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Air Quality and Climate Change

This chapter discusses the potential impacts of air quality and global climate change on residents' quality of life and health. The predominant source of air pollution and greenhouse gas emissions in Castro Valley is vehicular traffic. Because Interstate 580 runs directly through Castro Valley, air pollutant emissions from traffic directly affect the areas alongside the freeway. This chapter includes policies and actions to minimize the impacts of air quality on Castro Valley residents and businesses. In addition, this chapter includes strategies, policies, and actions to reduce greenhouse gas emissions from new growth and government operations and services in Castro Valley.

12.1 AIR QUALITY

Air Quality Regulations

Reduction of air pollutants will contribute to the quality of life for those who live and work in Castro Valley by improving their health. Motor vehicle transportation, including automobiles, trucks, transit buses, and other travel modes, is the major contributor to regional air pollution, so any further progress in air quality improvement now focuses heavily on transportation sources.

The Bay Area Air Quality Management District (BAAQMD) is the regional agency with regulatory authority over emission sources in the Bay Area, including Castro Valley. Specific rules and regulations adopted by the BAAQMD limit the emissions that can be generated by various uses and/or activities, and identify specific pollution reduction measures that must be implemented in association with various uses and activities. Emissions sources subject to these rules are regulated through the BAAQMD's permitting process and standards of operation. Through this permitting process, including an annual permit review, the BAAQMD monitors generation of stationary emissions and uses this information in developing its air quality plans. Any source of stationary emissions developed within Castro Valley, as well as equipment related to construction, is subject to the BAAQMD Rules and Regulations.

There are no monitoring stations located within Castro Valley. Levels of air quality in Castro Valley can generally be inferred from ambient air quality measurements conducted by the BAAQMD at its nearby monitoring stations, at San Leandro Station and the La Mesa Station in Hayward.

Pollution Sources

On average, there has been less than one incidence of the state one-hour ozone standard being exceeded per year over the last five years. The 8-hour ozone standard has been exceeded twice over the last five years at the La Mesa station in Hayward, but the standards have not been exceeded at the San Leandro station. Bay Area emissions of the ozone precursors ROG and NO_x are expected to decrease by approximately 24 and 36 percent, respectively, between 2005 and 2020 largely as a result of the State's on-road motor vehicle emission control program, as vehicles meeting more stringent emission standards enter the fleet and all vehicles use cleaner burning gasoline

and diesel fuel or alternative fuels.

The Bay Area does experience levels that exceed the state PM-10 and PM-2.5 standards on a fairly regular basis. PM-10 and PM-2.5 consist of particulate matter that is 10 microns or less in diameter and 2.5 microns or less in diameter, respectively. PM-10 and PM-2.5 represent particulate matter of sizes that can be inhaled into the air passages and the lungs and can cause adverse health effects. Generally, contributors to PM concentrations in Castro Valley are primarily urban sources, dust suspended by vehicle traffic, and secondary aerosols formed by reactions in the atmosphere. Particulate concentrations near residential sources generally are higher during the winter, when more fireplaces are in use and meteorological conditions prevent the dispersion of directly emitted contaminants.

Direct PM-10 emissions in Alameda County are expected to increase by approximately 19 percent between 2005 and 2020. (California Air Resources Board, 2006). This increase would be primarily from an increase in fugitive dust, an anticipated increase in the vehicle miles traveled, stationary sources (such as industrial activities) and area sources (such as construction and demolition, road dust and other miscellaneous processes). Fugitive dust refers to particulate matter not emitted from a duct, tailpipe or stack, which becomes airborne due to the forces of wind, man's activity, or both. Activities that generate fugitive dust include vehicle travel over paved and unpaved roads, brake wear, tire wear, soil cultivation, off-road vehicles, or any vehicles operating on open fields or dirt roadways, wind erosion of exposed surfaces, storage piles at construction sites, etc. PM-2.5 emissions in Alameda County are projected to remain steady over the same period (California Air Resources Board, 2006), as the reduction in emissions from on-road and off-road engines would be offset by an increase in their activity and also an increase in industrial growth.

The standards for carbon dioxide, nitrogen dioxide, sulfur dioxide, and lead are being met in the Bay Area, and the latest pollutant trends suggest that these standards will not be exceeded in the foreseeable future (ABAG, 2001).

Sensitive Land Uses

Land uses such as schools, day care centers, hospitals, and convalescent homes are considered to be relatively sensitive to poor air quality because the very young, the elderly, and the infirm are more susceptible to respiratory infections and other air-quality-

related health problems than the general public. Residential areas are also considered sensitive to poor air quality because people are often at home for extended periods. Recreational land uses are moderately sensitive to air pollution, because vigorous exercise associated with recreation places a high demand on the human respiratory system. Some persons are more sensitive than others to air pollutants. The reasons for heightened sensitivity may include health problems, proximity to the emissions source, and duration of exposure to air pollutants.

The California Air Resources Board recommends against locating sensitive uses within 500 feet of a freeway. The basis for the recommendations is a number of studies that identify an association with respiratory symptoms, asthma exacerbations and decreases in lung function in children. In traffic-related studies, the health risk attributable to proximity was seen within 1000 feet and was strongest within 300 feet. California freeway studies show about a 70 percent drop in particulate pollution levels at 500 feet. (California Air Resources Board, April 2005.)

AIR QUALITY GOAL

GOAL 12.1-1	Improve air quality and meet all Federal and State ambient air quality standards by reducing the generation of air pollutants from stationary and mobile sources and by appropriate siting and design of sensitive land uses.
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AIR QUALITY POLICIES

Policy 12.1-1	Promotion of Alternate Travel Modes to Reduce Air Pollution. Promote pedestrian, bicycle, and transit modes of travel to reduce air pollutant emissions from automobiles. (Action Steps for this policy are located in Chapter 6 – Transportation.)
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- Policy 12.1-2** **Land Use Planning to Reduce Air Pollution.** Promote land use mixes and development densities that encourage pedestrian, bicycle and transit modes of travel to reduce air pollutant emissions from automobiles. (Action Steps for this policy are located in Chapter 4 - Land Use and Community Development.)
- Policy 12.1-3** **Protection of Sensitive Receptors Adjacent to I-580.** Protect sensitive receptors, including residential uses, schools, day care centers, parks with recreation facilities, and medical facilities, which are located within 1000 feet of the Interstate 580 corridors from air pollutants. Also consider the impacts of odors and toxic emissions on sensitive receptors.
- Policy 12.1-4** **Location of Sensitive Receptors in Relation to I-580.** Locate sensitive receptors at least 300 feet away, and ideally 500 feet away, from the edge of Interstate 580.
- Policy 12.1-5** **Air Quality Requirements for Construction and Demolition Activities.** Reduce combustion emissions and release of suspended and inhalable particulate matter during construction and demolition phases.

AIR QUALITY ACTIONS

- Action 12.1-1** **Requirements for Air Quality Analyses for Environmental Review.** In environmental review documents analyzing air quality, comply with the Regional Air Quality Plan's assumptions used for population and vehicle miles traveled and be consistent with the Bay Area Air Quality Management District's 2010 Clean Air Plan.
- Action 12.1-2** **Regional Air Quality Strategies.** Cooperate with the Bay Area Air Quality Management District in the review of land use proposals. Provide input and assistance to the Bay Area Air Quality Management District's development and implementation of regional air quality strategies.

Action 12.1-3

Site Design Criteria/Development Standards for Projects Adjacent to I-580. Establish site design criteria and standards for development sites adjacent to the Interstate 580 corridor through Castro Valley (particularly parcels located downwind of the prevailing winds) to help reduce potential adverse air quality impacts. Also consider if there are any odor sources near the sites and whether mitigations should be required. Examples of design requirements and mitigations include, but would not be limited to:

- Orienting building openings and open areas, such as patios and decks, associated with sensitive land uses (residential, schools, hospitals, convalescent homes, parks, etc.) away from I-580; and
- Requiring minimum landscaped setbacks for buffer areas.
- Introducing landscaping and vegetation, which can absorb carbon monoxide, to buffer sensitive land uses.

Action 12.1-4

BAAQMD's Dust Abatement Approach. Require sponsors of individual development projects requiring site development and/or environmental review to implement the BAAQMD's approach to dust abatement through conditions of approval. This calls for "basic" control measures that should be implemented at all construction sites, "enhanced" control measures that should be implemented in addition to the basic control measures at construction sites greater than four acres in area, and "optional" control measures that should be implemented on a case-by-case basis at construction sites that are large in area, located near sensitive receptors or which, for any other reason, may warrant additional emissions reductions (BAAQMD, 1999).

12.2 CLIMATE CHANGE

Global climate change (GCC) is currently one of the most important and widely debated scientific, economic, and political issues in the United States. GCC refers to a change in the average weather of the earth that may be measured by wind patterns, storms, precipitation, and temperature. The baseline by which these changes are measured originates in historical records identifying temperature changes that have occurred in the distant past, such as during previous ice ages. The rate of temperature change has typically been incremental, with warming and cooling occurring over the course of thousands of years. In the past 10,000 years the earth has experienced incremental warming as glaciers retreated across the globe. However, scientists have observed an unprecedented increase in the rate of warming over the past 150 years, roughly coinciding with the global industrial revolution.

Although GCC is now widely accepted as a concept, the extent and speed of change to be expected, and the exact contribution from human sources, remains in debate. Nonetheless, the world's leading climate scientists, the Intergovernmental Panel on Climate Change (IPCC), have reached consensus that global climate change is very likely caused by humans, and that hotter temperatures and rising sea levels will continue for centuries no matter how much humans control their future emissions. In particular, human influences have:

- very likely contributed to sea level rise and increased storm surge during the latter half of the 20th century;
- likely contributed to changes in wind patterns, affecting extra-tropical storm tracks and temperature patterns;
- likely increased temperatures of extreme hot nights, cold nights and cold days;
- more likely than not increased risk of heat waves, area affected by drought since the 1970s, and frequency of heavy precipitation events. (IPCC, November 2007)

According to the California Climate Action Team (CCAT), accelerating GCC has the potential to cause a number of adverse impacts in California, including but not limited to: a shrinking Sierra snowpack that would threaten the state's water supply; public health threats caused by higher temperatures and more smog; damage to agriculture and forests due to reduced water storage capacity, rising temperatures, increasing salt water intrusion, flooding, and pest

infestations; critical habitat modification and destruction; eroding coastlines; increased wildfire risk; and increased electricity demand. (CCAT, April 2006) These impacts have and will continue to have considerable costs associated with them.

While all of these impacts may be felt to some extent in the Bay Area generally and Castro Valley specifically, of particular concern are high temperatures and the negative impacts on air quality, and water quality and water supply issues. Recent studies indicate that hot days correlate with poor air quality days, and air pollution is contributing to more annual deaths and cases of respiratory illness and asthma (Jacobson, 2008). In other areas of the Bay Area, sea level rise and the resulting potential for intermittent flooding and gradual inundation is a concern that must be addressed.

Greenhouse Gases

Gases that trap heat in the Earth's atmosphere are called greenhouse gases (GHGs). These gases play a critical role in determining the Earth's surface temperature. Part of the solar radiation that enters Earth's atmosphere from space is absorbed by the Earth's surface. The Earth reflects this radiation back toward space, but GHGs absorb some of the radiation. As a result, radiation that otherwise would have escaped back into space is retained, resulting in a warming of the atmosphere. Without natural GHGs, the Earth's surface would be about 61°F cooler. (CCAT, April 2006) This phenomenon is known as the greenhouse effect. However, many scientists believe that emissions from human activities—such as electricity generation, vehicle emissions, and even farming and forestry practices—have elevated the concentration of GHGs in the atmosphere beyond naturally-occurring concentrations, contributing to the larger process of global climate change. The six primary GHGs are:

- **Carbon dioxide (CO₂)**, emitted as a result of fossil fuel combustion, with contributions from cement manufacture;
- **Methane (CH₄)**, produced through the anaerobic decomposition of waste in landfills, animal digestion, decomposition of animal wastes, production and distribution of natural gas and petroleum, coal production, and incomplete fossil fuel combustion;
- **Nitrous oxide (N₂O)**, typically generated as a result of soil cultivation practices, particularly the use of commercial and organic fertilizers, fossil fuel combustion, nitric acid production, and biomass burning;

- **Hydrofluorocarbons (HFCs)**, primarily used as refrigerants;
- **Perfluorocarbons (PFCs)**, originally introduced as alternatives to ozone depleting substances and typically emitted as by-products of industrial and manufacturing processes; and
- **Sulfur hexafluoride (SF6)**, primarily used in electrical transmission and distribution systems.

Alameda County Climate Change Initiatives

In June 2006, the Alameda County Board of Supervisors established the County Climate Change Leadership Strategy. The County, along with 11 jurisdictions, committed to becoming members of the global organization Local Governments for Sustainability (ICLEI) and participating in the Alameda County Climate Protection Project (ACCPP). In committing to the project, the participating jurisdictions embarked on an ongoing, coordinated effort to reduce the emissions that cause global warming, improve air quality, reduce waste, cut energy use and save money. The Castro Valley community participates in the project through Alameda County. The County aims to reduce emissions to 1990 levels by 2020 and to 80 percent below 1990 levels by 2050.

To achieve these targets, the County prepared a Climate Action Plan (CAP) to determine appropriate actions to reduce local GHG emissions and facilitate monitoring and reporting. The CAP contains plans for the County's own government operations and for private development in the unincorporated areas. In addition to developing the CAP, the County has initiated several other activities to help achieve its GHG emissions reduction goals. These include the adoption of green building ordinances for County buildings and certain private development projects; the Alameda County Green Business Program; and increased use of alternative fuels for County

County Greenhouse Gas Inventory

One of the first steps to creating the Climate Action Plan was to complete an emissions inventory. Table 12.2-1 shows the unincorporated County's total greenhouse gas emissions from the major sectors for the year 2005. The residential population and employees in the unincorporated portions of Alameda County are emitting approximately 930,039 tonnes of CO₂e emissions each year. Burning fossil fuels in vehicles and for energy use in buildings and facilities is a major contributor to the County's greenhouse gas

emissions. Fuel consumption in the transportation sector is the single largest source of emissions, contributing almost 60 percent of total emissions. The estimated emissions from transportation include trips on local roads and locally-generated highway trips but omit “pass through” trips that originate or end in other counties. The residential and commercial/industrial sectors represent emissions that result from electricity and natural gas used in buildings and facilities. Emissions from waste landfill sites and the energy use associated with water consumption represent account for 6.6 percent of the total emissions.

Castro Valley Emissions

The Baseline Emissions Inventory for Unincorporated Alameda County for the year 2005 can be used to estimate the emissions from residents and employees (service population) in Castro Valley. Assuming that Castro Valley residents and employees use the same average amount of energy and generate the same average amount of waste as the other residents and employees in unincorporated Alameda County, in 2005, Castro Valley generated 356,465 tonnes of CO2e emissions per year. Due, however, to Castro Valley’s location within the regional transportation system, the planning area accounts for about 56 percent of the County’s vehicle mileage even though its share of the County’s service population is only 40 percent. Adjusting the average emissions from transportation to reflect Castro Valley’s larger share of mileage, increases the estimated emissions from the planning area to 446,656 tonnes per year. Table 12.2-2 summarizes the findings. To help achieve the County’s 15 percent reduction target, the greenhouse gas emissions from Castro Valley should be reduced to less than 379,658 tonnes per year by 2020.

Table 12.2-1 Unincorporated County 2005 GHG Emissions			
Sector	Emissions (Tonnes of CO2e)	Percent of Total Emissions	Estimated Average Emissions
Transportation	556,041	59.8%	3.07 tonnes per resident and employee
Residential	179,864	19.3%	1.29 tonnes per resident
Commercial/Industrial	132,768	14.3%	3.16 tonnes per employee
Waste Water	61,366	6.6%	0.34 tonnes per resident and employee
Total	930,039	100%	

Source: Alameda County, Draft Alameda County Community Climate Action Plan, Technical Appendix A, 2010; Dyett & Bhatia, 2010

Table 12.2-2 Castro Valley Estimated 2005 GHG Emissions

Sector	Estimated Average Emissions	Emissions (Tonnes of CO ₂ e)
Transportation*	4.32 tonnes per resident and employee	311,701
Residential	1.29 tonnes per resident	81,111
Commercial/ Industrial	3.16 tonnes per employee	29,312
Waste/Water	0.34 tonnes per resident and employee	24,532
Total		446,656

Source: Alameda County, Draft Alameda County Community Climate Action Plan, Technical Appendix A, 2010; Dyett & Bhatia, 2010

*Based on planning area's 56% share of County average daily vehicle miles travelled (DVMT)

Climate Change Adaptation and GHG Reductions

In addition to reducing the level of greenhouse gas emissions and potentially slowing the rate of climate change, Alameda County is working to develop strategies to help communities adapt to the effects of climate change. In areas of the County near the San Francisco Bay, issues related to potential sea level rise will be evaluated and addressed. The short-term focus for the Castro Valley planning area and other areas of the County will be on integrating land use and transportation, reducing water and energy consumption and reducing waste generation.

Community Climate Action Plan

The County will implement the adopted CAP within Castro Valley. The draft CAP identifies measures that the County could implement throughout the unincorporated areas to try to reduce GHG emissions by 15 percent by 2020. The draft CAP focuses the County's efforts into six action areas to reduce greenhouse gases: transportation, land use, building energy, water, waste, and green infrastructure. Within each action area there are strategies, measures and specific implementation actions that will allow the County to measure progress. Where appropriate, the quantified goals identified in the CAP have been incorporated into the Castro Valley General Plan.

General Plan Policies Addressing Climate Change

Many General Plan policies, particularly those related to land use, circulation, public utilities, biological resources, and community character and design, will help to reduce the total GHG emissions and limit climate change impacts on the community. The General Plan will also be updated to incorporate the strategies of the Alameda County Community Climate Action Plan when it is adopted.

- **Land Use and Development.** The General Plan land use policies focus on infill residential development and commercial renovation to accommodate anticipated growth, rather than developing in new areas. The land use and development strategies include: establishing an infill opportunity zone around the Castro Valley BART station to facilitate higher levels of development within easy access of regional public transit; and supporting local and home-based businesses to reduce commute traffic.
- **Community Character and Design.** Revitalizing the Central Business District and other commercial areas is one of the highest goals for the Castro Valley General Plan and the community. Improving the look and feel of the commercial areas will support new commercial uses that will serve the local community and help to reduce the number and length of trips that residents and local workers have to drive.
- **Transportation.** The transportation policies prioritize balancing the needs of transit riders, pedestrians, and bicyclists with the needs of drivers and create new opportunities for Castro Valley residents to travel by alternative modes. Since transportation is the largest source of GHGs in Castro Valley, measures that reduce dependence on traveling by private automobile have the greatest potential to reduce total GHGs.
- **Biological Resources.** Preserving and improving natural habitat is a primary proposal in the General Plan. In addition, there are policies that support expanding the urban forest and community gardens. These initiatives are intended to improve air quality by providing for carbon sequestration and support local food networks in order to limit the need to transport food products.
- **Public Services and Utilities.** This chapter contains strategies that will help to reduce greenhouse gases – water conservation and recycling measures, and solid waste reduction and recycling. Shrinking water demand through conservation and recycling will reduce the amount of GHG produced while transport-

ing water. Reducing solid waste disposal through composting and recycling will limit the amount of methane and other GHGs produced at landfills.

Additional goals, policies, and actions specific to addressing greenhouse gases and adapting to climate change are listed below. These policies support the County’s green building and energy efficiency initiatives.

CLIMATE CHANGE GOALS

- GOAL 12.2-1** **Reduce greenhouse gas emissions in Castro Valley.**
- GOAL 12.2-2** **Prepare Castro Valley for the effects of climate change through the adoption of adaptation and resiliency strategies.**

CLIMATE CHANGE POLICIES

- Policy 12.2-1** **GHG Reduction Program Participation.** The County shall continue to participate in international, national, regional, and local programs to reduce greenhouse gas emissions.
- Policy 12.2-2** **County Climate Action Plan.** The County’s Climate Action Plan shall be the guiding document for the reduction of greenhouse gases in Castro Valley and shall be implemented through all components of the County General Plan including the Castro General Plan.
- Policy 12.2-3** **Renewable Energy.** Decrease dependency on non-renewable fuel by increasing availability and use of renewable energy sources.
- Policy 12.2-4** **Energy Efficiency.** Encourage improvement to the energy efficiency of new and remodeled buildings in Castro Valley.
- Policy 12.2-5** **Adaptation Strategies.** The County shall participate in regional efforts focused on adapting communities to the effects of climate change.

CLIMATE CHANGE ACTIONS

- Action 12.2-1** **Emissions Inventory.** Reevaluate the government and community emissions inventories on a regular basis to monitor progress towards the County's emission reduction targets.
- Action 12.2-2** **Zoning to Support Emissions Reductions.** Review and, if appropriate, modify the Zoning and Subdivision Ordinances to support the emissions reduction targets and the goals of the Climate Action Plan.
- Action 12.2-3** **Renewable Energy Availability.** The County shall participate in regional and statewide efforts to improve the proportion of renewable energy available to Castro Valley energy customers.
- Action 12.2-4** **Green Building Standards.** New construction and remodels that exceed specified thresholds shall comply with the County's Green Building Ordinances.
- Action 12.2-5** **Adaptive Reuse.** The County shall encourage adaptive reuse of existing buildings, where they can be used efficiently or remodeled for energy-efficient operations.
- Action 12.2-6** **Zoning for Energy Efficiency and Heat Reduction.** Review and if appropriate, modify the Zoning Ordinance and Subdivision Ordinances to incorporate measures that will increase energy efficiency, reduce reliance on non-renewable fuels, and reduce heat retention.
- Action 12.2-7** **Green Building Incentives.** Develop and implement incentives to encourage green building practices in Castro Valley. Such incentives for green building could include:
- Fast-track permitting;
 - Permit fee reductions correlated with green building features;
 - Green design assistance program;
 - Staff training; and/or
 - Other energy efficiency programs.