are more expensive than gray cement. Certain blended cements are very light in color and may reflect similarly to white cement at an equivalent cost to normal gray cement.	Yes	natural sand or gravel colored single surface treatments to asphalt (EOE 2007).	CEC	paving (e.g., increased albedo pavement).
MM E-13: Cool Roofs	LD (R, C, M), I, SP, AQP, RR, P/Stationary & Area	NA/Low	Yes: 0.75–1.5/square feet coating (EPA 2007a)	Yes	Yes: Over 90% of the roofs in the United States are dark colored	CEC	Project provides cool roofs. Highly reflective, highly emissive roofing materials that stay 50-60°F cooler than a normal roof under a hot summer sun. CA's Cool Savings

AG=Attorney General; ARB=California Air Resources Board; ASTM=American Society for Testing and Material; BAAQMD=Bay Area Air Quality Management District; BEES= Building for Environmental and Economic Sustainability; CA=California; Caltrans=California Department of Transportation; CAPs=Criteria Air Pollutants; CCAP=Center for Clean Air Policy; CF=Connectivity Factor; CIWMB=California Integrated Waste Management Board; CO= Carbon Monoxide; CO₂=Carbon Dioxide; DGS=Department of General Services; DOE=U.S. Department of Energy; DPF=Diesel particulate Filter; E85=85% Ethanol; EERE=Energy Efficiency and Renewable Energy; EOE=Encyclopedia of Earth; EPA=U.S. Environmental Protection Agency; ETC=Edmonton Trolley Coalition; EVs/CNG=Electric Vehicles/Compressed Natural Gas; FAR=Floor Area Ratio; GHG=Greenhouse Gas; ITE=Institute of Transportation Engineers; kg/m²=kilogram per square meter; km=Kilometer; lb=pound; LEED=Leadership in Energy and Environmental Design; M=Million; NA=Not Available; NEV=Neighborhood Electric Vehicle; NIST=National Institute of Standards and Technology; NO_x=Oxides of Nitrogen; NREL=National Renewable Energy Laboratory; N/S=North/South; PG&E=Pacific Gas and Electric; PM=Particulate Matter; SJVAPCD=San Joaquin Valley Air Pollution Control District; SMAQMD=Sacramento Metropolitan Air Quality Management District; SMUD=Sacramento Municipal Utilities District; SO_x=Sulfur Oxides; SRI=Solar Reflectance Index; TACs=Toxic Air Contaminants; TDM=Transportation Demand Management; TMA=Transportation Management Association; THC=Total Hydrocarbon; ULEV=Ultra Low Emission Vehicle; USGBC=U.S. Green Building Council; and VTPI=Victoria Transit Policy.

**Table 16
Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective		Feasible (Yes/No)		Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments
		Emissions Reduction/Score ²	Cost (Yes/No) ³	Technical ⁴	Logistical ⁵			
					(EPA 2007a).			Program provided rebates to building owners for installing roofing materials with high solar reflectance and thermal emittance. The highest rebate went to roofs on air conditioned buildings, while buildings with rooftop ducts and other nonresidential buildings were eligible for slightly less. The program aimed to reduce peak summer electricity demand and was administered by the CEC.
MM E-14: Solar Water Heaters	LD (R, M), SP, AQP, RR, P/Stationary & Area	20%–70% reduction in cooling energy needs/Moderate	Yes: \$1675/20 square feet, requires a 50 gallon tank, annual operating cost of \$176 (DOE 2007).	Yes	Yes: Based on solar orientation, building codes, zoning ordinances.	Adverse: No Beneficial: CAPs, TACs	Europe	Project provides solar water heaters.
MM E-15: Electric Yard Equipment Compatibility	LD (R, M), SP, AQP, RR, P/Stationary & Area	NA/Low	Yes: \$75–\$250/outlet from existing circuit (Cost Helper 2007).	Yes	Yes	Adverse: No Beneficial: CAPs, TACs		Project provides electrical outlets at building exterior areas.
MM E-16: Energy Efficient Appliance Standards	LD (R, C, M), SP, AQP, RR, P/Stationary & Area	NA/Low	Yes: Varies for each appliance—higher capital costs, lower operating costs (Energy	Yes	Yes: Major retail stores.	Adverse: No Beneficial: CAPs, TACs		Project uses energy efficient appliances (e.g., Energy Star).

**Table 16
Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective	Feasible (Yes/No)		Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments	
		Emissions Reduction/Score ²	Cost (Yes/No) ³	Technical ⁴				Logistical ⁵
			Star 2007).					
MM E-17: Green Building Materials	LD (R, C, M), SP, AQP, RR, P/Stationary & Area	NA/Low: 25-30% more efficient on average.	Yes	Yes: BEES software allows users to balance the environmental and economic performance of building products; developed by NIST (NIST 2007).	Yes	Adverse: No Beneficial: CAPs, TACs	Project uses materials which are resource efficient, recycled, with long life cycles and manufactured in an environmentally friendly way.	
MM E-18: Shading Mechanisms	LD (R, C, M), I, SP, AQP, RR, P/Stationary, & Area	NA/Low: Up to \$450 annual energy savings (Energy Star 2007).	Yes: Higher capital costs, lower operating and maintenance costs (Energy Star 2007).	Yes	Yes: Major retail stores.	Adverse: No Beneficial: CAPs, TACs	Install energy-reducing shading mechanisms for windows, porch, patio and walkway overhangs.	

AG=Attorney General; ARB=California Air Resources Board; ASTM=American Society for Testing and Material; BAAQMD=Bay Area Air Quality Management District; BEES= Building for Environmental and Economic Sustainability; CA=California; Caltrans=California Department of Transportation; CAPs=Criteria Air Pollutants; CCAP=Center for Clean Air Policy; CF=Connectivity Factor; CIWMB=California Integrated Waste Management Board; CO= Carbon Monoxide; CO₂=Carbon Dioxide; DGS=Department of General Services; DOE=U.S. Department of Energy; DPF=Diesel particulate Filter; E85=85% Ethanol; EERE=Energy Efficiency and Renewable Energy; EOE=Encyclopedia of Earth; EPA=U.S. Environmental Protection Agency; ETC=Edmonton Trolley Coalition; EVs/CNG=Electric Vehicles/Compressed Natural Gas; FAR=Floor Area Ratio; GHG=Greenhouse Gas; ITE=Institute of Transportation Engineers; kg/m²=kilogram per square meter; km=Kilometer; lb=pound; LEED=Leadership in Energy and Environmental Design; M=Million; NA=Not Available; NEV=Neighborhood Electric Vehicle; NIST=National Institute of Standards and Technology; NO_x=Oxides of Nitrogen; NREL=National Renewable Energy Laboratory; N/S=North/South; PG&E=Pacific Gas and Electric; PM=Particulate Matter; SJVAPCD=San Joaquin Valley Air Pollution Control District; SMAQMD=Sacramento Metropolitan Air Quality Management District; SMUD=Sacramento Municipal Utilities District; SO_x=Sulfur Oxides; SRI=Solar Reflectance Index; TACs=Toxic Air Contaminants; TDM=Transportation Demand Management; TMA=Transportation Management Association; THC=Total Hydrocarbon; ULEV=Ultra Low Emission Vehicle; USGBC=U.S. Green Building Council; and VTPI=Victoria Transit Policy.

**Table 16
Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective	Feasible (Yes/No)		Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments
		Emissions Reduction/Score ²	Cost (Yes/No) ³	Technical ⁴			
MM E-19: Ceiling/Whole-House Fans	LD (R, C, M), I, SP, AQP, RR, P/Stationary, & Area	NA/Low: 50% more efficient than conventional fans (Energy Star 2007).	Yes: \$45-\$200/fan, installation extra (Lowe's 2007).	Yes	Yes: Major retail stores.	Adverse: No Beneficial: CAPs, TACs	Install energy-reducing ceiling/whole-house fans.
MM E-20: Programmable Thermostats	LD (R, C, M), I, SP, AQP, RR, P/Stationary, & Area	NA/Low: \$100 annual savings in energy costs (Energy Star 2007).	Yes: \$60/LCD display and 4 settings for typical residential use (Lowe's 2007).	Yes	Yes: Major retail stores.	Adverse: Yes, Mercury Beneficial: CAPs, TACs	Install energy-reducing programmable thermostats that automatically adjust temperature settings.
MM E-21: Passive Heating and Cooling Systems	LD (R, C, M), I, SP, AQP, RR, P/Stationary, & Area	NA/Low	Yes: \$800 (wall heaters) to \$4,000+ (central systems)	Yes	Yes	Adverse: No Beneficial: CAPs, TACs	Install energy-reducing passive heating and cooling systems (e.g., insulation and ventilation).
MM E-22: Day Lighting Systems	LD (R, C, M), I, SP, AQP, RR, P/Stationary, & Area	NA/Low	Yes: \$1,300 to \$1,500 depending upon the kind of roof (Barrier 1995), installation extra.	Yes	Yes: Work well only for space near the roof of the building, little benefit in multi-floor buildings.	Adverse: No Beneficial: CAPs, TACs	Install energy-reducing day lighting systems (e.g., skylights, light shelves and interior transom windows).
MM E-23: Low-Water Use Appliances	LD (R, C, M), I, SP, AQP, RR, P/Stationary, & Area	NA/Low: Avoided water agency cost for using water-efficient kitchen pre-rinse spray valves of \$65.18 per acre-foot.	Yes: Can return their cost through reduction in water consumption,	Yes	Yes	Adverse: No Beneficial: CAPs, TACs	Require the installation of low-water use appliances.

**Table 16
Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective	Feasible (Yes/No)		Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments
			Emissions Reduction/Score ²	Cost (Yes/No) ³			
							pumping, and treatment.
MM E-24: Goods Transport by Rail	LD (C, M), I, SP, AQP, RR, P/Mobile	NA/Moderate	Yes	Yes	Yes	Adverse: No Beneficial: CAPs, TACs	ARB Goods Movement Plan (ARB 2007) Provide a spur at nonresidential projects to use nearby rail for goods movement.
Social Awareness/Education							
MM S-1: GHG Emissions Reductions Education	LD (R, C, M), I, SP, TP, AQP, RR, P/Mobile, Stationary, & Mobile	NA/Low	Yes	Yes	Yes: Similar programs currently exist in CA.	Adverse: No Beneficial: CAPs, TACs	Provide local governments, businesses, and residents with guidance/protocols/information on how to reduce GHG emissions (e.g., energy saving, food miles).
MM S-2: School Curriculum	LD (R, C, M), I, SP, TP, AQP, RR, P/Mobile, Stationary, & Mobile	NA/Low	Yes	Yes	Yes: Similar programs currently exist in CA.	Adverse: No Beneficial: CAPs, TACs	Include how to reduce GHG emissions (e.g., energy saving, food miles) in the school curriculum.
Construction							
MM C-1: ARB-Certified Diesel Construction Equipment	LD (R, C, M), I, SP, TP, AQP, RR, P/Mobile	NA/Low	Yes: Oxidation Catalysts, \$1,000-	Yes	Yes	Adverse: Yes, NO _x Beneficial: CAPs, TACs	AG, EPA, ARB, and CA air quality management and pollution control districts. Use ARB-certified diesel construction equipment. Increases CO ₂ emissions when trapped CO and carbon particles

AG=Attorney General; ARB=California Air Resources Board; ASTM=American Society for Testing and Material; BAAQMD=Bay Area Air Quality Management District; BEES= Building for Environmental and Economic Sustainability; CA=California; Caltrans=California Department of Transportation; CAPs=Criteria Air Pollutants; CCAP=Center for Clean Air Policy; CF=Connectivity Factor; CIWMB=California Integrated Waste Management Board; CO= Carbon Monoxide; CO₂=Carbon Dioxide; DGS=Department of General Services; DOE=U.S. Department of Energy; DPF=Diesel particulate Filter; E85=85% Ethanol; EERE=Energy Efficiency and Renewable Energy; EOE=Encyclopedia of Earth; EPA=U.S. Environmental Protection Agency; ETC=Edmonton Trolley Coalition; EVs/CNG=Electric Vehicles/Compressed Natural Gas; FAR=Floor Area Ratio; GHG=Greenhouse Gas; ITE=Institute of Transportation Engineers; kg/m²=kilogram per square meter; km=Kilometer; lb=pound; LEED=Leadership in Energy and Environmental Design; M=Million; NA=Not Available; NEV=Neighborhood Electric Vehicle; NIST=National Institute of Standards and Technology; NO_x=Oxides of Nitrogen; NREL=National Renewable Energy Laboratory; N/S=North/South; PG&E=Pacific Gas and Electric; PM=Particulate Matter; SJVAPCD=San Joaquin Valley Air Pollution Control District; SMAQMD=Sacramento Metropolitan Air Quality Management District; SMUD=Sacramento Municipal Utilities District; SO_x=Sulfur Oxides; SRI=Solar Reflectance Index; TACs=Toxic Air Contaminants; TDM=Transportation Demand Management; TMA=Transportation Management Association; THC=Total Hydrocarbon; ULEV=Ultra Low Emission Vehicle; USGBC=U.S. Green Building Council; and VTPI=Victoria Transit Policy.

**Table 16
Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective	Feasible (Yes/No)		Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments
			Emissions Reduction/Score ²	Cost (Yes/No) ³			
			\$2,000. DPF, \$5000-\$10,000; installation extra (EPA 2007b).				are oxidized (Catalyst Products 2007, ETC 2007).
MM C-2: Alternative Fuel Construction Equipment	LD (R, C, M), NA/Low I, SP, TP, AQP, RR, P/Mobile	Yes	Yes	Yes	Adverse: Yes, THC, NO _x Beneficial: CO, PM, SO _x	AG, EPA, ARB, and CA air quality management and pollution control districts.	Use alternative fuel types for construction equipment. At the tailpipe biodiesel emits 10% more CO ₂ than petroleum diesel. Overall lifecycle emissions of CO ₂ from 100% biodiesel are 78% lower than those of petroleum diesel (NREL 1998, EPA 2007b).
MM C-3: Local Building Materials	LD (R, C, M), NA/Low I, SP, TP, AQP, RR, P/Mobile	Yes	Yes	Yes: Depends on location of building material manufacture sites.	Adverse: No Beneficial: CAPs, TACs		Use locally made building materials for construction of the project and associated infrastructure.
MM C-4: Recycle Demolished Construction Material	LD (R, C, M), NA/Low I, SP, TP, AQP, RR, P/Mobile	Yes	Yes	Yes	Adverse: No Beneficial: CAPs, TACs		Recycle/Reuse demolished construction material. Use locally made building materials for construction of the project and associated infrastructure.

**Table 16
Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective	Feasible (Yes/No)		Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments
		Emissions Reduction/Score ²	Cost (Yes/No) ³	Technical ⁴			
Miscellaneous							
MM M-1: Off-Site Mitigation Fee Program	LD (R, C, M), I, SP, TP, AQP, RR, P/Mobile & Area	NA/Moderate-High: Though there is currently no program in place, the potential for real and quantifiable reductions of GHG emissions could be high if a defensible fee program were designed.	Yes	Yes	No: Program does not exist in CA, but similar programs currently exist (e.g., Carl Moyer Program, SJVAPCD Rule 9510, SMAQMD Off-Site Construction Mitigation Fee Program).	Adverse: No Beneficial: CAPs, TACs	Provide/Pay into an off-site mitigation fee program, which focuses primarily on reducing emissions from existing development and buildings through retro-fit (e.g., increased insulation).
MM M-2: Offset Purchase	LD (R, C, M), I, SP, TP, AQP, RR, P/Mobile, Stationary, & Area	NA/Low	Yes	Yes	No: ARB has not adopted official program, but similar programs	No	Provide/purchase offsets for additional emissions by acquiring carbon credits or engaging in other market “cap and trade” systems.

AG=Attorney General; ARB=California Air Resources Board; ASTM=American Society for Testing and Material; BAAQMD=Bay Area Air Quality Management District; BEES= Building for Environmental and Economic Sustainability; CA=California; Caltrans=California Department of Transportation; CAPs=Criteria Air Pollutants; CCAP=Center for Clean Air Policy; CF=Connectivity Factor; CIWMB=California Integrated Waste Management Board; CO= Carbon Monoxide; CO₂=Carbon Dioxide; DGS=Department of General Services; DOE=U.S. Department of Energy; DPF=Diesel particulate Filter; E85=85% Ethanol; EERE=Energy Efficiency and Renewable Energy; EOE=Encyclopedia of Earth; EPA=U.S. Environmental Protection Agency; ETC=Edmonton Trolley Coalition; EVs/CNG=Electric Vehicles/Compressed Natural Gas; FAR=Floor Area Ratio; GHG=Greenhouse Gas; ITE=Institute of Transportation Engineers; kg/m²=kilogram per square meter; km=Kilometer; lb=pound; LEED=Leadership in Energy and Environmental Design; M=Million; NA=Not Available; NEV=Neighborhood Electric Vehicle; NIST=National Institute of Standards and Technology; NO_x=Oxides of Nitrogen; NREL=National Renewable Energy Laboratory; N/S=North/South; PG&E=Pacific Gas and Electric; PM=Particulate Matter; SJVAPCD=San Joaquin Valley Air Pollution Control District; SMAQMD=Sacramento Metropolitan Air Quality Management District; SMUD=Sacramento Municipal Utilities District; SO_x=Sulfur Oxides; SRI=Solar Reflectance Index; TACs=Toxic Air Contaminants; TDM=Transportation Demand Management; TMA=Transportation Management Association; THC=Total Hydrocarbon; ULEV=Ultra Low Emission Vehicle; USGBC=U.S. Green Building Council; and VTPI=Victoria Transit Policy.

**Table 16
Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective	Feasible (Yes/No)		Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments
		Emissions Reduction/Score ²	Cost (Yes/No) ³	Technical ⁴			
currently exist.							
Regional Transportation Plan Measures							
MM RTP-1: Dedicate High Occupancy Vehicle (HOV) lanes prior to adding capacity to existing highways.	RTP	Yes	Yes	Yes	Adverse: possible local CO Beneficial: regional CAPs, TACs	Caltrans, local government	Evaluate the trip reduction (and GHG reduction) potential of adding HOV lanes prior to adding standard lanes.
MM RTP-2: Implement toll/user fee programs prior to adding capacity to existing highways.	RTP	Yes	Yes	Yes	Adverse: possible local CO. Beneficial: regional CAPs, TACs	Caltrans	Evaluate price elasticity and associated trip reduction (and GHG reduction) potential with adding or increasing tolls prior to adding capacity to existing highways.
<p>Note: ¹ Where LD (R, C, M) =Land Development (Residential, Commercial, Mixed-Use), I=Industrial, GP=General Plan, SP=Specific Plan, TP=Transportation Plans, AQP=Air Quality Plans, RR=Rules/Regulations, and P=Policy. It is important to note that listed project types may not be directly specific to the mitigation measure (e.g., TP, AQP, RR, and P) as such could apply to a variety of source types, especially RR and P. ² This score system entails ratings of high, moderate, and low that refer to the level of the measure to provide a substantive, reasonably certain (e.g., documented emission reductions with proven technologies), and long-term reduction of GHG emissions. ³ Refers to whether the measure would provide a cost-effective reduction of GHG emissions based on available documentation. ⁴ Refers to whether the measure is based on currently, readily available technology based on available documentation. ⁵ Refers to whether the measure could be implemented without extraordinary effort based on available documentation. ⁶ List is not meant to be all inclusive. Source: Data compiled by EDAW in 2007</p>							

**Table 17
General Planning Level Mitigation Strategies Summary**

Strategy	Source Type ¹	Agency/Organization ²	Description/Comments
MS G-1: Adopt a GHG reduction plan	GP/ Mobile, Stationary, & Area	City of San Bernardino	<p>- Adopt GHG reduction targets for the planning area, based on the current legislation providing direction for state-wide targets, and update the plan as necessary.</p> <p>-The local government agency should serve as a model by inventorying its GHG emissions from agency operations, and implementing those reduction goals.</p>
Circulation			
MS G-2: Provide for convenient and safe local travel	GP/ Mobile	Cities/Counties (e.g., Aliso Viejo, Claremont)	<p>- Create a gridded street pattern with small block sizes. This promotes walkability through direct routing and ease of navigation.</p> <p>-Maintain a high level of connectivity of the roadway network. Minimize cul-de-sacs and incomplete roadway segments.</p> <p>-Plan and maintain an integrated, hierarchical and multi-modal system of roadways, pedestrian walks, and bicycle paths throughout the area.</p> <p>-Apply creative traffic management approaches to address congestion in areas with unique problems, particularly on roadways and intersections in the vicinity of schools in the morning and afternoon peak hours, and near churches, parks and community centers.</p> <p>-Work with adjacent jurisdictions to address the impacts of regional development patterns (e.g. residential development in surrounding communities, regional universities, employment centers, and commercial developments) on the circulation system.</p> <p>-Actively promote walking as a safe mode of local travel, particularly for children attending local schools. -Employ traffic calming methods such as median landscaping and provision of bike or transit lanes to slow traffic, improve roadway capacity, and address safety issues.</p>
MS G-3: Enhance the regional transportation network and maintain effectiveness	GP/ Mobile	Cities/Counties (e.g., Aliso Viejo, Claremont)	<p>-Encourage the transportation authority to reduce fees for short distance trips.</p> <p>-Ensure that improvements to the traffic corridors do not negatively impact the operation of local roadways and land uses.</p>

Table 17
General Planning Level Mitigation Strategies Summary

Strategy	Source Type ¹	Agency/Organization ²	Description/Comments
			<p>-Cooperate with adjacent jurisdictions to maintain adequate service levels at shared intersections and to provide adequate capacity on regional routes for through traffic.</p> <p>-Support initiatives to provide better public transportation. Work actively to ensure that public transportation is part of every regional transportation corridor.</p> <p>- Coordinate the different modes of travel to enable users to transfer easily from one mode to another.</p> <p>-Work to provide a strong paratransit system that promotes the mobility of all residents and educate residents about local mobility choices.</p> <p>- Promote transit-oriented development to facilitate the use of the community’s transit services.</p>
<p>MS G-4: Promote and support an efficient public transportation network connecting activity centers in the area to each other and the region.</p>	<p>GP/ Mobile</p>	<p>Cities/Counties (e.g., Aliso Viejo, Claremont)</p>	<p>-Promote increased use of public transportation and support efforts to increase bus service range and frequency within the area as appropriate.</p> <p>-Enhance and encourage provision of attractive and appropriate transit amenities, including shaded bus stops, to encourage use of public transportation.</p> <p>-Encourage the school districts, private schools and other operators to coordinate local bussing and to expand ride-sharing programs. All bussing options should be fully considered before substantial roadway improvements are made in the vicinity of schools to ease congestion.</p>
<p>MS G-5: Establish and maintain a comprehensive system, which is safe and convenient, of pedestrian ways and bicycle routes that provide viable options to travel by automobile.</p>	<p>GP/ Mobile</p>	<p>Cities/Counties (e.g., Aliso Viejo, Claremont)</p>	<p>-Improve area sidewalks and rights-of-way to make them efficient and appealing for walking and bicycling safely. Coordinate with adjacent jurisdictions and regional agencies to improve pedestrian and bicycle trails, facilities, signage, and amenities.</p> <p>-Provide safe and convenient pedestrian and bicycle connections to and from town centers, other commercial districts, office complexes, neighborhoods, schools, other major activity centers, and surrounding communities.</p> <p>-Work with neighboring jurisdictions to provide well-designed pedestrian and bicycle crossings of major roadways.</p> <p>-Promote walking throughout the community. Install sidewalks where missing and make improvements</p>

**Table 17
General Planning Level Mitigation Strategies Summary**

Strategy	Source Type ¹	Agency/Organization ²	Description/Comments
			<p>to existing sidewalks for accessibility purposes. Particular attention should be given to needed sidewalk improvement near schools and activity centers.</p> <ul style="list-style-type: none"> -Encourage businesses or residents to sponsor street furniture and landscaped areas. - Strive to provide pedestrian pathways that are well shaded and pleasantly landscaped to encourage use. - Attract bicyclists from neighboring communities to ride their bicycles or to bring their bicycles on the train to enjoy bicycling around the community and to support local businesses. - Meet guidelines to become nationally recognized as a Bicycle-Friendly community. - Provide for an education program and stepped up code enforcement to address and minimize vegetation that degrades access along public rights-of-way. -Engage in discussions with transit providers to increase the number of bicycles that can be accommodated on buses
MS G-6: Achieve optimum use of regional rail transit.	GP/ Mobile	Cities/Counties (e.g., Aliso Viejo, Claremont)	<ul style="list-style-type: none"> -Support regional rail and work with rail authority to expand services. - Achieve better integration of all transit options. -Work with regional transportation planning agencies to finance and provide incentives for multimodal transportation systems. - Promote activity centers and transit-oriented development projects around the transit station.
MS G-7: Expand and optimize use of local and regional bus and transit systems.	GP/ Mobile	Cities/Counties (e.g., Aliso Viejo, Claremont)	<ul style="list-style-type: none"> -Encourage convenient public transit service between area and airports. -Support the establishment of a local shuttle to serve commercial centers. -Promote convenient, clean, efficient, and accessible public transit that serves transit-dependent riders and attracts discretionary riders as an alternative to reliance on single-occupant automobiles.

**Table 17
General Planning Level Mitigation Strategies Summary**

Strategy	Source Type ¹	Agency/Organization ²	Description/Comments
			<ul style="list-style-type: none"> - Empower seniors and those with physical disabilities who desire maximum personal freedom and independence of lifestyle with unimpeded access to public transportation. -Integrate transit service and amenities with surrounding land uses and buildings.
Conservation, Open Space			
<p>MS G-8: Emphasize the importance of water conservation and maximizing the use of native, low-water landscaping.</p>	<p>GP/Stationary & Area</p>	<p>Cities/Counties (e.g., Aliso Viejo, Claremont)</p>	<ul style="list-style-type: none"> -Reduce the amount of water used for landscaping and increase use of native and low water plants. Maximize use of native, low-water plants for landscaping of areas adjacent to sidewalks or other impermeable surfaces. -Encourage the production, distribution and use of recycled and reclaimed water for landscaping projects throughout the community, while maintaining urban runoff water quality objectives. -Promote water conservation measures, reduce urban runoff, and prevent groundwater pollution within development projects, property maintenance, area operations and all activities requiring approval. -Educate the public about the importance of water conservation and avoiding wasteful water habits. -Work with water provider in exploring water conservation programs, and encourage the water provider to offer incentives for water conservation.
<p>MS G-9: Improve air quality within the region.</p>	<p>GP/ Mobile, Stationary, & Area</p>	<p>Cities/Counties (e.g., Aliso Viejo, Claremont)</p>	<ul style="list-style-type: none"> -Integrate air quality planning with area land use, economic development and transportation planning efforts. -Support programs that reduce air quality emissions related to vehicular travel. -Support alternative transportation modes and technologies, and develop bike- and pedestrian-friendly neighborhoods to reduce emissions associated with automobile use. -Encourage the use of clean fuel vehicles. -Promote the use of fuel-efficient heating and cooling equipment and other appliances, such as water

Table 17
General Planning Level Mitigation Strategies Summary

Strategy	Source Type ¹	Agency/Organization ²	Description/Comments
			<p>heaters, swimming pool heaters, cooking equipment, refrigerators, furnaces, and boiler units.</p> <ul style="list-style-type: none"> - Promote the use of clean air technologies such as fuel cell technologies, renewable energy sources, UV coatings, and alternative, non-fossil fuels. -Require the planting of street trees along streets and inclusion of trees and landscaping for all development projects to help improve airshed and minimize urban heat island effects. - Encourage small businesses to utilize clean, innovative technologies to reduce air pollution. - Implement principles of green building. - Support jobs/housing balance within the community so more people can both live and work within the community. To reduce vehicle trips, encourage people to telecommute or work out of home or in local satellite offices.
<p>MS G-10: Encourage and maximize energy conservation and identification of alternative energy sources.</p>	<p>GP/ Stationary & Area</p>	<p>Cities/Counties (e.g., Aliso Viejo, Claremont)</p>	<ul style="list-style-type: none"> -Encourage green building designs for new construction and renovation projects within the area. -Coordinate with regional and local energy suppliers to ensure adequate supplies of energy to meet community needs, implement energy conservation and public education programs, and identify alternative energy sources where appropriate. -Encourage building orientations and landscaping that enhance natural lighting and sun exposure. -Encourage expansion of neighborhood-level products and services and public transit opportunities throughout the area to reduce automobile use. - Incorporate the use of energy conservation strategies in area projects. - Promote energy-efficient design features, including appropriate site orientation, use of light color roofing and building materials, and use of evergreen trees and wind-break trees to reduce fuel consumption for heating and cooling.

Table 17
General Planning Level Mitigation Strategies Summary

Strategy	Source Type ¹	Agency/Organization ²	Description/Comments
			<ul style="list-style-type: none"> -Explore and consider the cost/benefits of alternative fuel vehicles including hybrid, natural gas, and hydrogen powered vehicles when purchasing new vehicles. -Continue to promote the use of solar power and other energy conservation measures. - Encourage residents to consider the cost/benefits of alternative fuel vehicles. - Promote the use of different technologies that reduce use of non-renewable energy resources. -Facilitate the use of green building standards and LEED in both private and public projects. -Promote sustainable building practices that go beyond the requirements of Title 24 of the California Administrative Code, and encourage energy-efficient design elements, as appropriate. -Support sustainable building practices that integrate building materials and methods that promote environmental quality, economic vitality, and social benefit through the design, construction, and operation of the built environment. - Investigate the feasibility of using solar (photovoltaic) street lights instead of conventional street lights that are powered by electricity in an effort to conserve energy. - Encourage cooperation between neighboring development to facilitate on-site renewable energy supplies or combined heat and power co-generation facilities that can serve the energy demand of contiguous development.

Table 17
General Planning Level Mitigation Strategies Summary

Strategy	Source Type ¹	Agency/Organization ²	Description/Comments
<p>MS G-11: Preserve unique community forests, and provide for sustainable increase and maintenance of this valuable resource.</p>	<p>GP/Stationary & Area</p>	<p>Cities/Counties (e.g., Aliso Viejo, Claremont)</p>	<ul style="list-style-type: none"> - Develop a tree planting policy that strives to accomplish specific % shading of constructed paved and concrete surfaces within five years of construction. -Provide adequate funding to manage and maintain the existing forest, including sufficient funds for tree planting, pest control, scheduled pruning, and removal and replacement of dead trees. -Coordinate with local and regional plant experts in selecting tree species that respect the natural region in which Claremont is located, to help create a healthier, more sustainable urban forest. - Continue to plant new trees (in particular native tree species where appropriate), and work to preserve mature native trees. -Increase the awareness of the benefits of street trees and the community forest through a area wide education effort. -Encourage residents to properly care for and preserve large and beautiful trees on their own private property.
Housing			
<p>MS G-12: Provide affordability levels to meet the needs of community residents.</p>	<p>GP/ Mobile</p>	<p>Cities/Counties (e.g., Aliso Viejo, Claremont)</p>	<ul style="list-style-type: none"> -Encourage development of affordable housing opportunities throughout the community, as well as development of housing for elderly and low and moderate income households near public transportation services. -Ensure a portion of future residential development is affordable to low and very low income households.
Land Use			
<p>MS G-13: Promote a visually-cohesive urban form and establish connections between the urban core and outlying portions of the</p>	<p>GP/ Mobile, Stationary, & Area</p>	<p>Cities/Counties (e.g., Aliso Viejo, Claremont)</p>	<ul style="list-style-type: none"> -Preserve the current pattern of development that encourages more intense and higher density development at the core of the community and less intense uses radiating from the central core. -Create and enhance landscaped greenway, trail and sidewalk connections between neighborhoods and to commercial areas, town centers, and parks.

**Table 17
General Planning Level Mitigation Strategies Summary**

Strategy	Source Type ¹	Agency/Organization ²	Description/Comments
community.			<p>-Identify ways to visually identify and physically connect all portions of the community, focusing on enhanced gateways and unifying isolated and/or outlying areas with the rest of the area.</p> <p>-Study and create a diverse plant identity with emphasis on drought-resistant native species.</p>
<p>MS G-14: Provide a diverse mix of land uses to meet the future needs of all residents and the business community.</p>	GP/ Mobile	<p>Cities/Counties (e.g., Aliso Viejo, Claremont)</p>	<p>-Attract a broad range of additional retail, medical, and office uses providing employment at all income levels.</p> <p>-Support efforts to provide beneficial civic, religious, recreational, cultural and educational opportunities and public services to the entire community.</p> <p>-Coordinate with public and private organizations to maximize the availability and use of parks and recreational facilities in the community.</p> <p>-Support development of hotel and recreational commercial land uses to provide these amenities to local residents and businesses.</p>
<p>MS G-15: Collaborate with providers of solid waste collection, disposal and recycling services to ensure a level of service that promotes a clean community and environment.</p>	GP/ Stationary, & Area	<p>Cities/Counties (e.g., Aliso Viejo, Claremont)</p>	<p>-Require recycling, composting, source reduction and education efforts throughout the community, including residential, businesses, industries, and institutions, within the construction industry, and in all sponsored activities.</p>
<p>MS G-16: Promote construction, maintenance and active use of publicly- and privately-operated parks, recreation programs, and a community center.</p>	GP/ Mobile	<p>Cities/Counties (e.g., Aliso Viejo, Claremont)</p>	<p>-Work to expand and improve community recreation amenities including parks, pedestrian trails and connections to regional trail facilities.</p> <p>-As a condition upon new development, require payment of park fees and/or dedication and provision of parkland, recreation facilities and/or multi-use trails that improve the public and private recreation system.</p> <p>-Research options or opportunities to provide necessary or desired community facilities.</p>

**Table 17
General Planning Level Mitigation Strategies Summary**

Strategy	Source Type ¹	Agency/Organization ²	Description/Comments
MS G-17: Promote the application of sustainable development practices.	GP/ Mobile, Stationary, & Area	Cities/Counties (e.g., Aliso Viejo, Claremont)	<ul style="list-style-type: none"> - Encourage sustainable development that incorporates green building best practices and involves the reuse of previously developed property and/or vacant sites within a built-up area. - Encourage the conservation, maintenance, and rehabilitation of the existing housing stock. -Encourage development that incorporates green building practices to conserve natural resources as part of sustainable development practices. -Avoid development of isolated residential areas in the hillsides or other areas where such development would require significant infrastructure investment, adversely impact biotic resources. - Provide land area zoned for commercial and industrial uses to support a mix of retail, office, professional, service, and manufacturing businesses.
MS G-18: Create activity nodes as important destination areas, with an emphasis on public life within the community.	GP/ Mobile	Cities/Counties (e.g., Aliso Viejo, Claremont)	<ul style="list-style-type: none"> -Provide pedestrian amenities, traffic-calming features, plazas and public areas, attractive streetscapes, shade trees, lighting, and retail stores at activity nodes. -Provide for a mixture of complementary retail uses to be located together to create activity nodes to serve adjacent neighborhoods and to draw visitors from other neighborhoods and from outside the area.
MS G-19: Make roads comfortable, safe, accessible, and attractive for use day and night.	GP/ Mobile	Cities/Counties (e.g., Aliso Viejo, Claremont)	<ul style="list-style-type: none"> -Provide crosswalks and sidewalks along streets that are accessible for people with disabilities and people who are physically challenged. -Provide lighting for walking and nighttime activities, where appropriate. -Provide transit shelters that are comfortable, attractive, and accommodate transit riders.
MS G-20: Maintain and expand where possible the system of neighborhood connections that attach neighborhoods to larger roadways.	GP/ Mobile	Cities/Counties (e.g., Aliso Viejo, Claremont)	<ul style="list-style-type: none"> - Provide sidewalks where they are missing, and provide wide sidewalks where appropriate with buffers and shade so that people can walk comfortably. -Make walking comfortable at intersections through traffic-calming, landscaping, and designated crosswalks.

**Table 17
General Planning Level Mitigation Strategies Summary**

Strategy	Source Type ¹	Agency/Organization ²	Description/Comments
MS G-21: Create distinctive places throughout the area.	GP/ Mobile	Cities/Counties (e.g., Aliso Viejo, Claremont)	<ul style="list-style-type: none"> -Look for opportunities for connections along easements & other areas where vehicles not permitted. -Provide benches, streetlights, public art, and other amenities in public areas to attract pedestrian activities. -Encourage new developments to incorporate drought tolerant and native landscaping that is pedestrian friendly, attractive, and consistent with the landscaped character of area. -Encourage all new development to preserve existing mature trees. -Encourage streetscape design programs for commercial frontages that create vibrant places which support walking, bicycling, transit, and sustainable economic development. -Encourage the design and placement of buildings on lots to provide opportunities for natural systems such as solar heating and passive cooling. - Ensure that all new industrial development projects are positive additions to the community setting, provide amenities for the comfort of the employees such as outdoor seating area for breaks or lunch, and have adequate landscape buffers.
MS G-22: Reinvest in existing neighborhoods and promote infill development as a preference over new, greenfield development	GP/ Mobile, Stationary, & Area	Cities/Counties (e.g., Aliso Viejo, Claremont)	<ul style="list-style-type: none"> - Identify all underused properties in the plan area and focus development in these opportunity sites prior to designating new growth areas for development. - Implement programs to retro-fit existing structures to make them more energy-efficient. -Encourage compact development, by placing the desired activity areas in smaller spaces.

Table 17
General Planning Level Mitigation Strategies Summary

Strategy	Source Type ¹	Agency/Organization ²	Description/Comments
Public Safety			
MS G-23: Promote a safe community in which residents can live, work, shop, and play.	GP/ Mobile	Cities/Counties (e.g., Aliso Viejo, Claremont)	<ul style="list-style-type: none"> - Foster an environment of trust by ensuring non-biased policing, and by adopting policies and encouraging collaboration that creates transparency. - Facilitate traffic safety for motorists and pedestrians through proper street design and traffic monitoring.
<p>Note: ¹ Where GP=General Plan. ² List is not meant to be all inclusive. Source: Data compiled by EDAW in 2007</p>			

Appendix C: General Plan Policy List

Policies are grouped by topical area and not by the order in which they appear in the General Plan

Policy Number	General Plan Policy
Air Quality and Greenhouse Gas Policies	
12.3-G-1	Improve and protect San Ramon's air quality and promote improvements in subregional air quality.
12.3-I-2	Establish a City Council-appointed body or other similar entity to assist in monitoring the City's progress in meeting greenhouse gas emissions targets.
12.3-I-3	Analyze the air quality and climate change impacts of discretionary projects using applicable regulatory guidance; for example, the BAAQMD's CEQA Guidelines for Assessing the Air Quality Impacts of Projects and Plans
12.3-I-4	Use the City's environmental review process to impose appropriate mitigation measures on new development to reduce air quality and greenhouse gas emissions impacts
12.3-I-5	Work with the Bay Area Air Quality Management District (BAAQMD), the Metropolitan Transportation Commission (MTC), and transit providers to implement the regional Clean Air Plan.
12.3-I-6	Educate residents on the linkage between land use, transportation, water and energy use and air pollution. Efforts should include measures that can be taken and resources that are available to improve air quality and reduce potential climate change impacts
12.4-G-1	Improve air quality by integrating air quality, land use, and transportation planning that incorporates appropriate project location, design, and application of best available technologies.
12.4-I-1	Minimize air quality and climate change impacts through project review, evaluation, and conditions of approval when planning the location and design of land use projects and transportation system projects needed to accommodate expected City population growth.
12.4-I-2	Support and encourage projects proposing infill, and mixed use development that creates walkable neighborhoods and communities and increases access to transit.
12.4-I-3	Work with regional and local transit agencies to assess development project impacts on long-range transit plans and transit facilities during the planning stages of land use projects and ensure that potential impacts are avoided.

Policy Number	General Plan Policy
12.6-G-1	Invest in more efficient and effective transportation infrastructure, City fleet management and support for trip reduction programs to reduce traffic congestion, vehicle trips, and the need for costly new or expanded roadways.
12.6-I-1	The City shall encourage participation in feasible, affordable, innovative, and flexible employer-based trip reduction programs for their employees.
12.6-I-2	City fleet vehicle operators shall be encouraged to develop and maintain a fiscally sound inventory and priority schedule to replace or convert existing conventional fuel vehicles with clean fuel vehicles as new vehicles are purchased and existing vehicles are retired from service.
12.6-I-3	Encourage the development of state-of-the-art telecommunications infrastructure within the City, including satellite and neighborhood work centers for telecommuting to reduce vehicular commute travel and related emissions.
12.6-I-4	Provide information to encourage the use of transportation modes that minimize motor vehicle use and resulting air pollution and greenhouse gas emissions.
12.6-I-5	Construct infrastructure and facilities that support and encourages the use of alternative modes of travel, including a safe and comprehensive bicycle and pedestrian system that connects all parts of the City.
12.7-G-1	Minimize air emissions and potential climate change impacts related to energy consumption in government operations and the community.
12.8-G-1	Reduce the City's proportionate contribution of greenhouse gas emissions and the potential impact that may result in climate change from internal governmental operations and land use activities within its authority.
12.8-I-1	Strive to reduce greenhouse gas emissions from its internal governmental operations and land use activities within its authority by 15 percent below 2008 levels by the year 2020 pending adoption of revised targets for the City's Climate Action Plan. The City will also work with the MTC to ensure that the City receives its proportionate fair share reduction in greenhouse gas emissions as may be identified under the provisions of SB 375 (2008 Chapter 728) for any projects or activities requiring approval by MTC.

Policy Number	General Plan Policy
12.8-I-2	The City will prepare and adopt a Climate Action Plan (CAP) as an implementation strategy of the General Plan 2030. The CAP shall include an inventory of the 2008 level of greenhouse gas emissions within the City. The CAP shall set out specific policies and actions to be undertaken by the City to reduce greenhouse gas emissions under the control of the City. The CAP target will be determined during the process of preparing the CAP based upon the potential of available sources for control, the feasibility of control implementation, and potential for funding to pursue implementation.
12.8-I-3	Include mechanisms to ensure regular review of progress towards greenhouse gas emission reduction targets established by the City's CAP, reporting progress and revising the plan as needed to achieve the plan's objectives.
12.8-I-4	Work with other local and regional governments to assess federal and state programs and their impact on greenhouse gas emissions and mitigation efforts.
12.8-I-5	Establish tiered significance thresholds for the evaluation of project greenhouse gas emissions impacts, the preparation of project level greenhouse gas emission inventories, and the identification and application of mitigation.
Land Use Policies	
3.6-I-5	As part of the development review process, support the accommodation of public transit, bicycle, and pedestrian access for new development.
5.2-I-6	Identify the impacts of land use decisions on regional as well as local transportation facilities.
5.6-I-7	Encourage new development to include a mix of uses and Complete Streets concepts that will allow people to walk and bike between destinations and reduce the amount of automobile vehicle miles traveled.
2.4-I-10	Continue to refine development standards that allow for better utilization of sites already developed for employment uses (e.g. through height and/or floor area ratio increases in combination with structured parking).
2.4-I-9	Work toward redevelopment in the Crow Canyon area through implementation of the Crow Canyon Specific Plan to address the City's future needs for residential and non-residential development.

Policy Number	General Plan Policy
4.6-I-15	Maintain neighborhood and community shopping centers of sizes and at locations that provide convenience and minimize the need for longer/multiple automobile trips while providing a variety of goods and services while sustaining a strong retail base for the City
4.6-I-17	Provide sufficient sites to meet the need for commercial services that can be supported by local residents, businesses and workers.
4.8-I-5	Encourage the linkage and integration of new development with existing neighborhoods by means of Complete Streets networks, open space areas, parks, and pathways as a means of enhancing pedestrian and bicycle connections.
5.6-I-19	Encourage infill and Transit Oriented Development (TOD) concepts as a vehicle miles traveled reduction strategy for existing and proposed development.
Mixed Use Policies	
2.4-I-14	Encourage retail development in mixed-use areas to accommodate local and regional demand.
2.4-I-15	Implement the approved City Center project into a cultural, recreational, and vibrant mixed-use lifestyle center.
7.3-I-4	Encourage the development of a variety of housing and recreational opportunities for senior citizens close to City services and facilities, including transportation.
7.3-I-5	Encourage the location of appropriate childcare facilities in residential areas and ensure that such operations are compatible with their surroundings.
2.4-I-18	Prepare and develop the North Camino Ramon Specific Plan (NCRSP) area into a fiscally balanced, transit-oriented mixed-use area that provides for neighborhood and regional retail opportunities lacking in San Ramon and vertical and horizontal mixed-use development in proximity to new and existing jobs.
4.6-I-18	Allow for a mix of complementary office uses and commercial service businesses in commercial service areas that is balanced and encourages economic vitality

Policy Number	General Plan Policy
4.6-I-19	Promote the revitalization and infill development in existing retail shopping centers, which are identified as mixed use centers on the General Plan Diagram, to provide opportunities for housing and other compatible non-retail uses
4.6-I-20	Continue to refine design standards for mixed-use development that will result in a high quality pedestrian-scaled environment, with one-to-four story buildings, integrated parking, streetfront windows, and entries, and public and private open space or as provided under a separate Specific Plan process.
4.6-I-21	Promote incentives that will provide for density and FAR bonuses for mixed-use development that includes amenities for public benefit, such as workforce housing, pedestrian-oriented facilities (outdoor seating, plazas, weather protection, transit waiting areas), historic preservation, cultural facilities, public art and water features, and open space preservation.
4.6-I-22	Allow for the revitalization and intensification of infill sites within the Bishop Ranch Business Park, consistent with FAR limitations
4.6-I-23	Permit a diverse mix of complementary uses within Bishop Ranch to better meet the daily needs of workers and to reduce the need to travel by automobile. Complementary uses shall be consistent with site zoning, compatible with the primary use and shall not adversely affect the traffic-carrying capacity of adjacent streets.
5.6-I-7	Encourage new development to include a mix of uses and Complete Streets concepts that will allow people to walk and bike between destinations and reduce the amount of automobile vehicle miles traveled.
11.1-I-7	Offer financial and regulatory incentives to promote a combination of residential, retail, and office uses in areas designated for mixed-use development.
11.4-I-2	Promote a combination of residential, retail, and office uses in areas designated for mixed use.
Compact Development Policies	
3.1-G-1	Manage the City's growth in a way that balances existing and planned transportation facilities, protection of open space and ridgelines, provision of diverse housing options, and the preservation of high quality community facilities and services.

Policy Number	General Plan Policy
8.3-G-1	Acquire, preserve, and maintain open space and its natural resources for future generations.
8.3-G-2	Strengthen the City's partnership with East Bay Regional Parks District, Contra Costa County, other jurisdictions and private organizations to expand the ridgeline and hillside open space system in the City's Planning Area.
8.3-I-13	Develop viewshed criteria to determine how to manage views of the natural hillsides surrounding San Ramon.
8.3-I-14	Develop and adopt regulations for the protection and preservation of hillsides, creeks, and ridgelines.
3.1-I-2	Work with Contra Costa County and appropriate agencies to preserve, protect and enhance open space and ridgelines within the City's Planning Area, and to establish contiguous open space areas along the edges of San Ramon.
8.4-G-1	Expand the ridgeline and hillside open space system in the City's Planning Area by joint efforts with East Bay Regional Parks District, Contra Costa County and nonprofit trustee agencies.
8.4-I-1	Confer with appropriate agencies and organizations in the creation of an institutional framework and financing mechanisms necessary to acquire additional ridgeline areas and agricultural lands, and to preserve, restore, and manage important open space.
8.4.1.2	Encourage developers to explore Transfer of Development Rights (TDRs) in conjunction with project review to cluster residential development and preserve open space, ridgelines, and creek corridors.
8.4-I-6	Use open space in new development to create buffers that delineate the edge of urban areas.
8.4-I-10	Continue planning and managing ridgelines, agricultural lands, and open space acquired by the City or other Open Space areas through the Geologic Hazard Abatement District(s) and the Dougherty Valley Open Space Management Plan.
8.4-I-11	Provide incentives for clustering of allowable residential use on infill open space sites to avoid unnecessary grading and site development inconsistent with Plan policies for open space and resource conservation.

Policy Number	General Plan Policy
2.3-I-17	Pursue alternative funding sources to secure and maintain open space and park facilities in San Ramon.
3.1-I-7	Allow urban development only within the City's Urban Growth Boundary (see Implementing Policies 4.6-I-1 through 4.6-I-5) and only in accord with a plan for full urban services (police, fire, parks, water, sanitation, streets and storm drainage) to which all providers are committed.
11.4-I-1	Utilize the Urban Growth Boundary as a tool to focus the provision of diverse housing options within proximity to the local employment base, community services, and public transportation opportunities.
Jobs/Housing Balance Policies	
3.1-I-3	Provide a variety of diverse housing options to accommodate the local employment base, including public service employees.
3.1-I-4	Allocate the number of new housing units according to the City's ability to provide public services and housing needs through the use of adopted performance standards. Refer to Table 3.2-1.
3.1-I-5	Use growth management policies to encourage the construction of workforce housing necessary to meet local housing needs.
3.6-G-1	Promote the opportunity to both work and live in San Ramon through implementation of the Housing Element.
3.6-I-1	Develop and implement housing programs that emphasize the availability of housing for people who work in local jobs.
3.6-I-2	Evaluate the impact of proposed General Plan Amendments on the availability of job and housing opportunities.
3.6-I-3	Prepare a biennial report on the implementation of actions outlined in the Housing Element, for submittal to Contra Costa Transportation Authority as part of the biennial Growth Management Program Compliance Checklist. The report will demonstrate reasonable progress by illustrating how San Ramon has adequately planned to meet the existing and projected housing needs through the adoption of land use plans and regulatory systems that provide opportunities for, and do not unduly constrain housing development.

Policy Number	General Plan Policy
4.6-I-10	Provide a wide range of housing opportunities for current and future residents
2.3-I-6	Encourage housing for San Ramon's resident workforce to improve the match between local employment and local workers.
11.1-G-1	Provide a diversity of housing types and affordability levels within San Ramon to meet the needs of community residents.
11.1-I-3	Facilitate the development of affordable housing throughout the community through use of financial and/or regulatory incentives, where feasible.
11.1-I-4	Negotiate with developers to ensure a portion of future residential development is affordable to extremely low, very low, low, and moderate income households.
11.1-I-5	Maintain a variety of housing types that complements the employment opportunities within the community and encourages a jobs/housing balance.
11.1-I-18	Require commercial development to contribute to the supply of workforce housing through new construction, partnerships with non-profit affordable housing providers, or payment of linkage fees; exempt mixed use development projects from this policy as they are already subject to the 25 percent affordable housing requirement.
Transportation Infrastructure Policies	
5.5-I-1	Implement residential traffic calming measures, as warranted, and police enforcement to mitigate speeding and other traffic impacts in residential areas of the City.
5.1-I-7	Implement a School Traffic Calming Program to address access and safety issues on streets adjacent to schools in San Ramon.
5.2-I-7	Support regional air quality objectives through effective management of the City's transportation system.
5.3-G-1	Encourage transportation facilities that consider the users' safety and allows for all modes of travel based on local conditions and needs of the community.

Policy Number	General Plan Policy
5.3-I-1	Develop Complete Streets Guidelines that establish local review and assessment criteria and encourage development of a multimodal transportation network to meet community needs.
5.3-I-2	Implement Complete Streets principles, as appropriate, for new roadway design and significant roadway rehabilitation.
5.3-I-3	Coordinate the implementation of Complete Streets concepts, as appropriate, with ongoing transportation and congestion relief programs such as the TDM Program, Street Smarts Traffic Safety Program, Residential Traffic Calming Program, Safe Routes to School Program and TRAFFIX Program.
5.3-I-4	Encourage Complete Streets concepts as a vehicle-miles-traveled (VMT) and greenhouse gas reduction strategy.
Transit Policies	
5.6-I-1	Cooperate with regional and local service providers and other jurisdictions to promote local and regional public transit service in San Ramon as part of a multimodal and Complete Streets strategy.
3.4-I-4	Support local feeder transit service to and from current and future regional transit lines.
3.4-I-5	Preserve options for future transit use when designing improvements for roadways.
3.4-I-6	Locate future transit uses, such as light rail or BART, in the I-680 right-of-way.
3.3.I-7	Support regional and local neighborhood transit options to reduce the use of the automobile and maintain acceptable traffic levels of service.
5.6-I-4	Preserve options for future public transit and alternative transportation uses when designing improvements for roadways such as Bollinger Canyon Road Corridor within Dougherty Valley.
3.4-I-3	Cooperate with regional and local service providers and other jurisdictions to promote local and regional public transit service.

Policy Number	General Plan Policy
5.6-I-1	Cooperate with public agencies and other jurisdictions to promote local and regional public transit service in San Ramon as part of a multimodal and Complete Streets strategy.
5.6-I-15	Work with local transit providers to increase and expand weekend transit service.
5.6-I-16	Explore opportunities for the location or relocation of a transit center to North Camino Ramon Specific Plan Area to better geographically balance the public transit needs for the City.
5.6-I-3	Encourage additional local bus or other public transportation service providers to and from regional transit lines. Bus service or other public transportation services should be included under the Initial Level of Development as part of the Dougherty Valley area. The City shall consistently strive to improve the transit service to and from San Ramon including the annexed areas of Dougherty Valley.
5.6-I-5	Support future transit uses within the I-680 corridor right-of-way.
5.6-I-11	Promote increased transit ridership through the use of Transportation Management Associations and other employer-based transit programs, equip buses with bike racks, and making transit information readily accessible.
5.6-I-9	Encourage employers and commercial complexes to emphasize public transit services or private alternatives to the single-occupant vehicle.
5.6-I-10	Work with transit providers to situate transit stops at convenient and safe locations.
Transportation Demand Management	
3.3-G-1	Maintain acceptable traffic level-of-service on City streets and roadways through implementation of Transportation Demand Management (TDM), Growth Management, the Capital Improvement Program and traffic engineering operational measures.
5.1-I-6	Implement the following transportation programs: the Transportation Demand Management Program (TDM Program), Street Smarts Traffic Safety Program, the Residential Traffic Calming Program, the Safe Routes to School Program, TRAFFIX Program and the Engineering Services Department's Traffic Engineering component.

Policy Number	General Plan Policy
5.2-I-5	Emphasize regional transportation demand management and trip reduction strategies as alternatives to improvements to existing facilities and the construction of new facilities.
5.4-I-7	Minimize congestion on arterials by fully implementing the policies in the Complete Streets, Transportation Demand Management and Transit section of the Circulation Element.
5.2-I-1	Develop and implement action plans for Routes of Regional Significance, in cooperation with the Southwest Area Transportation Committee (SWAT), Tri-Valley Transportation Council (TVTC) and the Contra Costa Transportation Authority (CCTA).
5.2-I-2	Develop and implement the Tri-Valley Transportation Action Plan through participation in the Tri-Valley Transportation Council (TVTC).
5.2-I-3	Participate in programs to mitigate regional traffic congestion.
5.2-I-4	Support goals and policies of the Contra Costa Congestion Management Plan (CMP).
5.6-I-8	Support alternative public transportation programs and obtain funding for new TDM projects or programs.
2.3-I-17	Encourage businesses to promote the use of commute alternatives among their employees by implementing the City's Transportation Demand Management (TDM) programs.
3.4-G-1 5.6-G-1	Utilize Transportation Demand Management (TDM) strategies as an integral component of the City's transportation program to reduce total vehicle trips on San Ramon roadways and reduce the corresponding vehicle emissions that promote regional air quality improvements.
5.6-I-2	Encourage and assist major employers and commercial complexes to reduce the number of single-occupant vehicles by participating in the City's TDM programs.
3.4-G-1	Utilize Transportation Demand Management (TDM) strategies to reduce total vehicle trips on San Ramon streets, and to contribute to regional air quality improvement and effective growth management.
3.4-I-1	Continue to implement the City's TDM Program to reduce trip generation.

Policy Number	General Plan Policy
3.4-I-2	Work with 511 Contra Costa, other jurisdictions and agencies to coordinate the City's TDM Program with regional TDM programs and activities.
5.6-I-6	Work with other jurisdictions and agencies to coordinate the City's TDM programs with regional plans that are aimed at reducing traffic congestion and improving air quality.
5.6-I-8	Support alternative public transportation programs and obtain funding for new TDM projects or programs.
2.4-I-12	Promote and encourage public transit, carpool and vanpool opportunities into San Ramon's business areas including Bishop Ranch, Crow Canyon business area, and the San Ramon Valley Boulevard business area.
5.6-I-13	Work with the San Ramon Valley Unified School District and other appropriate agencies and organizations to reduce vehicle trips through the provision of transit programs and promoting carpooling, bicycling, and walking.
5.6-G-2	Encourage trip reduction measures in an effort to reduce vehicle miles traveled improve air quality and reduce greenhouse gas emissions.
Parking Policies	
5.6-I-17	Encourage "Park Once" concepts as a vehicle miles traveled reduction strategy for mixed-use, commercial, and public facilities through the integration of common design features and shared parking concepts including but not limited to Parking Benefit Districts.
5.6-I-18	Encourage shared parking facilities and parking reductions for compatible land uses to minimize excessive parking to reduce inefficient use of land, unnecessary pavement and stormwater runoff, and encouraged alternative transportation and reductions in vehicle miles traveled.
5.6-I-14	Consider the construction of public parking facilities in the City Center, North Camino Ramon Specific Plan, or other commercial areas to serve projected parking demand, while carefully balancing the need for adequate parking against the desire to minimize traffic growth and create a pedestrian/bicycle friendly environment using Complete Streets design concepts.
5.6-I-12	Coordinate with Caltrans and transit providers to identify and implement park and ride lots with convenient access to public transit.

Policy Number	General Plan Policy
Bicycling and Pedestrian Policies	
5.7-G-1	Encourage bicycling and walking as alternatives to driving consistent with Complete Streets concepts.
5.7-I-1	Establish a network of on- and off-street bicycle routes to encourage their use for commute, recreational, and other trips. Improve and expand bicycle routes for commuters in San Ramon. The design of bike routes shall consider the safety of cyclists.
5.7-I-2	Develop bicycle routes that provide access to regional employment centers, shopping centers, public facilities, transit centers, schools and parks.
5.7-I-3	Continue to emphasize the Iron Horse Trail as a major north-south route for non-motorized transportation by improving connectivity and enhancing amenities for bicycles and pedestrians.
5.7-I-4	Require bicycle parking, storage and other support facilities as part of any new office and retail developments and public facilities.
5.7-I-5	Continue to promote and implement through the development review process, continuous circulation facilities within Bishop Ranch Business Park, commercial districts, and residential neighborhoods to enhance connectivity and promote pedestrian and bicycle modes of transportation consistent with Complete Streets concepts.
5.7-I-7	Adopt a local or regional Bicycle Master Plan that considers sources of statewide funding for bicycle programming.
5.7-I-8	Implement the San Ramon Valley Iron Horse Trail Corridor Concept Plan by refining the design alternatives and pursue funding through grants, public/private partnerships and other funding sources as appropriate.
5.7-I-9	Require roadway improvement projects to minimize both temporary and permanent reductions in bicycle and pedestrian mobility and/or accessibility.
5.7-I-10	Work with neighboring jurisdictions to ensure that continuity in bicycle and pedestrian networks is provided at jurisdictional boundaries.
5.7-I-11	Work with the California Department of Transportations (Caltrans) and other appropriate agencies to improve bicycle and pedestrian mobility and safety at freeway crossings.

Policy Number	General Plan Policy
5.7-I-12	Promote educational efforts about traffic laws and safe practices for all modes of transportation.
3.4-I-7	Improve and expand the bicycle routing system in San Ramon.
2.4-I-11	Encourage and facilitate non-motorized means of transportation to business areas.
Energy Conservation and Alternative Energy Production Policies	
12.7-I-1	Increase the use of energy conservation features, renewable sources of energy and low-emission equipment in new and existing development projects within the City.
12.7-I-2	Encourage the use of solar-ready roofs into residential and commercial development. New residential development should include proper solar orientation (south-facing roof area sloped at 20° to 55° from the horizontal).
12.7-I-3	Promote urban forestry projects that shade buildings homes, streets, pedestrian walkways, and urban core areas to reduce surface and ambient temperatures and reduce energy required for cooling.
12.7-I-6	Support ongoing efforts with the Green Affordable Housing Coalition (GAHC), building industry, water and utility districts and the BAAQMD to promote enhanced energy conservation and sustainable building standards for new construction.
12.7-I-7	Work with local water and energy utilities and the building industry to develop or revise City design standards relating to solar orientation water use, landscaping, use of cool paving surfaces, parking lot shading and such other measures oriented towards reducing energy demand
11.4-G-1	Promote energy conserving practices in the location, construction, renovation, and maintenance of San Ramon's housing units.
11.4-I-3	Allow minor variations in building setbacks and/or solar orientation during Plan Review to increase energy efficiency of new housing units.
11.4-I-4	Enforce the State's energy conservation standards for new residential construction and renovations to existing structures.

Policy Number	General Plan Policy
11.4-I-5	Encourage innovative designs to maximize passive energy efficiencies, while retaining compatibility with surrounding neighborhoods.
11.4-I-6	Disseminate information and support efforts by public utilities to encourage home conservation practices.
Water Conservation Policies	
8.6-G-1	Promote the implementation of water quality and conservation programs and measures by San Ramon employers, residents, and public agencies.
8.6-I-1	Require new development projects to implement indoor water conservation and demand management measures.
8.6-I-2	Require new development projects to implement outdoor water conservation and demand management measures.
8.6-I-3	New development in areas where recycled water service exists or is planned shall be plumbed with “purple pipe” and other measures necessary to accommodate non-potable water service.
8.6-I-4	Require new development to meet the State Model Water Efficient Landscape Ordinance (MWELo).
8.6-I-5	Collaborate with DERWA (Dublin San Ramon Services District and East Bay Municipal Utilities District Recycled Water Authorities) to expand the recycled water distribution system in an efficient and timely manner.
12.7-I-4	Initiate and sustain on-going efforts with local water agencies utility providers and developers to establish and implement voluntary incentive-based programs to encourage the use of energy and water efficient designs and equipment in new and existing development projects within the City.
12.7-I-5	Reduce water use and related energy use by using reclaimed water for landscaping where appropriate financially feasible and allowed by water quality regulations. Require new development areas that will be served with recycled water to be plumbed with a “purple pipe” system to facilitate the future use of recycled water.
4.8-I-12	Encourage attractive, drought-tolerant landscaping on private property that is suitable for San Ramon’s climate.

Policy Number	General Plan Policy
Regional Cooperation Policies	
3.5-G-1	Participate in regional cooperative and multi-jurisdictional transportation planning for the maintenance of regional mobility and air quality standards as required by the Measure J Growth Management Program and the Contra Costa Congestion Management Plan (CMP).
3.5-I-1 5.2-I-1	Continue to develop and implement Action Plans for Routes of Regional Significance, in cooperation with the Southwest Area Transportation Committee (SWAT), the Contra Costa Transportation Authority (CCTA), and the Tri-Valley Transportation Council (TVTC).
3.5-I-2 5.2-I-2	Continue to implement the Tri-Valley Transportation Action Plan through participation in the Tri-Valley Transportation Council (TVTC).
3.5-I-3	Participate in programs to mitigate regional traffic congestion, including implementation of regional and sub-regional traffic impact fees on new development.
5.2-I-5	Emphasize regional transportation demand management and trip reduction strategies as alternatives to improvements to existing facilities and the construction of new facilities.
3.5-I-5	Continue to address the impacts of land use decisions on regional and local transportation facilities by applying the Contra Costa Transportation Authority (CCTA) travel demand model and technical procedures during project analysis. Additionally, help maintain CCTA's travel demand modeling system by providing information on proposed improvements to the transportation system and future developments and long-range plans within San Ramon.
3.5-I-6	Participate in the Contra Costa Transportation Authority conflict resolution process as needed to resolve disputes related to the development and implementation of Action Plans and other Growth Management Program.
5.2-I-7	Support regional air quality objectives through effective management of the City's transportation system.
5.2-G-1	Actively participate in local and regional transportation planning.
5.6-I-6	Work with other jurisdictions and agencies to coordinate the City's TDM programs with regional plans that are aimed at reducing traffic congestion and improving air quality.

Policy Number	General Plan Policy
3.1-I-6	Join with and encourage other jurisdictions to participate in regional transportation planning programs
11.1-I-15	Work with neighboring jurisdictions in the Tri Valley area to develop affordable housing.
12.8-I-4	Work with other local and regional governments to assess federal and state programs and their impact on greenhouse gas emissions and mitigation efforts.
Waste Reduction and Recycling Policies	
7.5-G-1	Manage solid waste so that State goals are exceeded and the best possible service is provided to the citizens and businesses of San Ramon.
7.5-I-2	Provide and promote opportunities to reduce waste in all sectors of San Ramon including residential, commercial, non-profit, government, and educational sectors.
7.5-I-3	Develop a consumer friendly, convenient, affordable options for community-serving recycling services
7.5-I-4	Through the development review process encourage the provision of convenient recyclable material storage locations
12.7-I-8	Provide recycling programs for construction and demolition debris, and for commercial and/or community recycling of plastic, paper, green waste, and food waste to reduce energy consumption and greenhouse gas emissions.
7.5-I-5	Comply with State requirements for proper handling and storage of solid waste, recyclables, and hazardous materials, diversion of solid waste from landfills, and provision of programs to make these activities feasible.
7.5-I-6	Ensure that solid waste programs effectively address community needs and issues.
7.5-I-7	Provide options for the safe disposal of hazardous waste and materials.
7.5-I-8	Encourage solid waste diversion (e-G- waste prevention, reuse, recycling, and composting).

Policy Number	General Plan Policy
7.5-I-9	Require new development projects to comply with the Municipal Code's construction and demolition debris diversion requirements.
7.5-I-10	Provide convenient recycling opportunities at large public events and venues.
7.5-I-11	Promote public and private efforts to recycle electronic waste.
12.8-I-6	Require businesses to minimize emissions of ozone-depleting compounds.