

This section summarizes the cumulative impacts associated with the proposed 2009 Comprehensive Transportation Plan (CTP) that are identified in the environmental issue areas in Section 4.0. Cumulative impacts are the result of combining the potential effects of the project with other planned developments, as well as foreseeable development projects. The following discussion considers the cumulative impacts of the relevant environmental issue areas.

### 5.1 INTRODUCTION

The California Environmental Quality Act (CEQA) requires that an environmental impact report (EIR) contain an assessment of the cumulative impacts that could be associated with the proposed project. According to CEQA Guidelines Section 15130(a), "an EIR shall discuss cumulative impacts of a project when the project's incremental effect is cumulatively considerable." "Cumulatively considerable" means the incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (as defined by Section 15130). As defined in CEQA Guidelines Section 15355, a cumulative impact consists of an impact that is created as a result of the combination of the project evaluated in the EIR together with other projects causing related impacts. A cumulative impact occurs from:

...the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time.

In addition, Section 15130(b) identifies that the following three elements are necessary for an adequate cumulative analysis:

- 1) Either:
  - (A) A list of past, present, and probable future projects producing related or cumulative impacts, including, if necessary, those projects outside the control of the agency; or,
  - (B) A summary of projections contained in an adopted general plan or related planning document, or in a prior environmental document which has been adopted or certified, which described or evaluated regional or area wide conditions contributing to the cumulative impact. Any such planning document shall be referenced and made available to the public at a location specified by the lead agency.
- 2) A summary of the expected environmental effects to be produced by those projects with specific reference to additional information stating where that information is available; and
- 3) A reasonable analysis of the cumulative impacts of the relevant projects. An EIR shall examine reasonable, feasible options for mitigating or avoiding the project's contribution to any significant cumulative effects.

Where a lead agency is examining a project with an incremental effect that is not "cumulatively considerable," a lead agency need not consider that effect significant, but shall briefly describe its basis for concluding that the incremental effect is not cumulatively considerable.

## 5.0 CUMULATIVE IMPACTS

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Because of the regional nature of the 2009 CTP, Chapter 4.0 is devoted to an analysis of the direct and indirect impacts of the project on the environment that is inherently cumulative in its nature. For example, the EIR looks at the cumulative impact of motor vehicles in Sonoma County on overall ozone attainment planning for the larger San Francisco Bay Area Air Basin. In addition, the EIR looks at traffic and congestion issues that reflect overall growth projections within and outside of Sonoma County through 2035, the result of long-term, cumulative land use planning from local governments. Due to the regional nature of the 2009 CTP, Sections 4.1 through 4.13 analyze all of the projects within the CTP and their cumulative impact on resources. The resource areas that could experience significant cumulative impacts from implementation of the 2009 CTP include:

- Aesthetics
- Air Quality
- Traffic and Circulation
- Biological Resources
- Cultural Resources
- Geology and Soils
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use
- Noise
- Population and Housing
- Public Services
- Energy

### 5.2 CUMULATIVE SETTING

The 2009 CTP is a countywide transportation plan that accommodates planned growth in Sonoma County by providing a transportation system that maximizes mobility through 2035. This forecast and planned growth is a combination of the General Plans and policies for the nine incorporated cities and Sonoma County as described in Section 4.9, Land Use, of this Draft EIR. However, the setting for the EIR recognizes that neighboring counties, particularly Mendocino, Napa, and Marin counties, factor into the cumulative impacts that the proposed 2009 CTP would contribute toward.

### 5.3 CUMULATIVE IMPACT ANALYSIS

The 2009 CTP EIR recognizes in its modeling and analysis that cumulative growth from within and outside of Sonoma County affects how the transportation plan would impact thirteen areas of environmental resources. This section provides a compilation of the cumulative impacts that would result from the implementation of the project and future development in the vicinity. As described above, cumulative impacts are the result of combining the potential effects of the project with other planned projects and anticipated growth. Each cumulative impact is determined to have one of the following levels of significance: less than significant, significant, significant and mitigable, beneficial, or significant and unavoidable. The specific cumulative impacts for each environmental issue area are identified in Section 4.0 are described below.

#### SECTION 5.1 AESTHETIC IMPACTS

The cumulative setting for the aesthetic impacts consists of the proposed, approved, and conceptual development and growth anticipated in the nine incorporated cities and the unincorporated area of Sonoma County. With these projects visual change in areas that are

currently undeveloped or underdeveloped to areas that would increase development or redevelopment. However, all nine incorporated cities and the County have policies in place that protect visual resources within their respective jurisdictions. None of the projects would interrupt scenic views and vistas. All projects within the CTP shall implement design features to reduce light and glare. Therefore, because projects will be subject to specific design requirements and are implementing local goals and/or policies to protect scenic resources, implementation of the proposed project on visual resources would result in a less than cumulatively considerable visual impact.

### SECTION 5.2 AIR QUALITY IMPACTS

The analysis of air quality impacts is inherently cumulative in its approach, as air quality planning is done at the regional level. Since Sonoma County is included in parts of two air basins, the impact of the 2009 CTP on regional ozone and localized PM<sub>10</sub> and PM<sub>2.5</sub> emissions is done in a cumulative manner that considers the attainment planning and mandates that are being addressed by the Bay Area Air Quality Management District (BAAQMD) and the Northern Sonoma County Air Pollution Control District (NSCAPCD).

The proposed 2009 CTP would have beneficial impacts on regional air quality plans to achieve federal ozone standards. First, it would be consistent with BAAQMD's Clean Air Plan (CAP) and implement applicable Transportation Control Measures (TCMs) from the CAP on a timely basis. In addition, the CTP is consistent with CAP assumptions for population and VMT growth over time and its objectives and policies implement other elements of the CAP. It would also help reduce ozone precursors of ROG and NO<sub>x</sub> by 2035 that are consistent with the BAAQMD's 2005 Ozone Strategy.

While the proposed 2009 CTP would not directly cause increases in emissions from the transportation sector, motor vehicle emissions of PM<sub>10</sub> and PM<sub>2.5</sub> would increase by 26 and 75 percent, respectively, over existing conditions by 2035. However, these emissions would not lead to any violation of air quality standards, contribute to an existing or projected air quality violation, or result in a cumulatively considerable net increase of emissions of PM<sub>10</sub> and PM<sub>2.5</sub>, as these emissions are factored into the BAAQMD's plan to attain federal and state particulate standards. This is considered a less than cumulatively considerable impact.

### SECTION 5.3 TRAFFIC AND CIRCULATION IMPACTS

As with any transportation plan that is designed to accommodate planned growth, the 2009 CTP is designed to improve mobility throughout Sonoma County through 2035. This chapter's impact analysis is based on travel projections developed using SCTA's travel demand forecasting model. The Sonoma County Travel Model (SCTM07) uses land use, population, and employment data to estimate trips, travel patterns, traffic volumes, congestion, and mode choice (means of transportation). The model factors in growth from adjacent counties in considering the impacts of growth within Sonoma County with the cumulative impacts of growth in the larger San Francisco Bay Area region.

Implementation of the 2009 CTP would not directly cause increases in traffic or vehicle miles traveled. However, the 2009 CTP would support growth in Sonoma County that would substantially increase daily vehicle miles traveled in 2035 by 2,976,144 over existing conditions. Similar adverse cumulative impacts on vehicle hours traveled, person hours of delay, and average travel speeds are expected because of the overwhelming challenge of growth in Sonoma County and the larger region. However, proposed mitigation measures are able to

## 5.0 CUMULATIVE IMPACTS

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further reduce the significance of some, but not all, transportation impacts. Thus, this impact would be cumulatively considerable.

It should be noted that the 2009 CTP includes transportation projects that would be consistent with transportation policies in local general plans or other applicable local transportation plans. This ensures cumulative consistency with local governments within Sonoma County.

### SECTION 5.4 BIOLOGICAL RESOURCES

The cumulative setting for impacts to biological resources consists of the proposed, approved, and conceptual development anticipated in the nine incorporated cities and the unincorporated area of Sonoma County. As with construction of the proposed project, these projects could affect local plant communities, wetland resources and wildlife habitats by direct removal or temporary disturbance during construction.

Although implementation of the proposed 2009 CTP may result in the loss of populations or essential habitat for special-status plant and wildlife species, implementation of mitigation measures **MM 4.4-1a** and **MM 4.41b** reduces impacts to these resources to less than significant. Therefore, implementation of the proposed project will not contribute to a significant cumulative impact on special-status plants and wildlife species.

Nesting birds and bats can be impacted during construction of proposed projects or if trees are removed during the nesting season. However, implementation of mitigation measures **MM 4.4-2** and **MM 4.4-3** reduces impacts to these resources to less than significant. Therefore, implementation of the proposed project will not contribute to a significant cumulative impact on nesting birds or bats.

Sonoma County's and incorporated cities' general plans include numerous policies that regulate biological resource issues, such as impacts to sensitive biological communities that are relevant to the 2009 CTP projects. Applicable goals, policies, and implementation programs from these general plans would assist in reducing any potential biological impacts to sensitive biological communities. Additionally, implementation of mitigation measure **MM 4.4-4** further minimizes impacts to sensitive biological communities. Therefore, implementation of the proposed project will not contribute to a significant cumulative impact on sensitive biological communities.

Sonoma County's and incorporated cities' general plans include numerous policies that regulate biological resource issues that are relevant to the 2009 CTP projects. Applicable goals, policies, and implementation programs from these general plans would assist in reducing any potential biological impacts to waters of the U.S. Additional mitigation measures are proposed further to protect and minimize impacts to waters of the U.S. Specifically, implementation of mitigation measures **MM 4.4-5a** and **MM4.4-5b** further minimizes impacts to waters of the U.S. Therefore, implementation of the proposed project will not contribute to a significant cumulative impact to waters of the U.S.

Implementation of the proposed 2009 CTP may interfere with the movement of native resident or migratory wildlife species. Implementation of mitigation measures **MM 4.4-6a** and **MM 4.46b** reduces potential impacts to the movement of native or wildlife species. Therefore, implementation of the proposed project will not contribute to a significant cumulative impact to movement of wildlife corridors.

### SECTION 5.5 CULTURAL RESOURCES

The cumulative setting for impacts to cultural resources consists of the proposed, approved, and conceptual development anticipated in the nine incorporated cities and the unincorporated area of Sonoma County. At the time of project development, proposed projects could affect historic, cultural, and paleontological resources through direct removal or temporary disturbance during construction. With the incorporation of appropriate mitigation measures, project impacts would be mitigated and the cumulative impacts to historic resources would not be significant. Appropriate mitigation would consist of implementation of mitigation measures such as mitigation measures **MM 4.5-1a** through **MM 4.5-2d**. Therefore, implementation of the proposed project will not contribute to a significant cumulative impact to historic, archaeological, or paleontological resources.

### SECTION 5.6 GEOLOGY AND SOILS

The cumulative setting for impacts from geology and soils consists of the proposed, approved, and conceptual development anticipated in the nine incorporated cities and the unincorporated area of Sonoma County. Although new structures should be constructed to withstand an earthquake without collapse, some road segments and transit facilities are likely to be damaged. The damage from a seismic event could be significant. Although projects within the CTP will implement mitigation measures such as those described in mitigation measure **MM 4.6-1**, this impact would remain significant and unavoidable after mitigation. Therefore implementation of the proposed project will contribute to a significant cumulative impact to an increased risk of loss, injury, or death to travelers or structures due to earthquakes, landslides, ground failure, or liquefaction. Thus, this impact is cumulatively considerable.

Projects built on steep grades or that require substantial amounts of cut and fill pose the greatest potential for slides and erosion. Engineered soils could also erode due to improper construction techniques or lack of proper maintenance. At the time of specific project development, the implementation of proper construction methods, earthwork, and road cut design and mitigation measures such as mitigation measure **MM 4.6-2a** through **MM 4.6-2c** would reduce this type of impact to less than significant. Therefore, implementation of the proposed project will not contribute to a significant cumulative impact though an increase in soil erosion and slope instability.

Inadequate soil and foundation engineering on weak or unconsolidated soils could cause soils and overlying roadway and other structures to settle unevenly, resulting in a weakening of structural facilities. Roadways, pavements, and other flat construction are also susceptible to damage from expansive soils. At the time of specific project development, the implementation of mitigation measures such as mitigation measures **MM 4.6-3a** and **MM 4.6-3b** reduce the impacts to significant and mitigable. Therefore, implementation of the proposed project will not contribute to a significant cumulative impact though the development of improvements on expansive soils or on weak, unconsolidated soils.

Given the location of proposed CTP projects and their distance from the Pacific Ocean and San Pablo Bay, development of the CTP projects would result in a reduced probability of exposing persons or structures to the risk of loss, injury, or death from seiches or tsunamis. Therefore, implementation of the proposed project will not contribute to a significant cumulative impact of exposure of persons or structures to seiches or tsunamis.

## 5.0 CUMULATIVE IMPACTS

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### SECTION 5.7 HAZARDS AND HAZARDOUS MATERIALS

The cumulative setting for impacts from hazards and hazardous materials consists of the proposed, approved, and conceptual development anticipated in the nine incorporated cities and the unincorporated area of Sonoma County. The 2009 CTP includes transportation projects that have the potential to create significant hazards to the public or the environment through the routine transport, use, or disposal of hazardous materials. The Plan, however, would also improve the condition of roadways, reducing the potential for roadway accidents that could result in transport-related hazardous material spills. These impacts are considered less than significant. Therefore, implementation of the proposed project will not contribute to a significant cumulative impact from the creation of significant hazards through the routine transport, use, or disposal of material.

Implementation of the proposed 2009 CTP would not omit or create a hazard to the public or the environment by locating new or expanded roadways or transit alignments that transport hazardous materials within one-quarter mile of a school. These impacts are considered less than significant. Therefore, implementation of the proposed project will not contribute to a significant cumulative impact by locating new or expanded roadways or transit alignments that transport hazardous materials within one-quarter mile of a school.

Construction of new or expanded transportation facilities can disturb contaminated properties, particularly those in brownfield areas near proposed U.S. 101 freeway improvements. At the time of specific project development, the implementation of mitigation measures such as mitigation measure **MM 4.7-3** reduces these impacts to significant and mitigable. Therefore, implementation of the proposed project will not contribute to a significant cumulative impact through the disturbance of contaminated properties.

### SECTION 5.8 HYDROLOGY AND WATER QUALITY

The cumulative setting for impacts to hydrology and water quality consists of the proposed, approved, and conceptual development anticipated in the nine incorporated cities and the unincorporated area of Sonoma County. Construction of transportation projects could impact water quality during activities such as grading, soil stockpiling, and boring. However, projects that involve grading of more than one acre would be required to prepare a SWPPP that will require implementation of best management practices that will limit urban runoff. Additionally, smaller construction sites are subject to grading and erosion control ordinances and requirements of the county and cities. Impacts associated with these projects can be mitigated below significance through use of best management practices that parallel SWPPP compliance strategies.

Long-term implementation of the 2009 CTP will increase impervious surfaces through the creation or expansion of roadways. The ongoing operation of CTP capital improvements would be subject to applicable NPDES permit requirements for Caltrans, county and city for stormwater discharges. As such, surface runoff from CTP projects is not expected to produce long-term adverse impacts on water resources countywide. At the time of specific project development, the implementation of mitigation measures including mitigation measure **MM 4.8-1** reduces these impacts to significant and mitigable. Therefore, implementation of the proposed project will not contribute to a significant cumulative impact of degradation of water quality through the development of projects.

The transportation improvements in the 2009 CTP would not substantially deplete groundwater supplies or interfere substantially with groundwater recharge. Therefore, implementation of the proposed project will not contribute to a significant cumulative impact of depleting groundwater supplies.

The transportation improvements in the 2009 CTP could alter existing drainage patterns or substantially increase the rate or amount of surface runoff in a manner that would result in flooding. This could contribute runoff water that exceeds the capacity of existing or planned stormwater drainage systems. At the time of specific project development, the implementation of mitigation measures such as mitigation measures **MM 4.8-3a** through **MM 4.8-3c** reduces these impacts to significant and mitigable. Therefore, implementation of the proposed project will not contribute to a significant cumulative impact of altering drainage patterns or increasing runoff resulting in flooding.

The 2009 CTP will not place roadways or other structures within a 100-year flood hazard area that could impede or redirect flood flows. Therefore, implementation of the proposed project will not contribute to a significant cumulative impact by locating roadways or structures within a 100-year flood hazard area that could impede or redirect flows.

### SECTION 5.9 LAND USE

The cumulative setting for impacts from land use consists of the proposed, approved, and conceptual development anticipated in the nine incorporated cities and the unincorporated area of Sonoma County. The 2009 CTP is not expected to cause any land use disruption or displacement. Additionally, during the project design and environmental review phase, lead agencies for proposed CTP projects shall consult with the appropriate land use agency(ies) to ensure consistency with local land use policies, particularly for Caltrans projects. The CTP would not conflict with any applicable habitat conservation plan or natural community conservation plan. Additionally, any impacts on the county's 160,341 acres of regionally significant agricultural lands are considered less than significant. Therefore, implementation of the proposed project will not contribute to a significant cumulative impact by adversely impacting land use or converting farmland to non-agricultural uses.

### SECTION 5.10 NOISE

The cumulative setting for impacts from noise consists of the proposed, approved, and conceptual development anticipated in the nine incorporated cities and the unincorporated area of Sonoma County. Implementation of the CTP would result in noise and groundborne vibration impacts. At the time of specific project development, the implementation of mitigation measures such as mitigation measure **MM 4.10-1**, as well as adherence to noise ordinances of the applicable jurisdictions, reduces noise impacts to a less than significant level. Therefore, implementation of the proposed project will not contribute to a significant cumulative impact to noise and vibration.

The CTP will accommodate anticipated growth in traffic activity that will significantly increase traffic noise along noise-impacted roadway segments, given the limited funding to plan and construct acoustic barriers, including those along Caltrans-controlled U.S. 101. As a result, the CTP's long-term impact on ambient noise levels from traffic is considered significant and unavoidable. Therefore implementation of the proposed project will contribute to a significant cumulative impact to traffic noise. Thus, this impact is cumulatively considerable.

## 5.0 CUMULATIVE IMPACTS

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As shown in the 2005 SMART Project EIR, noise from passing SMART trains would not exceed the applicable noise significance criteria of 60 dBA Ldn at any sensitive receptors along the track. However, as shown in the 2008 SMART Project Supplemental EIR, with the addition of freight rail service, cumulative noise impacts from passing trains would exceed the criteria in some locations and SMART would make a cumulatively considerable contribution to the impact. With respect to train horn noise, the cumulative impact from passenger and freight train horns would be significant if Quiet Zones are not implemented, and SMART's contribution would be cumulatively considerable. SMART has committed to assisting local jurisdictions in obtaining Quiet Zone designations and has included funding for the necessary supplemental safety measures in its expenditure plan. If implemented, Quiet Zones would eliminate both SMART's project level impact and its contribution to cumulative noise impacts from train horns. (See 2008 SMART Project Final Supplemental EIR.) Thus, this impact is cumulatively considerable.

### 5.11 POPULATION, HOUSING AND EMPLOYMENT

The cumulative setting for impacts to population, housing, and employment consists of the proposed, approved, and conceptual development anticipated in the nine incorporated cities and the unincorporated area of Sonoma County. Implementation of the transportation improvements proposed in the 2009 CTP could potentially result in the displacement of existing residences or businesses and result in the need to construct additional housing units in the county over the planning horizon. At the time of specific project development, the implementation of mitigation measures such as mitigation measure **MM 4.11-1**, as well as adherence to policies of the applicable jurisdictions, reduces these impacts to a less than significant level. Therefore, implementation of the proposed project will not contribute to a significant cumulative impact by displacing residences or businesses.

The transportation projects included in the CTP will not induce substantial population growth in an area. The CTP will not directly result in new development of housing or employment centers or extend roads or other infrastructure that would expose substantial new areas to unplanned growth. Therefore, implementation of the proposed project will not contribute to a significant cumulative impact by inducing growth.

### 5.12 PUBLIC SERVICES

The cumulative setting for impacts to public services consists of the proposed, approved, and conceptual development anticipated in the nine incorporated cities and the unincorporated area of Sonoma County. Implementation of the proposed 2009 CTP could pose demands on future public services, such as police and fire/emergency personnel. However, these demands are expected to be minimal and unlikely to require the construction of additional public facilities in the county. Therefore, implementation of the proposed project will not contribute to a significant cumulative impact on public services.

Implementation of the proposed 2009 CTP would result in new SMART commuter rail service and freight service that could impact emergency response times. However, resulting delays of 40 seconds at at-grade crossings for paramedic, fire, and police service providers that must travel east-west across the U.S. 101 freeway corridor is considered a less than significant impact. Therefore, implementation of the proposed project will not contribute to a significant cumulative impact on emergency response times.

Construction of capital improvements in the proposed 2009 CTP will produce solid waste that will not impact the existing Central Landfill operated by Sonoma County. A project's solid waste disposal needs would be analyzed in project-specific environmental documents. Any new or

additional capacity needs at the landfills that contract with the County's Waste Management Agency will be assessed at the time of project implementation. Through the implementation of mitigation measures **MM 4.12-3a** through **MM 4.12-3c**, the CTP's impact on solid waste facilities is expected to be less than significant. However, due to the nature of other cumulative projects within the county and incorporated cities, it is possible for implementation of the proposed CTP to contribute to a significant cumulative impact on landfills located outside of the county. Thus, this impact is cumulatively considerable.

### SECTION 5.13 ENERGY

The proposed project would implement transportation projects and programs that would help address current and future mobility challenges within Sonoma County. This will help to reduce energy consumption from motor vehicles and their use of petroleum-based fuels and renewable fuels. However, the rate of growth of VMT and other travel indicators will lead to inevitable increases in vehicle fuel use, most of which is expected to rely on petroleum-based fossil fuels that are not renewable in their nature. Proposed mitigation measures will help to reduce the continuing trend for increased fuel consumption countywide, but major new reforms (e.g., higher federal CAFE fuel economy standards) would be needed to address the cumulative impacts of growth on fuel consumption. Thus, this impact is cumulatively considerable.

## 5.4 CLIMATE CHANGE

Perhaps the most challenging policy issue faced by communities through the world is global climate change. While other resource issues addressed in this EIR are cumulative at a county or even regional level, climate change is cumulative in the global sense. Emissions of greenhouse gases (GHGs) from vehicles in Sonoma County can contribute to global accumulation of these emissions that can raise temperatures in another part of the world.

While emitting CO<sub>2</sub> into the atmosphere is not itself an adverse environmental effect, it is the increased concentration of CO<sub>2</sub> in the atmosphere resulting in global climate change and the associated consequences of climate change that results in adverse environmental effects (e.g., sea level rise, loss of snowpack, severe weather events). As such, this issue is addressed in the Cumulative Impacts section of this EIR.

### ENVIRONMENTAL SETTING

Various gases in the Earth's atmosphere, classified as atmospheric greenhouse gases, play a critical role in determining the Earth's surface temperature. Solar radiation enters Earth's atmosphere from space, and a portion of the radiation is absorbed by the Earth's surface. The Earth emits this radiation back toward space, but the properties of the radiation change from high-frequency solar radiation to lower-frequency infrared radiation. Greenhouse gases, which are transparent to solar radiation, are effective in absorbing infrared radiation. As a result, this radiation that otherwise would have escaped back into space is now retained, resulting in a warming of the atmosphere. This phenomenon is known as the greenhouse effect. Among the prominent GHGs contributing to the greenhouse effect are carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF<sub>6</sub>).

## 5.0 CUMULATIVE IMPACTS

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In Sonoma County, it is estimated that transportation may be responsible for up to 60 percent of all man-made GHG emissions generated within the county. The primary greenhouse gases emitted by motor vehicles include carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), and hydrofluorocarbons (HFCs).<sup>1</sup> Following are descriptions of the primary greenhouse gases attributed to global climate change including a description of the physical properties, contribution to the greenhouse effect, and primary sources.

Carbon dioxide (CO<sub>2</sub>) is released to the atmosphere when solid waste, fossil fuels (oil, natural gas, and coal), and wood and wood products are burned. CO<sub>2</sub> emissions from motor vehicles generally occur directly from operation of the vehicles and from operation of air conditioning systems.

Methane (CH<sub>4</sub>) is emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from the decomposition of organic waste in solid waste landfills, the raising of livestock, natural gas and petroleum systems, stationary and mobile combustion, wastewater treatment, and certain industrial processes. Methane emissions from motor vehicles generally occur directly from operation of vehicles, though mobile sources represent 0.5 percent of overall methane emissions.<sup>2</sup>

Nitrous oxide (N<sub>2</sub>O) is emitted during agricultural and industrial activities, as well as during combustion of solid waste and fossil fuels. Mobile sources represent about 14 percent of N<sub>2</sub>O emissions.<sup>3</sup> N<sub>2</sub>O emissions from motor vehicles generally occur directly from operation of vehicles.

Hydrofluorocarbons (HFCs) are one of several GHGs that are not naturally occurring and are generated in a variety of industrial processes. HFC (refrigerant) emissions from vehicle air conditioning systems can occur due to either leakage, losses during recharging, or release from scrapping of vehicles at the end of their useful lives.

Perfluorocarbons (PFCs) are another of several high GWP gases that are not naturally occurring and are generated in a variety of industrial processes. Emissions of PFCs are generally negligible from motor vehicles.

Sulfur hexafluoride (SF<sub>6</sub>) is another of several high GWP gases that are not naturally occurring and are generated in a variety of industrial processes. Emissions of SF<sub>6</sub> are generally negligible from motor vehicles.

Each GHG differs in its ability to absorb heat in the atmosphere based on the lifetime, or persistence, of the gas molecule in the atmosphere. The Global Warming Potential (GWP) for a particular greenhouse gas is the ratio of heat trapped by one unit mass of the greenhouse gas to that of one unit mass of CO<sub>2</sub> over a specified time period.<sup>4</sup> High GWP gases such as HFCs, PFCs, and SF<sub>6</sub> are the most heat-absorbent. Methane traps over 21 times more heat per molecule than CO<sub>2</sub>, and N<sub>2</sub>O absorbs 310 times more heat per molecule than CO<sub>2</sub>. Often, estimates of GHG emissions are presented in carbon dioxide equivalents (CO<sub>2</sub>e), which weight

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<sup>1</sup> California Air Resources Board, *Climate Change Emission Control Regulations*, 2004.

<sup>2</sup> United States Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks, 1990-2003*, April 2005 (EPA 430-R-05-003).

<sup>3</sup> United States Environmental Protection Agency, *U.S. Adipic Acid and Nitric Acid N<sub>2</sub>O Emissions 1990-2020: Inventories, Projections and Opportunities for Reductions*, December 2001.

<sup>4</sup>United States Environmental Protection Agency, *High Global Warming Potential Gases*, <http://www.epa.gov/highgwp/scientific.html>, accessed March 14, 2009.

each gas by its GWP. Expressing GHG emissions in carbon dioxide equivalents takes the contribution of all GHG emissions to the greenhouse effect and converts them to a single unit equivalent to the effect that would occur if only CO<sub>2</sub> were being emitted. **Table 5.0-1** illustrates the GWPs for different GHGs for a 100-year time horizon.

**TABLE 5.0-1  
GLOBAL WARMING POTENTIALS FOR GREENHOUSE GASES**

Greenhouse Gas	Global Warming Potential
Carbon Dioxide (CO <sub>2</sub> )	1
Methane (CH <sub>4</sub> )	21
Nitrous Oxide (N <sub>2</sub> O)	310
Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs)	6,500
Sulfur Hexafluoride (SF <sub>6</sub> )	23,900

Source: BAAQMD Source Inventory of Bay Area Greenhouse Gas Emissions, November 2006

As the name implies, global climate change is a global problem. GHGs are global pollutants, unlike criteria air pollutants and toxic air contaminants, which are pollutants of regional and local concern, respectively. California is the 12th to 16th largest emitter of CO<sub>2</sub> in the world and produced 492 million gross metric tons of carbon dioxide equivalents in 2004.<sup>5</sup> Consumption of fossil fuels in the transportation sector was the single largest source of California's GHG emissions in 2004, accounting for 40.7 percent of total GHG emissions in the state (CEC 2006) and is estimated to account for up to 60 percent of the GHG emissions in Sonoma County.<sup>6</sup>

### Effects of Global Climate Change

The effects of increasing global temperature are far reaching and extremely difficult to quantify. The scientific community continues to study the effects of global climate change. In general, increases in the ambient global temperature as a result of increased GHGs is anticipated to result in rising sea levels which could threaten coastal areas through accelerated coastal erosion, threats to levees and inland water systems and disruption to coastal wetlands and habitat.

If the temperature of the ocean warms, it is anticipated that the winter snow season would be shortened. Snowpack in the Sierra Nevada provides both water supply (runoff) and storage (within the snowpack before melting), which is a major source of supply for the state. According to a California Energy Commission report, the snowpack portion of the supply could potentially decline by 70 to 90 percent by the end of the 21<sup>st</sup> century (CEC 2006). This phenomenon could lead to significant challenges securing an adequate water supply for a growing state population. Further, the increased ocean temperature could result in increased moisture flux into the state; however, since this would likely increasingly come in the form of rain rather than snow in the high elevations, increased precipitation could lead to increased potential and severity of flood events, placing more pressure on California's levee/flood control system. Sea level has risen approximately seven inches during the last century and, according to the CEC

<sup>5</sup> California Energy Commission, *New Research Identifies California's Greenhouse Gas Emissions*, Energy Commission Report Examines Causes of Climate Change, [http://www.energy.ca.gov/releases/2006\\_releases/2006-10-31\\_greenhouse\\_inventory.html](http://www.energy.ca.gov/releases/2006_releases/2006-10-31_greenhouse_inventory.html), accessed 2008.

<sup>6</sup> Ibid.

## 5.0 CUMULATIVE IMPACTS

report, it is predicted to rise an additional 22 to 35 inches by 2100, depending on the future GHG emissions levels (CEC 2006). If this occurs, resultant effects could include increased coastal flooding, saltwater intrusion and disruption of wetlands (CEC 2006). As the existing climate throughout California changes over time, mass migration of species, or worse, failure of species to migrate in time to adapt to the perturbations in climate, could also result.

Potential impacts of global climate change on transportation are summarized in **Table 5.0-2**, which is adapted from a Transportation Research Board special report.<sup>7</sup>

**TABLE 5.0-2  
POTENTIAL CLIMATE CHANGES AND IMPACTS ON TRANSPORTATION**

Potential Climate Change	Impacts on Transportation	
	Operations and Interruptions	Infrastructure
Increases in very hot days and heat waves.	<ul style="list-style-type: none"> <li>Limits on periods of construction activity due to health and safety concerns</li> <li>Vehicle overheating and tire deterioration.</li> </ul>	<ul style="list-style-type: none"> <li>Impacts on pavement and concrete construction practices.</li> <li>Thermal expansion on bridge expansion joints and paved surfaces.</li> <li>Impacts on landscaping in highway and street rights-of-way.</li> <li>Concerns regarding pavement integrity, e.g., softening, traffic-related rutting, migration of liquid asphalt.</li> <li>Rail-track deformities; high air temperatures can lead to equipment failure.</li> </ul>
Decreases in very cold days.	<ul style="list-style-type: none"> <li>Fewer cold-related restrictions for maintenance workers.</li> </ul>	
Sea level rise, added to storm surge.	<ul style="list-style-type: none"> <li>More frequent interruptions in travel on coastal and low-lying roadways and rail service due to storm surges.</li> <li>More severe storm surges, requiring evacuation.</li> </ul>	<ul style="list-style-type: none"> <li>Inundation of roads and rail lines in coastal areas.</li> <li>More frequent or severe flooding of underground tunnels and low-lying infrastructure.</li> <li>Erosion of road base and bridge supports.</li> <li>Bridge scour.</li> <li>Reduced clearance under bridges.</li> <li>Loss of coastal wetlands and barrier shoreline.</li> <li>Land subsidence.</li> </ul>

<sup>7</sup> National Research Council, *Potential Impacts of Climate Change on U.S. Transportation: Transportation Research Board Special Report 290*, Committee on Climate Change and U.S. Transportation, Transportation Research Board and Division on Earth and Life Studies, National Research Council of the National Academies, 2008.

Potential Climate Change	Impacts on Transportation	
	Operations and Interruptions	Infrastructure
Increase in intense precipitation events.	<ul style="list-style-type: none"> <li>Increases in weather-related delays.</li> <li>Increases in traffic disruptions.</li> <li>Increased flooding of evacuation routes.</li> <li>Disruption of construction activities.</li> <li>Changes in rain, snowfall, and seasonal flooding that affect safety and maintenance operations.</li> </ul>	<ul style="list-style-type: none"> <li>Increases in flooding of roadways, rail lines, and subterranean tunnels.</li> <li>Overloading of drainage systems, causing backups and street flooding.</li> <li>Increases in road scouring, road washout, damages to railbed support structures, and landslides and mudslides that damage roadways and tracks.</li> <li>Impacts on soil moisture levels, affecting structural integrity of roads, bridges, and tunnels.</li> <li>Adverse impacts of standing water on road bases.</li> <li>Increases in scouring of pipeline roadbeds and damages to pipelines.</li> </ul>
Increases in drought conditions for some regions.	<ul style="list-style-type: none"> <li>Increased susceptibility to wildfires, causing road closures due to fire threat or reduced visibility.</li> </ul>	<ul style="list-style-type: none"> <li>Increased susceptibility to wildfires that threaten transportation infrastructure directly.</li> <li>Increased susceptibility to mudslides in areas deforested by wildfires.</li> </ul>
Changes in seasonal precipitation and river flow patterns.	<ul style="list-style-type: none"> <li>Benefits for safety and reduced interruptions if frozen precipitation shifts to rainfall, depending on terrain.</li> </ul>	<ul style="list-style-type: none"> <li>Increased risk of floods from runoff, landslides, slope failures, and damage to roads if precipitation changes from snow to rain in winter and spring thaws.</li> </ul>

Source: National Research Council, *Potential Impacts of Climate Change on U.S. Transportation: Transportation Research Board Special Report 290. Committee on Climate Change and U.S. Transportation, Transportation Research Board and Division on Earth and Life Studies, National Research Council of the National Academies.2008.*

Research conducted by the San Francisco Bay Conservation and Development Commission (BCDC) projects a sea level rise within the Bay Area of 16 inches by the mid-century period of 2040 to 2060.<sup>8</sup> Exhibit 5.0-1 illustrates BCDC’s projection of areas affected by sea level rise in the period of 2040 to 2060 with a sea level rise of 16 inches.

<sup>8</sup> San Francisco Bay Conservation and Development Commission, *A Sea Level Rise Strategy for the San Francisco Bay Region*, September 2008.

## **5.0 CUMULATIVE IMPACTS**

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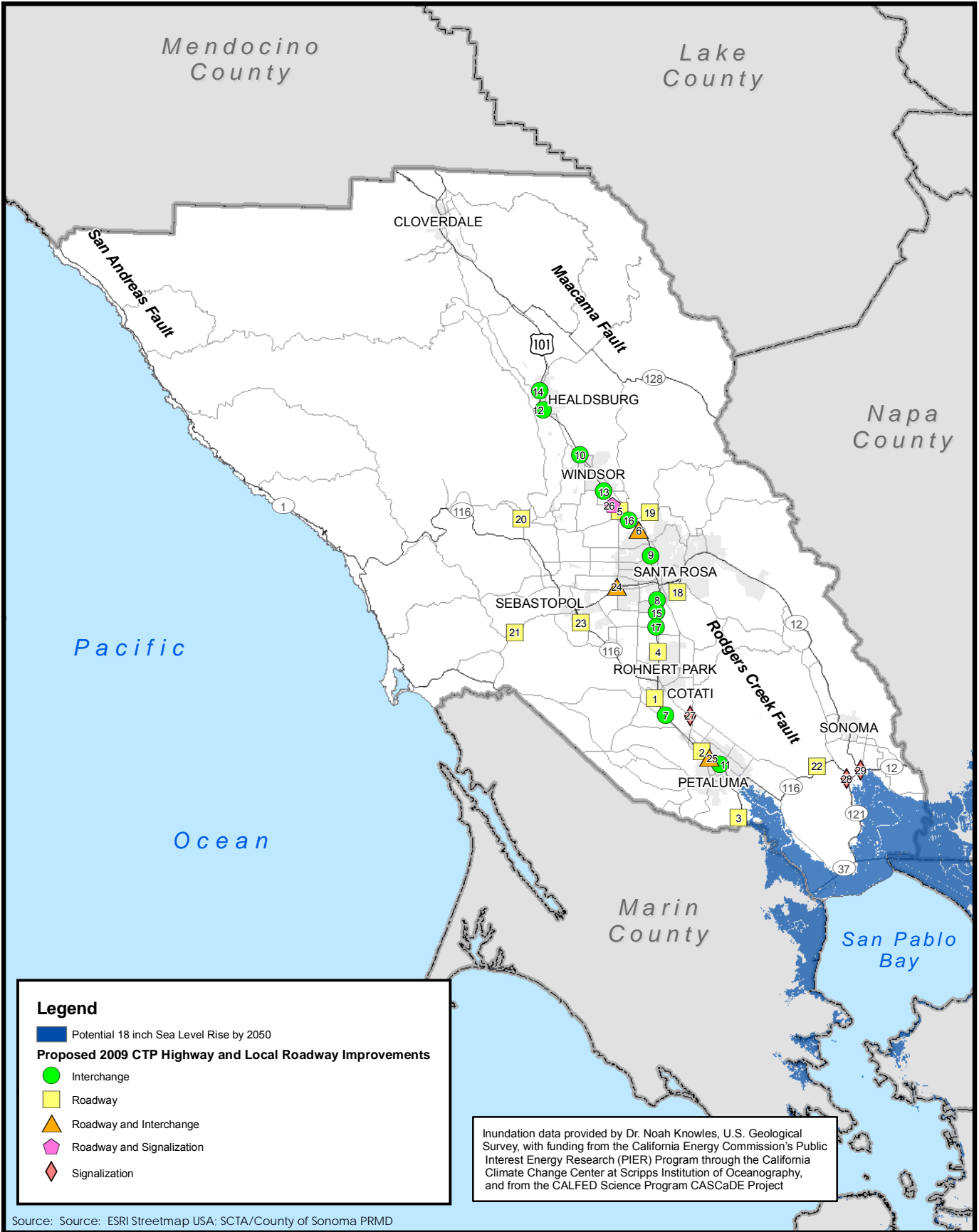


Exhibit 5.0-1  
Potential Sea Level Rise



**REGULATORY SETTING****Energy Independence and Security Act of 2007 (Public Lay 110-140, 42 USC Section 7545(0)(2))**

This federal energy bill, enacted in December 2007, revised the Corporate Average Fuel Economy (CAFE) standards that regulate the average fuel economy for vehicles sold in the U.S. by each major automaker. This bill requires that, by 2020, new cars and light trucks sold in the U.S. will have a combined fleet average fuel economy of 35 miles per gallon.

**Executive Order S-3-05**

Executive Order S-3-05, which was signed by Governor Schwarzenegger in 2005, proclaims that California is vulnerable to the impacts of climate change. It declares that increased temperatures could reduce the Sierra's snowpack, further exacerbate California's air quality problems, and potentially cause a rise in sea levels. To combat those concerns, the Executive Order established total greenhouse gas emission targets. Specifically, emissions are to be reduced to the 2000 level by 2010, the 1990 level by 2020, and to 80 percent below the 1990 level by 2050. The Executive Order directed the Secretary of the California Environmental Protection Agency (CalEPA) to coordinate a multi-agency effort to reduce greenhouse gas emissions to the target levels. The Secretary will also submit biannual reports to the Governor and state Legislature describing: (1) progress made toward reaching the emission targets; (2) impacts of global warming on California's resources; and (3) mitigation and adaptation plans to combat these impacts. To comply with the Executive Order, the Secretary of the CalEPA created a Climate Action Team (CAT) made up of members from various state agencies and commission. CAT released its first report in March 2006. The report proposed to achieve the targets by building on voluntary actions of California businesses, local government and community actions, as well as through state incentive and regulatory programs.

**Assembly Bill 32, The California Climate Solutions Act of 2006**

In September 2006, Governor Arnold Schwarzenegger signed AB 32, the California Climate Solutions Act of 2006. AB 32 requires that statewide GHG emissions be reduced to 1990 levels by the year 2020. This reduction will be accomplished through an enforceable statewide cap on GHG emissions that will be phased in starting in 2012. To effectively implement the cap, AB 32 directs the California Air Resources Board (ARB) to develop and implement regulations to reduce statewide GHG emissions from stationary sources. AB 32 specifies that regulations adopted in response to AB 1493 should be used to address GHG emissions from vehicles. However, AB 32 also includes language stating that if the AB 1493 regulations cannot be implemented, then ARB should develop new regulations to control vehicle GHG emissions under the authorization of AB 32.

AB 32 requires that ARB adopt a quantified cap on GHG emissions representing 1990 emissions levels and disclose how it arrives at the cap; institute a schedule to meet the emissions cap; and develop tracking, reporting, and enforcement mechanisms to ensure that the state achieves reductions in GHG emissions necessary to meet the cap. AB 32 also includes guidance to institute emissions reductions in an economically efficient manner and conditions to ensure that businesses and consumers are not unfairly affected by the reductions.

## 5.0 CUMULATIVE IMPACTS

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### Senate Bill 97

SB 97, enacted in 2007, amends the CEQA statute to clearly establish that GHG emissions and the effects of GHG emissions are appropriate subjects for CEQA analysis. It directs the Governor's Office of Planning and Research (OPR) to develop draft CEQA Guidelines "for the mitigation of greenhouse gas emissions or the effects of greenhouse gas emission" by July 1, 2009, and directs the Resources Agency to certify and adopt the CEQA Guidelines by January 1, 2010. On June 19, 2008, OPR issued a technical advisory titled *CEQA and Climate Change: Addressing Climate Change Through California Environmental Quality Act (CEQA) Review* to provide interim guidance on addressing GHG emissions in CEQA documents.

### Senate Bill 1368

SB 1368 is the companion bill of AB 32 and was signed by Governor Schwarzenegger in September 2006. SB 1368 requires the California Public Utilities Commission (PUC) to establish a greenhouse gas emission performance standard for baseload generation from investor-owned utilities by February 1, 2007. The California Energy Commission (CEC) must establish a similar standard for local publicly owned utilities by June 30, 2007. These standards cannot exceed the greenhouse gas emission rate from a baseload combined-cycle natural gas fired plant. The legislation further requires that all electricity provided to California, including imported electricity, must be generated from plants that meet the standards set by the PUC and CEC.

### Assembly Bill 1493

Assembly Bill 1493 (AB 1493) requires ARB to develop and adopt greenhouse gas emission standards for automobiles. The Legislature declared in AB 1493 that global warming was a matter of increasing concern for public health and environment in the state. It cited several risks that California faces from climate change, including reduction in the state's water supply, increased air pollution creation by higher temperatures, harm to agriculture, an increase in wildfires, damage to the coastline, and economic losses caused by higher food, water energy, and insurance prices. Further, the legislature stated that technological solutions to reduce greenhouse gas emissions would stimulate the California economy and provide jobs.

Analysis by ARB indicate that implementation of AB 1493, if U.S. EPA grants a waiver allowing California to implement these standards, would result in a combined fleet average fuel economy standard of roughly 43 miles per gallon for new cars and light trucks sold in California in 2020.<sup>9</sup>

### Senate Bill 375

SB 375 (1) requires ARB, by September 30, 2010, to provide each region throughout the state with GHG emission reduction targets for the automobile and light truck sector for 2020 and 2035, respectively; (2) requires a regional transportation plan to include a Sustainable Communities Strategy (SCS) designed to achieve the targets for GHG emission reduction; (3) requires cities and counties to revise their housing elements every eight years in conjunction with the regional transportation plan and complete any necessary rezoning within a specific time period; and (4) it relaxes CEQA requirements for housing developments that are consistent with a SCS.

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<sup>9</sup> California Air Resources Board, *Addendum to February 25 Technical Assessment: Comparison of Greenhouse Gas Reductions for the United States and Canada under ARB GHG Regulations and the Proposed Federal 2011-2015 Model Year Fuel Economy Standards*, May 2008.

**Office of Planning and Research CEQA and Climate Change Technical Advisory**

On June 19, 2008 the Governor's Office of Planning and Research issued a technical advisory titled *CEQA and Climate Change: Addressing Climate Change Through California Environmental Quality Act (CEQA) Review*. The advisory provides technical guidance for addressing the issue of climate change in CEQA documents.

**Sonoma County Community Climate Action Plan**

Sonoma County has been addressing climate change issues through the development of its Community Climate Action Plan (CAP). This initiative spearheaded by the Climate Action Campaign is a grassroots program that calls on municipal jurisdictions and the public to find ways to reduce the countywide carbon footprint. In 2002, all nine cities within the county and the County of Sonoma pledged to reduce GHG emissions through a five-step process. The steps include completing an inventory of GHG emissions, setting a target for reducing emissions, creating a plan for achieving the target, implementing measures for GHG reductions and tracking progress toward the target. All nine cities and the County have adopted the goal of reducing GHG emissions to 25 percent below 1990 levels by 2015. The 2009 CTP has set a goal of meeting the targets to reduce GHG emissions 25 percent below 1990 levels by 2015, and 40 percent below 1990 levels by 2035.

The Plan calls for reductions in GHG emissions through energy/water efficiency, investing in local renewable energy and jobs, carbon sequestration, and smart transit and land use strategies. This last strategy includes implementing SMART rail service, adopting the 2009 CTP, promoting electric car sharing that allows for vehicle rentals for those who eschew auto ownership, and implementing market-based pricing strategies that capture the true cost of automobile operations. Further, it also calls on local governments through the General Plan and zoning process to promote transit-oriented development, consider urban growth boundaries, and streamlining the permit process for "green" projects that promote renewable energy goals.

**SCTA Programs**

Locally, SCTA's CTP has proactively embraced a policy that calls for reducing GHG from the transportation sector and includes aggressive goals that go above and beyond the State's AB 32 requirements. Specifically, the CTP calls for 25 percent reductions in GHG from 1990 levels by 2015 and 40 percent reductions from 1990 levels by 2035. By comparison, AB 32 calls for the State to achieve 1990 GHG levels by 2020, for example. Its partnership with the local jurisdictions and other entities within Sonoma County through the Community Climate Action Plan and other initiatives will be critical to achieving these goals.

In addition, SCTA has promoted progressive ideas about how the transportation sector can promote solutions to reducing GHGs. In partnership with the Sonoma County Alliance and the Leadership Institute for the Ecology and the Economy, SCTA hosted an October 2008 conference *Moving Forward: Thinking Outside the Car* to explore ways to promote sustainable transportation policy.

## 5.0 CUMULATIVE IMPACTS

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### IMPACT ANALYSIS

#### METHODOLOGY

Emitting CO<sub>2</sub> into the atmosphere is not itself an adverse environmental effect. It is the increased concentration of CO<sub>2</sub> in the atmosphere resulting in global climate change and the associated consequences of climate change that results in adverse environmental effects (e.g., sea level rise, loss of snowpack, severe weather events). Although it is possible to estimate the proposed project's incremental contribution of CO<sub>2</sub> into the atmosphere, it is typically not possible to determine whether or how an individual project's relatively small incremental contribution might translate into physical effects on the environment. Given the complex interactions between various global and regional-scale physical, chemical, atmospheric, terrestrial, and aquatic systems that result in the physical expressions of global climate change, it is impossible to discern whether the presence or absence of CO<sub>2</sub> emitted by the project would result in any altered conditions.

Nevertheless, this section's impact analysis focuses on complete disclosure of potential GHG emissions associated with the 2009 CTP's efforts to address current and future mobility challenges. To that end, this analysis uses travel projections developed using SCTA's travel demand forecasting model as described in Section 4.3, along with a methodology developed by the Sonoma County Climate Protection Campaign for measuring transportation related GHG emissions for the CAP. The CAP was developed based on input from elected representatives, the business community, and the public, and has been adopted by the 10 local jurisdictions of Sonoma County and the County of Sonoma and represents Sonoma County's commitment to actively addressing Climate Change and GHG emissions.

The CACPS (Clean Air and Climate Protection Software) was used to estimate transportation CO<sub>2</sub>e emissions for the GHG impact analysis. This was to ensure consistency with the CAP and uses current, past, and future VMT, average vehicle fuel economies, along with recommended conversion factors. All GHG emission estimates are reported as carbon dioxide equivalents for all relevant GHG emissions. VMT estimates are obtained from the travel demand model. Fuel economies are based on MTC estimates used for the Transportation 2035 Plan. Current fuel economy estimates are based on current data from the American Automobile Association, the U.S. Energy Information Administration, U.S. Bureau of Labor Statistics, and ARB analysis of future compliance with AB 1493 fuel economy standards.

#### SIGNIFICANCE CRITERIA

No air district in California, including the Bay Area Air Quality Management District and the Northern Sonoma County Air Pollution Control District, has identified a significance threshold for GHG emissions or a methodology for analyzing air quality impacts related to greenhouse gas emissions. The state has identified 1990 emission levels as a goal through adoption of AB 32. To meet this goal, California would need to generate lower levels of GHG emissions than current levels. However, no standards have yet been adopted quantifying 1990 emission targets. Current standards for reducing vehicle emissions considered under AB 1493 call for "the maximum feasible reduction of greenhouse gases emitted by passenger vehicles and light-duty trucks and other vehicles," and do not provide a quantified target for GHG emissions reductions for vehicles.

For this analysis, the 2009 CTP's contribution to global climate change would be considered significant if it would:

- result in substantial net increases in greenhouse gases and CO<sub>2</sub> emissions compared to existing conditions.
- expose persons to significant risks associated with the effects of global climate change, or
- be inconsistent with state and local requirements and efforts to address climate change.

IMPACTS AND MITIGATION MEASURES

**Greenhouse Gas Emissions From Motor Vehicles**

**Impact 5.0-1** Implementation of the 2009 CTP would help decrease emissions of carbon dioxide equivalents (CO<sub>2</sub>e) from motor vehicles in 2035 by almost 550,000 pounds per day over existing (2005) conditions. While any emissions of GHG from the transportation sector contribute to the significant issues of global climate change, the CTP’s contribution to a net reduction in GHG emissions is considered to be **beneficial**.

Greenhouse Gas Emissions

Countywide GHG emissions from motor vehicles, expressed as carbon dioxide equivalents, are projected to decrease by 22 percent from 2,549,042 in 2005 to 1,999,582 in 2035 (Table 5.0-3). Although future VMT are projected to increase by 2035, there are two key State and federal initiatives that are projected to offset any VMT-related GHG emission increases, and would account for the majority of future GHG emission reductions. First, the Energy Independence and Security Act of 2007 strengthened federal fuel economy standards for automakers. This bill requires that new vehicles achieve a combined fleet average of 35 miles per gallon by 2020. Because fuel economy is a key variable in the combustion of fossil fuels, more fuel efficient vehicles will help to offset the growth in population and the vehicle fleet. Second, AB 1493 (Pavley, 2002) is a major initiative in California that calls for ARB to adopt regulations that maximize feasible reductions of GHG from passenger vehicles for implementation in the 2009 model year. ARB estimates that these regulations will reduce CO<sub>2</sub>e emissions statewide by 16.4 million metric tons by 2016 and by 31.7 million metric tons by 2020.

**TABLE 5.0-3  
MOTOR VEHICLE FLEET TRAVEL AND GHG FORECASTS (2005 AND 2035)**

Criterion	2005 Existing Conditions	2035 No Project Scenario	2009 CTP 2035 Conditions	Change 2005 to 2035	
				Numerical	Percentage
Daily Vehicle Miles of Travel (VMT)	11,441,811	14,768,411	14,417,956	+2,976,144	+26.0%
Daily Vehicle Miles Traveled per Capita	23.1	26.0	25.3	+2.2	+9.5%
Fuel Economy (miles per gallon)	19.86	32.15	32.15	+12.29	+61.9%
Carbon Dioxide Equivalent emissions (CO <sub>2</sub> e pounds per day)	2,549,042	2,048,185	1,999,582	-549,460	-21.6%

Source: Sonoma County Transportation Authority; Sonoma County Transportation Model and Clean Air and Climate Protection Software 5, 2008.

## 5.0 CUMULATIVE IMPACTS

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The 2009 CTP does reduce VMT when compared to the 2035 No Project Scenario, demonstrating that CTP policies and projects would decrease the carbon footprint of motor vehicles in 2035 by over 48,000 pounds per day beyond those reductions associated with vehicle fuel economy improvements.

### Potential Environmental Effects of Climate Change

Within Sonoma County, increased frequency and intensity of storms due to climate change could lead to subsidence and/or erosion damage to roads, bridges, and other transportation facilities. The west and north parts of the County would be the areas most impacted due to the topography and soil conditions in those areas that are more susceptible to subsidence and flooding. In addition, low-lying areas along the San Francisco Bay, such as Highway 37, would also be at risk from both storm-related flooding and sea level rise. Flooding could also close or damage roadways within the county, as has happened in the past in the Russian River valley, Petaluma, and in the south/southeast portions of the county.

As discussed in Impact 5.0-4, the CTP would help reduce GHG emissions from the countywide transportation system that could help reduce the impacts of global climate change on Sonoma County. Further, the proposed 2009 CTP includes a key policy (Policy 3: Reduce Greenhouse Gas Emissions) and incorporates the following associated objectives designed to reduce GHG emissions from the transportation sector:

- Objective 3A: Reduce vehicle miles of travel (VMT) per capita by 10% below 2005 levels by 2035. This includes a number of Transportation Strategies designed to promote land use strategies that promote reductions in travel demand that could reduce VMT on the roadway network.
- Objective 3B: Increase transit use and productivity.
- Objective 3C: Improve accessibility and safety for pedestrians at and around activity centers.
- Objective 3D: Implement 2008 Countywide Bicycle and Pedestrian Master Plan.
- Objective 3E: Support development and deployment of new technologies to reduce transportation emissions.

Ultimately, the potential impacts of climate change are real, given the general concurrence in the scientific community about the potential impacts of climate change on the environment. However, the severity and the precise location of such impacts is still speculative at this time. Nevertheless, the following mitigation measures as they would help reduce potential exposure of people and transportation projects to future impacts of climate change.

Given the ultimate significance of global climate change and the role of surface transportation systems worldwide, the need to consider all feasible strategies to reduce vehicle activity and resulting GHG emissions should be considered by transportation planning agencies, local governments, air pollution control districts, and other stakeholders. To that end, the following mitigation measures are recommended for implementation:

**Recommended Mitigation Measures**

- MM 5.0-1a** SCTA shall consider working in partnership with the Bay Area Air Quality Management District to conduct demonstration projects in Sonoma County that help reduce GHG emissions. This would help implement Bay Area Ozone Strategy TCM-17.
- MM 5.0-1b** SCTA shall work in partnership with appropriate stakeholders (e.g., Bay Area Air Quality Management District, Sonoma County Alliance, Leadership Institute for the Ecology and the Economy) to develop public information campaigns to educate residents, merchants, and the traveling public about transportation strategies that can help reduce GHG emissions.
- MM 5.0-1c** SCTA shall encourage project sponsors to design transportation-related improvements such as transit buildings and facilities to be certified by the Leadership in Energy and Environmental Design program (LEED).
- MM 5.0-1d** SCTA shall work with local governments to limit idling time for commercial vehicles, including delivery and construction vehicles.
- MM 5.0-1e** SCTA shall work with project sponsors to develop standards for construction management, including use of recycled materials or low-carbon products.
- MM 5.0-1f** SCTA shall work with MTC, BCDC, and other partners to address vulnerability of the county's transportation infrastructure and appropriate adaptation strategies to protect those transportation resources that are likely to be impacted by sea level rise and flooding associated with global climate change. Examples could include, but not be limited to:
- Engineering designs for new transportation projects shall demonstrate that they have factored in sea level rise and potential increases in storm surge inundation, and are budgeting for and already incorporating mitigation measures to adapt to projected sea level rise and storm surge. These mitigation measures should consider the effects on Bay and coastal zone resources and avoid or reduce risk to the infrastructure and the region.
  - For transportation projects that increase the capacity of existing infrastructure, project sponsors shall demonstrate they have investigated the vulnerability of their existing facilities to sea level rise and potential increases in storm surge inundation, and are budgeting for and already incorporating mitigation measures to adapt to projected sea level rise and storm surge. These mitigation measures should consider the effects on Bay and coastal zone resources and avoid or reduce risk to the infrastructure and the region.
- MM 5.0-1g** Where applicable, project sponsors for subsequent projects under the 2009 CTP shall include mitigation measures to reduce impacts related to significant storm events, sea level rise, and flooding resulting from global climate change.

## 5.0 CUMULATIVE IMPACTS

### Greenhouse Gas Emissions from Construction Activities

**Impact 5.0-2** Implementation of the 2009 CTP would result in construction of capital improvements that would emit carbon dioxide and other greenhouse gas emissions. While the continuation of construction activities over time will contribute GHG emissions to existing climate change, construction-related emissions would be expected to decrease per capita over time as low-carbon fuel standards and other climate change measures consistent with AB 32 and other State mandates are implemented. In addition, these impacts would be short-term in duration and as such, this impact is considered to be **less than significant**.

As transportation projects from the 2009 CTP are built, carbon dioxide emissions from off-road heavy-duty vehicles and construction equipment would be emitted, contributing to global climate change. However, these emissions are expected to decrease over time on a per capita basis, as low-carbon fuel standards and other climate change measures consistent with AB 32 and other similar mandates take hold. Based on an analysis of a hypothetical one-acre construction site, **Table 5.0-4** illustrates that using current assumptions about engine technology advancements, construction emissions of CO<sub>2</sub>, particularly from building of structures, are likely to decrease over time.

**TABLE 5.0-4**  
**EXAMPLE OF TYPICAL EMISSIONS FROM CONSTRUCTION PROJECTS (LB/DAY CO<sub>2</sub>)**

Construction Phase	2008	2035	Difference
Grading	2,376	2,376	+0.31
Asphalt	1,175	1,176	+0.62
Building	1,415	1,394	-20.53
Coating	9	9	0
Total (One Year)	4,975	4,955	-19.60

*Source: CARB URBEMIS 9.2.4 model run. Example assumes one acre site, 12 months of construction activity, with equal phases of fine grading, asphalt, building, and coating. CO<sub>2</sub> emissions from grading, asphalt, and coating activities are generally static given the model's current lack of foreseeable control measures for GHG emissions from equipment associated with those processes.*

Given the ultimate significance of global climate change and because continuing construction of new transportation projects would increase GHG emissions over existing conditions, the need to consider all feasible strategies to reduce construction-related GHG emissions should be considered by transportation planning agencies, local governments, air pollution control districts, and other stakeholders. To that end, the following mitigation measure is recommended for implementation:

### Recommended Mitigation Measure

**MM 5.0-2a** SCTA shall work with the BAAQMD and other appropriate stakeholders to develop guidance and/or requirements to use low-carbon emitting techniques or equipment in the construction process for capital improvements included in the 2009 CTP.

### **Consistency with State and Local Requirements and Efforts to Address Climate Change**

**Impact 5.0-3** Implementation of the 2009 CTP would help decrease emissions of carbon dioxide equivalents (CO<sub>2</sub>e) in 2035 by almost 550,000 pounds per day over existing (2005) conditions. This would be a 21.6 percent reduction in GHG emissions by 2035, which is generally consistent with AB 32's mandate to reduce GHG emissions to 1990 levels by 2020 (equivalent to an approximately 15 percent reduction in GHG from today's levels) as well as local efforts in Sonoma County. This impact is considered to be **less than significant**.

Given that many jurisdictions have not established 1990 CO<sub>2</sub>e inventories that serve as the basis for AB 32 compliance, the ARB's 2008 AB 32 Scoping Plan states that local governments can "move toward establishing similar goals for community emissions that parallel the State commitment to reduce greenhouse gas emissions by approximately 15 percent from current levels by 2020."<sup>10</sup> As such, the proposed 2009 CTP would reduce CO<sub>2</sub>e emissions by 21.6 percent by 2035. This magnitude of reductions is generally consistent with the requirements of AB 32 for a declining inventory of emissions that would meet the 2020 performance target for the State.

While AB 32 calls for reductions in statewide GHG emissions to 1990 levels by 2020, it also recognizes the need for new technologies and initiatives to achieve such a bold vision. This reduction will be accomplished through an enforceable statewide cap on GHG emissions that will be phased in starting in 2012. To effectively implement the cap, AB 32 directs ARB to develop and implement regulations to reduce statewide GHG emissions from stationary sources. AB 32 specifies that regulations adopted in response to AB 1493 should be used to address GHG emissions from vehicles. However, AB 32 also includes language stating that if the AB 1493 regulations cannot be implemented, then ARB should develop new regulations to control vehicle GHG emissions under the authorization of AB 32.

On April 20, 2007, the State released its 44 early action items for implementing AB 32.<sup>11</sup> It was dominated by technology-forcing standards to clean up combustion engines, including on- and off-road engines. As such, the proposed 2009 CTP does not conflict with these early action items, as it proposes reductions in vehicle activity and technologies that promote cleaner air from the motor vehicle fleet.

The proposed 2009 CTP includes a key policy (Policy 3: Reduce Greenhouse Gas Emissions) and incorporates the following associated objectives designed to reduce GHG emissions from the transportation sector:

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<sup>10</sup> California Air Resources Board, *AB 32 Scoping Plan*, <http://www.arb.ca.gov/cc/scopingplan/scopingplan.htm>, December 12, 2008.

<sup>11</sup> California Air Resources Board, *Proposed Early Actions to Mitigate Climate Change in California*, April 20, 2007.

## 5.0 CUMULATIVE IMPACTS

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- Objective 3A: Reduce vehicle miles of travel (VMT) per capita by 10% below 2005 levels by 2035. This includes a number of Transportation Strategies designed to promote land use strategies that promote reductions in travel demand that could reduce VMT on the roadway network.
- Objective 3B: Increase transit use and productivity.
- Objective 3C: Improve accessibility and safety for pedestrians at and around activity centers.
- Objective 3D: Implement 2008 Countywide Bicycle and Pedestrian Master Plan.
- Objective 3E: Support development and deployment of new technologies to reduce transportation emissions.

In addition, the CTP includes other policies, goals, and objectives that will further reduce GHGs from the transportation sector by reducing VMT countywide.

Because the proposed 2009 CTP does not conflict with AB 32's emission reduction goals or its 44 early action items, this impact is considered **less than significant**. Nevertheless, because ARB is still determining how compliance with AB 32 will be met, the following mitigation measure is recommended for implementation:

### Recommended Mitigation Measure

**MM 5.0-3** SCTA shall work with appropriate stakeholders to ensure that future transportation plans and projects are consistent with AB 32 implementation standards and guidelines once they are developed.