4.7 GREENHOUSE GAS EMISSIONS/CLIMATE CHANGE

4.7.1 Setting

a. Climate Change and Greenhouse Gases (GHGs). Climate change is the observed increase in the average temperature of the Earth's atmosphere and oceans along with other substantial changes in climate (such as wind patterns, precipitation, and storms) over an extended period of time. The term "climate change" is often used interchangeably with the term "global warming," but "climate change" is preferred to "global warming" because it helps convey that there are other changes in addition to rising temperatures. The baseline against which these changes are measured originates in historical records identifying temperature changes that have occurred in the past, such as during previous ice ages. The global climate is continuously changing, as evidenced by repeated episodes of substantial warming and cooling documented in the geologic record. The rate of change has typically been incremental, with warming or cooling trends occurring over the course of thousands of years. The past 10,000 years have been marked by a period of incremental warming, as glaciers have steadily retreated across the globe. However, scientists have observed acceleration in the rate of warming during the past 150 years. Per the United Nations Intergovernmental Panel on Climate Change (IPCC, 2007), the understanding of anthropogenic warming and cooling influences on climate has led to a high confidence (90 percent or greater chance) that the global average net effect of human activities since 1750 has been one of warming. The prevailing scientific opinion on climate change is that most of the observed increase in global average temperatures, since the mid-20th century, is likely due to the observed increase in anthropogenic GHG concentrations (IPCC, 2007).

Gases that absorb and re-emit infrared radiation in the atmosphere are called greenhouse gases (GHGs). GHGs are present in the atmosphere naturally and are released by natural sources or are formed from secondary reactions taking place in the atmosphere. The gases that are widely seen as the principal contributors to human-induced climate change include carbon dioxide (CO_2), methane (CH_4), nitrous oxides (N_2O), fluorinated gases such as hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). Water vapor is excluded from the list of GHGs because it is short-lived in the atmosphere and its atmospheric concentrations are largely determined by natural processes, such as oceanic evaporation.

GHGs are emitted by both natural processes and human activities. Of these gases, CO_2 and CH_4 are emitted in the greatest quantities from human activities. Emissions of CO_2 are largely by-products of fossil fuel combustion, whereas CH_4 results from off-gassing associated with agricultural practices and landfills. Man-made GHGs, many of which have greater heat-absorption potential than CO_2, include fluorinated gases and sulfur hexafluoride (SF_6) (California Environmental Protection Agency [CalEPA], 2006). Different types of GHGs have varying global warming potentials (GWPs). The GWP of a GHG is the potential of a gas or aerosol to trap heat in the atmosphere over a specified timescale (generally, 100 years). Because GHGs absorb different amounts of heat, a common reference gas (CO_2) is used to relate the amount of heat absorbed to the amount of the gas emissions, referred to as "carbon dioxide equivalent" (CO_2E), and is the amount of a GHG emitted multiplied by its GWP. Carbon dioxide has a GWP of one. By contrast, methane (CH_4) has a GWP of 21, meaning its global warming effect is 21 times greater than carbon dioxide on a molecule per molecule basis (IPCC, 1997).

The accumulation of GHGs in the atmosphere regulates the earth's temperature. Without the natural heat trapping effect of GHG, Earth's surface would be about 34° C cooler (CalEPA, 2006). However, it is believed that emissions from human activities, particularly the consumption of fossil fuels for electricity production and transportation, have elevated the concentration of these gases in the atmosphere beyond the level of naturally occurring concentrations. The following discusses the primary GHGs of concern.

Carbon Dioxide. The global carbon cycle is made up of large carbon flows and reservoirs. Billions of tons of carbon in the form of CO_2 are absorbed by oceans and living biomass (i.e., sinks) and are emitted to the atmosphere annually through natural processes (i.e., sources). When in equilibrium, carbon fluxes among these various reservoirs are roughly balanced (United States Environmental Protection Agency [U.S. EPA], April 2011). CO_2 was the first GHG demonstrated to be increasing in atmospheric concentration, with the first conclusive measurements being made in the last half of the 20th century. Concentrations of CO_2 in the atmosphere have risen approximately 40 percent since the industrial revolution. The global atmospheric concentration of CO_2 has increased from a pre-industrial value of about 280 parts per million (ppm) to 391 ppm in 2011 (IPCC, 2007; National Oceanic and Atmospheric Association [NOAA], 2010). The average annual CO_2 concentration growth rate was larger between 1995 and 2005 (average: 1.9 ppm per year) than it has been since the beginning of continuous direct atmospheric measurements (1960–2005 average: 1.4 ppm per year), although there is year-to-year variability in growth rates (NOAA, 2010). Currently, CO_2 represents an estimated 82.7 percent of total GHG emissions (Department of Energy [DOE] Energy Information Administration [EIA], December 2008). The largest source of CO_2, and of overall GHG emissions, is fossil fuel combustion.

Methane. Methane (CH_4) is an effective absorber of radiation, though its atmospheric concentration is less than that of CO_2 and its lifetime in the atmosphere is limited to 10 to 12 years. It has a global warming potential (GWP) approximately 21 times that of CO_2. Over the last 250 years, the concentration of CH_4 in the atmosphere has increased by 148 percent (IPCC, 2007), although emissions have declined from 1990 levels. Anthropogenic sources of CH_4 include enteric fermentation associated with domestic livestock, landfills, natural gas and petroleum systems, agricultural activities, coal mining, wastewater treatment, stationary and mobile combustion, and certain industrial processes (U.S. EPA, April 2011).

Nitrous Oxide. Concentrations of nitrous oxide (N_2O) began to rise at the beginning of the industrial revolution and continue to increase at a relatively uniform growth rate (NOAA, 2010). N_2O is produced by microbial processes in soil and water, including those reactions that occur in fertilizers that contain nitrogen, fossil fuel combustion, and other chemical processes. Use of these fertilizers has increased over the last century. Agricultural soil management and mobile source fossil fuel combustion are the major sources of N_2O emissions. Nitrous oxide's GWP is approximately 310 times that of CO_2.

Fluorinated Gases (HFCS, PFCS and SF_6). Fluorinated gases, such as hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfurhexafluoride (SF_6), are powerful GHGs that are emitted from a variety of industrial processes. Fluorinated gases are used as substitutes for ozone-depleting substances such as chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), and halons, which have been regulated since the mid-1980s because of their ozone-destroying potential and were phased out under the Montreal Protocol (1987) and Clean Air Act Amendments of 1990.

Electrical transmission and distribution systems account for most SF_6 emissions, while PFC emissions result from semiconductor manufacturing and as a by-product of primary aluminum production. Fluorinated gases are typically emitted in smaller quantities than CO_2, CH_4, and N_2O, but these compounds have much higher GWPs. SF_6 is the most potent GHG the IPCC has evaluated.

b. Statewide Greenhouse Gas Emissions Inventory. Worldwide anthropogenic emissions of GHG were approximately 40,000 million metric tons (MMT) CO_2E in 2004, including ongoing emissions from industrial and agricultural sources, but excluding emissions from land use changes (i.e., deforestation, biomass decay) (IPCC, 2007). CO_2 emissions from fossil fuel use accounts for 56.6 percent of the total emissions of 49,000 MMT CO_2E (includes land use changes) and CO_2 emissions from all sources accout for 76.7 percent of the total. Methane emissions account for 14.3 percent of GHG and N_2O emissions account for 7.9 percent (IPCC, 2007).

Total U.S. GHG emissions were 6,821.8 MMT CO_2E in 2009 (U.S. EPA, April 2012). Total U.S. emissions have increased by 10.5 percent since 1990; emissions rose by 3.2 percent from 2009 to 2010 (U.S. EPA, April 2012). This increase was primarily due to (1) an increase in economic output resulting in an increase in energy consumption across all sectors; and (2) much warmer summer conditions resulting in an increase in electricity demand for air conditioning. Since 1990, U.S. emissions have increased at an average annual rate of 0.5 percent. In 2010, the transportation and industrial end-use sectors accounted for 32 percent and 26 percent of CO_2 emissions from fossil fuel combustion, respectively. Meanwhile, the residential and commercial end-use sectors accounted for 22 percent and 19 percent of CO_2 emissions from fossil fuel combustion, respectively (U.S. EPA, April 2012).

Based upon the California Air Resources Board (CARB) *California Greenhouse Gas Inventory for 2000-2009* (http://www.arb.ca.gov/cc/inventory/data/data.htm), California produced 453 MMT CO_2E in 2009. The major source of GHG in California is transportation, contributing 36 percent of the state's total GHG emissions. Electricity generation is the second largest source, contributing 24 percent of the state's GHG emissions (CARB, April 2012). California emissions are due in part to its large size and large population compared to other states. However, a factor that reduces California's per capita fuel use and GHG emissions, as compared to other states, is its relatively mild climate. The ARB has projected statewide unregulated GHG emissions for the year 2020 will be 596 MMT CO_2E (CARB, 2007). These projections represent the emissions that would be expected to occur in the absence of any GHG reduction actions.

c. Potential Effects of Climate Change. Globally, climate change has the potential to affect numerous environmental resources through potential impacts related to future air temperatures and precipitation patterns. Scientific modeling predicts that continued GHG emissions at or above current rates would induce more extreme climate changes during the 21st century than were observed during the 20th century. Scientists have projected that the average global surface temperature could rise by1.0-4.5°F (0.6-2.5°C) in the next 50 years, and the increase may be as high as 2.2-10°F (1.4-5.8°C) in the next century. In addition to these projections, there are identifiable signs that global warming is currently taking place, including substantial ice loss in the Arctic (IPCC, 2007).

According to the CalEPA's *2010 Climate Action Team Biennial Report*, potential impacts of climate change in California may include loss in snow pack, sea level rise, more extreme heat days per year, more high ozone days, more large forest fires, and more drought years (CalEPA, April 2010). Below is a summary of some of the potential effects that could be experienced in California as a result of climate change.

Sea Level Rise. According to *The Impacts of Sea-Level Rise on the California Coast*, prepared by the California Climate Change Center (CCCC) (May 2009), climate change has the potential to induce substantial sea level rise in the coming century. The rising sea level increases the likelihood and risk of flooding. The study identifies a sea level rise on the California coast over the past century of approximately eight inches. Based on the results of various global climate change models, sea level rise is expected to continue. The California Climate Adaptation Strategy (December 2009) estimates a sea level rise of up to 55 inches by the end of this century.

Air Quality. Higher temperatures, which are conducive to air pollution formation, could worsen air quality in California. Climate change may increase the concentration of ground-level ozone, but the magnitude of the effect, and therefore its indirect effects, are uncertain. If higher temperatures are accompanied by drier conditions, the potential for large wildfires could increase, which, in turn, would further worsen air quality. However, if higher temperatures are accompanied by wetter, rather than drier conditions, the rains would tend to temporarily clear the air of particulate pollution and reduce the incidence of large wildfires, thereby ameliorating the pollution associated with wildfires. Additionally, severe heat accompanied by drier conditions and poor air quality could increase the number of heat-related deaths, illnesses, and asthma attacks throughout the state (California Energy Commission [CEC] March, 2009).

Water Supply. Analysis of paleoclimatic data (such as tree-ring reconstructions of stream flow and precipitation) indicates a history of naturally and widely varying hydrologic conditions in California and the west, including a pattern of recurring and extended droughts. Uncertainty remains with respect to the overall impact of climate change on future water supplies in California. However, the average early spring snowpack in the Sierra Nevada decreased by about 10 percent during the last century, a loss of 1.5 million acre-feet of snowpack storage. During the same period, sea level rose eight inches along California's coast. California's temperature has risen 1°F, mostly at night and during the winter, with higher elevations experiencing the highest increase. Many Southern California cities have experienced their lowest recorded annual precipitation twice within the past decade. In a span of only two years, Los Angeles experienced both its driest and wettest years on record (California Department of Water Resources [DWR], 2008; CCCC, May 2009).

This uncertainty complicates the analysis of future water demand, especially where the relationship between climate change and its potential effect on water demand is not well understood. The Sierra snowpack provides the majority of California's water supply by accumulating snow during our wet winters and releasing it slowly when we need it during our dry springs and summers. Based upon historical data and modeling, DWR projects that the Sierra snowpack will experience a 25 to 40 percent reduction from its historic average by 2050. Climate change is also anticipated to bring warmer storms that result in less snowfall at lower elevations, reducing the total snowpack (DWR, 2008).

Hydrology. As discussed above, climate change could potentially affect: the amount of snowfall, rainfall, and snow pack; the intensity and frequency of storms; flood hydrographs (flash floods, rain or snow events, coincidental high tide and high runoff events); sea level rise and coastal flooding; coastal erosion; and the potential for salt water intrusion. Sea level rise may be a product of climate change through two main processes: expansion of sea water as the oceans warm and melting of ice over land. A rise in sea levels could result in coastal flooding and erosion and could jeopardize California's water supply due to salt water intrusion. Increased storm intensity and frequency could affect the ability of flood-control facilities, including levees, to handle storm events.

Agriculture. California has a $30 billion agricultural industry that produces half of the country's fruits and vegetables. Higher CO_2 levels can stimulate plant production and increase plant water-use efficiency. However, if temperatures rise and drier conditions prevail, water demand could increase; crop-yield could be threatened by a less reliable water supply; and greater air pollution could render plants more susceptible to pest and disease outbreaks. In addition, temperature increases could change the time of year certain crops, such as wine grapes, bloom or ripen, and thereby affect their quality (CCCC, 2006).

Ecosystems and Wildlife. Climate change and the potential resulting changes in weather patterns could have ecological effects on a global and local scale. Increasing concentrations of GHGs are likely to accelerate the rate of climate change. Soil moisture is likely to decline in many regions, and intense rainstorms are likely to become more frequent. Rising temperatures could have four major impacts on plants and animals: (1) timing of ecological events; (2) geographic range; (3) species' composition within communities; and (4) ecosystem processes, such as carbon cycling and storage (Parmesan, 2004; Parmesan, C. and H. Galbraith, 2004).

d. Local Effects of Climate Change. While the above identifies the possible effects of climate change at a global and potentially statewide level, in general scientific modeling tools are currently unable to predict what impacts would occur locally with a similar degree of accuracy. In general, regional and local predictions are made based on downscaling statewide models (CEC, March 2009). According to the *Santa Cruz County Climate Action Strategy* and *City of Santa Cruz Climate Action Plan*, a wide range of ecological effects may result locally. These include:

- *Sea level rise*
- *Flooding*
- *Extreme Storm Events*
- *Coastal storm damage, bluff erosion, beach loss and landslides*
- *Ocean acidification*
- *Changes in precipitation and climatic water deficit*
- *Changes in temperatures*
- *Increase in wildland fires*
- *Impacts to biodiversity and habitat*
- *Impacts to water supply*
- *Impacts to public health*
- *Economic impacts of climate change*
- *Climate change and social vulnerability*

According to the Center for Ocean Solutions, potential impacts from sea level rise on coastal communities, such as those in Santa Cruz County, include: coastal erosion, coastal inundation, the intrusion of salt water into fresh water, and increased frequency and intensity of storms and waves. Unlike flooding events that can be short lived, erosion can cause greater and potentially permanent damage. Coastal erosion will increase as global sea levels continue to rise. Higher sea levels will allow waves and tides to travel farther inland, exposing beaches, cliffs and coastal dunes to more persistent erosion forces. Erosion is not a new issue in California but rising sea levels threaten to increase the severity and frequency of erosion damage to coastal infrastructure and property.

Projected sea level rise along the MBSST Network is depicted in Figures 4.7-1a through 4.7-1c. These figures show an approximate 4.6-foot (1.4-meter) sea level rise combined with a 100-year flood in 2100. The physical area at risk of erosion resulting from such a rise in sea level in Santa Cruz County is a maximum estimated cliff retreat of approximately 1,120 feet (340 meters) and an average retreat of 0.25 to 0.5 feet per year (0.07-0.15 meters per year).

e. Regulatory Setting. The following regulations address both climate change and GHG emissions.

International. The United States is, and has been, a participant in the United Nations Framework Convention on Climate Change (UNFCCC) since it was produced by the United Nations in 1992. The UNFCCC is an international environmental treaty with the objective of, "stabilization of GHG concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system." This is generally understood to be achieved by stabilizing global GHG concentrations between 350 and 400 ppm, in order to limit the global average temperature increases between 2 and 2.4°C above pre-industrial levels (IPCC 2007). The UNFCC itself does not set limits on GHG emissions for individual countries or enforcement mechanisms. Instead, the treaty provides for updates, called "protocols," that would identify mandatory emissions limits.

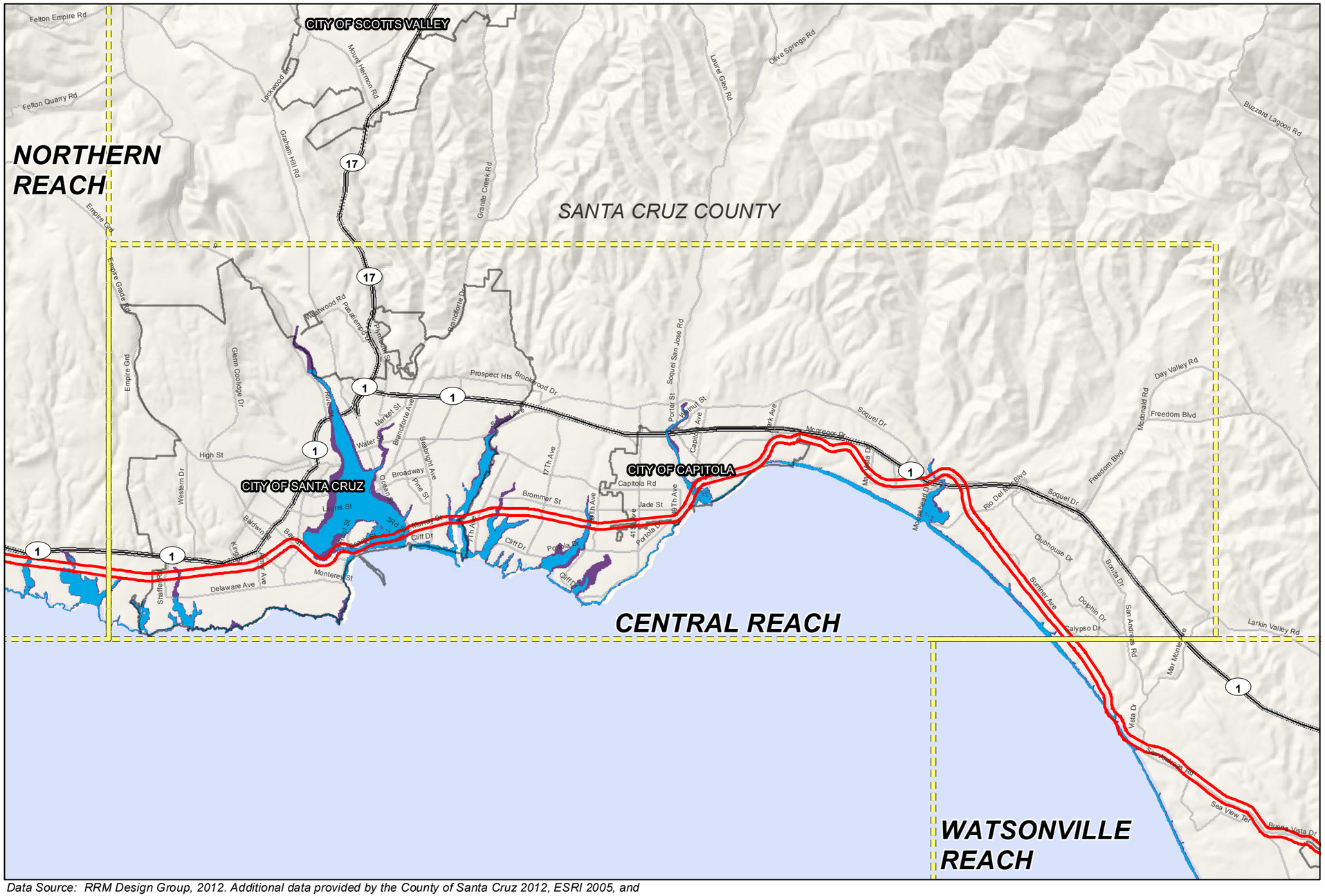
Five years later, the UNFCC brought nations together again to draft the *Kyoto Protocol* (1997). The Kyoto Protocol established commitments for industrialized nations to reduce their collective emissions of six GHGs (CO_2, CH_4, N_2O, SF_6, HFCs, and PFCs) to 5.2 percent below 1990 levels by 2012. The United States is a signatory of the Kyoto Protocol, but Congress has not ratified it and the United States has not bound itself to the Protocol's commitments (UNFCCC, 2007). The first commitment period of the Kyoto Protocol ended in 2012. Governments, including 38 industrialized countries, agreed to a second commitment period of the Kyoto Protocol, beginning January 1, 2013 and ending either on December 31, 2017 or December 31, 2020, to be decided by the Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol at its seventeenth session (UNFCCC, November 2011).

In Durban (17th session of the Conference of the Parties in Durban, South Africa, December 2011), governments decided to adopt a universal legal agreement on climate change as soon as possible, but not later than 2015. Work will begin on this immediately under a new group called the Ad Hoc Working Group on the Durban Platform for Enhanced Action. Progress was also made regarding the creation of a Green Climate Fund (GCF) for which a management framework was adopted.

Data Source: RRM Design Group, 2012. Additional data provided by the County of Santa Cruz 2012, ESRI 2005, and Heberger, Matthew, and Herrera, Pablo, 2009, California coast 100-year flood with a 1.4 meter sea-level rise, 2100: The Impacts of Sea-Level Rise on the California Coast, Pacific Institute, Oakland CA.

Changes in Flood Levels from Projected Sea Level Rise: Northern Reach

Figure 4.7-1a



Legend

- Monterey Bay Sancturary Scenic Trail Network Corridor*
- Reaches
- 100-Year Flood without Sea Level Rise
- 100-Year Flood with Sea Level Rise**

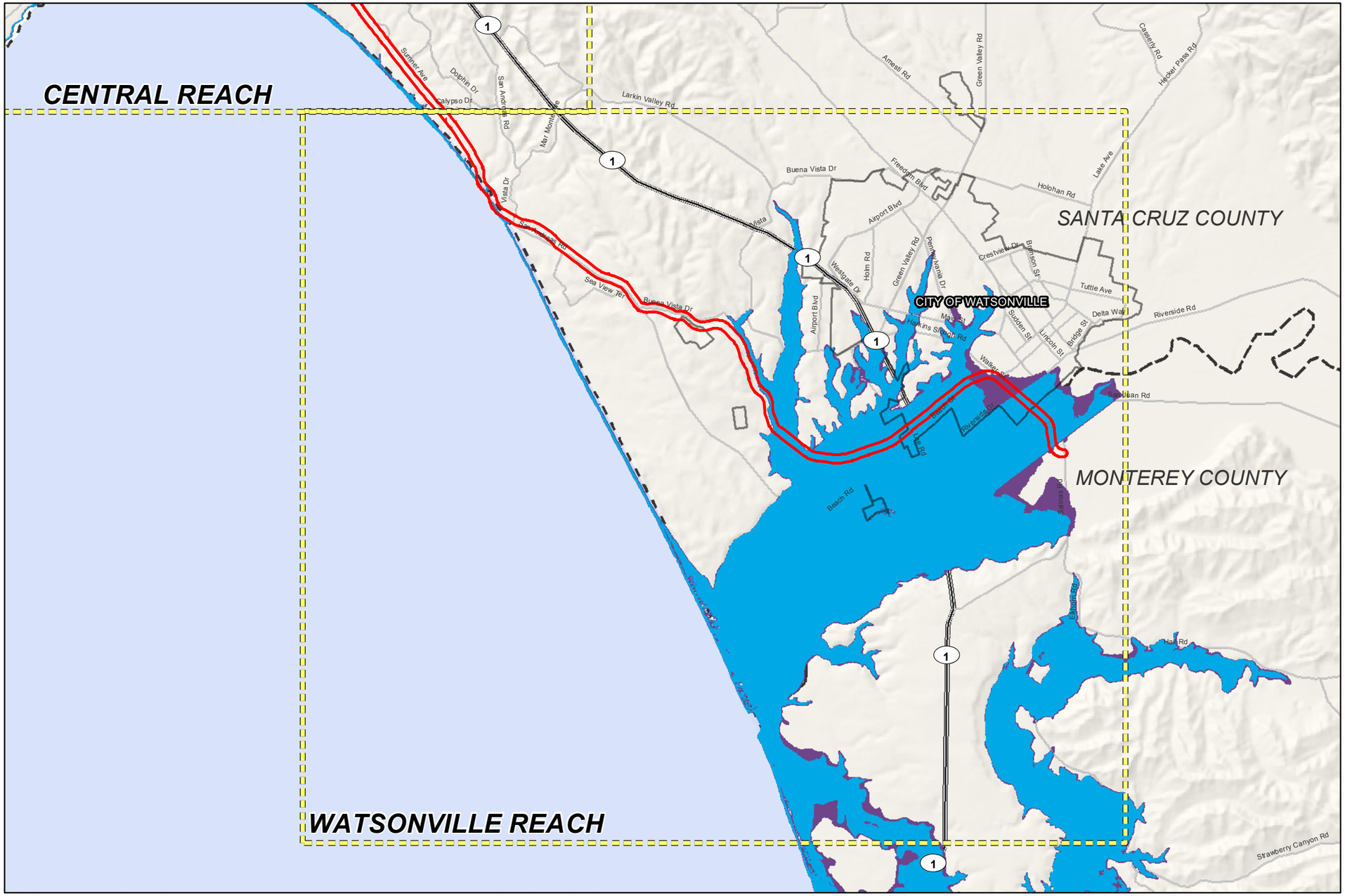
**NOTE - Monterey Bay Sanctuary Scenic Trail Network corridor width is exaggerated in order to better view underlying features.*

***Scenario assumes a 1.4-meter (4.6 foot) sea level rise in 2100*

Data Source: RRM Design Group, 2012. Additional data provided by the County of Santa Cruz 2012, ESRI 2005, and Heberger, Matthew, and Herrera, Pablo, 2009, California coast 100-year flood with a 1.4 meter sea-level rise, 2100: The Impacts of Sea-Level Rise on the California Coast, Pacific Institute, Oakland CA.

Changes in Flood Levels from Projected Sea Level Rise: Central Reach

Figure 4.7-1b



Data Source: RRM Design Group, 2012. Additional data provided by the County of Santa Cruz 2012, ESRI 2005, and Heberger, Matthew, and Herrera, Pablo, 2009, California coast 100-year flood with a 1.4 meter sea-level rise, 2100: The Impacts of Sea-Level Rise on the California Coast, Pacific Institute, Oakland CA.

Changes in Flood Levels from Projected Sea Level Rise: Watsonville Reach

Figure 4.7-1c

Federal. The United States is currently using a voluntary and incentive-based approach toward emissions reductions in lieu of the Kyoto Protocol's mandatory framework. The Climate Change Technology Program (CCTP) is a multi-agency research and development coordination effort (led by the Secretaries of Energy and Commerce) that is charged with carrying out the President's National Climate Change Technology Initiative (U.S. EPA, December 2007).

The U.S. EPA issued a Final Rule for mandatory reporting of GHG emissions in October 2009. This Final Rule applies to fossil fuel suppliers, industrial gas suppliers, direct GHG emitters, and manufacturers of heavy-duty and off-road vehicles and vehicle engines, and requires annual reporting of emissions. The first annual reports were due in March 2011.

On May 13, 2010, the U.S. EPA issued a Final Rule that took effect on January 2, 2011, setting a threshold of 75,000 million tons (MT) CO_2E per year for GHG emissions. New and existing industrial facilities that meet or exceed that threshold will require a permit after that date. On November 10, 2010, the U.S. EPA published the "PSD and Title V Permitting Guidance for Greenhouse Gases." The U.S. EPA's guidance document is directed at state agencies responsible for air pollution permits under the Federal Clean Air Act to help them understand how to implement GHG reduction requirements while mitigating costs for industry. It is expected that most states will use the U.S. EPA's new guidelines when processing new air pollution permits for power plants, oil refineries, cement manufacturing, and other big pollution point sources.

On January 2, 2011, the U.S. EPA implemented the first phase of the Tailoring Rule for GHG emissions Title V Permitting. Under the first phase of the Tailoring Rule, all new sources of emissions are subject to GHG Title V permitting if they are otherwise subject to Title V for another air pollutant and they emit at least 75,000 MT CO_2E per year. Under Phase 1, no sources were required to obtain a Title V permit solely due to GHG emissions. Phase 2 of the Tailoring Rule went into effect July 1, 2011. At that time new sources were subject to GHG Title V permitting if the source emits 100,000 MT CO_2E per year, or they are otherwise subject to Title V permitting for another pollutant and emit at least 75,000 MT CO_2E per year.

California. Assembly Bill (AB) 1493 (2002), referred to as "Pavley," requires ARB to develop and adopt regulations to achieve "the maximum feasible and cost-effective reduction of GHG emissions from motor vehicles." On June 30, 2009, EPA granted the waiver of Clean Air Act preemption to California for its greenhouse gas emission standards for motor vehicles beginning with the 2009 model year. Pavley I took effect for model years starting in 2009 to 2016 and Pavley II, which is now referred to as "LEV (Low Emission Vehicle) III GHG" will cover 2017 to 2025. Fleet average emission standards would reach 22 per cent reduction by 2012 and 30 per cent by 2016.

In 2005, former Governor Schwarzenegger issued Executive Order (EO) S-3-05, establishing statewide GHG emissions reduction targets. EO S-3-05 provided that by 2010, emissions shall be reduced to 2000 levels; by 2020, emissions shall be reduced to 1990 levels; and by 2050, emissions shall be reduced to 80 percent of 1990 levels (CalEPA, 2006). In response to EO S-3-05, CalEPA created the Climate Action Team (CAT), which in March 2006 published the Climate Action Team Report (the "2006 CAT Report") (CalEPA, 2006). The 2006 CAT Report identified a recommended list of strategies that the state could pursue to reduce GHG emissions. These are strategies that could be implemented by various state agencies to ensure that the emission

reduction targets in EO S-3-05 are met and can be met with existing authority of the state agencies. The strategies include the reduction of passenger and light duty truck emissions, the reduction of idling times for diesel trucks, an overhaul of shipping technology/infrastructure, increased use of alternative fuels, increased recycling, and landfill methane capture.

California's major initiative for reducing GHG emissions is outlined in Assembly Bill 32 (AB 32), the "California Global Warming Solutions Act of 2006," signed into law in 2006. AB 32 codifies the Statewide goal of reducing GHG emissions to 1990 levels by 2020 (essentially a 15 percent reduction below 2005 emission levels; the same requirement as under S-3-05), and requires ARB to prepare a Scoping Plan that outlines the main State strategies for reducing GHGs to meet the 2020 deadline. In addition, AB 32 requires ARB to adopt regulations to require reporting and verification of statewide GHG emissions.

After completing a comprehensive review and update process, the ARB approved a 1990 statewide GHG level and 2020 limit of 427 MMT CO_2E. The Scoping Plan was approved by ARB on December 11, 2008, and includes measures to address GHG emission reduction strategies related to energy efficiency, water use, and recycling and solid waste, among other measures. The Scoping Plan includes a range of GHG reduction actions that may include direct regulations, alternative compliance mechanisms, monetary and non-monetary incentives, voluntary actions, and market-based mechanisms.

Executive Order S-01-07 was enacted on January 18, 2007. The order mandates that a Low Carbon Fuel Standard ("LCFS") for transportation fuels be established for California to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020.

Senate Bill (SB) 97, signed in August 2007, acknowledges that climate change is an environmental issue that requires analysis in California Environmental Quality Act (CEQA) documents. In March 2010, the California Resources Agency (Resources Agency) adopted amendments to the State *CEQA Guidelines* for the feasible mitigation of GHG emissions or the effects of GHG emissions. The adopted guidelines give lead agencies the discretion to set quantitative or qualitative thresholds for the assessment and mitigation of GHGs and climate change impacts.

Senate Bill (SB) 375, signed in August 2008, enhances the State's ability to reach AB 32 goals by directing ARB to develop regional greenhouse gas emission reduction targets to be achieved from vehicles for 2020 and 2035. In addition, SB 375 directs each of the state's 18 major Metropolitan Planning Organizations (MPO) to prepare a "sustainable communities strategy" (SCS) that contains a growth strategy to meet these emission targets for inclusion in the Regional Transportation Plan (RTP). On September 23, 2010 CARB adopted final regional targets for reducing greenhouse gas emissions from 2005 levels by 2020 and 2035.

CARB Resolution 07-54 establishes 25,000 metric tons of GHG emissions as the threshold for identifying the largest stationary emission sources in California for purposes of requiring the annual reporting of emissions. This threshold is just over 0.005 percent of California's total inventory of GHG emissions for 2004.

In April 2011, Governor Brown signed SB 2X requiring California to generate 33 percent of its electricity from renewable energy by 2020.

For more information on the Senate and Assembly bills, Executive Orders, and reports discussed above, and to view reports and research referenced above, please refer to the following websites: www.climatechange.ca.gov and http://www.arb.ca.gov/cc/cc.htm.

California Environmental Quality Act. Pursuant to the requirements of SB 97, the Resources Agency has adopted amendments to the *State CEQA Guidelines* for the feasible mitigation of GHG emissions or the effects of GHG emissions. As noted previously, the adopted *CEQA Guidelines* provide general regulatory guidance on the analysis and mitigation of GHG emissions in CEQA documents, but contain no suggested thresholds of significance for GHG emissions. Instead, they give lead agencies the discretion to set quantitative or qualitative thresholds for the assessment and mitigation of GHGs and climate change impacts. To date, the Bay Area Air Quality Management District (BAAQMD), the South Coast Air Quality Management District (SCAQMD), the San Luis Obispo Air Pollution Control District (SLOAPCD), and the San Joaquin Air Pollution Control District (SJVAPCD) have adopted quantitative significance thresholds for GHGs. The BAAQMD thresholds are under litigation.

Local. The County of Santa Cruz adopted a Climate Action Strategy (CAS) in February 2013, and the City of Santa Cruz completed the final draft of its Climate Action Plan (CAP) in October 2012. The City of Santa Cruz also adopted its Climate Adaptation Plan in December 2011 (City of Santa Cruz, December 13, 2011). The City of Capitola is in the process of updating the City's General Plan, which will include the preparation of a Climate Action Plan (City of Capitola, December 2012). The City of Watsonville also began drafting a CAP in early 2013. The City of Watsonville CAP will be integrated into the City's 2030 Vista General Plan. The County CAS, the City of Santa Cruz CAP, and the City of Santa Cruz Climate Adaptation Plan are discussed below.

Santa Cruz County. The County of Santa Cruz CAS reports the results of the GHG emissions inventory for Santa Cruz County, proposes targets for GHG reduction, and outlines strategies and implementing actions to achieve the targets. The CAS describes current activities addressing adaptation to climate change and identifies next steps toward a complete vulnerability assessment and adaptation plan.

City of Santa Cruz. The City of Santa Cruz CAP was adopted in October 2012. The City's CAP outlines the actions the City and its partners may take to meet State land use requirements pertaining to climate change, achieve the policies identified in the General Plan 2030, and accomplish the GHG reduction goals set by the City Council.

The City of Santa Cruz Climate Adaptation Plan was adopted December 13, 2011. The City of Santa Cruz Climate Adaptation Plan creates a framework for decision makers to build a more resilient and sustainable community that is informed by the most current climate science. The Climate Adaptation Plan establishes goals and objectives for the City of Santa Cruz to adapt to climate change impacts. The following is a list of the objectives outlined in the City's Climate Adaptation Plan:

1. *Consider potential climate change impacts in planning and decision making processes*
2. *Coordinate adaptation planning with other planning, including General Plan/land use codes*
3. *Collaborate with others to raise awareness about climate change impacts*
4. *Seek opportunities to inform the community on potential climate change impacts*
5. *Incorporate ongoing monitoring processes to inform decisions*

6. *Seek opportunities to develop an environmentally sustainable economy*
7. *Continue Greenhouse Gas (GHG) mitigation efforts*
8. *Minimize impacts of future sea level rise*
9. *Maintain and add to the city's urban tree canopy and increase tree diversity within urbanized areas*
10. *Support protection of the Monterey Bay Marine Sanctuary*

4.7.2 Impact Analysis

a. Methodology and Significance Thresholds. Pursuant to the requirements of SB 97, the Resources Agency adopted amendments to the *State CEQA Guidelines* for the feasible mitigation of GHG emissions or the effects of GHG emissions in March 2010. These guidelines are used in evaluating the significance of GHG emissions from the proposed MBSST Network.

According to the *CEQA Guidelines*, impacts related to GHG emissions from the proposed MBSST Network would be significant if the project would:

1) *Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment; and/or*
2) *Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases.*

The vast majority of individual projects do not generate sufficient GHG emissions to create a project-specific impact through a direct influence to climate change; therefore, the issue of climate change typically involves an analysis of whether a project's contribution towards an impact is cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, other current projects, and probable future projects (*CEQA Guidelines*, Section 15355).

For future projects, the significance of GHG emissions may be evaluated based on locally adopted quantitative thresholds, or consistency with a regional GHG reduction plan (such as a Climate Action Plan). However, neither the Monterey Bay Unified Air Pollution Control District (MBUAPCD) nor the County of Santa Cruz has adopted GHG emissions thresholds. The MBUAPCD recommends using the San Luis Obispo APCD (SLOAPCD) quantitative emissions threshold of 1,150 metric tons of carbon dioxide equivalent (MT CO_2E) per year for most land use projects. As such, the proposed MBSST Network would have a significant impact related to GHG emissions if buildout of the trail network would generate more than 1,150 metric tons of CO_2E per year.

In addition, in order to determine whether or not the proposed MBSST Network project's GHG emissions are "cumulatively considerable," an inconsistency with applicable GHG emissions reductions strategies would be a significant impact under the second significance threshold discussed above.

There is no adopted significance threshold for sea level rise. For the purposes of this assessment, impacts related to sea level rise would be considered potentially significant if projected sea level rise would expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death, consistent with thresholds used in Section 4.6, *Geology/Soils*.

Study Methodology. Calculations of CO_2, CH_4, and N_2O emissions are provided to identify the magnitude of potential project effects. The analysis focuses on CO_2, CH_4, and N_2O because these make up 98.9 percent of all GHG emissions by volume (IPCC, 2007) and are the GHG emissions that the MBSST Network project would emit in the largest quantities. Fluorinated gases, such as HFCs, PFCs, and SF_6, were also considered for analysis. However, because the MBSST Network project would involve development of a recreational trail, the quantity of fluorinated gases would not be significant since fluorinated gases are primarily associated with industrial processes. Emissions of all GHGs are converted into their equivalent weight in CO_2 (CO_2E). Minimal amounts of other main GHGs (such as chlorofluorocarbons [CFCs]) would be emitted; however, these other GHG emissions would not substantially add to the calculated CO_2E amounts.

Construction Emissions. The California Emissions Estimator Model (CalEEMod) 2011 Version 2011.1.1 was used to estimate construction emissions for the proposed MBSST Network and is based on parameters such as the duration of construction activity, area of disturbance, and anticipated equipment use during construction. Although the trail right-of-way varies from 25 feet up to a maximum width of 148 feet (along segment 17), 25 feet represents an average expected disturbance area for trail components (multi-use paved path, unpaved [decomposed granite] path, landscaping, trail furnishings, and signage). Therefore, for the purposes of estimating emissions, it was assumed that the area of disturbance for the entire length of the proposed MBSST Network would be 25 feet wide. Based on this width and a total trail length of 49.6 miles, the total area of disturbance would be approximately 150.4 acres. This is considered a conservative estimate, as this trail length includes 10.4 miles of paved and un-paved coastal spur trails (which would be a maximum width of six feet) and 7.5 miles of on-shoulder improvements adjacent to Highway 1 (which may not include any ground disturbance).

Construction duration was determined using the phasing plan outlined in the proposed Master Plan and based on the default number of days assigned by CalEEMod. The MBSST Network is divided into 20 segments, ranging in length from 0.65 miles to 10.66 miles. As a reasonable worst-case scenario, construction of the longest segment (segment 5) was modeled to represent the largest area of disturbance throughout construction of the proposed MBSST Network. Based on this segment's length of 10.66 miles and the average expected disturbance area for trail components (25 feet), the estimated disturbance area of segment 5 is 32.3 acres, or 21.5% of the total trail disturbance area (150.3 acres). Using the default number of construction days[1] in CalEEMod, construction of 32.3 acres of trail would take an estimated 135 days (approximately seven months) to construct. This default construction length is consistent with the analysis in Section 4.3, *Air Quality*. The potential for multiple segments to be constructed at once is also considered.

Operational Emissions. A limitation on the quantitative analysis of operational impacts is that emission models, such as CalEEMod, evaluate aggregate emissions, meaning that all vehicle trips and related emissions assigned to a project are assumed to be new trips and emissions generated by the project itself. Such models do not demonstrate, with respect to a regional air quality impact, what proportion of these emissions are actually "new" emissions, specifically attributable to the project in question. For most projects, a primary contributor to regional air quality emissions is from motor vehicles; however, the quantity of vehicle trips appropriately characterized as "new" is usually uncertain as traffic associated with a project

[1] *The default number of construction days assumes construction would occur five days per week.*

may be relocated trips from other locales. This is the case with the proposed MBSST Network, as recreation is a land use with inherent demand. In other words, many of the vehicle trips associated with the proposed MBSST Network would be relocated from other existing recreational opportunities as people begin to use the MBSST Network instead. Therefore, because the incremental increase in trips estimated in Section 4.11, *Transportation/Traffic,* would not be perceptible, and because the proportion of "new" trips is unknown, a qualitative discussion of operational emissions is provided herein.

b. Project Impacts and Mitigation Measures.

Impact GHG-1 The proposed MBSST Network project would generate greenhouse gas emissions during construction and operation. Construction emissions would primarily be generated by construction equipment and paving. Operational emissions would be generated by vehicle trips by trail users and for trail maintenance, but may be balanced regionally by the potential reduction in vehicle trips on cross county arterial corridors due to a change in travel modes. Overall, greenhouse gas emissions from the proposed MBSST Network Impacts would be Class III, *less than* significant.

Construction GHG Emissions. Construction of the proposed MBSST Network project would result in the generation of greenhouse gas emissions, primarily from construction equipment emissions and paving. As a reasonable worst-case scenario, construction of the longest segment (segment 5) was modeled to represent the largest area of disturbance throughout construction of the proposed MBSST Network. Based on this segment's length of 10.66 miles and the average expected disturbance area for trail components (25 feet), the estimated disturbance area of segment 5 is 32.3 acres, or 21.5 percent of the total trail disturbance area (150.3 acres). Using the default number of construction days[2] in CalEEMod, construction of 32.3 acres of trail would take an estimated 135 days (approximately seven months) to construct. This default construction length is consistent with the analysis in Section 4.3, *Air Quality*. Greenhouse gas modeling assumptions and results are included in Appendix C.

Table 4.7-1 illustrates the estimated annual and total CO_2E emissions during construction of segment 5.

Table 4.7-1
Estimated GHG Construction Emissions Segment 5

Year	MT CO_2E
Year 1	352.9
Total Construction Emissions	**352.9**

Source: CalEEMod v.2011.1.1. See Appendix C for Calculations

[2] *The default number of construction days assumes construction would occur five days per week.*

It should be noted that, depending on funding availability and other local factors, more than one segment of the trail could be constructed at one time. Overlapping construction would increase the MT CO_2E being emitted across the MBSST Network. Table 4.7-1 depicts the maximum emissions from the longest segment of the trail (segment 5), which extends for 10.66 miles (or 21.5 percent of the total trail length). As shown, construction of this segment would result in 352.9 MT CO_2E; therefore, construction of this segment would result in approximately 33.1 MT CO_2E per mile of construction activity.[3] Using this factor as a proxy for the remainder of the trail, up to 34.7 miles (or 70 percent) of the MBSST Network project could be constructed at one time without exceeding the threshold of 1,150 MT CO_2E per year.[4] Given funding and infrastructure constraints, construction of approximately 34.7 miles of the trail corridor in any one year is highly unlikely.

Operational GHG Emissions. The proposed MBSST Network would result in the construction of new facilities for active modes of transportation in Santa Cruz County, including bicycle, pedestrian, and equestrian paths. As noted in Section 4.11, *Transportation/Traffic*, the proposed MBSST Network would incrementally increase the number of vehicles travelling to staging areas from recreational users, commuters and for general maintenance purposes. On an individual basis for each staging area, the peak hour increase in trips would be imperceptible. Further, the minimal increase in localized trips may be balanced regionally by the potential reduction in vehicle trips on cross county arterial corridors. This reduction would occur due to the change in commuter, utilitarian and recreational travel modes (from vehicles to bicycling or walking trips) and also because many of the trips may be relocated trips currently accessing other recreational opportunities, and thus do not constitute "new" trips.

Because vehicle trips to the proposed MBSST Network would be minimal, and from a regional perspective many would be relocated trips rather than "new" trips, the proposed MBSST Network would not be expected to generate measurable operational emissions from vehicles.

As shown in Table 4.7-1, construction emissions would not exceed the 1,150 MT CO_2E per year threshold, even if up to 34.7 miles (or 70 percent) of the MBSST Network project is constructed concurrently. In addition, as described above, operational GHG emissions would be negligible. Therefore, overall impacts related to the proposed MBSST Network's contribution to regional GHG emissions would be less than significant.

Mitigation Measures. No mitigation measures are required.

Significance After Mitigation. The MBSST Network project's contribution to cumulative GHG emissions would be less than significant without mitigation.

Impact GHG-2 **The proposed MBSST Network project would be generally consistent with the Climate Action Team GHG reduction strategies, the 2008 Attorney General Greenhouse Gas Reduction Measures, the City of Santa Cruz Climate Action Plan and County of Santa Cruz Climate Action Strategy. As a result, the project would not conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing GHG emissions. Impacts would be Class III, *less than significant.***

[3] *352.9 MT CO_2E ÷ 10.66 miles = 33.1 MT CO_2E per mile*
[4] *1,150 MT CO_2E ÷ 33.1 MT CO_2E = 34.7 miles*

The proposed MBSST Network would be generally consistent with applicable regulations or plans addressing greenhouse gas reductions. The CAT published the Climate Action Team Report to Governor Schwarzenegger and the Legislature (the "2006 CAT Report") in March 2006. The CAT Report identifies a recommended list of strategies that the State could pursue to reduce climate change greenhouse gas emissions. The CAT strategies are recommended to reduce GHG emissions at a statewide level to meet the goals of the Executive Order S-3-05. These are strategies that could be implemented by various State agencies to ensure that the Governor's targets are met and can be met with existing authority of the State agencies. In addition, in 2008 the California Attorney General published *The California Environmental Quality Act Addressing Global Warming Impacts at the Local Agency Level* (Office of the California Attorney General, Global Warming Measures Updated May 21, 2008). This document provides information that may be helpful to local agencies in carrying out their duties under CEQA as they relate to climate change. Included in this document are various measures that may reduce the climate change related impacts of a project.

Moreover, the City of Santa Cruz CAP outlines the actions the City and its partners may take to meet State land use requirements pertaining to climate change, achieve the policies identified in the General Plan 2020, and accomplish the GHG reduction goals set by City Council. The CAP includes Community-wide goals for the reduction of GHG emissions.

Tables 4.7-2, 4.7-3 and 4.7-4 demonstrate that the proposed MBSST Network would be consistent with the GHG reduction strategies set forth by the 2006 CAT Report, the 2008 Attorney General's Greenhouse Gas Reduction Measures and the City of Santa Cruz CAP.

Table 4.7-2
Consistency with Applicable Climate Action Team Greenhouse Gas Emission Reduction Strategies

Strategy	MBSST Network Consistency
California Air Resources Board	
Vehicle Climate Change Standards AB 1493 (Pavley) required the state to develop and adopt regulations that achieve the maximum feasible and cost-effective reduction of climate change emissions emitted by passenger vehicles and light duty trucks. Regulations were adopted by the ARB in September 2004.	**Consistent** The vehicles that would travel to and from the proposed MBSST Network during operation and construction would be in compliance with ARB vehicle standards that are in effect at the time of vehicle purchase.
Diesel Anti-Idling The ARB adopted a measure to limit diesel-fueled commercial motor vehicle idling in July 2004.	**Consistent** Current State law restricts diesel truck idling to five minutes or less. Diesel trucks traveling to and from the proposed MBSST Network during construction and operation would be subject to this state-wide law.
Hydrofluorocarbon Reduction 1) Ban retail sale of HFC in small cans. 2) Require that only low GWP refrigerants be used in new vehicular systems.	**Consistent** This strategy applies to consumer products. The proposed MBSST Network would not be anticipated to utilize consumer products. However, all applicable products would be required to comply with the

Table 4.7-2
Consistency with Applicable Climate Action Team Greenhouse Gas Emission Reduction Strategies

Strategy	MBSST Network Consistency
3) Adopt specifications for new commercial refrigeration. 4) Add refrigerant leak-tightness to the pass criteria for vehicular inspection and maintenance programs. 5) Enforce federal ban on releasing HFCs.	regulations that are in effect at the time of manufacture.
Alternative Fuels: Biodiesel Blends ARB would develop regulations to require the use of 1 percent to 4 percent biodiesel displacement of California diesel fuel.	**Consistent** The diesel vehicles such as construction vehicles that travel to and from the proposed MBSST Network could utilize this fuel once it is commercially available.
Alternative Fuels: Ethanol Increased use of E-85 fuel.	**Consistent** Future trail users could choose to purchase flex-fuel vehicles and utilize this fuel once it is commercially available regionally and locally.
Heavy-Duty Vehicle Emission Reduction Measures Increased efficiency in the design of heavy duty vehicles and an education program for the heavy duty vehicle sector.	**Consistent** The heavy-duty vehicles used for construction activities that would travel to and from the proposed MBSST Network would be subject to all applicable ARB efficiency standards that are in effect at the time of vehicle manufacture.
Achieve 50 percent Statewide Recycling Goal Achieving the State's 50 percent waste diversion mandate as established by the Integrated Waste Management Act of 1989, (AB 939, Sher, Chapter 1095, Statutes of 1989), will reduce climate change emissions associated with energy intensive material extraction and production as well as methane emission from landfills. A diversion rate of 48 percent has been achieved on a statewide basis. Therefore, a 2 percent additional reduction is needed.	**Consistent** As discussed in the Initial Study (Appendix A), landfills serving the jurisdictions within Santa Cruz County have sufficient remaining capacity to serve the limited waste generated by the proposed MBSST Network project. As of 2006, the cities of Santa Cruz, Capitola, and Watsonville were diverting approximately 62 percent, 58 percent, and 72 percent of their solid waste, respectively. As of 2006, the unincorporated areas of Santa Cruz County were diverting approximately 65 percent of their solid waste (CalRecycle, December 2012). It is anticipated that these jurisdictions will continue to divert more than 50 percent of their solid waste, including waste from the proposed MBSST Network.
Zero Waste – High Recycling Efforts to exceed the 50 percent goal would allow for additional reductions in climate change emissions.	**Consistent** In 2006, the cities of Santa Cruz, Capitola, and Watsonville were diverting approximately 62 percent, 58 percent, and 72 percent of their solid waste, respectively, while the unincorporated areas of Santa Cruz County were diverting approximately 65 percent of their solid waste. It is anticipated that these jurisdictions will continue to divert more than 50 percent of their solid waste, including waste from the proposed MBSST Network.

Table 4.7-2
Consistency with Applicable Climate Action Team Greenhouse Gas Emission Reduction Strategies

Strategy	MBSST Network Consistency
Department of Forestry	
Urban Forestry A new statewide goal of planting 5 million trees in urban areas by 2020 would be achieved through the expansion of local urban forestry programs.	**Consistent** Though construction of the proposed project may require limited tree removal, landscaping along some segments of the proposed MBSST Network project would result overall in additional planted trees throughout the County.
Department of Water Resources	
Water Use Efficiency Approximately 19 percent of all electricity, 30 percent of all natural gas, and 88 million gallons of diesel are used to convey, treat, distribute and use water and wastewater. Increasing the efficiency of water transport and reducing water use would reduce greenhouse gas emissions.	**Consistent** As described in Section 4.12, *Public Safety and Services*, the proposed MBSST Network would not require substantial amounts of water. The new planned restroom, to be located in the Watsonville reach, would be required to be consistent with CalGreen standards. As such, the new restroom would be equipped with low-flow plumbing fixtures, reducing water use.
Energy Commission (CEC)	
Building Energy Efficiency Standards in Place and in Progress Public Resources Code 25402 authorizes the CEC to adopt and periodically update its building energy efficiency standards (that apply to newly constructed buildings and additions to and alterations to existing buildings).	**Consistent** The proposed MBSST Network would involve the development of only one building that would require the use of energy. The planned restroom in the Watsonville reach would be required to comply with the standards of Title 24 that are in effect at the time of its development.
Appliance Energy Efficiency Standards in Place and in Progress Public Resources Code 25402 authorizes the Energy Commission to adopt and periodically update its appliance energy efficiency standards (that apply to devices and equipment using energy that are sold or offered for sale in California).	*Not applicable* The proposed MBSST Network would not involve physical development of structures that would require the use of appliances.
Fuel-Efficient Replacement Tires & Inflation Programs State legislation established a statewide program to encourage the production and use of more efficient tires.	**Consistent** Future trail users that travel to and from the 22 trail head locations could purchase tires for their vehicles that comply with state programs for increased fuel efficiency.
Municipal Utility Energy Efficiency Programs/Demand Response Includes energy efficiency programs, renewable	*Not Applicable* The proposed MBSST Network is an alternative transportation project that would not use substantial

Table 4.7-2
Consistency with Applicable Climate Action Team Greenhouse Gas Emission Reduction Strategies

Strategy	MBSST Network Consistency
portfolio standard, combined heat and power, and transitioning away from carbon-intensive generation.	amounts of energy. Development of the MBSST Network project would not preclude the implementation of this strategy by municipal utility providers.
Municipal Utility Renewable Portfolio Standard California's Renewable Portfolio Standard (RPS), established in 2002, requires that all load serving entities achieve a goal of 20 percent of retail electricity sales from renewable energy sources by 2017, within certain cost constraints.	*Not Applicable* The proposed MBSST Network does not involve a commercial development of the MBSST Network project and would not preclude the implementation of this strategy by Southern California Edison.
Municipal Utility Combined Heat and Power Cost effective reduction from fossil fuel consumption in the commercial and industrial sector through the application of on-site power production to meet both heat and electricity loads.	*Not Applicable* This strategy addresses incentives that could be provided by utility providers such as Southern California Edison and The Gas Company.
Alternative Fuels: Non-Petroleum Fuels Increasing the use of non-petroleum fuels in California's transportation sector, as recommended in the CEC's 2003 and 2005 Integrated Energy Policy Reports.	**Consistent** Future trail users that travel to and from the 22 trail head locations could purchase alternative fuel vehicles and utilize these fuels once they are commercially available regionally and locally. The proposed MBSST Network would provide a transportation and recreational opportunities that does not utilize fossil fuels and therefore, would also not increase the use of non-petroleum fuels.
Green Buildings Initiative Green Building Executive Order, S-20-04 (CA 2004), sets a goal of reducing energy use in public and private buildings by 20 percent by the year 2015, as compared with 2003 levels. The Executive Order and related action plan spell out specific actions state agencies are to take with state-owned and -leased buildings. The order and plan also discuss various strategies and incentives to encourage private building owners and operators to achieve the 20 percent target.	**Consistent** As discussed previously, the proposed MBSST Network would involve the development of one building that would require the use of energy. The planned restroom in the Watsonville reach would be required to be constructed in compliance with the standards of Title 24 that are in effect at the time of its development.
Business, Transportation and Housing	
Smart Land Use and Intelligent Transportation Systems (ITS) Smart land use strategies encourage jobs/housing proximity, promote transit-oriented development, and encourage high-density residential/commercial development along transit corridors.	**Consistent** The proposed MBSST Network is an alternative transportation project that would not involve commercial or residential development that would require the use of public transit systems. However, as the project would provide a new alternative transportation corridor, it could provide convenient

Table 4.7-2
Consistency with Applicable Climate Action Team Greenhouse Gas Emission Reduction Strategies

Strategy	MBSST Network Consistency
ITS is the application of advanced technology systems and management strategies to improve operational efficiency of transportation systems and movement of people, goods and services. Smart land use, demand management, ITS, and value pricing are critical elements in this plan for improving mobility and transportation efficiency. Specific strategies include: promoting jobs/housing proximity and transit-oriented development; encouraging high density residential/commercial development along transit/rail corridor; valuing and congestion pricing; implementing intelligent transportation systems, traveler information/traffic control, incident management; accelerating the development of broadband infrastructure; and comprehensive, integrated, multimodal/intermodal transportation planning.	access to and from new development and to and from existing transit facilities in the future.
Public Utilities Commission (PUC)	
Accelerated Renewable Portfolio Standard The Governor has set a goal of achieving 33 percent renewable in the State's resource mix by 2020. The joint PUC/Energy Commission September 2005 Energy Action Plan II (EAP II) adopts the 33 percent goal.	*Not Applicable* The proposed MBSST Network project would not require substantial amounts of energy. Project development would not preclude the implementation of this strategy by energy providers.
California Solar Initiative The solar initiative includes installation of 1 million solar roofs or an equivalent 3,000 MW by 2017 on homes and businesses, increased use of solar thermal systems to offset the increasing demand for natural gas, use of advanced metering in solar applications, and creation of a funding source that can provide rebates over 10 years through a declining incentive schedule.	*Not Applicable* The proposed MBSST Network would provide an opportunity for alternative modes of transportation within Santa Cruz County and would not involve the development of homes of businesses. However, project implementation would not preclude the implementation of this strategy.

Table 4.7-3
Consistency with Applicable Attorney General Greenhouse Gas Reduction Measures

Strategy	*MBSST Network Consistency*
Transportation-Related Emissions	
Diesel Anti-Idling Set specific limits on idling time for commercial vehicles, including delivery vehicles.	**Consistent** Currently, CARB's Airborne Toxic Control Measure (ATCM) to Limit Diesel-Fueled Commercial Motor Vehicle Idling restricts diesel truck idling to five minutes or less. Diesel trucks operating from and making deliveries to the proposed MBSST Network during construction and maintenance would be subject to this state-wide law.
Transportation Emissions Reduction Provide shuttle service to public transportation.	*Not Applicable* The proposed MBSST Network would not involve the development of businesses, homes or other structures that would generate increased population demanding public transportation.
Solid Waste and Energy Emissions	
Solid Waste Reduction Strategy Project construction shall require reuse and recycling of construction and demolition waste.	**Consistent** In 2006, the cities of Santa Cruz, Capitola, and Watsonville were diverting approximately 62 percent, 58 percent, and 72 percent of their solid waste, respectively, while the unincorporated areas of Santa Cruz County were diverting approximately 65 percent. It is anticipated that these jurisdictions will continue to divert more than 50 percent of their solid waste, including construction waste from the proposed MBSST Network.
Water Use Efficiency Require measures that reduce the amount of water sent to the sewer system – see examples in CAT standard above. Reduction in water volume sent to the sewer system means less water has to be treated and pumped to the end user, thereby saving energy.	**Consistent** The proposed MBSST Network would be anticipated to incorporate landscaping in certain areas that would be designed to require minimal irrigation and to reflect the native vegetation of the surrounding area, thereby reducing water use. In addition, the planned restroom in the Watsonville reach would be equipped with ultra-low-flow plumbing fixtures, further reducing water use at the project site, as required by CalGreen standards.
Land Use Measures, Smart Growth Strategies and Carbon Offsets	
Smart Land Use and Intelligent Transportation Systems Require pedestrian-only streets and plazas within the project site and destinations that may be reached conveniently by public transportation, walking or bicycling.	**Consistent** The proposed MBSST Network project is not a destination that would include pedestrian-only streets or plazas. However, the project would provide access to such destinations via new walking and bicycling trails.

Table 4.7-4
Consistency with City of Santa Cruz Climate Action Plan Goals

Goals	*MBSST Network Consistency*
Energy Consumption Significantly reduce energy use in municipal, residential and commercial buildings.	*Not Applicable* The proposed MBSST Network Master Plan would not involve residential, municipal, or commercial development that would consume energy.
Sustainable Transportation and Land Use Planning Reduce GHG emissions by reducing vehicle miles traveled, decreasing single occupancy vehicle travel, and increasing the use of alternative fuels and transportation options.	**Consistent** The proposed MBSST Network project would divert commuter trips towards the use of non-motorized transportation modes, which would limit long-term emissions of greenhouse gases.
Sustainable Transportation and Land Use Planning Promote land use strategies that encourage higher density development along transit corridors and activity centers to support efficient, accessible, and sustainable transportation options.	**Consistent** The MBSST Network project would link tourism and activity centers as it traverses downtown Watsonville, Aptos Village, Capitola Village, and the Santa Cruz beach area near downtown Santa Cruz.
Water Conservation Continue to reduce per capita and total water use within the Santa Cruz service area.	**Consistent** Water use along the proposed MBSST Network would be minimal, primarily for landscaping, as well as increased demands on existing restrooms and drinking fountains. As discussed in Section 4.12, *Public Safety and Services*, the proposed MBSST Network would not require significant amounts of water. Impacts to the City of Santa Cruz Water District would be *less than significant*.
Solid Waste Management Reduce GHG emissions through improved waste handling and increased recycling, composting, reuse, and waste reduction.	**Consistent** As discussed in the Initial Study (Appendix A), landfills serving the jurisdictions within Santa Cruz County, including the City of Santa Cruz, have sufficient remaining capacity to serve the limited waste generated by the proposed MBSST Network. In addition, it is anticipated that MBSST Network jurisdictions, including the City of Santa Cruz, will continue to divert more than 50 percent of their solid waste, including waste from the proposed project.
Renewable Energy Ensure a sustainable transition toward locally generated renewable energy through programs, policies, and investments.	*Not Applicable* The proposed MBSST Network is an alternative transportation project that would not use substantial amounts of energy. Development of the MBSST Network project would not preclude the implementation of this strategy by municipal utility providers.

Table 4.7-5
Consistency with County of Santa Cruz Climate Action Strategy Goals

Goals	*MBSST Network Consistency*
Energy Emissions	
Aggregated Purchasing Develop a Community Choice Aggregation (CCA) Program.	*Not Applicable* A CCA Program allows communities to aggregate the purchasing power of individual customers to secure electricity. As the proposed MDSST Network Master Plan would involve minimal consumption of energy, such a program would not apply. Development of the MBSST Network project would not preclude the implementation of this strategy by jurisdictions in Santa Cruz County.
Energy Efficiency Increase energy efficiency in new and existing buildings and facilities.	**Consistent** As discussed previously, the proposed MBSST Network would involve the development of one building that would require the use of energy. The planned restroom in the Watsonville reach would be constructed as an energy-efficient facility, in compliance with the standards of Title 24 that are in effect at the time of its development.
Green Business Program Enhance and expand the Green Business Program.	**Consistent** The MBSST Network project would facilitate employee commuting by alternative modes of transportation, which could reduce the amount of vehicle miles traveled per employee.
Renewable Energy Increase local renewable energy generation.	*Not Applicable* The proposed MBSST Network is an alternative transportation project that would not use substantial amounts of energy. Development of the MBSST Network project would not preclude the implementation of this strategy by municipal utility providers.
Public Education Public education about climate change and impacts of individual actions.	**Consistent** The proposed MDSST Network would have signs about historical and educational themes in strategic locations along the trail, which could include education about climate change.
Building Standards Continue to improve the Green Building Program by exceeding the minimum standards of the state green building code (Cal Green).	**Consistent** As discussed previously, the proposed MBSST Network would involve the development of one building that would require the use of energy. The planned restroom in the Watsonville reach would be constructed as an energy-efficient facility, in compliance with the standards of Title 24 that are in effect at the time of its development.

Table 4.7-5
Consistency with County of Santa Cruz Climate Action Strategy Goals

Goals	*MBSST Network Consistency*
Partnerships Form partnerships and cooperative agreements among local governments, educational institutions, nongovernmental organizations, and private businesses as a cost-effective way to facilitate mitigation and adaptation.	**Consistent** Administration of the proposed MBSST would involve the RTC and the implementing entities (City of Santa Cruz, County of Santa Cruz, City of Capitola, City of Watsonville, and/or State Parks). The RTC, as the owner of the Santa Cruz Branch Rail Line, would continue to provide regional policy oversight for the corridor and coordination with the rail operator. In addition, implementation of the proposed MDSST Network would involve cooperation with the County of Monterey, the Transportation Agency for Monterey County (TAMC), and the Monterey Bay National Marine Sanctuary.
Water Conservation Reduce energy use for water supply through water conservation strategies.	**Consistent** Water use along the proposed MBSST Network would be minimal, primarily for landscaping, as well as increased demands on existing restrooms and drinking fountains. As discussed in Section 4.12, *Public Safety and Services*, the proposed MBSST Network would not require significant amounts of water. The new planned restroom, to be located in the Watsonville reach, would be required to be consistent with CalGreen standards. Impacts to the City of Santa Cruz Water District would be *less than significant*.
Transportation-Related Emissions	
Vehicle Miles Traveled Reduce vehicle miles traveled (VMT) through County and regional long range planning efforts.	**Consistent** The proposed MBSST Network project would divert commuter trips towards the use of non-motorized transportation modes, which would reduce vehicle miles traveled in Santa Cruz County.
Bicycle and Pedestrian Activity Increase bicycle ridership and walking through incentive programs and investment in bicycle and pedestrian infrastructure and safety programs.	**Consistent** The proposed MBSST Network would substantially improve bicycle and pedestrian infrastructure along the coastline of Santa Cruz County, resulting in greater bicycle and pedestrian activity.
Zero and Low Emission Vehicles Provide infrastructure to support zero and low emissions vehicles (plug in, hybrid plug-in vehicles).	**Consistent** As discussed earlier, future trail users that travel to and from the 22 trail head locations could purchase alternative fuel vehicles and utilize these fuels once they are commercially available regionally and locally. The proposed MBSST Network would provide a transportation and recreational opportunities that does not utilize fossil fuels and therefore, would also not increase the use of non-petroleum fuels.

Table 4.7-5
Consistency with County of Santa Cruz Climate Action Strategy Goals

Goals	*MBSST Network Consistency*
Employee Commuting Increase employee use of alternative commute modes: bus transit, walking, bicycling, carpooling, etc.	**Consistent** As discussed above, the MBSST Network project would facilitate employee commuting by alternative modes of transportation, which could reduce the amount of vehicle miles traveled per employee.
County Fleet Reduce County fleet emissions.	*Not Applicable* The proposed MBSST Network would not affect emissions from the County's vehicle fleet.
Solid Waste Emissions	
Landfill "Waste to Energy" Pursue "waste to energy" capacity at County landfill through acquiring existing capacity and investigating new technology.	*Not Applicable* The proposed MBSST Network is an alternative transportation project that would not result in the generation of substantial amounts of solid waste. No "waste to energy" capacity would be acquired at landfills as part of the project.
Landfill Gas Capture Improve existing landfill gas capture system to increase percentage capture of landfill gases.	*Not Applicable* The proposed MBSST Network is an alternative transportation project that would not result in the generation of substantial amounts of solid waste. The project would not involve landfill gas capture.
Waste Diversion Reduce the amount of solid waste, particularly recyclable and compostable materials, in the commercial and residential waste stream.	**Consistent** As discussed in the Initial Study (Appendix A), landfills serving the jurisdictions within Santa Cruz County, including the City of Santa Cruz, have sufficient remaining capacity to serve the limited waste generated by the proposed MBSST Network. In addition, it is anticipated that MBSST Network jurisdictions, including the City of Santa Cruz, will continue to divert more than 50 percent of their solid waste, including waste from the proposed project.

As indicated in Tables 4.7-2 through 4.7-5, the proposed MBSST Network would be consistent with CAT strategies, the 2008 Attorney General Greenhouse Gas Reduction Measures, the City of Santa Cruz's CAP, and the County of Santa Cruz's CAS. Therefore, the proposed MBSST Network would be consistent with the objectives of AB 32, SB 97, and SB 375, and their contribution to the reduction of cumulative GHG emissions.

Mitigation Measures. No mitigation would be required.

Significance After Mitigation. Impacts would be less than significant without mitigation.

Impact GHG-3 Several segments of the proposed MBSST Network would parallel the coastal bluffs/edges of the Santa Cruz County coastline. Given the proximity to the coastline, these segments could be affected by flooding and/or shoreline retreat associated with sea level rise. However, ongoing trail maintenance and inspection activities would ensure that sea level rise does not expose people or structures to the risk of loss, injury, or death. Impacts would be Class III, *less than significant*.

The Master Plan corridor stretches the entire length of Santa Cruz County from the San Mateo County line north of Davenport past the Pajaro River in Watsonville. The trail would extend through unincorporated Santa Cruz County and portions of the cities of Santa Cruz, Capitola, and Watsonville. The southernmost segment (segment 20) would extend into Monterey County. The corridor is separated into three reaches: the northern reach extends from the San Mateo County line to the western Santa Cruz city limit; the central reach extends from the western Santa Cruz city limit to Seascape Boulevard; and the Watsonville reach extends from Seascape Boulevard to Railroad Avenue in Monterey County. Potential impacts to each of the three reaches resulting from sea level rise are discussed below.

Northern Reach. The northern reach consists primarily of narrow steep coastal bluffs from Waddell Creek to Yellow Bank Beach at Coastal Dairies, transitioning to rural agricultural land and natural coastal mesas south to Schaffer Road. The proposed MBSST Network project would construct limited pedestrian and bicycle improvements to the northernmost portion of the northern reach (segments 1 and 2) and would introduce a new multi-purpose trail along the existing railroad right-of-way for the remainder of the northern reach. Unpaved coastal bluff trails would also be constructed in some segments.

Figure 4.7-1a shows the portions of the northern reach that would be exposed to potential impacts resulting from a 100-year flood combined with 1.4 meters (55 inches) of sea level rise (the change from non-sea level rise flooding in 2012 and projected sea level rise flooding in 2100 is shown in purple). As shown therein, there are several areas throughout the northern reach that could be exposed to additional flooding during a 100-year flood event as a result of sea level rise. However, the extent of additional flood inundation caused by sea level rise is nominal and based on projections that rely on assumptions regarding global GHG emissions into the future. The actual global emissions and resulting change in global average temperature and rise in sea level are unknown. Impacts related to flooding under current conditions are addressed in Section 4.9, *Hydrology and Water Quality.* As noted therein, mitigation measures are required to reduce potential flooding impacts to a less than significant level. These measures would also be expected to address additional flooding impacts that may occur as a result of future sea level rise.

In addition to flooding, sea level rise can create an increased potential for erosion and shoreline retreat as a result of beaches and coastal bluffs being exposed to increased and more frequent wave attacks. As described in Section 4.7.1(d) (Local Effects of Climate Change), Santa Cruz County could experience a maximum estimated cliff retreat of approximately 1,120 feet (340 m) and an average retreat of 0.25 to 0.5 feet per year (0.07-0.15 m/yr). Such cliff retreat, as a result of climate change-induced sea level rise, could negatively affect some segments of the northern

reach. However, as described above, such projections are based on assumptions regarding future global GHG emissions. As such, the actual effect of climate change-induced sea level rise on the Santa Cruz County shoreline is unknown.

Central Reach. The central reach traverses portions of the City of Santa Cruz, the unincorporated County, and the City of Capitola. Improvements through the central reach would include a multi-use paved path with fencing, new pre-engineered and/or retrofitted bridges, roadway and railway crossings, trail furnishings, landscaping, and signage.

Figure 4.7-1b shows the portions of the central reach that would be exposed to potential impacts resulting from a 100-year flood combined with 1.4 meters (55 inches) of sea level rise (the change from non-sea level rise flooding in 2012 and projected sea level rise flooding in 2100 is shown in purple). As shown therein, there are several areas throughout the central reach that could be exposed to additional flooding during a 100-year flood event as a result of sea level rise, including segments 7 through 12. However, the extent of additional flood inundation caused by sea level rise is nominal and based on projections that rely on assumptions regarding global GHG emissions into the future. The actual global emissions and resulting change in global average temperature and rise in sea level are unknown. Impacts related to flooding under current conditions are addressed in Section 4.9, *Hydrology and Water Quality.* As noted therein, mitigation measures are required to reduce potential flooding impacts to a less than significant level. These measures would also be expected to address additional flooding impacts that may occur as a result of future sea level rise.

In addition to flooding, sea level rise can create an increased potential for erosion and shoreline retreat as a result of beaches and coastal bluffs being exposed to increased and more frequent wave attacks. As described in Section 4.7.1(d) (Local Effects of Climate Change), Santa Cruz County could experience a maximum estimated cliff retreat of approximately 1,120 feet (340 m) and an average retreat of 0.25 to 0.5 feet per year (0.07-0.15 m/yr). Such cliff retreat as a result of climate change-induced sea level rise could negatively affect some segments of the central reach. However, as described above, such projections are based on assumptions regarding future global GHG emissions. As such, the actual effect of climate change-induced sea level rise on the Santa Cruz County shoreline is unknown. Additionally, as described in Section 4.6, *Geology and Soils*, the City of Santa Cruz General Plan 2030 contains actions HZ 6.1.1 and HZ 6.1.2, which require new development to take the impacts of potential cliff retreat into account prior to project implementation. Therefore, the segments of the central reach which traverse the City of Santa Cruz would be required to account for cliff retreat in the design of the trail.

Watsonville Reach. The Watsonville reach parallels the coastal edge for approximately one mile before it begins following the San Andreas Road alignment inland as it heads south and east. In addition, on street improvements (Class II, Class III and sidewalks) are proposed for Beach Street. Improvements through the northern portion of the Watsonville reach would include a multi-use paved path with fencing, trail furnishings, landscaping, and signage. Within the City of Watsonville, improvements would be limited to on-street pedestrian and bicycle improvements.

Figure 4.7-1c shows the portions of the Watsonville reach that would be exposed to potential impacts resulting from a 100-year flood combined with 1.4 meters (55 inches) of sea level rise

(the change from non-sea level rise flooding in 2012 and projected sea level rise flooding in 2100 is shown in purple). As shown therein, there are several areas throughout the Watsonville reach that would be exposed to additional flooding during a 100-year flood event as a result of sea level rise, including segment 15 (near Manresa State Beach), the southern half of segment 17 (near Harkins Slough), and segments 18 through 20. However, the extent of additional flood inundation caused by sea level rise is nominal and based on projections that rely on assumptions regarding global GHG emissions into the future. The actual global emissions and resulting change in global average temperature and rise in sea level are unknown. Impacts related to flooding under current conditions are addressed in Section 4.9, *Hydrology and Water Quality.* As noted therein, mitigation measures are required to reduce potential flooding impacts to a less than significant level. These measures would also be expected to address additional flooding impacts that may occur as a result of future sea level rise.

In addition to flooding, sea level rise can create an increased potential for erosion and shoreline retreat as a result of beaches and coastal bluffs being exposed to increased and more frequent wave attacks. As described in Section 4.7.1(d) (Local Effects of Climate Change), Santa Cruz County could experience a maximum estimated cliff retreat of approximately 1,120 feet (340 m) and an average retreat of 0.25 to 0.5 feet per year (0.07-0.15 m/yr). Such cliff retreat as a result of climate change-induced sea level rise could negatively affect some segments of the Watsonville reach. However, as described above, such projections are based on assumptions regarding future global GHG emissions. As such, the actual effect of climate change-induced sea level rise on the Santa Cruz County shoreline is unknown.

Mitigating Design Features. The proposed MBSST Network Master Plan contains an operations and maintenance plan (O&M Plan; Chapter 7 of the proposed Master Plan) to ensure that the MBSST Network is operated in an efficient and safe manner for all trail users and adjacent uses. The O&M Plan identifies the responsibilities, tasks, procedures, estimated operations and trail maintenance costs and other aspects related to the management of the trail. In accordance with the O&M Plan, the Trail ~~Manager~~ Ranger would be responsible for monitoring security and safety of the trail through routine inspections, while the Trail Manager would be responsible for~~;~~ overseeing maintenance and rehabilitation efforts~~;~~ and managing and responding to issues and incidents. Through routine maintenance and inspections, it is anticipated that the Trail Manager and/or Trail Ranger would identify any areas of the trail that are experiencing excessive coastal erosion as a result of sea level rise. As these areas are identified, appropriate action would be taken to minimize the risk of loss, injury or death. Such actions may include trail segment closure, structural improvements or relocation of portions of the trail.

Mitigation Measures. Mitigation measures H-5(a) (Bridge Design) and H-5(b) (Trail Inspection and Repair Program) in Section 4.9, *Hydrology and Water Quality,* would reduce current flooding-related impacts to a less than significant level. If sea level rise causes flood hazard zones to expand in the future, as projected on Figures 4.7-1a through 4.7-1c, these measures would be expected to address such effects. In addition, ongoing trail maintenance and inspections would identify areas that are experiencing excessive coastal erosion as a result of sea level rise. As areas are identified, appropriate action would be taken to minimize the risk of loss, injury or death. Therefore, impacts of sea level rise on the proposed MBSST Network project would not be significant, and specific mitigation to address this issue is not required.

Significance After Mitigation. Impacts would be less than significant with mitigation.

c. Cumulative Impacts. Greenhouse gases and climate change are, by definition, cumulative impacts. As discussed in Impact GHG-1, the proposed MBSST Network project's contribution to regional GHG emissions would be less than significant. In addition, the proposed MBSST Network project would be consistent with the CAT strategies, the 2008 Attorney General Greenhouse Gas Reduction Measures, and the City of Santa Cruz's CAP, and the County of Santa Cruz CAS. Active transportation has been credited with not producing greenhouse gases (GHGs) that contribute to climate change, and are therefore modes that are generally consistent with statewide emissions reduction goals pursuant to AB 32. Moreover, long-term use of the proposed MBSST Network project would divert commute, utilitarian and recreational trips towards the use of non-motorized transportation modes. Therefore, the greenhouse gas emissions from the proposed MBSST Network would not be cumulatively considerable.

With the implementation of mitigation measures H-5(a) and H-5(b) and ongoing trail maintenance and inspection, the proposed MBSST Network would be consistent with Objective 7 of the City of Santa Cruz Climate Adaptation Plan, which calls for the minimization of impacts resulting from future sea level rise. As a result, the project's contribution to cumulative effects of sea level rise would be less than significant.

This page intentionally left blank.