Section 2.1
Air Quality and Greenhouse Gases

This section describes existing air quality and greenhouse gas (GHG) conditions and the applicable regulatory framework, and assesses potential impacts from air quality and GHG emissions that may result from implementing the proposed project. Finally, cumulative impacts and mitigation measures that would reduce potentially significant impacts are identified.

2.1.1 Existing Conditions

The proposed project is located in the San Diego Air Basin (SDAB); the air basin comprises the study area for the air quality analysis. Ambient air quality in the study area is affected by climatological conditions, topography, and the types and amounts of pollutants emitted. The following discussion describes relevant characteristics of the SDAB, describes key pollutants of concern, summarizes existing ambient pollutant concentrations, and identifies sensitive receptors. This section also provides a discussion of GHG emissions as they relate to the GHG study area, which is much broader than the study area for the air quality analysis to include potential regional and global GHG effects of the project.

Existing meteorological and air quality conditions within the project area and regionally are described below.

2.1.1.1 Regional Climate and Meteorology

The SDAB covers all of San Diego County and is bordered by the Pacific Ocean to the west, the South Coast Air Basin (SCAB) to the north, the Salton Sea Air Basin to the east, and the U.S./Mexico border to the south. The climate in Southern California, including the SDAB, is controlled largely by the strength and position of a subtropical high-pressure cell over the Pacific Ocean. Precipitation is mostly limited to a few storms during the winter season. Winds in the study area usually are driven by the dominant land/sea breeze circulation system. During the day, regional wind patterns are dominated by onshore sea breezes. At night, wind generally slows, remains still, or reverses direction, traveling toward the sea.

The atmospheric conditions of the SDAB contribute to the region's air quality conditions. Because of its climate, the SDAB experiences frequent temperature inversions. Typically, temperature decreases with height. However, under inversion conditions, temperature increases as altitude increases. Temperature inversions prevent air that is close to the ground from mixing with air at higher elevations. As a result, air pollutants are trapped near the ground. During the summer, the interaction between the ocean surface and the lower layer of the atmosphere creates a moist marine layer. An upper layer of warm air mass forms over the cool marine layer, preventing air pollutants from dispersing upward. Additionally, reactive organic gases (ROG) and nitrogen oxides (NO_X) react under strong sunlight and high temperatures, creating smog. Light daytime winds, primarily from the northwest, further aggravate this condition by driving the air pollutants inland toward the warmer foothills. During the fall and winter, elevated carbon monoxide (CO) and NO_X levels usually occur on days with summer-like conditions.

High air pollution levels in coastal communities of San Diego can often occur when polluted air from the SCAB, particularly from Los Angeles, travels southwest over the ocean at night and is brought on shore into San Diego by the sea breeze during the day (San Diego County Air Pollution Control District 2010a). A reduction in smog transported from the SCAB is a key factor in the reduction of peak ozone levels seen at coastal sites between 2003 and 2005. Ozone (O_3) and its precursor emissions (ROG and NO_X) are transported to San Diego during relatively mild Santa Ana weather conditions. During strong Santa Ana weather conditions, however, pollutants are pushed away from San Diego far out to sea (San Diego County Air Pollution Control District 2009).

2.1.1.2 Local Climate Conditions

The project area encompasses the unincorporated areas of the entire County. There are five distinct climate zones throughout the County that run nearly parallel to the coast.

- Maritime—runs from the coast to 3–5 miles inland.
- Coastal—runs from 5–15 miles inland.
- Transitional—runs from 20–25 miles inland.
- Interior—runs from 25–60 miles inland.
- Desert—runs about 60 miles inland to the County's eastern border.

Temperature and precipitation vary widely within the climate zones. For example, average annual precipitation ranges from approximately 10 inches in the coastal and inland areas to over 30 inches in the mountains (interior zone). In general, more mild annual temperatures are experienced in the maritime and coastal areas, whereas the interior and desert areas experience warmer summers and cooler winters. The majority of the unincorporated County is located within the interior and desert zones (San Diego County Air Pollution Control District 2010b).

There are several weather and climate monitoring stations throughout the County. Given the range of climate conditions throughout the unincorporated areas, historical climate records at four stations with diverse climate records, Chula Vista (coastal), El Cajon (transitional), Campo (interior zone) and Cuyamaca (interior zone), were assumed to be representative of the climate conditions over the project area. At Chula Vista, the annual average temperature is 61 degrees Fahrenheit (°F), with an average winter temperature of 55°F and an average summer temperature of 67°F. At El Cajon, the annual average temperature is 65°F, with an average winter temperature of 56°F and an average summer temperature of 74°F. At Campo, the annual average temperature is 61°F, with an average winter temperature of 48°F and an average summer temperature of 71°F. At Cuyamaca, the annual average temperature is 53°F, with an average winter temperature of 40°F and an average summer temperature of 68°F. Annual precipitation is 10 inches at Chula Vista, 12 inches at El Cajon, 15 inches at Campo, and 35 inches at Cuyamaca (Western Regional Climate Center 2015a, 2015b, 2015c, 2015d). The majority of precipitation occurs between November and March, with January being the wettest month at Campo and February being the wettest month at Cuyamaca (National Oceanic and Atmospheric Administration 2004).

Annual wind speeds at Campo average 8.2 miles per hour (mph) from the northeast (Western Regional Climate Center 2015e, 2015f). No wind monitoring data are available at El Cajon, Chula Vista, or Cuyamaca.

2.1.1.3 Pollutants of Concern

Criteria Pollutants

The federal and state governments have established air quality standards for six criteria pollutants: ozone, lead, CO, nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and particulate matter (PM), which consists of PM less than or equal to 10 microns in diameter (PM10) and PM less than or equal to 2.5 microns in diameter (PM2.5). Ozone and NO_2 are considered regional pollutants because they (or their precursors) affect air quality on a regional scale. Pollutants such as CO, SO_2, and lead are considered local pollutants that tend to accumulate in the air locally. PM10 and PM2.5 are both regional and local pollutants.

The primary criteria pollutants of concern in the project area are ozone (including ROG and NO_X), CO, PM, and SO_2. Principal characteristics surrounding these pollutants are discussed below. Table 2.1-1 summarizes primary emissions sources for each pollutant, as well as their effects on human health and the environment.

Ozone (O_3), or smog, is a photochemical oxidant that is formed when ROG and NO_X (discussed below) react in the presence of sunlight. Ozone poses a health threat to those who already suffer from respiratory diseases as well as to healthy people. Additionally, ozone has been tied to crop damage, typically in the form of stunted growth and premature death. Ozone can also act as a corrosive substance, resulting in property damage such as the degradation of rubber products.

Reactive Organic Gases (ROG) are compounds made up primarily of hydrogen and carbon atoms. Internal combustion associated with motor vehicle usage is the major source of hydrocarbons. Other sources of ROG are emissions associated with the use of paints and solvents, the application of asphalt paving, the use of household consumer products such as aerosols, and brewing and fermenting operations. Adverse effects on human health are not caused directly by ROG, but rather by reactions of ROG to form secondary pollutants such as ozone.

Nitrogen Oxides (NO_X) serve as integral participants in the process of photochemical smog production. The two major forms of NO_X are nitric oxide (NO) and NO_2. NO is a colorless, odorless gas formed from atmospheric nitrogen and oxygen when combustion takes place under high temperature and/or high pressure. NO_2 is a reddish-brown gas formed by the combination of NO and oxygen. NO_2 acts as an acute respiratory irritant and increases susceptibility to respiratory pathogens.

Carbon Monoxide (CO) is a colorless, odorless, toxic gas produced by incomplete combustion of carbon substances, such as gasoline or diesel fuel. The primary adverse health effect associated with CO is interference with normal oxygen transfer to the blood, which may result in tissue oxygen deprivation.

Particulate Matter (PM) consists of finely divided solids or liquids such as soot, dust, aerosols, fumes, and mists. Two forms of fine particulates are now recognized—inhalable coarse particles, or PM10, and inhalable fine particles, or PM2.5. Particulate discharge into the atmosphere results primarily from industrial, agricultural, construction, and transportation activities. However, wind on arid landscapes also contributes substantially to local particulate loading. Both PM10 and PM2.5 may adversely affect the human respiratory system, especially in those people who are naturally sensitive or susceptible to breathing problems.

Sulfur Dioxide (SO_2) is a product of high-sulfur fuel combustion. Main sources of SO_2 are coal and oil used in power stations and in industries, and for domestic heating. Industrial chemical manufacturing is another source of SO_2.

Toxic Air Contaminants

Although state and federal standards have been established for criteria pollutants, no ambient standards exist for toxic air contaminants (TAC). Many pollutants are identified as TACs because of their potential to increase the risk of developing cancer or because of their acute or chronic health risks. For TACs that are known or suspected carcinogens, the California Air Resources Board (ARB) has consistently found that there are no levels or thresholds below which exposure is risk-free. Individual TACs vary greatly in the risks they present. At a given level of exposure, one TAC may pose a hazard that is many times greater than another. TACs are identified and their toxicity is studied by the California Office of Environmental Health Hazard Assessment (OEHHA).

Air toxics are generated by a number of sources, including *stationary sources*, such as dry cleaners, gas stations, auto body shops, and combustion sources; *mobile sources*, such as motor vehicles, diesel trucks, ships, and trains; and *area sources*, such as farms, landfills, and construction sites. Adverse health effects of TACs can be carcinogenic (cancer-causing), short-term (acute) noncarcinogenic, and long-term (chronic) noncarcinogenic. Direct exposure to these pollutants has been shown to cause cancer, birth defects, damage to the brain and nervous system, and respiratory disorders.

Odors

Offensive odors rarely cause physical harm, but they can be unpleasant and lead to considerable distress among the public. This distress often generates citizen complaints to local governments and air districts. According to ARB's (2005) *Air Quality and Land Use Handbook*, land uses associated with odor complaints typically include sewage treatment plants, landfills, recycling facilities, manufacturing, and agricultural activities. ARB provides recommended screening distances for siting new receptors near existing odor sources. Microbrewing operations can also generate hydrogen sulfide (H_2S), which can lead to unpleasant odors.

Greenhouse Gases

Present in the Earth's lower atmosphere, GHGs play a critical role in maintaining the Earth's temperature. GHGs trap some of the long-wave infrared radiation emitted from the Earth's surface that would otherwise escape to space. The phenomenon known as the *greenhouse effect* keeps the atmosphere near the Earth's surface warm enough for the successful habitation of humans and other life forms. Increases in fossil fuel combustion and deforestation have exponentially increased concentrations of GHGs in the atmosphere since the Industrial Revolution, leading to warming of the Earth's lower atmosphere and noticeable beginning stage changes in the Earth's climate.

The principle anthropogenic GHGs contributing to climate change are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated compounds, including sulfur hexafluoride (SF_6), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs). Water vapor, the most abundant GHG, is not included in this list because its natural concentrations and fluctuations far outweigh its anthropogenic (human-made) sources. The primary GHGs of concern associated with the project are CO_2, CH_4, and N_2O. Principal characteristics surrounding these pollutants are discussed below.

Carbon Dioxide (CO_2) enters the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, respiration, and also as a result of other chemical reactions (e.g., manufacture of cement, microbrewing). Carbon dioxide is also removed from the atmosphere (or *sequestered*) when it is absorbed by plants as part of the biological carbon cycle.

Methane (CH_4) is emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from livestock and other agricultural practices and by the decay of organic waste in municipal solid waste landfills.

Nitrous Oxide (N_2O) is emitted during agricultural (i.e., fertilizer and pesticide application) and industrial activities, as well as during combustion of fossil fuels and solid waste.

Methods have been set forth to describe emissions of GHGs in terms of a single gas to simplify reporting and analysis. The most commonly accepted method to compare GHG emissions is the global warming potential (GWP) methodology defined in the Intergovernmental Panel on Climate Change (IPCC) reference documents. The IPCC defines the GWP of various GHG emissions on a normalized scale that recasts all GHG emissions in terms of carbon dioxide equivalent (CO_2e), which compares the gas in question to that of the same mass of CO_2 (CO_2 has a GWP of 1 by definition).

Table 2.1-2 lists the GWP of CO_2, CH_4, and N_2O, their lifetimes, and abundances in the atmosphere.

2.1.1.4 Ambient Pollutant Concentrations

Criteria Pollutants

The San Diego Air Pollution Control District (SDAPCD) maintains and operates a network of ambient air monitoring stations throughout the County. The purpose of the monitoring stations is to measure ambient concentrations of the pollutants and determine whether the ambient air quality meets the national ambient air quality standards (NAAQS) and California ambient air quality standards (CAAQS) (discussed further below). Monitoring data for 3 years (2013–2015) from the Otay Mesa-Paseo and Alpine-Victoria Drive stations are presented in Table 2.1-3 to represent the range of ambient air quality conditions throughout the unincorporated area.

As shown in Table 2.1-3, the Alpine-Victoria Drive station has experienced frequent violations of the state and federal ozone standards, whereas the Otay Mesa-Paseo station did not violate either ozone standard over these 3 years. The Otay Mesa-Paseo station recorded six exceedances of the state PM10 standard in 2012.

Local monitoring data (Table 2.1-3) are used to designate areas as nonattainment, maintenance, attainment, or unclassified for the NAAQS and CAAQS. The four designations are defined as follows.

- Nonattainment—assigned to areas where monitored pollutant concentrations consistently violate the standard in question.
- Maintenance—assigned to areas where monitored pollutant concentrations exceeded the standard in question in the past but are no longer in violation of that standard.
- Attainment—assigned to areas where pollutant concentrations meet the standard in question over a designated period of time.
- Unclassified—assigned to areas where data are insufficient to determine whether a pollutant is violating the standard in question.

Table 2.1-4 summarizes the attainment status of San Diego County with regard to the NAAQS and CAAQS.

Toxic Air Contaminants

According to ARB's (2009) *California Almanac of Emissions and Air Quality*, the annual average diesel particulate matter (DPM) concentration in the SDAB was 1.4 micrograms per cubic meter ($\mu g/m^3$) as of the year 2000, with an estimated cancer risk of 420 persons in one million. The annual average cancer risk from all TACs within the SDAB was 187 persons in one million. For perspective, 1 out of 3 Americans will eventually develop cancer, and 1 out of 4 will die from cancer. Therefore, the national average background cancer incidence is equivalent to 333,000 persons in one million (California Air Resources Board 2009).

Greenhouse Gases

A GHG inventory is a quantification of all GHG emissions and sinks[1] within a selected physical and/or economic boundary. GHG inventories can be performed on a large scale (i.e., for global and national entities) or on a small scale (i.e., for a particular building or person). Although many processes are difficult to evaluate, several agencies have developed tools to quantify emissions from certain sources.

Table 2.1-5 outlines the most recent global, national, statewide, and local GHG inventories to help contextualize the magnitude of potential project-related emissions.

2.1.1.5 Sensitive Receptors

The impact of emissions on sensitive members of the population is a particular concern. ARB identifies sensitive populations as segments of the population most susceptible to poor air quality (i.e., children, the elderly, pregnant women, and those with pre-existing serious health problems affected by air quality). Land uses where sensitive individuals are most likely to spend time include schools and schoolyards, parks and playgrounds, daycare centers, nursing homes, hospitals, and residential communities (California Air Resources Board 2005). Because agricultural operations are typically located in rural areas, the number of sensitive receptors affected by the project is generally low, but these sensitive receptors do occur throughout the unincorporated area, with higher numbers closer to town centers.

2.1.2 Regulatory Setting

The agencies of direct importance to the project for air quality are the U.S. Environmental Protection Agency (EPA), ARB, and SDAPCD. EPA has established federal air quality standards for which ARB and SDAPCD have primary implementation responsibility. ARB and SDAPCD are responsible for ensuring that state air quality standards are met, as well as for developing policies and plans to reduce state and local GHG emissions. The following federal, state, and local air quality and GHG regulations and policies are applicable to the proposed project.

[1] A greenhouse gas sink is a process, activity, or mechanism that removes a GHG from the atmosphere.

2.1.2.1 Federal Regulations

Air Quality

The Clean Air Act (CAA) was first enacted in 1963 and has been amended numerous times in subsequent years (1965, 1967, 1970, 1977, and 1990). The CAA establishes federal air quality standards (NAAQS) and specifies future dates for achieving compliance. The CAA also mandates that the state submit and implement a State Implementation Plan (SIP) for local areas not meeting those standards. The plans must include pollution control measures that demonstrate how the standards will be met.

The 1990 amendments to the CAA identify specific emission-reduction goals for areas not meeting the NAAQS. These amendments require both a demonstration of reasonable further progress toward attainment and incorporation of additional sanctions for failure to attain or meet interim milestones. The sections of the CAA that would most substantially affect the development of the project include Title I (Nonattainment Provisions) and Title II (Mobile-Source Provisions).

Table 2.1-6 shows the NAAQS currently in effect for each criteria pollutant. The CAAQS (discussed below) are also provided for reference.

Greenhouse Gases

Climate change is widely recognized as an imminent threat to the global climate, economy, and population. The EPA has acknowledged potential threats posed by climate change in a Cause or Contribute Finding, which found that the GHG emissions from new motor vehicles contribute to pollution that threatens public health and welfare and was a necessary finding prior to adopting new vehicle emissions standards that reduce GHG emissions. Federal climate change regulation under the federal CAA is also currently under development for both existing and new sources. Standards for CO_2 emissions from new fossil-fuel-fired electricity power plants have also been proposed by EPA and outlined in President Obama's 2013 "Climate Action Plan." Federal vehicle emission standards have been established that specifically take into account the need for GHG emissions reductions. Despite these actions, there is still no comprehensive federal overarching law specifically related to the reduction of GHG emissions.

2.1.2.2 State Regulations

Air Quality

California Clean Air Act and California Ambient Air Quality Standards

In 1988, the state legislature adopted the California CAA, which established a statewide air pollution control program. The California CAA requires all air districts in the state to endeavor to meet the CAAQS by the earliest practical date. Unlike the federal CAA, the California CAA does not set precise attainment deadlines. Instead, the California CAA establishes increasingly stringent requirements for areas that will require more time to achieve the standards. CAAQS are generally more stringent than the NAAQS and incorporate additional standards for sulfates, hydrogen sulfide, visibility reducing particles, and vinyl chloride. The CAAQS and NAAQS are listed together in Table 2.1-6.

ARB and local air districts bear responsibility for achieving California's air quality standards, which are to be achieved through district-level air quality management plans that would be incorporated

into the SIP. In California, EPA has delegated authority to prepare SIPs to ARB, which, in turn, has delegated that authority to individual air districts. ARB traditionally has established state air quality standards, maintaining oversight authority in air quality planning, developing programs for reducing emissions from motor vehicles, developing air emission inventories, collecting air quality and meteorological data, and approving SIPs.

The California CAA substantially adds to the authority and responsibilities of air districts. The California CAA designates air districts as lead air quality planning agencies, requires air districts to prepare air quality plans, and grants air districts authority to implement transportation control measures. The California CAA also emphasizes the control of "indirect and area-wide sources" of air pollutant emissions. The California CAA gives local air pollution control districts explicit authority to regulate indirect sources of air pollution and to establish traffic control measures (TCMs).

Carl Moyer Program

The Carl Moyer Memorial Air Quality Standards Attainment Program (Carl Moyer Program) is a voluntary program that offers grants to owners of heavy-duty vehicles and equipment. The program is a partnership between ARB and the local air districts throughout the state to reduce air pollution emissions from heavy-duty engines. Locally, the air districts administer the Carl Moyer Program.

Toxic Air Contaminant Regulation

California regulates TACs primarily through the Toxic Air Contaminant Identification and Control Act (Tanner Act) and the Air Toxics "Hot Spots" Information and Assessment Act of 1987 ("Hot Spots" Act). In the early 1980s, ARB established a statewide comprehensive air toxics program to reduce exposure to air toxics. The Tanner Act created California's program to reduce exposure to air toxics. The "Hot Spots" Act supplements the Tanner Act by requiring a statewide air toxics inventory, notification of people exposed to a significant health risk, and facility plans to reduce these risks.

In August 1998, ARB identified DPM from diesel-fueled engines as TACs. In September 2000, ARB approved a comprehensive Diesel Risk Reduction Plan to reduce emissions from both new and existing diesel-fueled engines and vehicles. As an ongoing process, ARB reviews air contaminants and identifies those that are classified as TACs. ARB also continues to establish new programs and regulations for the control of TACs, including DPM, as appropriate. ARB has adopted several regulations to reduce emissions from in-use diesel vehicles and engines throughout California, including trucks and stationary sources (California Air Resources Board 2012). In some cases, the TAC reduction strategies also reduce smog-forming emissions such as NO_X.

Greenhouse Gases

California has adopted statewide legislation addressing various aspects of climate change and GHG mitigation. Much of this establishes a broad framework for the state's long-term GHG reduction and climate change adaptation program. The former and current governors of California have also issued several executive orders (EOs) related to the state's evolving climate change policy. Brief summaries of key policies, EOs, regulations, and legislation at the state level that are relevant to the project are described below in chronological order.

Executive Order S-3-05 (2005)

EO S-3-05 is designed to reduce California's GHG emissions to (1) 2000 levels by 2010, (2) 1990 levels by 2020, and (3) 80 percent below 1990 levels by 2050.

Assembly Bill 1493—Pavley Rules (2002, Amendments 2009, 2012 Rule-Making)

Assembly Bill (AB) 1493 (Pavley) requires ARB to adopt vehicle standards that will lower GHG emissions from new light duty autos to the maximum extent feasible beginning in 2009. Additional strengthening of the Pavley standards (referred to previously as *Pavley II* and now referred to as the *Advanced Clean Cars* [ACC] measure) was adopted for vehicle model years 2017–2025 in 2012. Together, the two standards are expected to increase average fuel economy to roughly 54.5 miles per gallon in 2025.

Assembly Bill 32—California Global Warming Solutions Act (2006)

AB 32 codified the state's GHG emissions target by requiring that the state's global warming emissions be reduced to 1990 levels by 2020. The 2008 *Climate Change Scoping Plan* for AB 32 (AB 32 Scoping Plan) identifies specific measures to reduce GHG emissions to 1990 levels by 2020 and requires ARB and other state agencies to develop and enforce regulations and other initiatives for reducing GHGs. The first update to the 2008 Scoping Plan was released in February 2014 and includes revised GHG reduction estimates based on updated statewide GHG inventories. The update also discusses the need for continued GHG reduction progress post-2020. ARB is currently working on a second update to the Scoping Plan to reflect the 2030 target established in Executive Order B-30-15 (discussed below). ARB is expecting to present the final 2030 Target Scoping Plan to the board in late 2016.

Executive Order S-01-07—Low Carbon Fuel Standard (2007)

EO S-01-07 mandated (1) that a statewide goal be established to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020, and (2) that a low carbon fuel standard (LCFS) for transportation fuels be established in California. ARB approved the LCFS in 2009 and implemented in LCFS as a discrete early action measure under AB 32 and within the Scoping Plan. In addition, ARB subsequently approved amendments to the LCFS in December 2011, which began implementation on January 1, 2013. As the result of a court ruling that found procedural issues related to the original adoption of the LCFS, ARB re-adopted the LCFS regulation in September 2015, and the changes went into effect on January 1, 2016. The program establishes a strong framework to promote the low carbon fuel adoption necessary to achieve the Governor's 2030 and 2050 GHG goals. Note that the LCFS regulation does not apply to certain transportation applications, including locomotives and ocean-going vessels. Also, the majority of the emissions benefits due to the LCFS come from the production cycle (upstream emissions) of the fuel rather than the combustion cycle (tailpipe) (California Air Resources Board 2016a).

State CEQA Guidelines (2010)

The State CEQA Guidelines require lead agencies to describe, calculate, or estimate the amount of GHG emissions that would result from a project. Moreover, the guidelines emphasize the necessity of determining potential climate change effects of a project and proposing mitigation as necessary. They also confirm the discretion of lead agencies to determine appropriate significance thresholds, but require the preparation of an EIR if "there is substantial evidence that the possible effects of a

particular project are still cumulatively considerable notwithstanding compliance with adopted regulations or requirements" (Section 15064.4).

State CEQA Guidelines Section 15126.4 includes considerations for lead agencies related to feasible mitigation measures to reduce GHG emissions, which may include, among others, measures in an existing plan or mitigation program for the reduction of emissions that are required as part of the lead agency's decision; implementation of project features, project design, or other measures that are incorporated into the project to substantially reduce energy consumption or GHG emissions; offsite measures, including offsets that are not otherwise required, to mitigate a project's emissions; and measures that sequester carbon or carbon-equivalent emissions.

California Green Building Standards Code and Title 24 (2010)

The Green Building Standards Code (CALGreen) applies to the planning, design, operation, construction, use, and occupancy of newly constructed buildings and requires the installation of energy- and water-efficient indoor infrastructure for all new projects beginning after January 1, 2011. CALGreen also requires newly constructed buildings to develop a waste management plan and divert at least 50 percent of the construction materials generated during project construction.

Administrative regulations to CALGreen Part 11 and the California Building Energy Efficiency Standards were adopted in 2013 and took effect on January 1, 2014. The 2013 Building Energy Efficiency Standards are 30 percent more efficient than the 2008 standards for commercial construction. Part 11 also established voluntary standards in the 2008 edition of the code that became mandatory in the 2010 edition of the code, including planning and design for sustainable site development, energy efficiency, water conservation, material conservation, and internal air contaminants (California Energy Commission 2012). The next set of energy efficiency standards (the 2016 Building Energy Efficiency Standards) take effect on January 1, 2017.

Senate Bills X 1-2 and 350, Renewable Portfolio Standard (2011, 2015)

Senate Bill (SB) X 1-2 extended the Renewables Portfolio Standard (RPS) enacted under SBs 1078 and 107 to require all California electricity providers to obtain at least 33 percent of their energy from renewable resources by 2020. SB 350, which was signed in 2015, extended the RPS once again to require 50 percent renewable sourced energy by 2030.

Senate Bill 32 and Assembly Bill 197 (2016)

SB 32 requires the ARB to ensure that statewide GHG emissions are reduced to at least 40% below the 1990 level by 2030, consistent with the target set forth in EO B-30-15. AB 197 creates requirements to form a the Joint Legislative Committee on Climate Change Policies, requires the ARB to prioritize direct emission reductions and consider social costs when adopting regulations to reduce GHG emissions beyond the 2020 statewide limit, requires ARB to prepare reports on sources of GHGs and other pollutants, establishes six-year terms for voting members of ARB, and adds two legislators as non-voting members of ARB. Both bills were signed by Governor Brown on September 8, 2016.

2.1.2.3 Local Regulations

Air Quality

SDAPCD has local air quality jurisdiction over projects in San Diego County. Responsibilities of the air district include overseeing stationary-source emissions, approving permits, maintaining emissions inventories, maintaining air quality stations, overseeing agricultural burning permits, and providing CEQA compliance assistance on an as-needed basis. SDAPCD is also responsible for establishing and enforcing local air quality rules and regulations that address the requirements of federal and state air quality laws and for ensuring that NAAQS and CAAQS are met.

SDAPCD has adopted air quality plans to improve air quality, protect public health, and protect the climate. The San Diego Regional Air Quality Strategy (RAQS) identifies feasible emission control measures and provides expeditious progress toward attaining the state ozone standards. SDAPCD has also developed plans for attaining and maintaining federal ozone standards, including the 2012 maintenance plan and 2007 attainment plan, both for the 1997 ozone standard. SDAPCD is currently working on updating the RAQS and developing an attainment plan for attaining the federal 2008 ozone standard.

The project may be subject to the following district rules. This list may not be all encompassing as additional SDAPCD rules may apply to the project as specific components are identified.

- **Regulation 2, Rule 20.2—New Source Review Non-Major Stationary Sources:** establishes Air Quality Impact Analysis (AQIA) Trigger Levels, which set emission limits for non-major new or modified stationary sources.
- **Rule 50—Visible Emissions:** establishes limits to the opacity of emissions within the SDAPCD. The proposed facility is subject to Rule 50(d)(1) and (6) and should not exceed the visible emission limitation.
- **Rule 51—Nuisance:** prohibits emissions that cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public; or which endanger the comfort, repose, health, or safety of any such persons or the public; or which cause injury or damage to business or property.
- **Rule 52—Particulate Matter:** establishes limits to the discharge of any particulate matter from non-stationary sources.
- **Rule 54—Dust and Fumes:** establishes limits to the amount of dust or fume discharged into the atmosphere in any 1 hour.
- **Rule 55—Fugitive Dust Control:** sets restrictions on visible fugitive dust from construction and demolition projects.
- **Rule 67—Architectural Coatings:** establishes limits to the ROG content for coatings applied within the SDAPCD.

SDAPCD has not developed advisory emission thresholds or guidance to assist lead agencies in determining the level of significance of a project's emissions in CEQA documents. However, the County has developed guidance that includes recommended screening level thresholds to assist lead agencies in determining the level of significance of a project's emissions in CEQA documents. Furthermore, County Code Section 87.428, Dust Control Measures, also requires all clearing and grading to be carried out with dust control measures adequate to prevent creation of a nuisance to

persons or public or private property. Clearing, grading, or improvement plans must require that measures such as the following be undertaken to achieve this result: watering, application of surfactants, shrouding, control of vehicle speeds, paving of access areas, or other operational or technological measures to reduce dispersion of dust. These project design measures are to be incorporated into all earth-disturbing activities to minimize the amount of PM emissions from construction.

Greenhouse Gases

The County is currently preparing a Climate Action Plan (CAP). The CAP will be a comprehensive plan outlining the specific activities that the County will undertake to reduce GHG emissions in its unincorporated communities. The CAP will also help the County meet state-mandated GHG reduction targets. The CAP will focus on activities that can achieve the greatest GHG emission reductions in the most technologically feasible and cost-effective manner. Adoption of the CAP is expected in the fall of 2017.

2.1.3 Analysis of Project Effects and Determination of Significance

The proposed project consists of an amendment to the Zoning Ordinance related to accessory agricultural uses in unincorporated portions of the County over which the County has land use jurisdiction (see Section 1.4, *Project Description*, for further details). Specifically, the proposed project applies to properties where active agriculture exists within the County or properties where agricultural uses are allowed. During the scoping process for this project, which considered potentially significant environmental impacts and involved a 30-day Notice of Preparation public comment period, all thresholds related to air quality and GHG emissions were considered to be potentially significant and are thus evaluated below. No comments on air quality or GHG emissions were received during the public comment period.

A significant impact on air quality would occur if the proposed project conflicted with applicable air quality plans, violated any air quality standard, exposed sensitive receptors to substantial pollutant concentrations, or created objectionable odors. A significant impact on GHGs would occur if the proposed project generated a substantial amount of GHG emissions or conflicted with applicable plans or policies adopted to reduce GHG emissions. Each of these issues is evaluated below. The analysis below is based on the evaluation guidance and threshold recommendations within the County's *Guidelines for Determining Significance for Air Quality* (County of San Diego 2007a).

2.1.3.1 Air Quality Plan

Guidelines for the Determination of Significance

The following significance guideline from Appendix G of the State CEQA Guidelines applies to both the direct and cumulative impact analyses. A significant impact would result if the project would:

- Conflict with or obstruct implementation of the applicable air quality plan.

For the purposes of this analysis, "conflict with or obstruct implementation" is defined as circumstances in which the project would worsen existing air quality violations or exceed the growth projections developed by the County and San Diego Association of Governments (SANDAG). A project is deemed inconsistent with air quality plans if it would result in population and/or

employment growth that exceeds estimates used to develop applicable air quality plans, which, in turn, would generate emissions not accounted for in the regional emissions budgets. Therefore, the proposed project is evaluated to determine if it is consistent with the land use designations and growth anticipated in the RAQS and ozone attainment and maintenance plans prepared for the San Diego region.

Analysis

San Diego County is currently designated as a nonattainment area for the federal 8-hour ozone standard and the state ozone, PM10, and PM2.5 standards (California Air Resources Board 2014; EPA 2015a). The RAQS is the region's plan for improving air quality and attaining the federal and state air quality standards. The RAQS relies on information from ARB and SANDAG to project future emissions and determine appropriate emissions reduction strategies. SDAPCD has also adopted an ozone maintenance plan.

The proposed project consists of amendments to the zoning ordinance to promote and encourage additional land use activities on active agricultural lands throughout the County. Although the proposed project would amend the existing Zoning Ordinance, no change in land uses would occur, and the proposed project would remain consistent with the existing land use designation as delineated in the County General Plan. Because the proposed project includes development that is consistent with the uses allowed by the Land Use Element and agricultural zones, the new development was anticipated in SANDAG growth projections used in establishing the RAQS and SIP. Therefore, it conforms to the forecast and would not conflict or obstruct implementation of the air quality plans. **Impacts would be less than significant and no mitigation measures are required**.

2.1.3.2 Violate Air Quality Standards

Guidelines for the Determination of Significance

The following significance guideline from Appendix G of the State CEQA Guidelines applies to both the direct and cumulative impact analyses. A significant impact would result if the project would:

- Violate any air quality standard or contribute substantially to an existing or projected air quality violation.

For the purposes of this analysis, "violate any air quality standard or substantially contribute to an existing or projected air quality violation" is defined as circumstances in which construction or operational emissions exceed the pertinent air quality thresholds, as described in Appendix D under *Regional Thresholds for Air Basin Attainment of State and Federal Ambient Air Quality Standards*. As described in Appendix D, emissions in excess of San Diego County's screening level thresholds (SLTs) would be expected to have a significant impact on air quality because an exceedance of the SLTs is anticipated to contribute to CAAQS and NAAQS violations in the County.

Emissions Assumptions and Modeling Methodology

Implementation of the proposed project would revise and introduce new permitting requirements for agricultural areas. Several of these revisions would promote the development of uses that are accessory to agricultural activities, including microbreweries, dairy operations, and retail stores. Table 2.1-7 summarizes the 14 uses associated with the project and identifies whether the changes

to the draft Zoning Ordinance would induce increases in construction or operational criteria pollutant or GHG emissions.

As shown in Table 2.1-7, several uses associated with agricultural activities supported by the project could result in increased criteria pollutant and GHG emissions (identified as "moderate" and "high" for emissions potential). For example, construction of new buildings would generate emissions that could result in short-term air quality and GHG impacts. Operation of the buildings would result in long-term criteria pollutant and GHG emissions from mobile (i.e., vehicle trips), area (i.e., periodic paint emissions from facility upkeep), and energy (i.e., natural gas combustion). Operational GHG emissions would also be generated by electricity and water consumption, as well as waste generation. Certain uses, such as microbreweries, wineries, and dairies, could also result in process-related emissions—for example, microbrewing generates ROG during fermentation. Livestock management can also generate CH_4 and N_2O emissions.

The draft Zoning Ordinance revisions identify maximum floor areas and acreages for each new use, as applicable. The number of new buildings and uses that could be induced by the permitting revisions is currently unknown. Accordingly, to illustrate the potential air quality and GHG impacts from construction and operation of new development, a representative project within each use category with the potential to generate moderate or high emissions was evaluated. Table 2.1-8 summarizes the key modeling assumptions for each project by use. Because agricultural tourism, aquaponics/fish markets, and mobile butchering would ~~not~~ support relatively few new building construction or operational vehicle trips, they have a relatively low emissions potential (see Table 2.1-7). As such, an illustrative emissions analysis was not performed for these use types.

Construction and operational emissions for each of the project types except animal raising[2] were estimated using the California Emissions Estimator Model (CalEEMod), version 2013.2.2. CalEEMod does not contain land use types for any of the project uses. Accordingly, the representative projects were modeled using the following land use assumptions, which are considered most similar to the potential project types.

- Homestay = Hotel
- Microbrewery, Winery, and Dairy = Refrigerated Warehouse
- Roadside Sales and Agricultural Store = Convenience Store

Emissions from construction activity and operational area sources, energy consumption, water use, and wastewater generation were quantified using model defaults based on the project sizes and selected land use types, with the following exceptions. These defaults were replaced, based on available information, to capture the unique energy and water demands associated with microbreweries, wineries, and dairies.

- CalEEMod defaults for electricity, natural gas, and indoor water consumption for a refrigerated warehouse were replaced based on data specific to microbreweries. It was assumed 120,000 kilowatts (kWh), 10,400 therms, and 2.5 million gallons of water would be consumed annually to produce 248,000 gallons of beer (Sound Brewing Systems 2016).
- CalEEMod defaults for electricity, natural gas, and outdoor water consumption for a refrigerated warehouse were replaced based on data specific to wineries. It was assumed 481,000 kWh and

[2] Revisions to the animal raising provisions would not permit any new buildings that would generate construction or operational emissions.

5,900 therms are consumed annually at a small winery, and that 5.8 million gallons of irrigation water are needed to support vines to produce 12,000 gallons of wine per year (Wu et al. 2013; Dunne 2014).

- CalEEMod defaults for electricity and outdoor water consumption for a refrigerated warehouse were replaced based on data specific to California dairies. It was assumed 900 kWh and 12,337 gallons of water are consumed each year per dairy head (Looper and Waldner 2007; Ludington et al. 2007).

Operational emissions from mobile sources were estimated using the trip generation assumptions provided by Chen Ryan (2016) and summarized in Table 2.1-8. All vehicle trip lengths were set to 9 miles per the County's Transportation Impact Fee. It was conservatively assumed all construction would take place immediately following adoption of the revised ordinance in 2017.

As noted above, beer and wine production can result in ROG emissions. Likewise, fugitive N_2O emissions can be released during fertilizer application at wineries. Livestock management also represents a source of CH_4 and N_2O from manure management and enteric fermentation. Process emissions from beer and wine production were estimated assuming 4.17 pounds of ROG are emitted per 1,000 barrels of beer and 6.2 pounds of ROG are emitted per gallon of wine (San Joaquin Valley Air Pollution Control District 2010, 2015). Fugitive GHG emissions from manure management and enteric fermentation were analyzed using emissions factors from ICLEI (2012) and EPA (2015b). It was conservatively assumed that new animals would be dairy cows, which have the highest CH_4 and N_2O emissions per head. Emissions resulting from fertilizer use at vineyards were calculated using emission factors from ARB (2013). The analysis also accounts for increased carbon sequestration at vineyards assuming a carbon stock factor of 1.2 metric tons per acre (Kroodsma and Field 2006).

As discussed in Section 2.10, *Water Supply and Groundwater*, the majority of the unincorporated area is reliant on either separate groundwater-dependent districts or private wells that are unaffiliated with the San Diego County Water Authority. The water-related GHG calculations contained herein assume that all project-related water uses have associated supply-, conveyance-, treatment-, and distribution-related energy requirements. Because these processes consume more electricity than water delivered by a private well, the emissions analysis represents a conservative assessment of potential water-related GHG impacts.

The installation, use, and disposal of refrigeration systems like air conditioners, chillers, and refrigerators may result in refrigerant leaks. These fugitive leaks can result in small, but potent emissions of high-GWP gases that consist mostly of hydrofluorocarbons (HFCs). Because the exact refrigeration requirements are not known at this time, refrigeration-related high-GWP gasses are discussed qualitatively.

Analysis

Potential violation of air quality standards is analyzed separately for construction and operations.

General Construction-Related Impacts

As shown in Table 2.1-7, several uses associated with agricultural activities supported by the project could result in increased criteria pollutant emissions. However, the number of new buildings and uses that could be induced by the permitting revisions is currently unknown. Accordingly, to illustrate the potential air quality impacts from construction of new development, a representative project within each use category with the potential to generate moderate or high emissions was

evaluated. Emissions were estimated using CalEEMod based on the maximum floor areas and acreages for each new use, as shown in Table 2.1-8. It was conservatively assumed all construction would take place immediately following adoption of the revised Zoning Ordinance in 2017.

Table 2.1-9 summarizes the anticipated criteria pollutant emissions from construction of each project. As shown in Table 2.1-9, emissions from construction of the representative project types would not exceed the County's thresholds of significance. Accordingly, construction of individual projects induced by the permitting revisions would not have a direct air quality impact. However, there is the potential that multiple uses could be constructed simultaneously. The exact number and timing of all construction activities that could occur as a result of the project are unknown. Based on the illustrative analysis presented in Table 2.1-9, four simultaneous microbreweries, wineries, or dairies could be constructed at the same time before an emissions threshold is exceeded. If five projects were constructed at once, NO_X emissions would be 259 pounds per day and would exceed the County's SLTs.

San Diego and Sonoma Counties have the highest densities of breweries and wineries per acre in the state.[3] If the existing densities are applied to half the project study area (185,100 acres), 8 new breweries and 83 new wineries could be developed as a result of the project. Extending the same logic to the County's four dairies, one new dairy may be developed with the permitting revisions. As such, it is highly likely five or more microbreweries, wineries, or dairies would be constructed at the same time, resulting in a short-term impact. Simultaneous construction of the other analyzed uses—homestay, roadside sales, and agricultural stores—would further contribute to the emissions exceedance. Therefore, **if multiple projects are built simultaneously, construction impacts related to a violation of an air quality standard would be potentially significant (Impact AQ-1).**

General Operational-Related Impacts

Development accessory to agricultural activities that are promoted by the proposed project represents a long-term source of criteria pollutants. New buildings would generate emissions from energy, mobile, and area sources. Energy sources include natural gas combustion for space heating, whereas mobile sources are visitor and employee vehicle trips. Area sources include consumer products, landscaping equipment, and the periodic application of paint for facility upkeep. Microbreweries and wineries also release ROG during the malting and fermentation processes, respectively.

The number of new buildings and uses that could be induced by the permitting revisions is currently unknown. Accordingly, to illustrate the potential air quality impacts from operation of new development, a representative project within each use category with the potential to generate moderate or high emissions was evaluated. Emissions were estimated using CalEEMod based on the maximum floor areas and acreages for each new use, as shown in Table 2.1-8. It was conservatively assumed all projects would begin operation in 2018 immediately following construction.

Table 2.1-10 summarizes the anticipated criteria pollutant emissions from operation of each project. As shown in Table 2.1-10, emissions from operation of the representative project types would not exceed the County's thresholds of significance. Accordingly, operation of individual projects promoted by the permitting revisions would not have a direct air quality impact. However, at full

[3] There are currently 116 breweries in San Diego County (2.7 million acres) and 450 wineries in Sonoma County (1 million acres) (Chen Ryan 2016).

buildout, multiple uses would operate simultaneously. The exact number of new uses that could occur as a result of the project are unknown. As an illustrative example of potential operational impacts at full buildout, development associated with the three uses with the largest emissions potential—microbreweries, wineries, and creameries/dairies—were estimated based on existing land use densities. As discussed above, it is assumed that 8 new breweries, 83 new wineries, and 1 new creamery/dairy may be developed with the permitting revisions. As noted in the Transportation Impact Assessment (TIA) (Chen Ryan 2016), it is unreasonable to assume that every eligible parcel within the County will construct or incorporate the improvements that would be allowed by the proposed project. The TIA analyzes potential traffic impacts at full-build assuming that 7% of the eligible parcels would construct or implement improvements. This value represents an average across all improvement types; it is possible more or less breweries, wineries, and dairies could be developed. Accordingly, since the air quality analysis presents emissions associated with breweries, wineries, and dairies as an illustrative example of potential impacts, the assessment assumes a higher penetration rate to ensure impacts are not unrepresented. –[4] Total operational emissions generated by these uses based on the individual project emissions (see Table 2.1-10) are summarized in Table 2.1-11.

As shown in Table 2.1-11, all emissions except SO_2 from a theoretical full buildout scenario for microbreweries, wineries, and creameries/dairies would exceed County thresholds of significance. Operational emissions from the other analyzed uses—homestay, roadside sales, and agricultural stores—would further contribute to the emissions exceedances. Therefore, **if multiple projects operate simultaneously, operational impacts related to a violation of an air quality standard would be potentially significant (Impact AQ-2).**

2.1.3.3 Exposure of Receptors to Substantial Pollutant Concentrations

Guidelines for the Determination of Significance

The following significance guideline from Appendix G of the State CEQA Guidelines applies to both the direct and cumulative impact analyses. A significant impact would result if the project would:

- Expose sensitive receptors to substantial pollutant concentrations.

For the purpose of this analysis, schools, daycare facilities, places of assembly, medical facilities, parks, and residences are considered sensitive receptor locations. A "substantial pollutant concentration" is defined as levels in excess of applicable County thresholds, as described in Appendix D under *Health-Based Thresholds for Project-Generated Pollutants of Human Health Concern.* As described in Appendix D, emissions in excess of San Diego County's SLTs would be expected to have a significant impact on air quality because an exceedance of the SLTs is anticipated to contribute to CAAQS and NAAQS violations in the County.

[4] ~~As noted in the Transportation Impact Assessment (TIA) (Chen Ryan 2016), it is unreasonable to assume that every eligible parcel within the County will construct or incorporate the improvements that would be allowed by the proposed project. The TIA analyzes potential traffic impacts at full-build assuming that 7% of the eligible parcels would construct or implement improvements. This value represents an average across all improvement types; it is possible more or less breweries, wineries, and dairies could be developed. Accordingly, since the air quality analysis presents emissions associated with breweries, wineries, and dairies as an illustrative example of potential impacts, the assessment assumes a higher penetration rate to ensure impacts are not unrepresented.~~

Analysis

The analysis of project-related impacts on human health focuses on those localized pollutants with the greatest potential to result in a significant, material impact on human health. This is consistent with the current state-of-practice and published guidance by the California Air Pollution Control Officers Association (2009), Office of Environmental Health Hazard Assessment (2015), and ARB (2005). These pollutants are locally concentrated DPM and CO.

Diesel Particulate Matter

Health risks related to DPM are assessed qualitatively based on anticipated project emissions and proximity to sensitive receptors. Projects that require construction activity would generate DPM emissions from the use of heavy-duty equipment and trucks. As shown in Table 2.1-9, microbreweries, wineries, and creameries/dairies are anticipated to generate the highest PM emissions of all uses promoted by the proposed project. These uses would also generate minor DPM emissions from material deliveries and export of bottled beverages and other products. Diesel-powered processing equipment may also generate DPM emissions.

Cancer health risks associated with exposure to diesel exhaust are typically associated with chronic exposure, in which a 70-year exposure period is assumed. Based on the maximum allowable building sizes, construction activities at individual project sites are anticipated to be short-term and would not exceed 2 years (refer to Appendix D). In addition, DPM concentrations, and thus cancer health risks, dissipate as a function of distance from the emissions source. Because agricultural operations are typically located in rural areas, the number of sensitive receptors affected by individual projects is expected to be minimal. SDAPCD Rule 1200 also establishes acceptable risk levels and emission control requirements for new and modified facilities that may emit operational TACs, including DPM.[5] Under Rule 1200, permits to operate may not be issued when emissions of TACs result in an incremental cancer risk greater than 1 in 1 million without application of best available control technology or a health hazard index (chronic and acute) greater than one.

Given the rural nature of anticipated construction and required compliance with SDAPCD Rule 1200, implementation of the project is not anticipated to expose sensitive receptors to substantial DPM concentrations. **This impact would be less than significant**.

Carbon Monoxide Hot-Spots

The County requires an analysis of localized CO concentrations associated with traffic congestion to ensure concentrations remain below CAAQS and NAAQS. As discussed in Appendix D, the County has developed a set of preliminary screening criteria that can be used to determine whether a project would cause or contribute to an existing or future violation of the ambient air quality standards. The criteria are placement of receptors within 500 feet of a signalized intersection operating at or below level of service (LOS) E, or degradation of road intersections with peak-hour trips exceeding 3,000 to LOS E or worse.

The proposed project would not support any sensitive land uses and therefore would not place new sensitive receptors within 500 feet of a signalized intersection operating at or below LOS E.

[5] Specifically, Rule 1200 applies to any new, relocated, or modified emission unit that may increase emissions of one or more TAC and for which an Authority to Construct or Permit to Operate is required pursuant to Rule 10, or for which a Notice of Intention or Application for Certification has been accepted by the California Energy Commission.

Although the traffic study prepared by Chen Ryan (2016) did not analyze intersection operations, it does indicate that the project would impact seven roadway segments operating at LOS F.[6] Accordingly, the project may fail the County's second CO screening criteria at intersections along the affected roadway segments, resulting in elevated CO concentrations and potential health risks.

A screening analysis was performed to confirm that implementation of the project would not cause CO hot-spots. The analysis utilized daily traffic counts provided by Chen Ryan (2016) along the Lilac Road (between Valley Center Road and New Road 19) segment, which has the highest project and cumulative plus project-related traffic. It was conservatively assumed that peak-hour volumes travel along the roadway at 5 mph at year 2016 emission rates. Because peak hour volumes were not available, daily volumes were converted to peak hour using a conversion factor of 5, which is a common practice (Cook pers. comm.). Converting daily to peak hour provides a conservative yet realistic assessment of project traffic impacts as additional vehicles would be spread throughout several hours of the day, and during even the most congested times would travel at speeds above 5 mph.

Elevated CO concentrations are typically found in areas with significant traffic congestion. CO is a public health concern because it combines readily with hemoglobin and reduces the amount of oxygen transported in the bloodstream. Table 2.1-12 presents the results of the worst-case CO screening, which was modeled using the CALINE4 dispersion model. Worst-case cumulative plus project (2035) traffic conditions within 2016 emission rates were modeled to provide a conservative analysis of potential impacts. As shown in Table 2.1-12, CO concentrations are not expected to contribute to any new localized violations of the 1- or 8-hour ambient air quality standards. Because the screening-level analysis concentrates the highest peak hour volumes at a single roadway segment at a low travel speed, actual CO concentrations that would be generated at multiple intersections throughout the County would not result in CO hot-spots. Consequently, **this impact would be less than significant**.

2.1.3.4 Objectionable Odors

Guidelines for the Determination of Significance

The following significance guideline from Appendix G of the State CEQA Guidelines applies to both the direct and cumulative impact analyses. A significant impact would result if the project would:

- Create objectionable odors affecting a substantial number of people.

For the purpose of this analysis, an odor-producing facility, as defined by ARB (2005), creates an "objectionable odor" if it results in a nuisance violation, per SDAPCD Rule 51.The potential for the project to create objectionable odors is assessed qualitatively based on the proposed land use types and proximity to sensitive receptors.

Analysis

The proposed project would promote and encourage additional agricultural uses within the County. Agricultural activities are considered by the County and ARB (2005) as having a high potential to generate nuisance odors. Use types most likely to result in odors include creameries/dairies and

[6] The project would impact five additional roadways, but these have been accepted by the County's Mobility Element as operating at LOS F (Chen Ryan 2016).

animal raising. Potential odors associated with these uses would be caused by animal waste generated and stockpiled on site. Microbreweries and wineries may also result in temporary odors during fermenter venting. Although the number of people exposed to potential odors is anticipated to be minimal, odor dispersion during wind events may lead to offsite nuisance violations. Therefore, **impacts related to objectionable odors would be potentially significant (Impact AQ-3).**

2.1.3.5 Generate Substantial GHG Emissions

Guidelines for the Determination of Significance

The following significance guideline from Appendix G of the State CEQA Guidelines applies to both the direct and cumulative impact analyses. A significant impact would result if the project would:

- Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.

For the purposes of this analysis, a significant level of GHG emissions is a circumstance in which construction or operational emissions exceed the pertinent GHG thresholds, as described in Appendix D under *Thresholds for Greenhouse Gases.*

Analysis

GHG emissions during construction and operation were assessed using the same methods as described above in Section 2.1.3.2, *Violate Air Quality Standards*. The impact of GHG emissions is analyzed separately for construction and operations

General Construction-Related Impacts

As shown in Table 2.1-7, several uses associated with agricultural activities supported by the project could result in increased GHG emissions. However, the number of new buildings and uses promoted by the permitting revisions is currently unknown. Accordingly, to illustrate the potential GHG impacts from construction of new development, a representative project within each use category with the potential to generate moderate or high emissions was evaluated. Emissions were estimated using CalEEMod based on the maximum floor areas and acreages for each new use, as shown in Table 2.1-8. It was conservatively assumed all construction would take place immediately following adoption of the revised ordinance in 2017.

Table 2.1-13 summarizes the anticipated GHG emissions from construction of each project. As shown in Table 2.1-13, the representative projects would generate between 58 and 323 metric tons CO_2e during the construction periods. Consistent with the County's GHG guidance, construction-related GHG emissions were amortized over a 20-year period analyzed with the operational emissions discussed below.

General Operational-Related Impacts

Development of accessory uses to agricultural activities that are promoted by the proposed project represent a long-term source of GHG emissions. New buildings would generate emissions from energy consumption, mobile and area sources, and from water consumption and wastewater and waste generation. Wineries also represent both a source and sink of GHG emissions, generating N_2O during fertilizer application and sequestering CO_2 through photosynthesis. Livestock management

represents a source of CH_4 and N_2O from manure management and enteric fermentation. All of these sources were taken into account when assessing project-generated GHG emissions.

The number of new buildings and uses that could be induced by the permitting revisions is currently unknown. Accordingly, to illustrate the potential GHG impacts from project operation, a representative project within each use category with the potential to generate moderate or high emissions was evaluated. Emissions were estimated using CalEEMod based on the maximum floor areas and acreages for each new use, as shown in Table 2.1-8. It was conservatively assumed all projects would begin operation in 2018 immediately following construction.

Table 2.1-14 summarizes the anticipated GHG emissions from operation of each project. Amortized construction emissions are also provided, consistent with County guidance. As shown in Table 2.1-14, emissions from operation of the representative winery and microbrewery project types would exceed the County's interim screening level of 900 metric tons CO_2e. As discussed in Appendix D, this screening level is recommended by the County as an indicator for projects that require further analysis and mitigation and may result in significant GHG impacts. The number of new buildings and uses that could be induced by the permitting revisions is currently unknown. Therefore, the analysis herein discloses potential GHG emissions using an illustrative example of potential project buildout. Additional detail to allow for further analysis of project emissions is not available at this time. Accordingly, the 900 metric tons CO_2e screening level is used as an indicator of project significance in this case. Because operation of individual projects promoted by the permitting revisions exceed 900 metric tons CO_2e, implementation of the proposed project may potentially have a direct GHG impact. Moreover, at full buildout, multiple uses would operate simultaneously. The exact number of new uses that could occur as a result of the project are unknown. As an illustrative example of potential operational impacts at full buildout, development associated with the three uses with the largest emissions potential—microbreweries, wineries, and creameries/dairies—were estimated based on existing land use densities. As discussed above, it is assumed that 8 new breweries, 83 new wineries, and 1 new creamery/dairy may be developed with the permitting revisions.[7] Total operational and amortized construction emissions generated by these uses based on the individual project emissions (see Table 2.1-14) are summarized in Table 2.1-15.

As shown in Table 2.1-15, GHG emissions from a theoretical full buildout scenario for microbreweries, wineries, and creameries/dairies would exceed the County's interim screening level of 900 metric tons CO_2e. Operational emissions from the other analyzed uses—homestay, roadside sales, and agricultural stores—would further contribute to the emissions exceedances. Therefore, **impacts related to greenhouse gas emissions would be potentially significant (Impact AQ-4).**

[7] As noted in the TIA (Chen Ryan 2016), it is unreasonable to assume that every eligible parcel within the County will construct or incorporate the improvements that would be allowed by the proposed project. The TIA analyzes potential traffic impacts at full-build assuming that 7% of the eligible parcels would construct or implement improvements. This value represents an average across all improvement types; it is possible more or less breweries, wineries, and dairies could be developed. Accordingly, since the air quality analysis presents emissions associated with breweries, wineries, and dairies as an illustrative example of potential impacts, the assessment assumes a higher penetration rate to ensure impacts are not unrepresented

2.1.3.6 Consistency with GHG Plans, Policies, and Regulations

Guidelines for the Determination of Significance

The following significance guideline from Appendix G of the State CEQA Guidelines applies to both the direct and cumulative impact analyses. A significant impact would result if the project would:

- Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

For the purposes of this analysis, applicable plans include the AB 32 Scoping Plan, SB 32, the County's General Plan, and EO S-3-05.

Analysis

The AB 32 Scoping Plan and SB 32 represent the most applicable plans, policies, or regulations adopted for the purpose of reducing GHG emissions. AB 32 codified the State's GHG emissions reduction targets for 2020 and identified the acceptable level of GHG emissions in California, with reductions coming in the form of changes to vehicle emissions and mileage standards, sources of electricity, and energy efficiency. Remaining reductions will need to come from plans, policies, or regulations that will require new facilities to have lower carbon intensities than they have under business as usual (BAU) conditions.

The AB 32 Scoping Plan details specific GHG emissions-reduction measures that target specific GHG emissions sources. The Scoping Plan considers a range of actions, including direct regulations, alternative compliance mechanisms, monetary and non-monetary incentives, voluntary actions, and market-based mechanisms (e.g., a cap-and-trade system). Also included are mobile-source emissions reduction measures (Pavley, Low Carbon Fuel Standard vehicle efficiency measures), energy production–related emissions-reduction measures (natural gas transmission and distribution efficiency measures, natural gas extraction efficiency measures), and the RPS (electricity). While the ARB's 2030 Scoping Plan for achieving SB 32 has not yet been published, it is anticipated to extend and further much of the policies and programs included in the AB 32 Scoping Plan. As a result, project-related GHG emissions would be reduced through several of the AB 32 and SB 32 Scoping Plan measures.

At the local level, the County is currently preparing a CAP that will provide a framework for meeting state-mandated GHG reduction targets. Adoption of the CAP is expected in the fall of 2017. Until then, the most relevant local plan is the County's General Plan, which lays out the long-term land use planning framework for future growth and development patterns within the unincorporated areas of the County. The proposed project is for a Zoning Ordinance Amendment that introduces new permitting requirements to promote the development of uses that are accessories to agricultural activities, including microbreweries, dairy operations, and retail stores. As discussed in Section 3.1.1, *Land Use and Planning*, the proposed project would be consistent with the County's General Plan's goals and policies pertaining to agricultural development within the County. On an individual basis, projects allowed under the Zoning Ordinance Amendment would generally be small and result in minor amounts of emissions; however, taken as a whole (i.e., maximum number of uses) they may result in a substantial increase in GHG emissions. Individual projects, such as microbreweries and wineries, would likely result in the highest GHG emissions given the amount of process-related inputs required, including electricity and water as well as cooling requirements and fugitive releases.

The project would be consistent with AB 32, SB 32, and the County's General Plan by providing for uses that are consistent with the County's General Plan's goals, policies, and development patterns pertaining to agricultural development within the County. These uses would not hinder the State's ability to meet the reduction goals of AB 32 or SB 32.

As discussed above, EO S-03-05 established a long-term goal of reducing statewide GHG emissions to 80 percent below 1990 levels by 2050. Achieving this long-term GHG reduction policy will require systemic changes in how energy is produced and used. These deep reductions are to be achieved only with significant changes in electricity production, transportation fuels, and industrial processes, such as increasing energy efficiency, avoiding waste emissions, and replacing high global warming potential gases. The changes necessitated to achieve these targets will require additional policy and regulatory changes, which are unknown at this time. Moreover, there is currently no statewide plan that lays out the framework as to exactly how the state plans on achieving this target and to what extent action is required at the local and project level in order to achieve the target. Therefore, the extent to which the project's emissions and resulting impacts would be mitigated through implementation of such changes is not known and would thus be inconsistent with plans, policies, or regulations adopted for the purposed of reducing GHG emissions in the long-term. Therefore, **impacts related to conflicts with an applicable plan, policy, or regulation would be potentially significant (Impact AQ-5).**

2.1.4 Cumulative Impacts Analysis

The geographic scope for the cumulative analysis of air quality includes the SDAB, which encompasses the entire County, including both incorporated and unincorporated areas and tribal and public agency lands. Because GHGs are global pollutants, the geographic scope for the GHG analysis is much broader and considers global effects of project-generated emissions.

2.1.4.1 Air Quality Plan

The RAQS is the region's plan for improving air quality and attaining the federal and state air quality standards. The control strategies and emissions forecasts analyzed in the RAQS account for current, planned, and reasonably foreseeable projects in the SDAB. Accordingly, the RAQS consistency analysis completed in Section 2.1.3, *Analysis of Project Effects and Determination of Significance*, is inherently cumulative; as discussed above, because the proposed project includes development that is consistent with the uses allowed by the Land Use Element and agricultural zones, the new development was anticipated in SANDAG growth projections used in development of the RAQS and SIP. Therefore, the project would not conflict with or obstruct implementation of the air quality plans or contribute to a cumulatively considerable impact.

2.1.4.2 Violate Air Quality Standards

San Diego County is currently in marginal nonattainment for the federal 8-hour ozone standard and nonattainment for the state ozone, PM2.5, and PM10 standards (see Table 2.1-4). The nonattainment status, which is a result of past and present projects, may be further impeded by reasonably foreseeable future projects. The project would result in a cumulatively considerable net increase of criteria pollutants if emissions exceed the County's thresholds during construction or long-term operation. In addition, cumulative impacts could occur if emissions of concern from other past, present, or reasonably foreseeable future projects within proximity of the project would expose nearby receptors to substantial pollutant concentrations.

As discussed above, concurrent construction and operation of agricultural uses promoted by the project would exceed the County's applicable air quality thresholds. These emissions would occur during the same period as other projects in the SDAB, further contributing to the emissions exceedances. Accordingly, **the project would contribute to a cumulatively considerable impact on air quality standards (Impact AQ-6).**

2.1.4.3 Exposure of Receptors to Substantial Pollutant Concentrations

The project is not anticipated to expose sensitive receptors to substantial DPM or CO concentrations. Geographically proximate construction activities associated with planned and reasonably foreseeable projects may expose adjacent receptors to increased health threats from localized CO or and DPM. Effects would vary according to the equipment used, locations of emission sources and receptors, and underlying meteorology. However, given the remote nature of the project area and the fact that construction an operational activities would be spread throughout the 370,200-acre study area, receptor exposure to CO or DPM in excess of County thresholds is unlikely. Accordingly, the **proposed project would not contribute to a cumulatively considerable impact from exposure of receptors to substantial pollutant concentrations**.

2.1.4.4 Objectionable Odors

The project would promote agricultural activities that are considered by the County and ARB (2005) as having a high potential to generate nuisance odors. These odor emissions would be magnified when combined with odors from geographically proximate projects. Similar to receptor exposure to substantial pollutant concentrations, effects would vary according to underlying meteorology and the locations of odor sources and receptors. Although the number of people exposed to potential odors is anticipated to minimal, given the nature of agricultural activities, cumulative odor emissions within the study area may create a nuisance violation, per SDAPCD Rule 51. Accordingly, **the project would contribute to a cumulatively considerable impact on odors (Impact AQ-7).**

2.1.4.5 Generate Substantial GHG Emissions

Climate change is a global problem, and GHGs are global pollutants, unlike criteria air pollutants (such as ozone precursors), which are primarily pollutants of regional and local concern. Given their long atmospheric lifetimes, GHGs emitted by countless sources worldwide accumulate in the atmosphere. No single emitter of GHGs is large enough to trigger global climate change on its own. Rather, climate change is the result of the individual contributions of countless past, present, and future sources. Therefore, GHG impacts are inherently cumulative, and the GHG analysis presented in Section 2.1.3 is a cumulative impact analysis.

As described above, concurrent construction and operation of agricultural uses promoted by the project would exceed the County's GHG SLT. Accordingly**, the project would contribute to a cumulatively considerable impact on GHG emissions (Impact AQ-8).**

2.1.4.6 Consistency with GHG Plans, Policies, and Regulations

The GHG analysis presented in Section 2.1.3 is a cumulative impact analysis. As discussed above, the project would be consistent with AB 32, SB 32, and the County's General Plan by providing for uses that are consistent with the County's General Plan's goals, policies, and development patterns pertaining to agricultural development within the County that would not result in emission that

would impede progress toward 2020 or 2030 targets. However, as there is no framework for achieving long-term reduction targets (2050), it is unknown exactly how the state plans on achieving these targets and to what extent action is required at the local and project level in order to achieve these targets. Accordingly, **the project would contribute to a cumulatively considerable impact on long-term GHG reduction planning efforts (Impact AQ-9).**

2.1.5 Significance of Impacts Prior to Mitigation

The proposed project would result in potentially significant impacts related to construction and operational criteria pollutant and GHG emissions (**Impacts AQ-1, AQ-2, AQ-4,** and **AQ-5, direct/indirect**, and **AQ-6** and **AQ-8, cumulative**), as well as odors (**Impact AQ-3, direct,** and **AQ-7, cumulative**). The proposed project would result in less-than-significant impacts related to consistency with applicable air quality plans and exposure of sensitive receptors to substantial pollutant concentrations.

2.1.6 Mitigation Measures

2.1.6.1 Air Quality Plan

The project would not conflict with or obstruct implementation of the RAQS and SIP. **This impact would be less than significant, and no mitigation measures are required**.

2.1.6.2 Violate Air Quality Standards

Simultaneous construction and operation of agricultural uses promoted by the project would exceed the County's criteria pollutant thresholds, and as such, may violate air quality standards. Mitigation measures (described below) have been identified that would reduce construction and operational emissions, but not below a significant level.

Mitigation Measures

M-AQ-1: During the environmental review process for future discretionary permits, the County Guidelines for Determining Significance for Air Quality will be applied. When impacts are determined to be significant, feasible and appropriate project-specific mitigation measures will be incorporated. Grading can generate fugitive dust, including PM10 and PM2.5. Projects that involve site grading, excavation, or substantial material movement will implement the following dust control measures during construction, as applicable, in compliance with SDAPCD Rule 55.

- Water the grading areas a minimum of twice daily to minimize fugitive dust.
- Stabilize graded areas as quickly as possible to minimize fugitive dust.
- Apply chemical stabilizer or pave the last 100 feet of internal travel path within the construction site prior to public road entry.
- Install wheel washers adjacent to a paved apron prior to vehicle entry on public roads.
- Remove any visible track-out into traveled public streets within 30 minutes of occurrence.
- Wet wash the construction access point at the end of each workday if any vehicle travel on unpaved surfaces has occurred.

- Provide sufficient perimeter erosion control to prevent washout of silty material onto public roads.
- Cover haul trucks or maintain at least 12 inches of freeboard to reduce blow-off during hauling.
- Suspend all soil disturbance and travel on unpaved surfaces if winds exceed 25 mph.
- Cover/water onsite stockpiles of excavated material.
- Enforce a 15 mph speed limit on unpaved surfaces.
- On dry days, sweep up any dirt and debris spilled onto paved surfaces immediately to reduce re-suspension of particulate matter caused by vehicle movement. Clean approach routes to construction sites daily for construction-related dirt in dry weather.
- Hydroseed, landscape, or develop as quickly as possible all disturbed areas and as directed by the County and/or SDAPCD to reduce dust generation.
- Limit the daily grading volumes/area.

M-AQ-2: During the environmental review process for future discretionary permits, the County Guidelines for Determining Significance for Air Quality will be applied. When impacts are determined to be significant, feasible and appropriate project-specific mitigation measures will be incorporated. Construction projects typically require equipment such as bulldozers, graders, loaders, scrapers, backhoes, and heavy trucks. Project applicants will utilize clean-diesel, alternative fuel, or other engine controls to reduce equipment and vehicle exhaust emissions during construction. Project applicants will implement the following control measures, as applicable, to reduce equipment and exhaust related emissions.

- Require equipment to be maintained in good tune and to reduce excessive idling time.
- Utilize alternative fuels, such as compressed natural gas, renewable diesel, and diesel.
- Require the use of equipment that meets EPA Tier 4 or higher (as promulgated) emission standards.
- Require older equipment be retrofitted with advanced engine controls, such as diesel particulate filters, selective catalytic reduction (SCR), or cooled exhaust gas recirculation.

M-AQ-3: During the environmental review process for future discretionary permits, the County Guidelines for Determining Significance for Air Quality will be applied. When impacts are determined to be significant, feasible and appropriate project-specific mitigation measures will be incorporated. Building construction may result in off-gassing of ROG from architectural coatings and paints that exceed the County's threshold. Project applicants will reduce ROG emissions related to architectural coatings through the use of low Volatile Organic Compound (VOC) coatings (VOC content less than or equal to 50 grams per liter).

M-AQ-4. During the environmental review process for future discretionary permits, the County Guidelines for Determining Significance for Air Quality will be applied. When impacts are determined to be significant, feasible and appropriate project-specific mitigation measures will be incorporated. Project applicants will implement the following control measures, as applicable, to reduce operational related criteria pollutant and GHG emissions.

General Strategies

- Increase energy efficiency by at least 10 percent beyond the Title 24 standard in place at the time of construction, unless demonstrated to be infeasible.
- Utilize low VOC coatings (VOC content less than or equal to 50 grams per liter) for periodic painting and facility upkeep.
- Plant shade trees within 40 feet of the south side or within 60 feet of the west side of properties.
- Utilize cool roof materials (albedo greater than or equal to 30) or install green roofs.
- Install solar water heaters.
- Maximize interior day light and utilize high efficiency lighting.
- Increase roof/ceiling insulation beyond the American Society of Heating, Refrigeration and Air Conditioning Engineers Standard 90.1-2010.
- Install low-water use appliances and fixtures to reduce indoor water consumption by a minimum of 10 percent relative to the 2008 Plumbing Code baseline.
- Design and install a backbone recycled water system to supply to landscaped spaces.
- Install weather-based irrigation controllers to reduce outdoor water consumption.
- Compost food waste and other forms of organic waste, as feasible.
- Provide easily accessible and well-maintained recycling bins for visitor use.
- Provide shuttles for visitors and employees from the nearest town.
- Incorporate onsite renewable energy production, including installation of photovoltaic cells or other options.

Additional Strategies for Microbreweries

- Prepare and implement an energy management system (EMS) to improve process- and facility energy-efficiency and reduce overall energy consumption. Table 2.1-16 lists potential measures that may be incorporated into the EMS. Please refer to the *General Strategies* section for potential measures to reduce water consumption and waste generation.

Additional Strategies for Wineries, and Dairies

- Prepare and implement an EMS to improve process- and facility energy-efficiency and reduce overall energy consumption. Table 2.1-17 lists potential measures that may be incorporated into the EMS. Please refer to the *General Strategies* section for potential measures to reduce water consumption and waste generation.

Additional Strategies for Dairies

- Prepare and implement an EMS to improve process- and facility energy-efficiency and reduce overall energy consumption. Table 2.1-18 lists potential measures that may be incorporated into the EMS. Please refer to the *General Strategies* section for potential measures to reduce water consumption and waste generation.

Because the mitigation measures listed above will not be applied to future non-discretionary actions that will result from the proposed zoning ordinance amendment, **impacts would remain**

potentially significant and unavoidable. Chapter 4, *Project Alternatives*, provides a discussion of alternatives to the proposed project that would result in some reduced impacts associated with air quality as compared to the proposed project.

2.1.6.3 Exposure of Receptors to Substantial Pollutant Concentrations

The project is not anticipated to expose sensitive receptors to substantial DPM or CO concentrations. **This impact would be less than significant, and no mitigation is required**.

2.1.6.4 Objectionable Odors

The project would promote agricultural activities that are considered by the County and ARB (2005) as having a high potential to generate nuisance odors. As discussed in Section 2.5, *Hydrology and Water Quality*, agricultural operations in the County are required to implement stormwater best management practices (BMPs) to protect water quality. To the extent that these BMPs reduce moisture in manure stockpiles and prevent animal waste (and associated odor) runoff, ambient odors from animal operations may be lessened. The following mitigation measure has been identified to reduce odors, but not below a significant level.

Mitigation Measure

M-AQ-5: During the environmental review process for future discretionary permits, the County Guidelines for Determining Significance for Air Quality shall be applied. When impacts are determined to be significant, feasible and appropriate project-specific mitigation measures shall be incorporated. Creameries/ dairies and animal raising may generate odors from animal waste. Microbreweries and wineries may also result in temporary odors during fermenter venting. Project applicants will implement best management practices to control odors.

Animal-Related Operations

- Animal stalls will be cleaned at least once per day including the removal of animal waste and soiled bedding.
- Animal waste will be stockpiled in an enclosed, covered containment vessel to ensure anaerobic off-gassing and associated odor generation is minimized. The containment vessel will protect animal waste stockpiles from heavy weather conditions, including wind and rain which may cause siltation and accelerate anaerobic decomposition of the waste.
- If a project site is located within 1 mile of residents and/or sensitive receptors, containment vessels storing animal waste will be located at the furthest feasible distance from nearby residents and/or sensitive receptors.

Microbreweries and Wineries

- If a project site is located within 1 mile of residents and/or sensitive receptors, chemical neutralizers (e.g., chlorination, hydrogen peroxide) will be used to control odors associated with malting and fermentation.

2.1.6.5 Generate Substantial GHG emissions

Simultaneous construction and operation of agricultural uses promoted by the project would exceed the County's GHG thresholds. Mitigation Measure **M-AQ-4** (described above) has been identified to reduce operational emissions, but not below a significant level.

2.1.6.6 Consistency with GHG Plans, Policies, and Regulations

Simultaneous construction and operation of agricultural uses promoted by the project would not impede progress toward 2020 targets but would impede progress toward long-term post-2020 targets. Mitigation Measure **M-AQ-4** (described above) has been identified to reduce operational emissions, but not below a significant level

2.1.7 Conclusion

The proposed project would result in a less-than-significant impacts related to consistency with applicable air quality plans and exposure of sensitive receptors to substantial pollutant concentrations. The proposed project would result in potentially significant impacts related to construction and operational criteria pollutant and GHG emissions (**Impacts AQ-1, AQ-2, AQ-4,** and **AQ-5, direct/indirect**, and **AQ-6** and **AQ-8, cumulative**), as well as odors (**Impact AQ-3, direct,** and **AQ-7, cumulative**). Mitigation would reduce construction emissions through use of advanced engine technologies, alternative fuels, and BMPs, and reduce operational emissions through improvements in building energy efficiency, incorporation of renewable energy, and other design considerations. Measures are also identified to reduce odors through BMPs for manure management and gas venting at microbreweries. The mitigation measures described above would reduce potential air quality and GHG impacts, but not below a significant level. **Accordingly, the proposed project would result in significant and unavoidable impacts related to construction and operational criteria pollutant and GHG emissions, as well as odors**.

Table 2.1-1. Emission Sources and Health Effects of Criteria Pollutants of Concern

Pollutants	Sources	Primary Effects
Ozone (O_3)	• Atmospheric ROG gases with NO_x in sunlight	• Aggravation of respiratory and cardiovascular diseases • Irritation of eyes • Impairment of cardiopulmonary function • Plant leaf injury
Carbon Monoxide (CO)	• Incomplete combustion of fuels and other carbon containing substances, such as motor exhaust • Natural events, such as decomposition of organic matter	• Reduced tolerance for exercise • Impairment of mental function • Impairment of fetal development • Death at high levels of exposure • Aggravation of some heart diseases (angina)
Particulate Matter (PM2.5 and PM10)	• Stationary combustion of solid fuels • Construction activities • Industrial processes • Atmospheric chemical reactions	• Reduced lung function • Aggravation of the effects of gaseous pollutants • Aggravation of respiratory and cardio-respiratory diseases • Increased cough and chest discomfort • Soiling • Reduced visibility
Sulfur Dioxide (SO_2)	• Combustion of sulfur-containing fossil fuels • Smelting of sulfur-bearing metal ores • Industrial processes	• Aggravation of respiratory diseases • Reduced lung function • Irritation of eyes • Reduced visibility • Plant injury • Deterioration of metals, textiles, leather, finishes, coatings.

Source: South Coast Air Quality Management District 2005; California Air Resources 2005.

Table 2.1-2. Lifetimes and Global Warming Potentials of Key Greenhouse Gases

Greenhouse Gas	Global Warming Potential (100 years)	Lifetime (years)	Atmospheric Abundance
CO_2	1	50–200	400 ppm
CH_4	25	12	1,834 ppb
N_2O	298	114	328 ppb

Sources: Myhre et al. 2013, Blasing 2016.
Notes:
CH_4 = methane
CO_2 = carbon dioxide
N_2O = nitrous oxide
ppb = parts per billion
ppt = parts per trillion

Table 2.1-3. Ambient Criteria Air Pollutant Monitoring Data (2013–2015)

	Otay Mesa-Paseo			Alpine-Victoria		
Pollutant Standards	**2013**	**2014**	**2015**	**2013**	**2014**	**2015**
1-Hour Ozone (O_3)						
Maximum Concentration (ppm)	0.073	0.061	N/A	0.095	0.092	0.097
Number of Days Standard Exceeded						
CAAQS 1-hour (>0.09 ppm)	0	0	N/A	2	0	2
8-Hour Ozone (O_3)						
State Maximum Concentration (ppm)	0.063	0.055	N/A	0.083	0.082	0.085
National Maximum Concentration (ppm)	0.063	0.054	N/A	0.082	0.081	0.084
National 4th Highest Concentration (ppm)	0.059	0.049	N/A	0.078	0.080	0.079
Number of days standard exceeded						
CAAQS 8-hour (>0.070 ppm)	0	0	N/A	27	30	31
NAAQS 8-hour (> 0.070 ppm)	0	0	N/A	6	10	11
Nitrogen Dioxide (NO_2)						
Maximum 1-hour Concentration	91	87	N/A	40	30	48
Annual Average Concentration	19	N/A	N/A	6	5	5
Number of Days Standard Exceeded						
CAAQS 1-Hour (0.18 ppm)	0	0	N/A	0	0	0
NAAQS 1-Hour (0.100 ppm)	0	0	N/A	0	0	0
Suspended Particulates (PM10)						
State Maximum 24-hour Concentration	N/A	N/A	N/A	N/A	N/A	N/A
National Maximum 24-hour Concentration	N/A	N/A	N/A	N/A	N/A	N/A
State Annual Average Concentration	N/A	N/A	N/A	N/A	N/A	N/A
Number of Days Standard Exceeded						
CAAQS 24-hour (>50 µg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
NAAQS 24-hour (>150 µg/m^3)	N/A	N/A	N/A	N/A	N/A	N/A
Suspended Particulates (PM2.5)						
National Maximum 24-hour Concentration (µg/m^3)	N/A	N/A	N/A	20.1	17.4	18.8
24-hour Standard 98th Percentile (µg/m^3)	N/A	N/A	N/A	16.6	16.0	N/A
National Annual Average Concentration	N/A	N/A	N/A	7.9	8.1	N/A
Number of Days Standard Exceeded						
NAAQS 24-Hour (>35 µg/m^3)	N/A	N/A	N/A	0	0	N/A

Source: California Air Resources Board 2016b. Data compiled by ICF.
N/A = data not available; µg/m^3 = micrograms per cubic meter; ppm = parts per million. No data available for CO.

Table 2.1-4. Federal and State Attainment Status for San Diego County

Criteria Pollutant	Federal Designation	State Designation
Ozone	Moderate Nonattainment (P)	Nonattainment
CO	Moderate Maintenance (P)	Attainment
PM10	Attainment	Nonattainment
PM2.5	Attainment	Nonattainment
NO_2	Attainment	Attainment
SO_2	Attainment	Attainment
Lead	Attainment	Attainment
Sulfates	(No federal standard)	Attainment
Hydrogen Sulfide	(No federal standard)	Unclassified
Visibility	(No federal standard)	Unclassified

Source: California Air Resources Board 2016c; EPA 2016a.

Notes:

CO = carbon monoxide
PM10 = particulate matter less than or equal to 10 microns
PM2.5 = particulate matter less than or equal to 2.5 microns
NO_2 = nitrogen dioxide
SO_2 = sulfur dioxide
(P) = designation applies to a portion of the County

Table 2.1-5. Global, National, State, and Local GHG Emissions Inventories

Emissions Inventory	CO_2e (metric tons)
2010 IPCC Global GHG Emissions Inventory	52,000,000,000
2014 EPA National GHG Emissions Inventory	6,870,000,000
2014 ARB State GHG Emissions Inventory	441,500,000
2012 County of San Diego GHG Emissions Inventory	34,670,000

Sources: Intergovernmental Panel on Climate Change 2014; EPA 2016b; California Air Resources Board 2016d; Energy Policy Initiatives Center 2015.

Table 2.1-6. National and State Ambient Air Quality Standards

Criteria Pollutant	Average Time	California Standards	National Standards[a]	
			Primary	Secondary
Ozone	1-hour	0.09 ppm	None[b]	None[b]
	8–hour	0.070 ppm	0.070 ppm	0.070 ppm
Particulate Matter (PM10)	24-hour	50 μg/m^3	150 μg/m^3	150 μg/m^3
	Annual mean	20 μg/m^3	None	None
Fine Particulate Matter (PM2.5)	24-hour	None	35 μg/m^3	35 μg/m^3
	Annual mean	12 μg/m^3	12.0 μg/m^3	15.0 μg/m^3
Carbon Monoxide	8-hour	9.0 ppm	9 ppm	None
	1-hour	20 ppm	35 ppm	None
	8-hour (Lake Tahoe)	6 ppm	None	None
Nitrogen Dioxide	Annual mean	0.030 ppm	0.053 ppm	0.053 ppm
	1-hour	0.18 ppm	0.100 ppm	None
Sulfur Dioxide[c]	Annual mean	None	0.030 ppm	None
	24-hour	0.04 ppm	0.14 ppm	None
	3-hour	None	None	0.5 ppm
	1-hour	0.25 ppm	0.075 ppm	None
Lead	30-day Average	1.5 μg/m^3	None	None
	Calendar quarter	None	1.5 μg/m^3	1.5 μg/m^3
	3-month average	None	0.15 μg/m^3	0.15 μg/m^3
Sulfates	24-hour	25 μg/m^3	None	None
Visibility Reducing Particles	8-hour	--[d]	None	None
Hydrogen Sulfide	1-hour	0.03 ppm	None	None
Vinyl Chloride	24-hour	0.01 ppm	None	None

Source: California Air Resources Board 2016e.

Notes:

PM10 = particulate matter less than or equal to 10 microns in diameter.

PM2.5 = particulate matter less than or equal to 2.5 microns in diameter.

μg/m^3 = micrograms per cubic meter.

ppm = parts per million.

[a] National standards are divided into primary and secondary standards. Primary standards are intended to protect public health, whereas secondary standards are intended to protect public welfare and the environment.

[b] The federal 1-hour standard of 12 parts per hundred million was in effect from 1979 through June 15, 2005. The revoked standard is referenced because it was employed for such a long period and is a benchmark for State Implementation Plans.

[c] The annual and 24-hour NAAQS for sulfur dioxide only apply for 1 year after designation of the new 1-hour standard to those areas that were previously nonattainment for 24-hour and annual NAAQS.

[d] CAAQS for visibility reducing particles is defined by an extinction coefficient of 0.23 per kilometer – visibility of 10 miles or more due to particles when relative humidity is less than 70%.

Table 2.1-7. Summary of Proposed Agricultural Enhancements and Corresponding Potential to Result in Increased Criteria Pollutant or GHG Emissions

Use	Zones Allowed	Building Size Allowed (Site Area)	Emissions Potential
Agricultural Tourism	RR, A70, A72, S88, S90, and S92	None	**Low.** Minimal new building construction or operational vehicle trips.
Homestay	RR, A70, A72, S90, or S92	500 sf if detached (4 acres)	**Moderate**. Building construction and operation, including new vehicle trips.
Microbrewery, Small	Commercial Agriculture	2,000 sf (0–2 acres) 3,000 sf (2–4 acres) 5,000 sf (4+ acres)	**High**. Building construction and operation, including new vehicle trips, as well as process emissions from brewing operations.
Microbrewery, Large	Commercial Agriculture	3,000 sf (0–2 acres) 4,000 sf (2–4 acres) 5,000 sf (4+ acres)	
Winery, Small	S92	1,000 sf (0–1 acres) 1,500 sf (1–2 acres) 2,000 sf (2–4 acres) 5,000 sf (4+ acres)	**High**. Building construction and operation, including new vehicle trips, as well as process emissions from fermenting operations and the application of fertilizers.
Winery, Boutique	S92		
Winery, Wholesale	S92		
Animal Raising	All	None	**Moderate**. No new building construction, operational vehicle trips, but increases the number of animals allowed per acre, resulting in associated fugitive GHGs from manure management.
Aquaponics/Fish Markets	C31, C32, C34, C35, C36, C37, C40 or C42 or S88	None	**Low**. Minimal~~No~~ new building construction or operational vehicle trips. Minimal GHGs associated with water delivery.
Creamery/Dairy	M50, M52, M54, M58, A70, A72, S90, S92	2,000 sf (0–1 acre) 3,000 sf (1–2 acres) 5,000 sf (2–4 acres)	**High**. Building construction and operation, including new vehicle trips, as well as additional livestock.
Roadside Sales	RR on lots one acre or larger, and in A70, A72, S88, S90, and S92.	300 sf limit	**Moderate**. Building construction and operation, including new vehicle trips.
Agricultural Store (Small)	RR on lots of 2 acres or larger, and in A70, A72, S88, S90, and S92.	1,500 sf limit (2–4 acres)	
Agricultural Store (Large)	RR on lots of 4 acres or larger, and A70, A72, S88, S90, and S92.	3,000 sf limit (4 acres)	
Mobile Butchering	All	None	**Low**. ~~No~~ Minimal new building construction or operational vehicle trips. Minimal GHGs associated with water delivery.

sf = square feet.

Table 2.1-8. Representative Projects and Associated Air Quality and GHG Modeling Assumptions

Use	Building Size[a]	Vehicle Trips[b]	Production	Livestock	Fertilizer
Homestay	500 sf	8 trips per room	None	None	None
Microbrewery	5,000 sf (4 acres)	160 trips per 1,000 sf	248,000 gal per year	None	None
Winery	5,000 sf (4 acres)	160 trips per 1,000 sf	12,000 gal per year[c]	None	51 lbs per acre
Animal Raising	None	None	None	4 head[d]	None
Creamery/ Dairy	5,000 sf (4 acres)	16 trips per 1,000 sf	None	32 head[d]	None
Roadside Sales	300 sf	None	None	None	None
Agricultural Store	3,000 sf	40 trips per 1,000 sf	None	None	None

Notes:
sf = square feet
gal = gallon
lbs = pounds
[a] Based on the maximum floor areas and acreages allowed under the draft Zoning Ordinance revisions (see Table 2.1-7).
[b] Based on the trip generation rates summarized in the traffic study prepared by Chen Ryan (2016).
[c] Maximum limit for boutique wineries; there is no maximum limit if a winery obtains a major use permit.
[d] Assumed 4 per ½ acre per the animal raising provisions.

Table 2.1-9. Estimated Maximum Daily Criteria Pollutant Emissions Generated by Representative Project Construction (pounds per day)

Use[a,b]	ROG	NO_X	CO	SO_2	PM10	PM2.5
Homestay	3	13	9	<1	2	1
Microbrewery	7	52	40	<1	21	13
Winery	7	52	40	<1	21	13
Creamery/Dairy	7	52	40	<1	21	13
Roadside Sales	2	13	9	<1	2	1
Agricultural Store	14	13	9	<1	2	1
County Threshold	*75*	*250*	*550*	*250*	*100*	*55*

Source: CalEEMod (refer to Appendix D)
[a] Because agricultural tourism, aquaponics/fish markets, and mobile butchering would ~~not~~ support minimal new building construction or operational vehicle trips, they have a relatively low emissions potential (see Table 2.1-7). As such, an illustrative emissions analysis was not performed for these use types.
[b] New development is not directly supported by the animal raising provisions. Accordingly, any construction-related emissions would be minor and related to indirect development to support animal raising operations.

Table 2.1-10. Estimated Daily Criteria Pollutant Emissions Generated by Representative Project Operation (pounds per day)

Use[a,b]	ROG	NO_X	CO	SO_2	PM10	PM2.5
Homestay	<1	<1	<1	<1	<1	<1
Microbrewery[c]	3	7	29	<1	5	1
Winery[c]	3	6	29	<1	5	1
Creamery/Dairy	0	1	3	<1	1	0
Roadside Sales	<1	<1	<1	<1	<1	<1
Agricultural Store	<1	<1	2	<1	<1	<1
County Threshold	*75*	*250*	*550*	*250*	*100*	*55*

Source: CalEEMod (refer to Appendix D)

[a] Because agricultural tourism, farm employee housing, aquaponics/fish markets, and mobile butchering would ~~not~~ support minimal new building construction or operational vehicle trips, they have a relatively low emissions potential (see Table 2.1-7). As such, an illustrative emissions analysis was not performed for these use types.

[b] New development is not directly supported by the animal raising provisions. Accordingly, any operational-related emissions would be minor and related to indirect development to support animal raising operations.

[c] Microbreweries and wineries release ROG during the malting and fermentation processes, respectively. Accordingly, the estimate includes operational building and process emissions. Process emissions for the representative microbrewery and winery are small in comparison to building-related emissions, and are 0.1 and 0.2 pounds per day of ROG, respectively.

Table 2.1-11. Estimated Daily Criteria Pollutant Emissions Generated by a Theoretical Buildout Scenario for Microbreweries, Wineries, and Creameries/Dairies (pounds per day)

Use[a]	ROG	NO_X	CO	SO_2	PM10	PM2.5
Microbrewery[b~~a~~]	24	53	234	1	42	12
Winery[c~~b~~]	257	536	2,424	6	438	122
Creamery/Dairy[d~~c~~]	<1	1	3	<1	1	<1
Total	281	590	2,661	7	481	134
County Threshold	*75*	*250*	*550*	*250*	*100*	*55*

Source: CalEEMod (refer to Appendix D)

[a] Because agricultural tourism, farm employee housing, aquaponics/fish markets, and mobile butchering would have relatively few new building construction or operational vehicle trips, they have a relatively low emissions potential (see Table 2.1-7). As such, adding emissions from additional uses would not affect the exceedance of emissions thresholds as the three uses with the largest emissions potential already exceeds the thresholds for theoretical buildout.

[b~~a~~] Assumes operation of 8 representative microbreweries (see Table 2.1-10).

[c~~b~~] Assumes operation of 83 representative wineries (see Table 2.1-10).

[d~~c~~] Assumes operation of 1 representative creamery/dairy (see Table 2.1-10).

Table 2.1-12. Screening-Level CO Hot-Spot Analysis

Receptor	1-hour[a] (ppm)	8-hour[b] (ppm)
1	4.1	3.4
2	4.1	3.4
3	4.1	3.4
4	4.1	3.4

Source: CALINE4

[a] A background CO concentration of 4.4 was added to the modeling results based on the maximum 1-hour concentration over the past 5 years in the County.

[b] Includes a 0.6 persistence factor for a rural or suburban setting.

Table 2.1-13. Estimated Greenhouse Gas Emissions Generated by Representative Project Construction (metric tons)

Use[a,b]	CO_2	CH_4	N_2O	CO_2e[c]
Homestay	58	<0.1	<0.1	58
Microbrewery	321	0.1	<0.1	323
Winery	321	0.1	<0.1	323
Creamery/Dairy	321	0.1	<0.1	323
Roadside Sales	58	<0.1	<0.1	58
Agricultural Store	58	<0.1	<0.1	59

Source: CalEEMod

[a] Because agricultural tourism, farm employee housing, aquaponics/fish markets, and mobile butchering would ~~not~~ support minimal new building construction or operational vehicle trips, they have a relatively low emissions potential (see Table 2.1-7). As such, an illustrative emissions analysis was not performed for these use types.

[b] New development is not directly supported by the animal raising provisions. Accordingly, any construction-related emissions would be minor and related to indirect development to support animal raising operations.

[c] CalEEMod utilizes GWP from the IPCC's Second Assessment Report (SAR). The GWPs from the SAR have been superseded by revised values published in IPCC's Fourth Assessment Report (AR4). Accordingly, CO_2e was calculated based on the CalEEMod outputs for CO_2, CH_4, and N_2O and the GWPs from the AR4 (which are 25 for CH_4 and 298 for N_2O).

Table 2.1-14. Estimated Greenhouse Gas Emissions Generated by Representative Project Operation and Amortized Construction (metric tons per year)

Use[a,b]	CO_2	CH_4	N_2O	CO_2e[c]
Project Operation				
Homestay	12	<0.1	<0.1	12
Microbrewery	1,092	0.2	<0.1	1,097
Winery[d]	1,170	0.1	<0.1	1,174
Animal Raising[e]	<1	1.1	<0.1	29
Creamery/Dairy[e]	128	9.1	<0.1	359
Roadside Sales	2	<0.1	<0.1	2
Agricultural Store	65	0.1	<0.1	68
Amortized Construction[f]				
Homestay	3	<0.1	<0.1	3
Microbrewery	16	<0.1	<0.1	16
Winery	16	<0.1	<0.1	16
Animal Raising[g]	--	--	--	--
Creamery/Dairy	16	<0.1	<0.1	16
Roadside Sales	3	<0.1	<0.1	3
Agricultural Store	3	<0.1	<0.1	3
Total (Operation + Construction)				
Homestay	15	<0.1	<0.1	15
Microbrewery	1,108	0.2	<0.1	1,113
Winery	1,186	0.1	<0.1	1,190
Animal Raising	<1	1.1	<0.1	29
Creamery/Dairy	144	9.1	<0.1	375
Roadside Sales	5	<0.1	<0.1	5
Agricultural Store	68	0.1	<0.1	71
County Screening Level				*900*

Source: CalEEMod

[a] Because agricultural tourism, farm employee housing, aquaponics/fish markets, and mobile butchering would ~~not~~ support minimal new building construction or operational vehicle trips, they have a relatively low emissions potential (see Table 2.1-7). As such, an illustrative emissions analysis was not performed for these use types.

[b] New development is not directly supported by the animal raising provisions. Accordingly, any operational-related emissions would be minor and related to indirect development to support animal raising operations.

[c] CalEEMod utilizes GWP from the IPCC's SAR. The GWPs from the SAR have been superseded by revised values published in IPCC's AR4. Accordingly, CO_2e was calculated based on the CalEEMod outputs for CO_2, CH_4, and N_2O and the GWPs from the AR4 (which are 25 for CH_4 and 298 for N_2O).

[d] Wineries release N_2O during fertilizer application, but sequester CO_2 through photosynthesis. Accordingly, the estimate includes operational building and fertilizer process emissions, as well as emissions savings from increased carbon sequestration. Please note that projects may also result in a one-time release of stored carbon if existing vegetation is cleared to establish a vineyard. Because the potential for lost carbon stock would vary considerably among projects, it is not included in the above analysis.

Use[a,b]	CO_2	CH_4	N_2O	CO_2e[c]

[e] Uses that support livestock generate CH_4 and N_2O emissions from enteric fermentation and manure management. Accordingly, the estimates include operational building (as applicable) and manure-related emissions.
[f] Includes total construction emissions amortized over 20 years.
[g] New development is not directly supported by the animal raising provisions. Accordingly, any construction-related emissions would be minor and related to indirect development to support animal raising operations.

Table 2.1-15. Estimated Greenhouse Gas Emissions Generated by a Theoretical Buildout Scenario for Microbreweries, Wineries, and Creameries/Dairies (metric tons per year)

Use	CO_2	CH_4	N_2O	CO_2e[a]
Operation				
Microbrewery[b]	8,734	1	<1	8,779
Winery[c]	97,082	12	<1	97,469
Creamery/Dairy[d]	128	9	<1	359
Amortized Construction[e]				
Microbrewery	128	<1	<1	129
Winery	128	<1	<1	129
Creamery/Dairy	128	<1	<1	129
Total (operation + construction)	106,330	22	<1	106,994
County Screening Level				*900*

Source: CalEEMod
[a] CalEEMod utilizes GWP from the IPCC's SAR. The GWPs from the SAR have been superseded by revised values published in IPCC's AR4. Accordingly, CO_2e was calculated based on the CalEEMod outputs for CO_2, CH_4, and N_2O and the GWPs from the AR4 (which are 25 for CH_4 and 298 for N_2O).
[b] Assumes operation of 8 representative microbreweries (see Table 2.1-10).
[c] Assumes operation of 83 representative wineries (see Table 2.1-10).
[d] Assumes operation of 1 representative creamery/dairy (see Table 2.1-10).
[e] Includes total construction emissions amortized over 20 years.

Table 2.1-16. Potential Energy Efficiency Measures for Microbreweries

Process/Technology	Measure
Mashing	Capture and reuse waste heat energy
Wort boiling and cooling	Capture heat by using vapor condensers
	Use thermal vapor recompression
	Use high specific gravity brewing
	Use low pressure wort boiling
	Use wort stripping systems
Fermentation	Use immobilized yeast fermenters for accelerated fermentation
	Capture and reuse waste heat energy
	Recover and reuse CO_2 from closed fermentation tanks
Beer processing	Use microfiltration for sterilization and clarification
	Recover heat during pasteurization
	Use flash (plate) pasteurization
Packaging	Recover heat during bottle washing

Process/Technology	Measure
Boilers	Implement a boiler maintenance program to ensure optimal and efficient performance
	Use flue gas monitors to maintain optimum flame temperature
	Recover flue gas heat and blowdown steam
	Attach automatic monitors to steam traps to save energy
	Inspect and repair distribution pipes on a regular basis to avoid leaks
	Recover and reuse the hot condensate in the boiler
	Improve the insulation of the steam distribution system
	Replace old boilers
	Use direct contact water heating
	Use thermostatic steam traps and perform regular maintenance and monitoring
	Perform a process integration or pinch analysis to identify potential synergies of integrating various heating and cooling processes
Motors	Use variable speed drives or adjustable speed drives to better match loads
	Size motors, pumps, and compressors to match loads
	Use high efficiency motors, pumps, and system components
Refrigeration Systems	Better match cooling capacity and loads
	Use ammonia as the coolant in a central cooling system
	Inspect and repair cooling systems on a regular basis
	Insulating cooling lines and jackets
Other	Use membrane filtration to treat wastewater
	Use combined heat and power (CHP) systems and CHP systems with absorption cooling
	Install skylights and occupancy sensors

Source: Galtisky et al. 2003

Table 2.1-17. Potential Energy Efficiency Measures for Wineries

Process/Technology	Measure
Refrigeration	Make sure refrigeration systems are well maintained to cut energy use and extend equipment life. Check refrigerant levels, clean filters, and control operations to ensure cooling is provided only as needed.
	Insulate refrigeration supply piping to maintain a more consistent processing temperature.
	Use reflective paint on the facility roof to reduce cooling loads.
	Install variable speed refrigerant compressors.
Tanks	Insulate wine storage tanks to reduce heat gain from the surrounding air.
Compressed Air	Implement programs to detect leaks in compressed air and steam lines
	Optimize the control strategy of your compressed air system. Use properly sized equipment, along with staging, to increase the operation of your compressed air system.
Other	Install skylights and occupancy sensors

Source: Washington State University 2011

Table 2.1-18. Potential Energy Efficiency Measures for Dairies

Process/Technology	Measure
Boilers and Steam Systems	See Table 2.1-16 for potential measures
Motors	See Table 2.1-16 for potential measures
Pumps	Perform regular maintenance and monitoring of the pumping system
	Match pumping requirements to end use loads
	Install automatic pump shutoffs
	Install high efficiency pumps
	Use multiple pumps to meet variable loads
	Reduce the diameter of the impeller
	Avoid throttling valves
	Replace belt drives
	Properly size pipes
Refrigeration	Make sure refrigeration systems are well maintained
	Implement a monitoring program to detect performance issues
	Ensure proper refrigerant charge
	Periodically check refrigeration units for contamination
	Design interconnecting pipes to reduce friction and pressure drops
	Use thermal storage for running at off-peak hours
	Segregate different cooling temperature requirements
	Insulate pipes
	Minimize heat sources in cold storage areas
	Mix milk products in cooled storage tanks to achieve more efficient heat transfer
	Use cooling towers instead of chilled water
	Use compressor control systems and scheduling
	Use floating head pressure control in compressors
	Use indirect lubricant cooling and raise system suction pressure
	Keep condensers clean and use automatic purging systems
	Reduce compressor fan use and pressure
Compressor Air	Make sure compressed air systems are well maintained
	Reduce air leaks and turn off unnecessary air
	Install boosters or other retrofits rather than increasing pressure
	Improve load management and pressure drops
	Reduce the inlet air temperature
	Properly size pipe diameters
	Recover and reuse heat
	Use a buffer tank to regulate compressor duty cycle
	Replace the compressor system all together with a more energy efficiency system
Other	Install skylights and occupancy sensors
	Use CHP systems and CHP systems with tri-generation
	Use backpressure turbines to provide electricity

Source: Brush et al. 2011