3.6 - Greenhouse Gas Emissions

3.6.1 - Introduction

This section describes the existing greenhouse gas emissions and potential effects from project implementation on the site and its surrounding area. Michael Brandman Associates performed air quality analysis for the proposed project, which included construction and operational air quality modeling, and greenhouse gas emissions modeling. Appendix B contains the modeling assumptions and model output.

3.6.2 - Environmental Setting

Climate change is a change in the average weather of the earth that is measured by changes in wind patterns, storms, precipitation, and temperature. These changes are assessed using historical records of temperature changes that have occurred in the past, such as during previous ice ages. Many of the concerns regarding climate change use this data to extrapolate a level of statistical significance specifically focusing on temperature records from the last 150 years (the Industrial Age) that differ from previous climate changes in rate and magnitude.

The United Nations Intergovernmental Panel on Climate Change (IPCC) constructed several emission trajectories of greenhouse gases needed to stabilize global temperatures and climate change impacts. The IPCC predicted that global mean temperature change from 1990 to 2100, given six scenarios, could range from 1.1 degrees Centigrade (°C) to 6.4°C. Regardless of analytical methodology, global average temperatures and sea levels are expected to rise under all scenarios (IPCC 2007).

According to the California Climate Change Center's 2006 report "Our Changing Climate, Assessing the Risks to California," climate change effects in California may result in consequences such as loss of snowpack, increased risk of large wildfires, and reductions in the quality and quantity of certain agricultural products.

Emissions Inventory and Trends

Total worldwide greenhouse gas emissions were estimated to be 49,000 million metric tons of carbon dioxide equivalents ($MTCO_2e$) in 2004 (IPCC 2007b). In 2004, greenhouse gas emissions in the U.S. were 7,074.4 million $MTCO_2e$. The largest source of greenhouse gases in California is transportation, contributing 38 percent of the State's total greenhouse gas emissions in 2009 (ARB 2011). The inventory for California's greenhouse gas emissions between 2000 and 2009 is summarized in Figure 3.6-1 (source: ARB 2011).

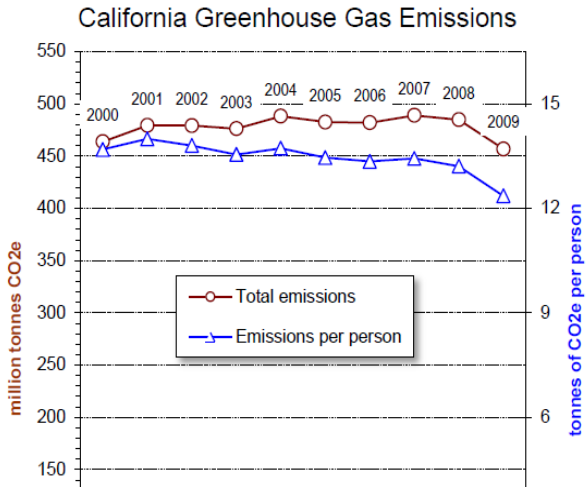

Figure 3.6-1: California Greenhouse Gas Emissions

Estimated emissions for the County of Solano are shown in Table 3.6-1.

Table 3.6-1: County of Solano Community Greenhouse Gas Emissions

Sector	2005	2020
Transportation	491,265	438,600
Energy consumption	212,388	215,090
Agriculture	201,888	201,890
Water consumption	34,964	37,810
Solid waste	20,235	22,770
Total	**960,740**	**916,160**
Source: County of Solano Climate Action Plan 2011.		

The estimated emissions for the City of Vallejo are shown in Table 3.6-2. The state reductions refer to reductions enacted pursuant to AB 32, and include the renewable portfolio standards, Title 24, Pavley, and the California Solar Initiative. Emissions for the years 2020 and 2035 are projected based on various data sources.

Table 3.6-2: City of Vallejo Community Greenhouse Gas Emissions

Sector	Emissions (MTCO2e per year)		
	2008	2020	2035
Residential	172,310	184,060	198,380
Commercial/industrial	110,390	126,100	153,230
Transportation	277,720	297,790	325,910
Waste	14,640	16,080	18,100
Water related	6,570	7,220	8,120
Off-road	6,410	19,080	24,430
Total	**588,040**	**650,330**	**728,170**
State reductions	0	-79,480	-143,540
Adjusted projections	588,040	570,860	584,630
Source: City of Vallejo Climate Action Plan 2012.			

Potential Environmental Effects

Worldwide, average temperatures are likely to increase by 1.8°C to 4°C, or approximately 3°F to 7°F, by the end of the 21st century (IPCC 2007). However, a global temperature increase does not translate to a uniform increase in temperature in all locations on the earth. Regional climate changes are dependent on multiple variables, such as topography. One region of the Earth may experience

increased temperature, increased incidents of drought and similar warming effects, whereas another region may experience a relative cooling.

In California, climate change may result in the following (California Climate Change Center 2006 and Moser et al. 2009):

- Reduced precipitation;
- Changes to precipitation and runoff patterns;
- Reduced snowfall (precipitation occurring as rain instead of snow);
- Earlier snowmelt;
- Decreased snowpack;
- Increased agricultural demand for water;
- Intrusion of seawater into coastal aquifers;
- Increased agricultural growing season;
- Increased growth rates of weeds, insect pests and pathogens;
- Inundation of low-lying coastal areas by sea level rise;
- Increased incidents and severity of wildfire events; and,
- Expansion of the range and increased frequency of pest outbreaks.

Although certain environmental effects are widely accepted to be a potential hazard to certain locations, such as rising sea level for low-laying coastal areas, it is currently infeasible to predict all environmental effects of climate change on any one location.

Pollutants of Concern

Gases that trap heat in the atmosphere are greenhouse gases. The effect is analogous to the way a greenhouse retains heat. Common greenhouse gases include water vapor, carbon dioxide, methane, nitrous oxides, chlorofluorocarbons, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, ozone, and aerosols. Natural processes and human activities emit greenhouse gases. The presence of greenhouse gases in the atmosphere affects the earth's temperature. It is believed that emissions from human activities, such as electricity production and vehicle use, have elevated the concentration of these gases in the atmosphere beyond the level of naturally occurring concentrations. Some greenhouse gases can remain in the atmosphere for hundreds of years.

The global warming potential is the potential of a gas or aerosol to trap heat in the atmosphere, based on the reference gas, carbon dioxide. Individual greenhouse gas compounds have varying GWP and atmospheric lifetimes. Carbon dioxide has a global warming potential of 1. Methane's warming potential of 21 indicates that methane has a warming effect that is 21 times greater than carbon dioxide on a molecule per molecule basis.

Global warming potential is used to calculate the carbon dioxide equivalent of a greenhouse gas. Using carbon dioxide equivalents create a consistent methodology for comparing greenhouse gas emissions, since it normalizes various greenhouse gas emissions to a consistent metric. A carbon dioxide equivalent is the mass emissions (tons) of an individual greenhouse gas multiplied by its GWP, using the formula:

$$MTCO_2e = (\text{tons of gas}) \times (\text{global warming potential}) \times (0.9072 \text{ metric tons of gas})$$

Greenhouse gases defined by AB 23 are summarized in Table 3.6-3.

Table 3.6-3: AB 32 Greenhouse Gases

Greenhouse Gas	Description and Physical Properties	Sources
Nitrous oxide	Nitrous oxide (laughing gas) is a colorless greenhouse gas. It has a lifetime of 114 years. Its global warming potential is 310.	Microbial processes in soil and water, fuel combustion, and industrial processes.
Methane	Methane is a flammable gas and is the main component of natural gas. It has a lifetime of 12 years. Its global warming potential is 21.	Methane is extracted from geological deposits (natural gas fields). Other sources are landfills, fermentation of manure, and decay of organic matter.
Carbon dioxide	Carbon dioxide (CO_2) is an odorless, colorless, natural greenhouse gas. Carbon dioxide's global warming potential is 1. The concentration in 2005 was 379 parts per million (ppm), which is an increase of about 1.4 ppm per year since 1960.	Natural sources include decomposition of dead organic matter; respiration of bacteria, plants, animals, and fungus; evaporation from oceans; and volcanic outgassing. Anthropogenic sources are from burning coal, oil, natural gas, and wood.
Chloro-fluorocarbons	These are gases formed synthetically by replacing all hydrogen atoms in methane or ethane with chlorine and/or fluorine atoms. They are nontoxic, nonflammable, insoluble, and chemically unreactive in the troposphere (the level of air at the earth's surface). Global warming potentials range from 3,800 to 8,100.	Chlorofluorocarbons were synthesized in 1928 for use as refrigerants, aerosol propellants, and cleaning solvents. They destroy stratospheric ozone. The Montreal Protocol on Substances that Deplete the Ozone Layer prohibited their production in 1987.
Hydro-fluorocarbons	Hydrofluorocarbons are a group of greenhouse gases containing carbon, chlorine, and at least one hydrogen atom. Global warming potentials range from 140 to 11,700.	Hydrofluorocarbons are synthetic manmade chemicals used as a substitute for chlorofluorocarbons in applications such as automobile air conditioners and refrigerants.
Perfluorocarbons	Perfluorocarbons have stable molecular structures and only break down by ultraviolet rays about 60 kilometers above Earth's surface. Because of this, they have long lifetimes, between 10,000 and 50,000 years. Global warming potentials range from 6,500 to 9,200.	Two main sources of perfluorocarbons are primary aluminum production and semiconductor manufacturing.
Sulfur hexafluoride	Sulfur hexafluoride is an inorganic, odorless, colorless, and nontoxic, nonflammable gas. It has a lifetime of 3,200 years. It has a high global warming potential, 23,900.	This gas is manmade and used for insulation in electric power transmission equipment, in the magnesium industry, in semiconductor manufacturing, and as a tracer gas.
Sources: Compiled from a variety of sources, primarily Intergovernmental Panel on Climate Change 2007a and 2007b.		

The project may also emit greenhouse gases that are not defined by AB 32. For example, the project may generate aerosols through diesel particulate matter emissions from construction equipment and

diesel fueled vehicles during construction. Aerosols are short-lived particles, as they remain in the atmosphere for about one week. Black carbon is a component of aerosol. Studies have indicated that black carbon has a high global warming potential; however, the Intergovernmental Panel on Climate Change states that it has a low level of scientific certainty (IPCC 2007).

Water vapor could be emitted from evaporated water used for landscaping, but this is not a significant impact because water vapor concentrations in the upper atmosphere are primarily due to climate feedbacks rather than emissions from project-related activities. The project would emit nitrogen oxides and volatile organic compounds, which are ozone precursors. Ozone is a greenhouse gas; however, unlike the other greenhouse gases, ozone in the troposphere is relatively short-lived and can be reduced in the troposphere on a daily basis. Stratospheric ozone can be reduced through reactions with other pollutants. Therefore, aerosols, water vapor, and ozone are not considered pollutants of concern for the project, and are not quantified or assessed in this document.

3.6.3 - Regulatory Framework

Climate change is caused by greenhouse gases emitted all around the world from a variety of sources, including the combustion of fuel for transportation and heat, cement manufacturing, and refrigerant emissions. International and federal agreements have been enacted to deal with climate change issues. The State of California has enacted key legislation in an effort to reduce its contribution to climate change, as discussed below.

International

Intergovernmental Panel on Climate Change. In 1988, the United Nations and the World Meteorological Organization established the Intergovernmental Panel on Climate Change to assess the scientific, technical and socio-economic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts, and options for adaptation and mitigation.

United Nations Framework Convention on Climate Change (Convention). On March 21, 1994, the United States joined a number of countries around the world in signing the Convention. Under the Convention, governments gather and share information on greenhouse gas emissions, national policies, and best practices; launch national strategies for addressing greenhouse gas emissions and adapting to expected impacts, including the provision of financial and technological support to developing countries; and cooperate in preparing for adaptation to the impacts of climate change.

Kyoto Protocol. The Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on Climate Change. The major feature of the Kyoto Protocol is that it sets binding targets for 37 industrialized countries and the European community for reducing greenhouse gas emissions at average of five per cent against 1990 levels over the five-year period 2008-2012. The Convention (as discussed above) encouraged industrialized countries to stabilize emissions; however, the Protocol commits them to do so. Developed countries have contributed more emissions

over the last 150 years; therefore, the Protocol places a heavier burden on developed nations under the principle of "common but differentiated responsibilities."

The United States has not entered into force of the Kyoto Protocol. However, other countries have entered, such as Australia, Canada, China, the European Union (Belgium, Denmark, Germany, the Hellenic Republic, Spain, France, Ireland, Italy, Luxembourg, Netherlands, Austria, Portugal, Finland, Sweden, Great Britain, and Northern Ireland), Japan, Mexico, and New Zealand.

National

Prior to the last decade, there have been no concrete federal regulations of greenhouse gases or major planning for climate change adaptation. The following are actions regarding the federal government, greenhouse gases, and fuel efficiency.

Greenhouse Gas Endangerment. *Massachusetts v. EPA* (Supreme Court Case 05-1120) was argued before the United States Supreme Court on November 29, 2006, in which it was petitioned that the EPA regulate four greenhouse gases, including carbon dioxide, under Section 202(a)(1) of the Clean Air Act. A decision was made on April 2, 2007, in which the Supreme Court found that greenhouse gases are air pollutants covered by the Clean Air Act. The Court held that the Administrator must determine whether emissions of greenhouse gases from new motor vehicles cause or contribute to air pollution, which may reasonably be anticipated to endanger public health or welfare, or whether the science is too uncertain to make a reasoned decision. On December 7, 2009, the EPA Administrator signed two distinct findings regarding greenhouse gases under section 202(a) of the Clean Air Act:

- Endangerment Finding: The Administrator finds that the current and projected concentrations of the six key well-mixed greenhouse gases—carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride—in the atmosphere threaten the public health and welfare of current and future generations.
- Cause or Contribute Finding: The Administrator finds that the combined emissions of these well-mixed greenhouse gases from new motor vehicles and new motor vehicle engines contribute to the greenhouse gas pollution, which threatens public health and welfare.

These findings do not impose requirements on industry or other entities. However, this was a prerequisite for implementing greenhouse gas emissions standards for vehicles, as discussed in the section "Clean Vehicles" below.

The EPA denied ten petitions for Reconsideration of the Endangerment and Cause or Contribute Findings in 2010. Some of the petitioners included the Ohio Coal Association, Peabody Energy Company, and the State of Texas.

In September 2011, the EPA Office of Inspector General evaluated the EPA's compliance with established policy and procedures in the development of the endangerment finding, including

processes for ensuring information quality. The evaluation concluded that the technical support document should have had more rigorous EPA peer review.

In June 2012, a federal appeals court rejected a lawsuit by thirteen states against the EPA. The suit alleged that the EPA violated the law by relying almost exclusively on data from the United Nations Intergovernmental Panel on Climate Change rather than doing its own research or testing data according to federal standards. The states include Virginia, Texas, Alabama, Florida, Hawaii, Indiana, Kentucky, Louisiana, Mississippi, Nebraska, North Dakota, Oklahoma, South Carolina, South Dakota, and Utah. Virginia intends to petition the Supreme Court to review the case.

Clean Vehicles. Congress first passed the Corporate Average Fuel Economy law in 1975 to increase the fuel economy of cars and light duty trucks. The law has become more stringent over time. On May 19, 2009, President Obama put in motion a new national policy to increase fuel economy for all new cars and trucks sold in the United States. On April 1, 2010, the EPA and the Department of Transportation's National Highway Safety Administration announced a joint final rule establishing a national program that would reduce greenhouse gas emissions and improve fuel economy for new cars and trucks sold in the United States.

The first phase of the national program would apply to passenger cars, light-duty trucks, and medium-duty passenger vehicles, covering model years 2012 through 2016. They require these vehicles to meet an estimated combined average emissions level of 250 grams of carbon dioxide per mile, equivalent to 35.5 miles per gallon if the automobile industry were to meet this carbon dioxide level solely through fuel economy improvements. Together, these standards would cut carbon dioxide emissions by an estimated 960 million metric tons and 1.8 billion barrels of oil over the lifetime of the vehicles sold under the program (model years 2012-2016). The EPA and the National Highway Safety Administration are working on a second-phase joint rulemaking to establish national standards for light-duty vehicles for model years 2017 and beyond.

On October 25, 2010, the EPA and the U.S. Department of Transportation proposed the first national standards to reduce greenhouse gas emissions and improve fuel efficiency of *heavy-duty trucks and buses*. For combination tractors, the agencies are proposing engine and vehicle standards that begin in the 2014 model year and achieve up to a 20 percent reduction in carbon dioxide emissions and fuel consumption by the 2018 model year. For heavy-duty pickup trucks and vans, the agencies are proposing separate gasoline and diesel truck standards, which phase in starting in the 2014 model year and achieve up to a 10 percent reduction for gasoline vehicles and 15 percent reduction for diesel vehicles by 2018 model year (12 and 17 percent respectively if accounting for air conditioning leakage). Lastly, for vocational vehicles, the agencies are proposing engine and vehicle standards starting in the 2014 model year, which would achieve up to a 10 percent reduction in fuel consumption and carbon dioxide emissions by 2018 model year.

Mandatory Reporting of Greenhouse Gases. The Consolidated Appropriations Act of 2008, passed in December 2007, requires the establishment of mandatory greenhouse gas reporting requirements. On September 22, 2009, the EPA issued the Final Mandatory Reporting of Greenhouse Gases Rule. The rule requires reporting of greenhouse gas emissions from large sources and suppliers in the United States, and is intended to collect accurate and timely emissions data to inform future policy decisions. Under the rule, suppliers of fossil fuels or industrial greenhouse gases, manufacturers of vehicles and engines, and facilities that emit 25,000 metric tons or more per year of greenhouse gas emissions are required to submit annual reports to the EPA.

New Source Review. The EPA issued a final rule on May 13, 2010 that establishes thresholds for greenhouse gases that define when permits under the New Source Review Prevention of Significant Deterioration and Title V Operating Permit programs are required for new and existing industrial facilities. This final rule "tailors" the requirements of these Clean Air Act permitting programs to limit which facilities will be required to obtain Prevention of Significant Deterioration and Title V permits. In the preamble to the revisions to the federal code of regulations, EPA states:

> This rulemaking is necessary because without it the Prevention of Significant Deterioration and Title V requirements would apply, as of January 2, 2011, at the 100 or 250 tons per year levels provided under the Clean Air Act, greatly increasing the number of required permits, imposing undue costs on small sources, overwhelming the resources of permitting authorities, and severely impairing the functioning of the programs. EPA is relieving these resource burdens by phasing in the applicability of these programs to greenhouse gas sources, starting with the largest greenhouse gas emitters. This rule establishes two initial steps of the phase-in. The rule also commits the agency to take certain actions on future steps addressing smaller sources, but excludes certain smaller sources from Prevention of Significant Deterioration and Title V permitting for greenhouse gas emissions until at least April 30, 2016.

EPA estimates that facilities responsible for nearly 70 percent of the national greenhouse gas emissions from stationary sources will be subject to permitting requirements under this rule. This includes the nation's largest greenhouse gas emitters—power plants, refineries, and cement production facilities.

Standards of Performance for Greenhouse Gas Emissions for New Stationary Sources: Electric Utility Generating Units. As required by a settlement agreement, the EPA proposed new performance standards for emissions of carbon dioxide for new affected fossil fuel-fired electric utility generating units on March 27, 2012. New sources greater than 25 megawatt would be required to meet an output based standard of 1,000 pounds of carbon dioxide per megawatt-hour, based on the performance of widely used natural gas combined cycle technology.

Proposed Energy Tax Prevention Act of 2011. This Republican-submitted Act passed the House of Representatives in April 2011 but has not passed the Senate; therefore, it is not currently a law. If it is passed by the Senate and signed by the president, the Act would amend the Clean Air Act to prohibit the Administrator of the EPA from promulgating any regulation concerning, taking action relating to, or taking into consideration the emission of a greenhouse gas to address climate change. It would exclude greenhouse gases from the definition of "air pollutant" for purposes of addressing climate change. Items except from this Act include the following: implementation and enforcement of the light-, medium-, and heavy-duty vehicle greenhouse gas emission standards and Corporate Average Fuel Economy Standards; implementation of the renewable fuel program; federal research and programs addressing climate change; stratospheric ozone protection; and monitoring and reporting of carbon dioxide emissions. The Act provides that none of such exemptions shall cause a greenhouse gas to be subject to regulations relating to prevention of significant deterioration of air quality or considered an air pollutant for purposes of air pollution prevention and control permits.

Cap and Trade. Cap and trade refers to a policy tool where emissions are limited to a certain amount and can be traded, or provides flexibility on how the emitter can comply. Successful examples in the United States include the Acid Rain Program and the NOx Budget Trading Program in the northeast. There is no federal cap and trade program currently; however, some states have joined to create initiatives to provide a mechanism for cap and trade.

The Regional Greenhouse Gas Initiative is an effort to reduce greenhouse gases among the states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont. Each state caps carbon dioxide emissions from power plants, auctions carbon dioxide emission allowances, and invests the proceeds in strategic energy programs that further reduce emissions, save consumers money, create jobs, and build a clean energy economy. The Initiative began in 2008.

The Western Climate Initiative partner jurisdictions have developed a comprehensive initiative to reduce regional greenhouse gas emissions to 15 percent below 2005 levels by 2020. The partners are California, British Columbia, Manitoba, Ontario, and Quebec. Its cap and trade program is estimated to be fully implemented in 2015.

State

Pavley Regulations and Fuel Efficiency Standards. California AB 1493, enacted on July 22, 2002, required the ARB to develop and adopt regulations that reduce greenhouse gases emitted by passenger vehicles and light duty trucks. The regulation was stalled by automaker lawsuits and by the EPA's denial of an implementation waiver. On January 21, 2009, the ARB requested that the EPA reconsider its previous waiver denial. On January 26, 2009, President Obama directed that the EPA assess whether the denial of the waiver was appropriate. On June 30, 2009, the EPA granted the waiver request. On September 8, 2009, the U.S. Chamber of Commerce and the National Automobile Dealers Association sued EPA to challenge its granting of the waiver to California for its standards.

California assisted EPA in defending the waiver decision. The U.S. District Court for the District of Columbia denied the Chamber's petition on April 29, 2011.

The standards phase in during the 2009 through 2016 model years. When fully phased in, the near term (2009-2012) standards will result in about a 22-percent reduction compared with the 2002 fleet, and the mid-term (2013-2016) standards will result in about a 30-percent reduction. Several technologies stand out as providing significant reductions in emissions at favorable costs. These include discrete variable valve lift or camless valve actuation to optimize valve operation rather than relying on fixed valve timing and lift as has historically been done; turbocharging to boost power and allow for engine downsizing; improved multi-speed transmissions; and improved air conditioning systems that operate optimally, leak less, and/or use an alternative refrigerant.

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

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

The 2050 reduction goal represents what scientists believe is necessary to reach levels that will stabilize the climate. The 2020 goal was established to be an aggressive, but achievable, mid-term target. Because this is an executive order, the goals are not legally enforceable for local governments or the private sector.

Low Carbon Fuel Standard - Executive Order S-01-07. The Governor signed Executive Order S-01-07 on January 18, 2007. The order mandates that a statewide goal shall be established to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020. In particular, the executive order established a Low Carbon Fuel Standard and directed the Secretary for Environmental Protection to coordinate the actions of the California Energy Commission, the ARB, the University of California, and other agencies to develop and propose protocols for measuring the "life-cycle carbon intensity" of transportation fuels. This analysis supporting development of the protocols was included in the State Implementation Plan for alternative fuels (State Alternative Fuels Plan adopted by California Energy Commission on December 24, 2007) and was submitted to ARB for consideration as an "early action" item under AB 32. The ARB adopted the Low Carbon Fuel Standard on April 23, 2009. The Low Carbon Fuel Standard was challenged in the United States District Court in Fresno in 2011. The court's ruling issued on December 29, 2011 included a preliminary injunction against ARB's implementation of the rule. The Ninth Circuit Court of Appeals stayed the injunction on April 23, 2012 pending final ruling on appeal, allowing the ARB to continue to implement and enforce the regulation.

SB 1368. In 2006, the State Legislature adopted Senate Bill (SB) 1368, which was subsequently signed into law by the Governor. SB 1368 directs the California Public Utilities Commission to adopt a performance standard for greenhouse gas emissions for the future power purchases of California utilities. SB 1368 seeks to limit carbon emissions associated with electrical energy consumed in California by forbidding procurement arrangements for energy longer than 5 years from resources that exceed the emissions of a relatively clean, combined cycle natural gas power plant. Because of the carbon content of its fuel source, a coal-fired plant cannot meet this standard because such plants emit roughly twice as much carbon as natural gas, combined cycle plants. Accordingly, the new law will effectively prevent California's utilities from investing in, otherwise financially supporting, or purchasing power from new coal plants located in or out of the State. Thus, SB 1368 will lead to dramatically lower greenhouse gas emissions associated with California's energy demand, as SB 1368 will effectively prohibit California utilities from purchasing power from out-of-state producers that cannot satisfy the performance standard for greenhouse gas emissions required by SB 1368. The California Public Utilities Commission adopted the regulations required by SB 1368 on August 29, 2007.

SB 97 and the CEQA Guidelines Update. Passed in August 2007, SB 97 added Section 21083.05 to the Public Resources Code. The code states "(a) On or before July 1, 2009, the Office of Planning and Research shall prepare, develop, and transmit to the Resources Agency guidelines for the mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions as required by this division, including, but not limited to, effects associated with transportation or energy consumption. (b) On or before January 1, 2010, the Resources Agency shall certify and adopt guidelines prepared and developed by the Office of Planning and Research pursuant to subdivision (a)." Section 21097 was also added to the Public Resources Code. It provided CEQA protection until January 1, 2010 for transportation projects funded by the Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006 or projects funded by the Disaster Preparedness and Flood Prevention Bond Act of 2006, in stating that the failure to analyze adequately the effects of greenhouse gases would not violate CEQA.

On April 13, 2009, the Office of Planning and Research submitted to the Secretary for Natural Resources its recommended amendments to the CEQA Guidelines for addressing greenhouse gas emissions. On July 3, 2009, the Natural Resources Agency commenced the Administrative Procedure Act rulemaking process for certifying and adopting these amendments pursuant to Public Resources Code section 21083.05. Following a 55-day public comment period and two public hearings, the Natural Resources Agency proposed revisions to the text of the proposed Guidelines amendments. The Natural Resources Agency transmitted the adopted amendments and the entire rulemaking file to the Office of Administrative Law on December 31, 2009. On February 16, 2010, the Office of Administrative Law approved the Amendments, and filed them with the Secretary of State for inclusion in the California Code of Regulations. The Amendments became effective on March 18, 2010.

The CEQA Amendments provide guidance to public agencies regarding the analysis and mitigation of the effects of greenhouse gas emissions in CEQA documents. The CEQA Amendments fit within the existing CEQA framework by amending existing CEQA Guidelines to reference climate change.

A new section, CEQA Guidelines Section 15064.4, was added to assist agencies in determining the significance of greenhouse gas emissions. The new section allows agencies the discretion to determine whether a quantitative or qualitative analysis is best for a particular project. However, little guidance is offered on the crucial next step in this assessment process—how to determine whether the project's estimated greenhouse gas emissions are significant or cumulatively considerable.

Also amended were CEQA Guidelines Sections 15126.4 and 15130, which address mitigation measures and cumulative impacts respectively. Greenhouse gas mitigation measures are referenced in general terms, but no specific measures are championed. The revision to the cumulative impact discussion requirement (Section 15130) simply directs agencies to analyze greenhouse gas emissions in an EIR when a project's incremental contribution of emissions may be cumulatively considerable, however it does not answer the question of when emissions are cumulatively considerable.

Section 15183.5 permits programmatic greenhouse gas analysis and later project-specific tiering, as well as the preparation of Greenhouse Gas Reduction Plans. Compliance with such plans can support a determination that a project's cumulative effect is not cumulatively considerable, according to proposed Section 15183.5(b).

In addition, the amendments revised Appendix F of the CEQA Guidelines, which focuses on Energy Conservation. The sample environmental checklist in Appendix G was amended to include greenhouse gas questions.

AB 32. The California State Legislature enacted AB 32, the California Global Warming Solutions Act of 2006. AB 32 requires that greenhouse gases emitted in California be reduced to 1990 levels by the year 2020. "Greenhouse gases" as defined under AB 32 include carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. ARB is the state agency charged with monitoring and regulating sources of greenhouse gases. AB 32 states the following:

> Global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California. The potential adverse impacts of global warming include the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems.

The ARB Board approved the 1990 greenhouse gas emissions level of 427 million metric tons of carbon dioxide equivalent ($MMTCO_2e$) on December 6, 2007 (California Air Resources Board 2007). Therefore, emissions generated in California in 2020 are required to be equal to or less than 427 $MMTCO_2e$. Emissions in 2020 in a "business as usual" scenario are estimated to be 596 $MMTCO_2e$.

Under AB 32, the ARB published its Final Expanded List of Early Action Measures to Reduce Greenhouse Gas Emissions in California. Discrete early action measures are currently underway or are enforceable by January 1, 2010. The ARB has 44 early action measures that apply to the transportation, commercial, forestry, agriculture, cement, oil and gas, fire suppression, fuels, education, energy efficiency, electricity, and waste sectors. Of these early action measures, nine are considered discrete early action measures, as they are regulatory and enforceable by January 1, 2010. The ARB estimates that the 44 recommendations are expected to result in reductions of at least 42 $MMTCO_2e$ by 2020, representing approximately 25 percent of the 2020 target.

The ARB's Climate Change Scoping Plan (Scoping Plan) contains measures designed to reduce the State's emissions to 1990 levels by the year 2020 (California Air Resources Board 2008). The Scoping Plan identifies recommended measures for multiple greenhouse gas emission sectors and the associated emission reductions needed to achieve the year 2020 emissions target—each sector has a different emission reduction target. Most of the measures target the transportation and electricity sectors. As stated in the Scoping Plan, the key elements of the strategy for achieving the 2020 greenhouse gas target include:

- Expanding and strengthening existing energy efficiency programs as well as building and appliance standards;
- Achieving a statewide renewables energy mix of 33 percent;
- Developing a California cap-and-trade program that links with other Western Climate Initiative partner programs to create a regional market system;
- Establishing targets for transportation-related greenhouse gas emissions for regions throughout California and pursuing policies and incentives to achieve those targets;
- Adopting and implementing measures pursuant to existing State laws and policies, including California's clean car standards, goods movement measures, and the Low Carbon Fuel Standard; and
- Creating targeted fees, including a public goods charge on water use, fees on high global warming potential gases, and a fee to fund the administrative costs of the State's long-term commitment to AB 32 implementation.

In addition, the Scoping Plan differentiates between "capped" and "uncapped" strategies. "Capped" strategies are subject to the proposed cap-and-trade program. The Scoping Plan states that the

inclusion of these emissions within the cap-and trade program will help ensure that the year 2020 emission targets are met despite some degree of uncertainty in the emission reduction estimates for any individual measure. Implementation of the capped strategies is calculated to achieve a sufficient amount of reductions by 2020 to achieve the emission target contained in AB 32. "Uncapped" strategies that will not be subject to the cap-and-trade emissions caps and requirements are provided as a margin of safety by accounting for additional greenhouse gas emission reductions.[1]

SB 375. Passing the Senate on August 30, 2008, SB 375 was signed by the Governor on September 30, 2008. According to SB 375, the transportation sector is the largest contributor of greenhouse gas emissions, which emits over 40 percent of the total greenhouse gas emissions in California. SB 375 states, "Without improved land use and transportation policy, California will not be able to achieve the goals of AB 32." SB 375 does the following: (1) requires metropolitan planning organizations to include sustainable community strategies in their regional transportation plans for reducing greenhouse gas emissions, (2) aligns planning for transportation and housing, and (3) creates specified incentives for the implementation of the strategies. The Southern California Association of Governments has adopted emissions reductions for per capita light duty vehicles from 2005 levels of 7 percent by 2020 and 13 percent by 2035.

Concerning CEQA, SB 375, section 21159.28 states that CEQA findings determinations for certain projects are not required to reference, describe, or discuss (1) growth inducing impacts or (2) any project-specific or cumulative impacts from cars and light-duty truck trips generated by the project on global warming or the regional transportation network if the project:

1. Is in an area with an approved sustainable communities strategy or an alternative planning strategy that the ARB accepts as achieving the greenhouse gas emission reduction targets.
2. Is consistent with that strategy (in designation, density, building intensity, and applicable policies).
3. Incorporates the mitigation measures required by an applicable prior environmental document.

Executive Order S-13-08. Executive Order S-13-08 indicates that "climate change in California during the next century is expected to shift precipitation patterns, accelerate sea level rise and increase temperatures, thereby posing a serious threat to California's economy, to the health and welfare of its population and to its natural resources." Pursuant to the requirements in the order, the

[1] On March 17, 2011, the San Francisco Superior Court issued a final decision in *Association of Irritated Residents v. California Air Resources Board* (Case No. CPF-09-509562). While the Court upheld the validity of the ARB Scoping Plan for the implementation of AB 32, the Court enjoined ARB from further rulemaking under AB 32 until ARB amends its CEQA environmental review of the Scoping Plan to address the flaws identified by the Court. On May 23, 2011, ARB filed an appeal. On June 24, 2011, the Court of Appeal granted ARB's petition staying the trail court's order pending consideration of the appeal. In the interest of informed decision-making, on June 13, 2011, ARB released the expanded alternatives analysis in a draft Supplement to the AB 32 Scoping Plan Functional Equivalent Document. The ARB Board approved the Scoping Plan and the CEQA document on August 24, 2011.

2009 California Climate Adaptation Strategy (California Natural Resources Agency 2009) was adopted, which is the " . . . first statewide, multi-sector, region-specific, and information-based climate change adaptation strategy in the United States." Objectives include analyzing risks of climate change in California, identifying and exploring strategies to adapt to climate change, and specifying a direction for future research.

Renewable Electricity Standards. On September 12, 2002, Governor Gray Davis signed SB 1078 requiring California to generate 20 percent of its electricity from renewable energy by 2017. SB 107 changed the due date to 2010 instead of 2017. On November 17, 2008, Governor Arnold Schwarzenegger signed Executive Order S-14-08, which established a Renewable Portfolio Standard target for California requiring that all retail sellers of electricity serve 33 percent of their load with renewable energy by 2020. Governor Schwarzenegger also directed the ARB (Executive Order S-21-09) to adopt a regulation by July 31, 2010, requiring the state's load serving entities to meet a 33 percent renewable energy target by 2020. The ARB Board approved the Renewable Electricity Standard on September 23, 2010 by Resolution 10-23.

Title 24. Title 24, also known as the California Building Standards Code, consists of a compilation of building standards from a variety of sources, and contains the following 12 parts, including electrical code, plumbing code, historical building code, and fire code. The California Building Standards Commission administers the rulemaking process for Title 24, and is responsible for processes related to the adoption, approval, publication, and implementation of California's building codes. The Title 24 provides the minimum standard that buildings need to meet in order to be certified for occupancy. Enforcement is generally through the local building official.

Although not originally intended to reduce greenhouse gases, Part 6 of Title 24, the California Energy Code, reduces energy consumption by residential an nonresidential buildings in California. Energy efficient buildings require less electricity; therefore, increased energy efficiency reduces fossil fuel consumption and decreases greenhouse gas emissions.

The California Building Standards Code is updated annually, and republished in its entirety every three years, to allow consideration and possible incorporation of new energy efficient technologies and methods. The term "Title 24" is often used to reference the California's building energy standards. The current version of Part 6, California Energy Code, is the 2008 Standards, which became effective January 1, 2010.

California Green Building Standards. On January 12, 2010, the State Building Standards Commission adopted updates to the California Green Building Standards (CALGreen) Code, which became effective January 1, 2011. The CALGreen Code is Part 11 of the official compilation of Title 24, as discussed above. The CALGreen Code contains mandatory measures for residential and nonresidential buildings, as well as two "tiers" of voluntary measures. Although considered voluntary by the State of California, the CALGreen Code does not prevent a local jurisdiction from

requiring implementation of the tiers at the local level, as state law provides methods for local enhancements, or from adopting a more stringent code.

The CALGreen Code recognizes that many jurisdictions have developed existing construction and demolition ordinances, and defers to them as the ruling guidance provided they provide a minimum 50-percent diversion requirement. The CALGreen Code also provides exemptions for areas not served by construction and demolition recycling infrastructure.

The CALGreen Code's mandatory measures for nonresidential buildings include but are not limited to (code section in parentheses):

- **Short-term bicycle parking.** If the project is anticipated to generate visitor traffic, provide permanently anchored bicycle racks within 200 feet of the visitors' entrance, readily visible to passers-by, for 5 percent of visitor motorized vehicle parking capacity, with a minimum of one two-bike capacity rack (5.106.4.1).
- **Long-term bicycle parking.** For buildings with over 10 tenant-occupants, provide secure bicycle parking for 5 percent of tenant-occupied motorized vehicle parking capacity, with a minimum of one space (5.106.4.2).
- **Designated parking.** Provide designated parking for any combination of low-emitting, fuel-efficient and carpool/van pool vehicles as shown in Table 5.106.6.2 (5.106.5.2).
- **20 percent indoor water use savings**. A schedule of plumbing fixtures and fixture fittings that will reduce the overall use of potable water within the building by 20 percent shall be provided, as calculate by the CALGreen Water Use Worksheets (5.303.2).
- **Wastewater reduction**. Each building shall reduce the generation of wastewater by one of the following methods:
  1. The installation of water-conserving fixtures or
  2. Utilizing nonpotable water systems (5.303.4).
- **Construction Waste Management Plan.** Prepare a construction waste management plan or meet local ordinance, whichever is more stringent, and submit it to an enforcement authority. The plan shall be to recycle and/or salvage for reuse a minimum 50-percent of nonhazardous construction and demolition debris. All (100 percent) of trees, stumps, rocks and associated vegetation and soils resulting from land clearing shall be reused or recycled.
- **Recycling by Occupants.** Provide readily accessible areas that serve the entire building and are identified for the depositing, storage and collection of nonhazardous materials for recycling.
- **Irrigation Efficiency.** Moisture-sensing irrigation systems for larger landscaped areas.

- **Materials Pollution Control.** Low-pollutant emitting interior finish materials such as paints, carpet, vinyl flooring and particle board.
- **Building Commissioning.** Mandatory inspections of energy systems (e.g., heat furnace, air conditioner, mechanical equipment) for nonresidential buildings over 10,000 square feet to ensure that all are working at their maximum capacity according to their design efficiencies.

Bay Area Air Quality Management District

The District has prepared an emission inventory of pollutants contributing to climate change (i.e., greenhouse gases. The Greenhouse Gas Source Inventory estimates direct and indirect emissions from sources within the District's jurisdiction for the following gases: carbon dioxide, methane, nitrous oxides, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (BAAQMD 2010).

The emissions inventory estimates greenhouse gas emissions produced by the San Francisco Bay Area in 2007. This inventory updates the District's previous greenhouse gas emissions inventory for base year 2002 (published in November 2006). All activity data has been updated to reflect current industrial activity, motor vehicle travel, and economic and population growth.

The inventory found that the majority of greenhouse gas emissions in the Bay Area were generated by the transportation sector and industrial and commercial sector, with each contributing approximately 36 percent of the total emissions inventory.

County of Solano

The County of Solano adopted its Climate Action Plan (CAP) on June 7, 2011. The CAP is discussed in Impact GHG-2.

City of Vallejo

The City of Vallejo adopted its CAP in March 2012, which contains a 2008 baseline greenhouse gas emissions inventory and future year forecasts for both community sources and City operations. The CAP details the City's year 2020 emission reduction goal of 15 percent below baseline levels, and the City's strategy for achieving that goal. The CAP is discussed in Impact GHG-2.

Project Sustainability Features

The following sustainable building features and goals in the Draft Specific Plan (Plan) are referenced throughout this section. This list is not exhaustive but provides a sample of the sustainable features that would be implemented throughout the project.

Energy

- The south-facing half of the Exposition Hall is proposed for installation of photovoltaic arrays and/or solar water heaters. With a total roof surface of 48,600 square feet, this south-facing portion would provide an area of 24,300 square feet. Additional roof areas over the entry lobby,

meeting rooms, and/or south-facing shade canopy could also be utilized, depending on the results of more detailed studies in conjunction with overall energy programs for the plan area.

- Pre-manufactured exterior wall and ceiling panels should be selected to provide high insulation values, with metal support framing and finish surface options containing up to 85 percent recycled material content.
- To minimize the use of artificial light, south-facing yet shaded lobby/lounge spaces (as well as small meeting rooms) should have access to natural daylight through operable windows and exterior doors that open directly onto landscape areas. Additionally, skylights or light tubes should be included wherever practical.
- Operable windows should be provided at the upper (clerestory) level of the main Exposition Hall to provide natural daylight, as well as naturally ventilate the space.
- Efficient interior lighting and control systems should be provided, and occupancy sensors utilized wherever practical.

Recycled Content

- Concrete slabs and foundations should include reinforcing steel with recycled content (ranging between 45% and 70%) and fly-ash, as part of a recycled waste diversion program.

Water Conservation and Low Impact Development

- High efficiency water fixtures should be utilized to conserve water and offset high peak loads within the facility.
- Stormwater Collection and Re-use: The new multi-purpose water feature within Creek Park will retain and improve runoff from the plan area, which can then be re-used onsite for irrigation. It also functions as a recreational amenity and water quality best management practice. Capture and reuse is consistent with Low Impact Development practices and the San Francisco Bay Area NPDES stormwater quality permit. A majority of the plan area will be designed to drain to the Creek Park water feature for water quality treatment. Portions of the southern plan area may drain to the Fairgrounds Channel depending on the storm drain system hydraulic limitations.
- Potable Water Demand: Capture and reuse of stormwater for irrigation within the water feature will reduce potable water demand. Use of drought-tolerant and local plant species will further reduce potable water demand. In addition, a “purple-pipe” (recycled water) system is planned within each backbone roadway. The “purple-pipe” system will be installed in accordance with Title 22 standards for recycled water use in the event recycled water becomes available on a municipal scale.
- Low Impact Design (LID): Structural LIDs proposed by the Plan include the water feature bioswales and rain gardens to collect water from the Exposition Hall roof. Non-structure LIDs

include minimization of paved parking areas through creation of shared parking strategies and multi-purpose turf areas, such as the midway, that can accommodate overflow parking.

- Wastewater: The Plan's water reduction and conservation measures also result in reduced generation of wastewater due to recycling and reduced flows.

Transportation

- Bicycle and Pedestrian System: In addition to open space, the Plan proposes pedestrian and bicycle routes. In addition, a jogging circuit is proposed for consideration along the Fairgrounds Channel. These public trails, promenades, bike lanes and paths encourage residents and visitors to get out of their cars and walk, bike or jog from destinations within and near the plan area.
- Walkable Streets: Walking is key to providing healthy and sustainable communities. The major roads (Entry Road and Loop Road) provide a minimum of 10-foot wide, tree-shaded sidewalks or multi-purpose paths on each side. Controlled intersections, bulb-outs, and high-visibility crosswalks are provided at onsite intersections to enhance pedestrian safety; this includes the raised intersection at the Fairgrounds Arrival Plaza.
- Bicycle Facilities: The Plan proposes bicycle facilities along the Entry Road and Loop Road, connecting to proposed bike lanes on Fairgrounds Drive between SR 37 and Redwood Parkway and allowing easy bike connections to onsite destinations. These facilities consist of bike lanes on Entry Road and North Loop Road, multi-purpose paths along South Loop Road, and secure bicycle parking at key activity nodes including the Fairgrounds and private purpose development (Entertainment Mixed Use and Entertainment Commercial) parcels. The Transit/North Parking Center will also provide a secure bicycle parking area and may include other bicycle amenities such as a bicycle repair facility.
- Transit: The Plan provides a multi-modal Transit/North Parking Center where commuters can park their vehicles and board buses bound for job centers or other destinations such as the Vallejo Ferry Terminal. The Transit/North Parking Center can also be used for parking during weekend events.

Education

- Sustainability Awareness and Education: The proposed Demonstration Farm provides opportunities to celebrate the historic agricultural character of the area and provide educational programming. Other environmental education programs may be provided through the Fair. Educational and interpretive signs describing restored habitat and water conveyance systems will be located throughout the Creek Park.

3.6.4 - Methodology

In June 2010, the District adopted its CEQA Air Quality Guidelines, which were subsequently revised in May 2011. The District's June 2010 (revised May 2011) adopted thresholds of significance were challenged in a lawsuit. On March 5, 2012, the Alameda County Superior Court issued a judgment finding that the District had failed to comply with CEQA when it adopted the thresholds. The court found that the adoption of the thresholds was a project under CEQA and ordered the District to examine whether the thresholds would have a significant impact on the environment under CEQA before recommending their use. The court did not determine whether the thresholds are based on substantial evidence and whether they are valid on their merits. The court issued a writ of mandate ordering the District to set aside the thresholds and cease dissemination of them until the District had complied with CEQA. The court's order permits the District to develop and disseminate these CEQA Guidelines, as long as they do not implement the thresholds of significance. In light of the court's order, all references of the Air District's June 2010 (revised May 2011) adopted thresholds, including related screening criteria, have been removed from the CEQA Guidelines. The updated May 2012 Guidelines therefore do not include thresholds or screening criteria.

The project's air quality impacts were evaluated in accordance with the guidance set forth by the District's 2012 CEQA Air Quality Guidelines. Emissions output and modeling assumptions for construction and operational emissions are provided in Appendix B.

3.6.5 - Thresholds of Significance

According to the CEQA Guidelines' Appendix G Environmental Checklist, to determine whether greenhouse emissions impacts are significant environmental effects, the following questions are analyzed and evaluated. Would the project:

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

b) Conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases?

3.6.6 - Project Impacts and Mitigation Measures

Greenhouse Gas Emissions

Impact GHG-1:	**The project would generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.**

Impact Analysis

Threshold

The District does not provide a construction-related greenhouse gas threshold, but recommends that the construction-generated greenhouse gases be quantified and disclosed. The District also recommends that Lead Agencies make a determination of the significance of construction-generated greenhouse gas emissions in relation to meeting AB 32 greenhouse gas reduction goals.

The District's 2011 Guidelines contained *project-level* operational greenhouse gas thresholds, which were removed from the 2012 Guidelines pursuant to a lawsuit in the Alameda County Superior Court. The following thresholds are not currently recommended by the District and are shown herein for informational purposes:

- Compliance with a qualified Greenhouse Gas Reduction Strategy, or
- 1,100 metric tons of CO_2 equivalent per year, or
- 4.6 metric tons of CO_2 equivalent per service population (employees plus residents).

The City of Vallejo is a responsible agency for this project under CEQA. Since the City of Vallejo CAP is a qualified Greenhouse Gas Reduction Strategy, the project's compliance with the CAP will be used for determining the significance of the project's greenhouse gas emissions.

The District's 2011 Guidelines contained *Plan-level* operational greenhouse gas thresholds, which were removed from the 2012 Guidelines and are shown herein for informational purposes:

- Compliance with a qualified Greenhouse Gas Reduction Strategy, or
- 6.6 metric tons of CO_2 equivalents per service population (employees plus residents).

The service population for the project is estimated as follows. Analysis by the Goodwin Consulting Group (2011) indicates that the Fair of the Future would generate approximately 65 permanent employee equivalent positions. The Goodwin Consulting Group estimates that the proposed EC area would generate the equivalent of 190 permanent employee equivalent positions, while the EMU area is anticipated to employ 405 persons at the retail uses and 218 persons at the restaurant uses. The project would also provide 50 residential units, assuming 2.89 people per unit (Census 2012) yields 145 people. Therefore, the total service population is estimated at 1,023 people.

Emissions Inventory

This analysis is restricted to greenhouse gases identified by AB 32, which include carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. The project would generate a variety of greenhouse gases during construction and operation, including several defined by AB 32 such as carbon dioxide, methane, and nitrous oxide.

Certain greenhouse gases defined by AB 32 would not be emitted by the project. Perfluorocarbons and sulfur hexafluoride are typically used in industrial applications, none of which would be used by the project. Therefore, it is not anticipated that the project would emit perfluorocarbons or sulfur hexafluoride.

Because the level of detail known for both the Fairground and Private Uses are the same, and because the trip generation data shows a high level of internal trip capture, the emissions analysis and

significance determination prepared below does not differentiate between the two project components.

Construction Emissions

The project would emit greenhouse gases from upstream emission sources and direct sources (combustion of fuels from worker vehicles and construction equipment).

An upstream emission source (also known as life cycle emissions) refers to emissions that were generated during the manufacture of products to be used for construction of the project. Upstream emission sources for the project include but are not limited to the following: emissions from the manufacture of cement; emissions from the manufacture of steel; and/or emissions from the transportation of building materials to the seller (i.e., CalEEMod only estimates the transportation of building materials locally). The upstream emissions were not estimated because they are not within the control of the project and to do so would be speculative at this time. Additionally, the California Air Pollution Control Officers Association White Paper on CEQA and Climate Change supports this conclusion by stating, "The full life-cycle of GHG [greenhouse gas] emissions from construction activities is not accounted for . . . and the information needed to characterize [life-cycle emissions] would be speculative at the CEQA analysis level" (CAPCOA 2008). Therefore, pursuant to CEQA Guidelines Sections 15144 and 15145, upstream /life cycle emissions are speculative and no further discussion is necessary.

The emissions of carbon dioxide from project construction equipment and worker vehicles are shown in Table 3.6-4. Emissions were estimated using CalEEMod using the procedures and methodology described in Appendix B. As stated above, the District does not provide a construction-related greenhouse gas threshold, nor do they recommend determining a level of significance of project-construction emissions. Significance for this impact is determined by project compliance with the City of Vallejo CAP. As shown in Impact GHG-2, the project is consistent with the CAP after mitigation. Therefore, these emissions are anticipated to be less than significant.

Table 3.6-4: Construction Greenhouse Gas Emissions

Phase	Emissions (pounds CO_2e per day)	Days	Emissions ($MTCO_2e$)
Demolition	7,714	50	193
Site preparation	8,487	90	382
Grading	11,374	90	512
Building construction	5,214	2,080	5,423
Paving	3,121	200	312
Architectural coating	355	140	25

Table 3.6-4 (cont.): Construction Greenhouse Gas Emissions

Phase	Emissions (pounds CO_2e per day)	Days	Emissions ($MTCO_2e$)
Total Project Construction Emissions			**6,847**
Source of Emissions: Michael Brandman Associates 2012 (Appendix B, CalEEMod output for year 2013, unmitigated) Source of Days: Michael Brandman Associates 2012 (Appendix B) Source of MTCO2e (metric tons of carbon dioxide equivalents): Emissions (pounds CO2e per day) * days * 0.0005			

Operational Emissions

The project's operational emissions were estimated using CalEEMod as described in Appendix B. The project's estimated operational greenhouse gas generation is provided in Table 3.6-5. Mitigation measure, regulation, and project design feature reductions are estimated using the following procedures:

- Motor vehicle regulation: Pavley and the Low Carbon Fuel Standard (estimated automatically by CalEEMod by estimating emissions for the year 2020).
- Motor vehicle pass-by trip reduction: A 33-percent reduction in Entertainment Mixed Use trips is accounted for pursuant to information in the traffic section of this EIR.
- Electricity and Water: Renewable portfolio standard, emission factors are reduced to account for an increased renewable energy in PG&E's portfolio.
- Hearth: Take into account Mitigation Measure AIR-3d, which prohibits wood-burning appliances. Therefore, these emissions are from the use of natural gas fireplaces in the residential units.
- Solar (project design): The Plan indicates that the project would have 24,300 square feet (2,257 square meters) of roof space in the Exposition Hall available for solar installation. The project area generates 5.53 kilowatt-hours (kWh) per square meter per day;[2] therefore, the project could generate 12,481 kWh per year, which is entered into CalEEMod for the mitigated version, even though it is technically not mitigation but a project design.
- Mitigation Measure AIR-1a requires that the project exceed Title 24 energy efficiency standards by 15 percent. This is accounted for in CalEEMod in the electricity and natural gas emissions estimates.
- Increase density (project design): This CalEEMod "mitigation measure" assumes 10 dwelling units per acre (although the density for the residential units is unknown at this time, it is assumed to be 50 units divided by 5 acres) and 122 jobs per acre (approximate). The CalEEMod suburban center setting was used for the transportation related measures.
- Increase diversity (project design).

[2] National Renewable Energy Laboratory. PVWatts Viewer, http://mapserve3.nrel.gov/PVWatts_Viewer/index.html.

- Increase transit accessibility (project design): distance to Transit/North Parking Center is 0.1 mile.
- Improve pedestrian network onsite (project design).

Project emissions after implementation of mitigation measures, regulation, and project design features are provided in Table 3.6-5. The operational emissions are shown herein for informational purposes, since significance for this impact is determined by project compliance with the City of Vallejo CAP. If the operational emissions are compared with the numerical thresholds in the District's 2011 Guidelines, which are no longer being recommended by the District, the emissions would be over the thresholds. However, as shown in Impact GHG-2, the project is consistent with the CAP after mitigation. The CAP identifies policies that will achieve the state-recommended greenhouse gas reduction target of 15 percent below 2008 levels by the year 2020. Therefore, these emissions are anticipated to be less than significant with mitigation.

Table 3.6-5: Operational Greenhouse Gas Emissions with Mitigation, Regulation, and Project Design Features

Source	Emissions ($MTCO_2e$/year)
Transportation	23,555
Hearth	37
Electricity	2,428
Natural Gas	1,241
Water & Wastewater	101
Solid Waste	539
Total Project Annual Emissions	**27,901**
Emissions per service population	**27.3**

$MTCO_2e$ = metric tons of carbon dioxide equivalents
Source of total emissions: Michael Brandman Associates 2012 (Appendix B, CalEEMod output for the year 2020, assuming full buildout)
Source of emissions per service population: total emissions divided by 1023 people

Level of Significance Prior to Mitigation

Potentially significant impact.

Mitigation Measures

Implement Mitigation Measures AIR-1a (exceed Title 24), AIR-3d (prohibits wood burning appliances), AIR-4b (during operation, no idling and provide electrical hookups), GHG-2a (City of Vallejo CAP measures), and GHG-2b (County of Solano CAP measures).

Level of Significance After Mitigation

Less than significant impact.

Conflict with Plan, Policy, or Regulation that Reduces Emissions

Impact GHG-2: **The project would not conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases.**

Impact Analysis

To address this potential impact, project consistency with the City of Vallejo Climate Action Plan (CAP), the County of Solano CAP, and the ARB's Scoping Plan are addressed.

City of Vallejo Climate Action Plan

The City of Vallejo adopted its CAP in March 2012. The CAP identifies policies that will achieve the state-recommended greenhouse gas reduction target of 15 percent below 2008 levels by the year 2020. The CAP provides goals and associated measures, also referred to as reduction measures, in the sectors of energy use, transportation, land use, water, solid waste, and off-road equipment.

The CAP contains a compliance checklist for new development, which is used to determine compliance with the CAP, a qualified Greenhouse Gas Reduction Plan according to the District's 2011 guidelines. Project compliance with those policies and requirements are shown in Table 3.6-6. As shown in the table, the project complies with applicable requirements after application of Mitigation Measure GHG-2a.

Table 3.6-6: Project Compliance with Vallejo Climate Action Plan

Policy	Project Requirements	Project Compliance
Building Standards: Require all new development to meet minimum energy efficiency and green building requirements, as amended and encourage new development to exceed Title 24 Energy Efficiency and CALGreen Standards.	Comply with Title 24 minimum requirements and consider adhering to the Tier 1 or Tier 2 standards of the CALGreen Code for Energy Efficiency.	Complies with mitigation and project design features.
	Complete CAP checklist	Complies; this table constitutes the checklist.
Smart Meters: Increase the community's awareness and utilization of real-time energy consumption data available through PG&E's SmartMeter program.	Install indoor real-time energy monitor in each unit or tenant space.	Complies with mitigation.
	Provide information to prospective buyers or tenants on available rebates for appliances with smart grid enabled technology.	Complies with mitigation.
Cool Roofs and Pavements: Increase tree planting and the use of cool roofs and cool pavement materials to reduce the urban heat island effect and corresponding energy consumption. Implement tree replacement policy for projects where tree removal is necessary.	Comply with minimum Title 24 requirements for cool roofs to have a minimum SRI of 10 for steep slope and 64 for low-slope roofs on residential and nonresidential projects.	Complies with mitigation.
	Reduce exterior heat gain by planting vegetation, installing solar panel shade structures, or utilizing paving materials with a minimum SRI of 29 for at least 50% of non-roof impervious site surfaces.	Complies with mitigation.

Table 3.6-6 (cont.): Project Compliance with Vallejo Climate Action Plan

Policy	Project Requirements	Project Compliance
	Install and maintain street trees in compliance with current development standards.	Complies with mitigation.
	Utilize high albedo paving material when required to install or renovate sidewalks, roads, crosswalks, parking lots, and driveways.	Complies with mitigation.
Support the installation of small-scale renewable energy systems including solar photovoltaic, solar thermal, and wind, river current, and tidal energy conversion systems. Promote mixed-use, higher-density development near transit nodes.	Pre-wire and pre-plumb new residential and commercial buildings for solar and solar thermal installations. Include sidewalks, walking paths, or hiking trails connecting various land uses and including safety amenities such as lighting and signage throughout the project site for projects with the Downtown Specific Plan. Incorporate commercial services such as day care, restaurants, banks, and stores near employment centers where feasible in mixed use projects for projects within the Downtown Specific Plan.	Complies with mitigation.
Expand and link the network of pedestrian and bicycle paths and facilities through preparation of a Bicycle and Pedestrian Master Plan, with the goal of increasing the bicycle and pedestrian mode share 20% by 2035.	Provide bicycle support facilities at a rate of 1 changing room and shower per 200 occupants within non-residential developments.	Complies with mitigation.
Revise parking requirements for new commercial and multifamily residential projects and implement the Downtown Parking Meter Installation Plan.	Provide bike racks for 5% of the projected building occupants within 200 feet of the building entrance and one long-term bicycle storage space per two-multi-family units.	Complies with mitigation.
	Consider reducing the number of required vehicle parking spaces by up to 15% through the development of an approved trip reduction program.	Not feasible. The project provides parking, some of which would be near the proposed Transit/North Parking Center.
	Consider utilizing shared parking in mixed-use and transit-oriented developments.	Complies with project design.
	Design parking lots, where feasible, to include clearly marked and shaded pedestrian pathways between transit facilities and building entrances.	Complies with mitigation.
Reduce emissions from commute travel to and from schools and workplaces.	Implement applicable transportation demand management programs and techniques.	Complies. The project would install a Transit/North Parking Center.

Table 3.6-6 (cont.): Project Compliance with Vallejo Climate Action Plan

Policy	Project Requirements	Project Compliance
	Install infrastructure within and adjacent to the project site to ensure the safe passage of children to and from school.	Complies. The project would provide pedestrian amenities pursuant to project design.
	Encourage employers and employees to utilize the Solano Transit Authority's rideshare matching system and support services.	Complies with mitigation.
Plan for an improved jobs/housing balance in order to reduce the need for long-distance travel from residences to places of work.	Provide jobs and economic revitalization that improves Vallejo's jobs/housing balance.	Complies with project design – the project would provide mixed use residential and jobs.
	Provide live/work opportunities when compatible within existing neighborhood.	
Support the expanded use of efficient and alternative fuel vehicles.	Include designated stalls for low-emitting, fuel efficient vehicles and carpool/vanpool vehicles for a minimum of 8% of total non-residential parking capacity and pre-wire stalls for future electric vehicle charging stations for 2% of total parking capacity.	Complies with mitigation.
	Consider including alternative fuel stations within the project.	Not feasible.
Require water conservation in all new buildings and landscapes	Install individual water meters for each tenant space projected to consume more than 100 gallons per day in all non-residential buildings larger than 50,000 square feet.	Complies with mitigation.
	Provide an additional water meter or sub-meter for landscaping uses for all new non-residential facilities with 1,000 to 5,000 square feet of irrigated landscaped space.	Complies with mitigation.
	Consider installing greywater, recycled water, and rainwater catchment systems if feasible.	Complies with project design, as noted in the Plan.[1]
	Implement low impact development strategies in new non-residential projects to treat a minimum of 40% of the average annual rainfall on-site.	Consistent with project design.
	Facilitate onsite retention of water and reduce water run-off by installing permeable surfaces for a minimum of 20% of the total parking, walkway, and porch area surfaces serving single-family and multi-family residential buildings under 4 units.	Not applicable.

Table 3.6-6 (cont.): Project Compliance with Vallejo Climate Action Plan

Policy	Project Requirements	Project Compliance
Require waste diversion and the use of recycled materials in new development.	Comply with the City's Construction/ Demolition Waste Reuse and Recycling Ordinance.	Complies with mitigation.
	Incorporate recycled content materials for a minimum of 10% of total materials.	Complies with mitigation.
Encourage the use of electrified and higher efficiency lawn and garden equipment.	Install outdoor electrical outlets on the exterior of each building in an accessible location.	Complies with mitigation.
	Consider installing low-maintenance, native landscaping to minimize the need for gas-powered lawn and garden equipment.	Complies with project design.[2]
Reduce emissions from heavy-duty construction equipment by limiting idling and utilizing cleaner fuels, equipment, and vehicles.	Shut construction equipment off when not in use or reduce the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]), or less.	Complies with mitigation.
	Maintain construction equipment per manufacturer's specifications.	Complies with mitigation.
	Implement one of the following best practices to minimize construction related greenhouse gas emissions: • Substitute electrified equipment for diesel- and gasoline-powered equipment where practical. • Use alternatively fueled construction equipment onsite, where feasible, such as compressed natural gas (CNG), liquefied natural gas (LNG), propane, or biodiesel. • Avoid the use on onsite generators by connecting to grid electricity or utilizing solar powered equipment. • Limit heavy-duty equipment idling time to a period of 3 minutes or less, exceeding California Air Resources Board regulation minimum requirements of 5 minutes.	Complies with mitigation.
Integrate potential climate change impacts into local planning documents and processes.	Review, analyze and disclose possible impacts of climate change on the project or plan area, with an emphasis on sea level rise.	Complies – see discussion below.

Notes:
[1] Excerpt from Draft Specific Plan: Gutters and roof drains will be also be piped to a series of landscaped "rain garden" areas, where rainwater can be collected and filtered before draining to the central water feature.
[2] Excerpt from Draft Specific Plan: Parkways should be planted in low maintenance shrubs, groundcovers or lawn, grasses or wild flowers.
Source of policy and project requirements: City of Vallejo Climate Action Plan 2012.
Source of project compliance: Michael Brandman Associates

Climate Change Adaptation

Sea level rise: The Pacific Institute, with support from the California Energy Commission, California Department of Transportation, and the Ocean Protection Council, prepared impact maps showing the potential extent of coastal flooding and erosion under one scenario that involved a sea level rise of 1.4 meters (55 inches). This scenario represents the medium to high greenhouse gas emissions scenarios, but does not reflect the worst-case that could occur. The scenario estimates that the 1.4-meter sea-level rise would occur by 2100. Review of current sea level rise maps in California indicate that the project would not be threatened by sea level rise (CalAdapt 2012).

Water quality and availability: One of the major impacts of climate change is a loss of natural snowpack, particularly the Sierra Nevada snowpack. Snowmelt provides an annual average of 15 million acre-feet of water, released between April and July each year (Department of Water Resources 2008). The California Department of Water Resources projects that the Sierra snowpack will experience a 25- to 40-percent reduction from its historic average by 2050. Climate change is also anticipated to bring warmer storms that result in less snowfall at lower elevations, reducing the total snowpack. As shown above, the project would implement many project design features to reduce its water use, including but not limited to high efficiency water fixtures, stormwater collection and reuse, drought-tolerant plants, planned recycled water system, and low impact design. Therefore, impacts are anticipated to be less than significant.

County of Solano Climate Action Plan and County of Solano General Plan

The County of Solano adopted its CAP in June 2011. The project is generally consistent with the following actions and General Plan policies after implementation of Mitigation Measure GHG-2b:

- Green Building and Energy Efficiency E-4: New residential units and commercial buildings exceeding Title 24 energy performance by 15 percent.
- RS.I-46: Require residential development of more than six units to participate in the California Energy Commission's New Solar Homes Partnership and to construct LEED-certified units or meet equivalent performance standards. For new affordable housing projects, performance standards shall be established pursuant to the requirements of the funding source(s). Require new construction or major renovation of commercial and industrial buildings over 10,000 square feet in size to incorporate renewable energy generation to provide the maximum feasible amount of the project's energy needs. Commercial buildings shall incorporate renewable energy generation to provide at least 20 percent of the project's needs.
- RS.I-47: Require the use of Energy Star-rated appliances and the most energy-efficient Energy Star-rated water heaters and air conditioning systems that are feasible in the construction of new homes, in all substantial remodels when appliances are being replaced, and in any case, where a permit is needed to install or replace appliances (e.g., water heaters, air conditioning).

- RS.I-48: Require all commercial, institutional, and industrial development to reduce potential urban heat island effect by using U.S. EPA–Energy Star rated roofing materials and light colored paint, using light colored paving materials for internal roads and parking, and using shade trees to shade south and west sides of new or renovated buildings and to achieve a minimum of 50 percent shading for all parking lots surfaces. Continue to ensure compliance with existing state building requirements for energy-conserving roofing materials on nonresidential buildings in new construction and reroofing. Amend the County Zoning Ordinance to encompass these requirements.
- RS.I-51: Adopt a County "green building program." Require all new and renovated commercial, office, and institutional buildings over 10,000 square feet in size to achieve LEED certification, or meet equivalent performance standards. Amend the County Zoning Ordinance to encompass these green building requirements. Provide permitting-related and other incentives for building projects that exceed the County's energy efficiency standards by greater than 5 percent.
- RS.I-52: Require that development projects use landscaping and site design techniques that minimize energy use. These may include designing landscaping to shield or expose structures to maximize energy conservation or acquisition; and taking advantage of orientation, sun-shade patterns, prevailing winds, landscaping, and sunscreens. Amend development standards to require such techniques.
- RS.I-55: Require the design and orientation of all buildings to maximize passive solar heating during cool seasons, avoid solar heat gain during hot periods, enhance natural ventilation, and promote effective use of daylight. Orientation should optimize opportunities for onsite solar generation.
- RS.P-54: Reduce Solano County's reliance on fossil fuels for transportation and other energy consuming activities.
- PF.I-29: Expand waste minimization efforts, including household recycling, food waste and green waste recycling, business paper recycling, and construction and demolition recycling. Require commercial and industrial recycling. Require building projects to recycle or reuse a minimum of 50 percent of unused or leftover building materials.
- PF.P-27: Require responsible waste management practices, including recycling and composting. Coordinate with service providers to compost green waste and encourage local farmers to use this.
- PF.P-28: Promote technologies that allow the use and reuse of solid waste, including biomass or biofuel as an alternative energy source.
- PF.I-28: Require that demolition projects submit a plan to maximize reuse of building materials at the time of permit application.

- PF.I-29: Expand waste minimization efforts, including . . . construction and demolition recycling. Require commercial and industrial recycling. Require building projects to recycle or reuse a minimum of 50 percent of unused or leftover building materials.
- PF.P-20: Minimize the consumption of water in all new development.

Scoping Plan

As discussed in the Regulatory Section, ARB adopted the Climate Change Scoping Plan (Scoping Plan), which outlines actions recommended to obtain that the emission reduction goals contained in AB 32. The Scoping Plan states, "The 2020 goal was established to be an aggressive, but achievable, mid-term target, and the 2050 greenhouse gas emissions reduction goal represents the level scientists believe is necessary to reach levels that will stabilize climate" (ARB 2008, page 4). The year 2020 goal of AB 32 corresponds with the mid-term target established by S-3-05, which aims to reduce California's fair-share contribution of greenhouse gases in 2050 to levels that will stabilize the climate. The Scoping Plan identifies recommended measures for multiple greenhouse gas emission sectors and the associated emission reductions needed to achieve the year 2020 emissions target—each sector has a different emission reduction target. Most of the measures target the transportation and electricity sectors. Therefore, the majority of measures are not directly applicable or implementable at the project level. However, the project would be increasing energy efficiency, would conserve water, and would reduce waste pursuant to design features and mitigation measures.

Level of Significance Prior to Mitigation

Potentially significant impact.

Mitigation Measures

Implement Mitigation Measure AIR-1a and the following:

MM GHG-2a To be consistent with the City of Vallejo Climate Action Plan, the project shall incorporate the following measures:

- Install indoor real-time energy monitors in each unit or tenant space.
- Provide information to prospective buyers or tenants on available rebates for appliances with smart grid technology. (See PG&E's SmartMeter Program)
- Comply with minimum Title 24 requirements for cool roofs to have a minimum solar reflectance index (SRI) of 10 for steep slope and 64 for low-slope roofs.
- Reduce exterior heat gain by planting vegetation, installing solar panel shade structures, or utilizing paving materials with a minimum SRI of 29 for at least 50 percent of non-roof impervious site surfaces.
- Install and maintain street trees in compliance with current development standards.

- Utilize high albedo paving material when required to install or renovate sidewalks, roads, crosswalks, parking lots, and driveways.
- Pre-wire and pre-plumb new residential and commercial buildings for solar and solar thermal installations.
- Provide bicycle support facilities at a rate of 1 changing room and shower per 200 employees within non-residential developments.
- Provide bike racks for 5 percent of the projected building occupants within 200 feet of the building entrance and one long-term bicycle storage space per two-multi-family units.
- Design parking lots to include clearly marked and shaded pedestrian pathways between existing and planned transit facilities and building entrances.
- Encourage employers and employees to utilize the Solano Transit Authority's rideshare matching system and support services.
- Include designated stalls for low-emitting, fuel efficient vehicles and carpool/vanpool vehicles for a minimum of 8 percent of total non-residential parking capacity and pre-wire stalls for future electric vehicle charging stations for 2 percent of total parking capacity. The stalls shall be in preferred parking locations and shall be marked with signs.
- Install individual water meters for each residential unit and high water use commercial uses such as restaurants or laundromats.
- Provide an additional water meter or sub-meter for landscaping uses for all new non-residential facilities with 1,000 to 5,000 square feet of irrigated landscaped space.
- Comply with the City of Vallejo's Construction/ Demolition Waste Reuse and Recycling Ordinance.
- Incorporate recycled content materials for a minimum of 10 percent of total materials.
- Install outdoor electrical outlets on the exterior of each building in an accessible location.
- Require construction contractors to shut construction equipment off when not in use or reduce the maximum idling time to 5 minutes or less.
- Construction contractors shall maintain construction equipment per manufacturer's specifications.
- Substitute electrified equipment for diesel- and gasoline-powered equipment where practical.

MM GHG-2b To be consistent with the County of Solano Climate Action Plan, the project shall incorporate the following measures:

- The residential units shall be LEED certified units or meet equivalent performance standards. For new affordable housing projects, performance standards shall be established pursuant to the requirements of the funding source(s).
- Buildings over 10,000 square feet in size shall incorporate renewable energy generation to provide the maximum feasible amount of the project's energy needs. Commercial buildings shall incorporate renewable energy generation to provide at least 20 percent of the project's needs.
- Energy Star-rated appliances and the most energy-efficient Energy Star-rated water heaters and air conditioning systems that are feasible shall be installed in the new residential units.
- New buildings over 10,000 square feet in size shall achieve LEED certification, or meet equivalent performance standards.
- Require the design and orientation of all buildings to maximize passive solar heating during cool seasons, avoid solar heat gain during hot periods, enhance natural ventilation, and promote effective use of daylight.
- Any new shuttles that are used in the project or to shuttle people to the adjacent theme park shall use electricity, natural gas, or hybrid-electric technology.
- All buildings shall have space in the design for adequate recycling, composting, and yard waste collection.
- During demolition of the existing structures prior to construction of the project, at the time of permit application, the project shall submit a plan to the County that outlines methods to maximize reuse of building materials.
- The project shall recycle or reuse a minimum of 50 percent of unused or leftover building materials.

Level of Significance After Mitigation

Less than significant impact.

3.6.7 - Residual Significant Impacts

None identified.