4.7 GREENHOUSE GAS EMISSIONS, CLIMATE CHANGE, AND ENERGY

This section discusses greenhouse gas (GHG) emissions and energy use. Emissions of GHGs have the potential to adversely affect the environment because they contribute, on a cumulative basis, to global climate change. This issue is, therefore, addressed as a cumulative impact issue because no single project produces enough GHG to alter climate change effects, but each project has the potential to contribute GHGs that ultimately concentrate in the globe's atmosphere and, from a global perspective, contribute to this growing problem. Unlike criteria air pollutants and toxic air contaminants (TACs) that are pollutants of localized or regional concern, the location where GHG emissions are generated is less of a concern. Rather, the total amount, type, and per capita emissions of GHGs ultimately define whether GHG contributions from a project should be considered significant.

An important consideration is that, unlike many resources affected by a project, GHG emissions largely are associated with the fact that a population exists: people use energy to heat and cool their homes, for transportation, and in economic activity. Thus, it is important to consider whether a project is designed to be GHG-efficient, that is, to produce relatively few GHG emissions per unit (per resident, employee, etc.) because in large part, individual projects "shift" where and how GHGs are produced, including GHG emissions per person, rather than whether they are produced.

4.7.1 Environmental Setting

GHG EMISSIONS AND CLIMATE CHANGE

The Physical Scientific Basis

Certain gases in the earth's atmosphere, classified as greenhouse gas (GHG) emissions, play a critical role in determining the earth's surface temperature. Solar radiation enters the earth's atmosphere from space. A portion of the radiation is absorbed by the earth's surface and a smaller portion of this radiation is reflected back toward space. This absorbed radiation is then emitted from the earth as low-frequency infrared radiation. The frequencies at which bodies emit radiation are proportional to temperature. The earth has a much lower temperature than the sun; therefore, the earth emits lower frequency radiation. Most solar radiation passes through GHGs; however, infrared radiation is absorbed by these gases. As a result, radiation that otherwise would have escaped back into space is instead "trapped," resulting in a warming of the atmosphere. This phenomenon, known as the greenhouse effect, is responsible for maintaining a habitable climate on Earth. Without the greenhouse effect, Earth would not be able to support life as we know it.

Prominent GHGs contributing to the greenhouse effect are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). Human-caused emissions of these GHGs in excess of natural ambient concentrations are believed responsible for intensifying the greenhouse effect and leading to a trend of unnatural warming of the earth's climate, known as global climate change or global warming. It is "extremely likely" that more than half of the observed increase in global average surface temperature from 1951 to 2010 was caused by the anthropogenic increase in GHG concentrations and other anthropogenic forcings together (IPCC 2014:3, 5).

Climate change is a global problem. GHGs are global pollutants, unlike criteria air pollutants and toxic air contaminants, which are pollutants of regional and local concern. Whereas pollutants with localized air quality effects have relatively short atmospheric lifetimes (about one day), GHGs have long atmospheric lifetimes (one to several thousand years). GHGs persist in the atmosphere for long enough time periods to be dispersed around the globe. Although the exact lifetime of any particular GHG molecule is dependent on

multiple variables and cannot be pinpointed, it is understood that more CO_2 is emitted into the atmosphere than is sequestered by ocean uptake, vegetation, and other forms of sequestration. CO_2 sinks, or reservoirs, include vegetation and the ocean, which absorb CO_2 through sequestration and dissolution, respectively, two of the most common processes of CO_2 sequestration. Of the total annual human-caused CO_2 emissions, approximately 55 percent is sequestered through ocean and land uptakes every year, averaged over the last 50 years, whereas the remaining 45 percent of human-caused CO_2 emissions remains stored in the atmosphere (IPCC 2013:467).

The quantity of GHGs that it takes to ultimately result in climate change is not precisely known; suffice it to say, the quantity is enormous, and no single project alone would measurably contribute to a noticeable incremental change in the global average temperature, or to global, local, or micro climates. From the standpoint of CEQA, GHG impacts to global climate change are inherently cumulative.

Greenhouse Gas Emission Sources

Emissions of GHGs contributing to global climate change are attributable in large part to human activities associated with the transportation, industrial/manufacturing, utility, residential, commercial, and agricultural emissions sectors (ARB 2014a). In California, the transportation sector is the largest emitter of GHGs, followed by electricity generation (ARB 2014a). Emissions of CO_2 are, largely, byproducts of fossil fuel combustion. CH_4, a highly potent GHG, primarily results from off-gassing (the release of chemicals from nonmetallic substances under ambient or greater pressure conditions) and is largely associated with agricultural practices and landfills. N_2O is also largely attributable to agricultural practices and soil management. Additionally, high-GWP gases have atmospheric insulative properties that are hundred to tens of thousands of times greater than that of CO_2. HFCs, PFCs, and SF_6 are some of the most common types of high-global warming potential (GWP) gases and result from a variety of industrial processes. HFCs and PFCs are used as refrigerants and can be emitted through evaporation and leakage. SF_6 is a powerful electrical insulator used in power transmission and semiconductor manufacturing and is emitted through evaporation and leakage into the atmosphere.

EFFECTS OF CLIMATE CHANGE ON THE ENVIRONMENT

The Intergovernmental Panel on Climate Change (IPCC) was established in 1988 by the World Meteorological Organization and the United Nations Environment Programme to provide the world with a scientific view on climate change and its potential effects. According to the IPCC global average temperature is expected to increase relative to the 1986-2005 period by 0.3–4.8°C (0.5-8.6 °F) by the end of the 21st century (2081-2100), depending on future GHG emission scenarios (IPCC 2014:SPM-8). This temperature range represents the lower and higher bounds of five mitigation scenarios analyzed by the IPCC – two stringent scenarios, two intermediate scenarios, and a worst-case scenario. Temperatures in California are projected to increase 2.7°F above 2000 averages by 2050 and, depending on global emission levels, 4.1–8.6°F by 2100 (Moser et al 2012:2).

Physical conditions beyond average temperatures could be indirectly affected by the accumulation of GHG emissions. For example, changes in weather patterns resulting from increases in global average temperature are expected to result in a decreased volume of precipitation falling as snow in California and an overall reduction in snowpack in the Sierra Nevada. Based upon historical data and modeling, DWR projects that the Sierra snowpack will experience a 25 to 40 percent reduction from its historic average by 2050 (DWR 2008:4). An increase in precipitation falling as rain rather than snow also could lead to increased potential for floods because water that would normally be held in the Sierra Nevada until spring could flow into the Central Valley concurrently with winter storm events (Moser et al 2012:5). This scenario would place more pressure on California's levee/flood control system.

Another outcome of global climate change is sea level rise. Sea level rose approximately 7 inches during the last century. The National Research Council (NRCouncil), in their 2012 report on *Sea-Level Rise for the Coasts of California, Oregon, and Washington* projects that the sea level along the California coastline will

change between -1 inch (fall) to 24 inches (rise) between 2000 and 2050 and 4 to 66 inches (rise) between 2000 and the end of this century. This projection is based on projected future ice loss at the poles, steric and ocean dynamics, seismic trends affecting land subsidence, and other numerical models and extrapolations, accounting for increasing levels of uncertainty in future years (NRCouncil 2012:6).

As the existing climate throughout California changes over time, the ranges of various plant and wildlife species could shift or be reduced, depending on the favored temperature and moisture regimes of each species. In the worst cases, some species would become extinct or be extirpated from the state if suitable conditions are no longer available (Moser et al 2012:11 and 12).

Changes in precipitation patterns and increased temperatures are expected to alter the distribution and character of natural vegetation and associated moisture content of plants and soils. An increase in frequency of extreme heat events and drought are also expected. These changes are expected to lead to increased frequency and intensity of large wildfires (Moser et al 2012:11).

ENERGY

The majority of GHG emissions are the product of fuel consumed for energy use. The major users are residential and commercial buildings, industry, transportation, and electric power generators. Pacific Gas & Electric (PG&E) provides electricity and natural gas services to the majority of Northern California, including Yolo County [California Energy Commission (CEC) 2015a]. In 2012, PG&E's electricity generation sources consisted of: 36 percent natural gas, 27 percent nuclear, 17 percent hydropower, 19 percent renewable sources, and 1.0 percent from other sources (CEC 2013a). On the demand side, in 2013, Yolo County residents and non-residential energy consumers used 1.7 million gigawatt-hours (GWh) of electricity and 60 million therms of natural gas (CEC 2015b). With respect to transportation fuels, the California Energy Commission (CEC) estimates that 87 million gallons of gasoline and 33 million gallons of diesel fuel were sold in Yolo County in 2012 (CEC 2015c, 2015d). Information on alternative transportation fuels sold in the County was not available. Energy consumption within the City of Davis was not readily available. At the state level, California annually consumes 14.6 billion gallons of gasoline, 2.7 billion gallons of diesel fuel, and 1.8 billion gallons of gasoline equivalents of other alternative and miscellaneous fuels[1] (BOE 2015, CEC 2013a: 289).

A CEC staff forecast of future energy demand shows that statewide electricity consumption will grow by between 0.79 and 1.56 percent per year between 2012 and 2024; and natural gas consumption is expected to reach up to 24,092 million therms by 2025 for an annual average growth rate of up to 0.86 percent. The most recent Scoping Plan, prepared to address GHG emissions in the State, also commissioned state agencies to develop comprehensive and enforceable requirements for the State's electric and utilities to achieve near-zero GHG emissions by 2050 (ARB 2014b:45). With the onset of several transportation energy policies, such as the Low Carbon Fuel Standard and the Advanced Clean Cars program discussed in the regulatory settings below, the CEC anticipates that the state would experience a 2-billion-gallon decline in annual gasoline consumption from 2012 to 2022. However, the CEC anticipates a growing demand for diesel fuel, reflecting the recent growth in freight transport, although alternatives, such as natural gas trucks and electrification of freight lines, may provide some relief (CEC 2013b).

4.7.2 Regulatory Setting

GHG emissions and responses to global climate change are regulated by a variety of federal, state, and local laws and policies. Key regulatory and conservation planning issues applicable to the proposed project are discussed below.

[1] Gasoline and diesel consumption is based on fuel tax statistics for 2014. Other fuel estimates reflect 2013 conditions, based on the California Energy Commissions estimates.

FEDERAL

Supreme Court Ruling of Carbon Dioxide as a pollutant

The U.S. Environmental Protection Agency (EPA) is the federal agency responsible for implementing the federal Clean Air Act (CAA) and its amendments. The Supreme Court of the United States ruled on April 2, 2007 that CO_2 is an air pollutant as defined under the CAA, and that EPA has the authority to regulate emissions of GHGs. The ruling in this case resulted in EPA taking steps to regulate GHG emissions and lent support for state and local agencies' efforts to reduce GHG emissions.

National Program to Cut Greenhouse Gas Emissions and Improve Fuel Economy for Cars and Trucks

On August 28, 2014, EPA and the Department of Transportation's National Highway Traffic Safety Administration (NHTSA) finalized a new national program that would reduce GHG emissions and improve fuel economy for all new cars and trucks sold in the U.S. (NHTSA 2012). EPA proposed the first-ever national GHG emissions standards under the CAA, and NHTSA proposed Corporate Average Fuel Economy (CAFE) standards under the Energy Policy and Conservation Act. This proposed national program allows automobile manufacturers to build a single light-duty national fleet that satisfies all requirements under both Federal programs and the standards of California and other states. While this program will increase fuel economy to the equivalent of 54.5 mpg for cars and light-duty trucks by Model Year 2025, additional phases are being developed by NHTS and EPA that address GHG emission standards for new medium- and heavy-duty trucks (NHTSA 2014).

Energy Policy and Conservation Act

The Energy Policy and Conservation Act of 1975 sought to ensure that all vehicles sold in the U.S. would meet certain fuel economy goals. Through this Act, Congress established the first fuel economy standards for on-road motor vehicles in the U.S. Pursuant to the Act, the National Highway Traffic and Safety Administration, which is part of the U.S. Department of Transportation (USDOT), is responsible for establishing additional vehicle standards and for revising existing standards. Since 1990, the fuel economy standard for new passenger cars has been 27.5 miles per gallon (mpg). Since 1996, the fuel economy standard for new light trucks (gross vehicle weight of 8,500 pounds or less) has been 20.7 mpg. Heavy-duty vehicles (i.e., vehicles and trucks over 8,500 pounds gross vehicle weight) are not currently subject to fuel economy standards. Compliance with federal fuel economy standards is determined on the basis of each manufacturer's average fuel economy for the portion of its vehicles produced for sale in the U.S. The Corporate Average Fuel Economy (CAFE) program, administered by EPA, was created to determine vehicle manufacturers' compliance with the fuel economy standards. EPA calculates a CAFE value for each manufacturer based on city and highway fuel economy test results and vehicle sales. Based on the information generated under the CAFE program, the USDOT is authorized to assess penalties for noncompliance.

Energy Policy Act of 1992

The Energy Policy Act of 1992 (EPAct) was passed to reduce the country's dependence on foreign petroleum and improve air quality. EPAct includes several parts intended to build an inventory of alternative fuel vehicles (AFVs) in large, centrally fueled fleets in metropolitan areas. EPAct requires certain federal, state, and local government and private fleets to purchase a percentage of light duty AFVs capable of running on alternative fuels each year. In addition, financial incentives are included in EPAct. Federal tax deductions will be allowed for businesses and individuals to cover the incremental cost of AFVs. States are also required by the act to consider a variety of incentive programs to help promote AFVs.

Energy Policy Act of 2005

The Energy Policy Act of 2005 was signed into law on August 8, 2005. Generally, the act provides for renewed and expanded tax credits for electricity generated by qualified energy sources, such as landfill gas; provides bond financing, tax incentives, grants, and loan guarantees for a clean renewable energy and rural community electrification; and establishes a federal purchase requirement for renewable energy.

STATE

Executive Order S-3-05

Executive Order S-3-05, signed by Governor Arnold Schwarzenegger in 2005, proclaims that California is vulnerable to the impacts of climate change. It declares that increased temperatures could reduce the Sierra Nevada snowpack, further exacerbate California's air quality problems, and potentially cause a rise in sea levels. To combat those concerns, the Executive Order established total GHG emission targets for the State. Specifically, emissions are to be reduced to the 2000 level by 2010, the 1990 level by 2020, and to 80 percent below the 1990 level by 2050.

As described below, legislation was passed in 2006 to limit GHG emissions to 1990 levels by 2020, but no additional reductions were specifically enumerated in the legislation.

Assembly Bill 32, the California Global Warming Solutions Act of 2006

In September 2006, Governor Schwarzenegger signed the California Global Warming Solutions Act of 2006 (Assembly Bill [AB] 32). AB 32 establishes regulatory, reporting, and market mechanisms to achieve quantifiable reductions in GHG emissions and a cap on statewide GHG emissions. AB 32 requires that statewide GHG emissions be reduced to 1990 levels by 2020. AB 32 also requires that these reductions "…shall remain in effect unless otherwise amended or repealed. (b) It is the intent of the Legislature that the statewide GHG emissions limit continue in existence and be used to maintain and continue reductions in emissions of GHGs beyond 2020. (c) The (Air Resources Board) shall make recommendations to the Governor and the Legislature on how to continue reductions of GHG emissions beyond 2020." [California Health and Safety Code, Division 25.5, Part 3, Section 38551]

Assembly Bill 32 Climate Change Scoping Plan and Update

In December 2008, ARB adopted its Climate Change Scoping Plan, which contains the main strategies California will implement to achieve reduction of approximately 118 million metric tons (MMT) of CO_2-equivalent (CO_2e) emissions, or approximately 21.7 percent from the state's projected 2020 emission level of 545 MMT of CO_2e under a business-as-usual scenario (this is a reduction of 47 MMT CO_2e, or almost 10 percent, from 2008 emissions). In May 2014, ARB released and has since adopted the *First Update to the Climate Change Scoping Plan* to identify the next steps in reaching AB 32 goals and evaluate the progress that has been made between 2000 and 2012 (ARB 2014b:4 and 5). According to the update, California is on track to meet the near-term 2020 GHG limit and is well positioned to maintain and continue reductions beyond 2020 (ARB 2014b:ES-2). The update also reports the trends in GHG emissions from various emission sectors.

The update also elaborates on potential GHG reduction goals beyond 2020:

> California will develop a mid-term target to frame the next suite of emission reduction measures and ensure continued progress toward scientifically based targets. This target should be consistent with the level of reduction needed [by 2050] in the developed world to stabilize warming at 2°C (3.6°F) [above pre-industrial levels] and align with targets and commitments elsewhere. The European Union has adopted an emissions reduction target of 40 percent below 1990 levels by 2030. The United Kingdom has committed to reduce its emissions by 50 percent below 1990 levels within the 2022–2027 timeframe, and Germany has set its own 2030 emissions target of 55 percent below 1990 levels. The United States, in support of the Copenhagen Accord, pledged emission reductions of 42 percent below 2005 levels in 2030 (which, for California, translates to 35 percent below 1990 levels).
>
> This level of reduction is achievable in California. In fact, if California realizes the expected benefits of existing policy goals (such as 12,000 megawatts [MW] of renewable distributed generation by 2020, net zero energy homes after 2020, existing building retrofits under AB 758, and others) it could reduce emissions by 2030 to levels squarely in line with those needed in the developed world and to stay on track to reduce emissions to 80 percent below 1990 levels by 2050. Additional measures, including locally driven measures and those necessary to meet federal air quality standards in 2032, could lead to even greater emission reductions (ARB 2014b:34).

> As supported by many of California's climate scientists and economists, a key next step needed to build on California's framework for climate action is to establish a mid-term statewide emission reduction target. Cumulative emissions drive climate change, and a continuum of action is needed to reduce emissions not just to stated limits in 2020 or 2050, but also every year in between (ARB 2014b:ES6).

The update summarizes sector-specific actions needed to stay on the path toward the 2050 target. While the update acknowledges certain reduction targets by others (such as in the Copenhagen Accord), it stops short of recommending a specific target for California, instead acknowledging that mid-term targets need to be set "consistent with the level of reduction needed [by 2050] in the developed world to stabilize warming at 2°C (3.6°F) [above pre-industrial levels]."

Actions are recommended for the energy sector, transportation (clean cars, expanded zero-emission vehicle program, fuels policies, etc.), land use (compliance with regional sustainability planning targets), agriculture, water use (more stringent efficiency and conservation standards, runoff capture, etc.), waste (elimination of organic material disposal, expanded recycling, use of Cap and Trade program, etc.), green building (strengthen Green Building Standards), and other sectors. Many of the actions that result in meeting targets will need to be driven by new or modified regulations.

Senate Bill 375

SB 375, signed by the Governor in September 2008, aligns regional transportation planning efforts, regional GHG emission reduction targets for cars and light duty trucks, and land use and housing allocation. SB 375 requires Metropolitan Planning Organizations (MPOs) to adopt a Metropolitan Transportation Plan/Sustainable Communities Strategy (MTP/SCS) or Alternative Planning Strategy, showing prescribed land use allocation in each MPO's Regional Transportation Plan. ARB, in consultation with the MPOs, is to provide each affected region with reduction targets for GHGs emitted by passenger cars and light trucks in their respective regions for 2020 and 2035.

The applicable MPO in the project region is the Sacramento Area Council of Governments (SACOG), which includes Yolo County. SACOG adopted its current MTP/SCS for 2035 in 2012 (2012 MTP/SCS) and is currently working on a 2016 update to the plan (2016 MTP/SCS) to identify opportunities that can help steer the region toward the goals set forth in the 2012 MTP/SCS (SACOG 2014).

Executive Order B-30-15

On April 20, 2015 Governor Edmund G. Brown Jr. signed Executive Order B-30-15 to establish a California GHG reduction target of 40 percent below 1990 levels by 2030. The Governor's executive order aligns California's GHG reduction targets with those of leading international governments such as the 28-nation European Union which adopted the same target in October 2014. California is on track to meet or exceed the current target of reducing GHG emissions to 1990 levels by 2020, as established in the California Global Warming Solutions Act of 2006. California's new emission reduction target of 40 percent below 1990 levels by 2030 will make it possible to reach the ultimate goal of reducing emissions 80 percent below 1990 levels by 2050. This is in line with the scientifically established levels needed in the U.S. to limit global warming below 2°C, the warming threshold at which there will likely be major climate disruptions such as super droughts and rising sea levels.

Advanced Clean Cars Program

In January 2012, ARB approved the Advanced Clean Cars program which combines the control of GHG emissions and criteria air pollutants, as well as requirements for greater numbers of zero-emission vehicles, into a single package of standards for vehicle model years 2017 through 2025. The new rules strengthen the GHG standard for 2017 models and beyond. This will be achieved through existing technologies, the use of stronger and lighter materials, and more efficient drivetrains and engines. The program's zero-emission vehicle regulation requires battery, fuel cell, and/or plug-in hybrid electric vehicles to account for up to 15 percent of California's new vehicle sales by 2025. The program also includes a clean fuels outlet regulation designed to support the commercialization of zero-emission hydrogen fuel cell vehicles planned by vehicle manufacturers by 2015 by requiring increased numbers of hydrogen fueling stations throughout the state. The number of

stations will grow as vehicle manufacturers sell more fuel cell vehicles. By 2025, when the rules will be fully implemented, the statewide fleet of new cars and light trucks will emit 34 percent fewer GHG emissions and 75 percent fewer smog-forming emissions than the statewide fleet in 2016 (ARB 2011b).

Integrated Energy Policy Reports (Senate Bill 1389)

Senate Bill 1389 (Bowen, Chapter 568, Statutes of 2002) requires the CEC to prepare a biennial integrated energy policy report that contains an assessment of major energy trends and issues facing the state's electricity, natural gas, and transportation fuel sectors and provides policy recommendations to conserve resources; protect the environment; ensure reliable, secure, and diverse energy supplies; enhance the state's economy; and protect public health and safety (Public Resources Code § 25301[a]). The Energy Commission prepares these assessments and associated policy recommendations every two years, with updates in alternate years, as part of the Integrated Energy Policy Report (IEPR). Preparation of the IEPR involves close collaboration with federal, state, and local agencies and a wide variety of stakeholders in an extensive public process to identify critical energy issues and develop strategies to address those issues. (CEC 2012a.)

California Long-Term Energy Efficiency Strategic Plan

On Sept. 18, 2008, the California Public Utilities Commission (CPUC) adopted California's first Long Term Energy Efficiency Strategic Plan, presenting a single roadmap to achieve maximum energy savings across all major groups and sectors in California. This comprehensive Plan for 2009 to 2020 is the state's first integrated framework of goals and strategies for saving energy, covering government, utility, and private sector actions, and holds energy efficiency to its role as the highest priority resource in meeting California's energy needs. The plan was updated in January 2011 to include a lighting chapter.

California Building Energy Efficiency Standards

California's Building Energy Efficiency Standards (Title 24, Part 6 of the California Code of Regulations) conserve electricity and natural gas in new building construction and are administered by the CEC. Local governments enforce the standards through local building permitting and inspections. The CEC has updated these standards on a periodic basis. The new 2013 Building Energy Efficiency Standards, which take effect on January 1, 2014, are 25 percent more efficient than previous standards for residential construction and 30 percent more efficient for nonresidential construction.

Comprehensive Energy Efficiency Plan for Existing Buildings (Assembly Bill 758)

Assembly Bill 758 (Skinner, Chapter 470, Statutes 2009) requires the CEC, in collaboration with the CPUC and stakeholders, to develop a comprehensive program to achieve greater energy efficiency in the state's existing buildings.

California Renewable Energy Portfolio Standard (Senate Bill X1-2)

In 2011, Governor Brown signed SB X1-2, which requires retail sellers of electricity, including investor-owned utilities and community choice aggregators, to provide at least 33 percent of their electricity supply (portfolio) from renewable sources by 2020. The CPUC and the CEC jointly implement the statewide Renewable Portfolio Standard (RPS) program through rulemakings and monitoring the activities of electric energy utilities in the state.

California Qualifying Facility and Combined Heat and Power Program Settlement

In December 2010, the CPUC approved California's Qualifying Facility and Combined Heat and Power Program Settlement, which established a CHP framework for the state's investor-owned utilities. The settlement established a near-term target of 3,000 MW of CHP for entities under the jurisdiction of the CPUC, although this target includes not just new CHP, but capacity from renewal of contracts due to expire in the next three years. The CPUC has also adopted a settlement agreement that includes reforms to the Rule 21 interconnection process to provide a clear, predictable path to interconnection of distributed generation while maintaining the safety and reliability of the grid (CEC 2012b).

California Appliance Efficiency Regulations

California's Appliance Efficiency Regulations, enacted in 1976, requires that certain appliances meet efficiency standards. Each appliance must be tested and the results certified by the CEC in order for a product to be sold in California (CEC 2012c).

Alternative and Renewable Fuel and Vehicle Technology Program

AB 118 (Statues of 2007) created the CEC's Alternative and Renewable Fuel and Vehicle Technology Program. The statute, subsequently amended by AB 109 (Statues of 2008), authorizes the CEC to develop and deploy alternative and renewable fuels and advanced transportation technologies to help attain the state's climate change policies.

LOCAL

Sacramento Area Council of Governments

Pursuant to SB 375, SACOG was tasked by ARB to achieve a 7 percent per capita reduction in passenger-vehicle generated transportation emissions by 2020 and a 16 percent per capita reduction by 2035 from 2005, which ARB confirmed the region would achieve by implementing its Sustainable Communities Strategy (ARB 2013). In fact, SACOG's 2012-2035 MTP/SCS projects are estimated to exceed ARB's targets with anticipated per capita reductions of 10 percent by 2020 and 16 percent by 2035 from 2005 levels [23.0 pounds (lb) CO_2 per capita per day]. These percent reductions translate to a planned forecast of 20.8 lb CO_2 per capita per day in 2020 and 19.7 lb CO_2 per capita per day in 2035 (SACOG 2012: 177,178).

SACOG is currently working on a 2016 update to the plan (2016 MTP/SCS) to identify opportunities that can help steer the region toward the goals set forth in the 2012 MTP/SCS. The 2016 MTP/SCS will also focus on implementation challenges and commitments of the current 2012 MTP/SCS. (SACOG 2014).

Yolo-Solano Air Quality Management District

The Yolo-Solano Air Quality Management District's (YSAQMD) CEQA handbook and website currently recommends that GHG emissions and impacts to climate change be evaluated for every CEQA project (YSAQMD 2007:24-25, 2015). However, in a recent letter to the City of Davis from YSAQMD written in response to the notice of preparation for this project, YSAQMD states the following.

> "Recent changes to CEQA require any CEQA analysis to address a project's impacts on global climate change. The lead agency should provide a discussion of the project's potential to produce greenhouse gas emissions (GHG) and whether these emissions would be in conflict with the GHG-reduction goals set by the State. If emissions are quantified, the lead agency should contact the District to determine the most appropriate threshold of significance for the project." (Jones, pers. comm., 2015a.)

In subsequent discussions, YSAQMD has recommended using Sacramento Metropolitan Air Quality Management District's (SMAQMD) adopted GHG thresholds and guidance, pending an update of YSAQMD's own guidance. SMAQMD considers a project as having a significant impact on the environment if construction and operational emissions exceed 1,100 $MTCO_2e$/year. YSAQMD recommends the use of SMAQMD threshold guidance because SMAQMD is the only adjacent air district with officially adopted thresholds and YSAQMD agrees with the methodology that was used to develop SMAQMD thresholds (Jones, pers. comm., 2015b).

City of Davis General Plan

The Energy Element of the City's General Plan (amended through January 2007) contains goals, policies, and actions that pertain to energy use (City of Davis 2007). Key policies that are applicable to the proposed project include the following:

Although the General Plan does not currently have a specific Climate Change or GHG element, it does address elements of sustainability and GHG emissions as they relate to transportation in its Transportation Element. See Chapter 4.14, Transportation and Circulation, for the list of relevant policies.

Goal ENERGY 1. Reduce per capita energy consumption in Davis.

- **Policy ENERGY 1.3** Promote the development and use of advanced energy technology and building materials in Davis.
- **Policy ENERGY 1.5** Encourage the development of energy-efficient subdivisions and buildings.

Davis Climate Action and Adaptation Plan

Adopted in 2010 by the City of Davis, the Davis Climate Action and Adaptation Plan (D-CAAP) describes actions and objectives to reach the City's GHG emission targets through the year 2050 and to prepare for climate change at the City level. The D-CAAP recommends GHG emission reduction targets and strategies for achieving those targets from both community and municipal operations within the City of Davis. The reduction target and strategies focus on actions and objectives in nine sectors: mobility, energy, land use and buildings, consumption and waste, food and agriculture, community engagement, government operations, advocacy, and climate change preparation (adaptation). The City's goals extend from reducing the City's community-wide emissions to 15 percent below 1990 levels in 2015 to achieving a community-wide carbon neutral status by 2050. These targets are based on the City's desire to exceed state-recommended targets for 2020 and 2050 adopted as part of AB32 and EO S-3-05, which were adopted at the time the D-CAAP was published in 2010, and do not include the recently adopted interim 2030 target identified in EO B-30-15. The applicable targets identified in the D-CAAP are summarized in Table 4.7-1.

With respect to adaptation, the D-CAAP includes an action to prepare an assessment of vulnerabilities to climate change associated with local resources, infrastructure, and the public health system. The D-CAAP established objectives and specific actions for 2015, and only established foundations for long-term reductions beyond 2015.

Table 4.7-1 City of Davis GHG Reduction Targets: Community and City Operations

Year	Target Range[1]		Notes	
	State	Davis[2]	Minimum	Desired
2015	1995 levels	15% below 1990 levels	State does not establish target for this year; linear interpolation from 2010 target.	Consistent with initial ICLEI modeling conducted by the City.
2015 to 2020	Average annual reduction	Average of 2.6% reduction/ year to achieve 80% below 1990 levels by 2040	State does not establish target for these years.	Average reduction encourages monitoring of progress and some flexibility in implementation.
2020	1990 levels	28% below 1990 levels	State target.	Average reduction encourages monitoring of progress and some flexibility in implementation.
2020-2040	No formal target, but must reduce an average of 2.66%/year to achieve 80% below 1990 levels by 2050	Average of 2.6% reduction/year to achieve 80% below 1990 levels	State does not establish target for these years[3]	Reduction level adopted by the state based on climate stabilization levels of 3-5.5 degree increase in temp. Average reduction encourages monitoring of progress and some flexibility in implementation.
2050	80% below 1990 levels	Carbon neutral	State target. Reduction level adopted by the state based on climate stabilization levels of 3-5.5 degree increase in temp. Average reduction encourages monitoring of progress and some flexibility in implementation.	Combination of actions at the local, regional, national, and international levels and carbon offsets. Similar target set by the UC system, City of Berkeley, and Norway.

[1] The City of Davis anticipates that it will achieve reductions within the range of the state targets (minimum) and local targets (desired)
[2] Due to residency time of GHG gasses in the atmosphere, early GHG reduction is generally more beneficial for mitigation of the most severe impacts of climate change.
[3] The state has recently adopted an interim target of achieving a 40 percent reduction in statewide GHG emissions by 2030 as part of Executive Order B-30-15.

GHG = Greenhouse gas
ICLEI = International Council for Local Environmental Initiatives – Local Governments for Sustainability
UC = University of California

Source: City of Davis 2010

4.7.3 Impacts and Mitigation Measures

SIGNIFICANCE CRITERIA

Greenhouse Gases

Establishment of a GHG significance threshold for a single project has been a challenge ever since this issue was first addressed in CEQA. A single land use development plan or project is not large enough to meaningfully affect climate change by itself (because climate change has resulted from many decades of cumulative global GHG emissions). In 2008, the Governor's Office of Planning and Research (OPR) issued guidance regarding this issue; that guidance stated that the adoption of appropriate significance thresholds was a matter of discretion for the lead agency. The guidance states (California Governor's Office of Planning and Research 2008, pp. 4-6):

> "[T]he global nature of climate change warrants investigation of a statewide threshold of significance for GHG emissions. To this end, OPR has asked ARB technical staff to recommend a method for setting thresholds which will encourage consistency and uniformity in the CEQA analysis of GHG emissions throughout the state. Until such time as state guidance is available on thresholds of significance for GHG emissions, we recommend the following approach to your CEQA analysis."
>
> *Determine Significance*
>
> - *When assessing a project's GHG emissions, lead agencies must describe the existing environmental conditions or setting, without the project, which normally constitutes the baseline physical conditions for determining whether a project's impacts are significant.*
> - *As with any environmental impact, lead agencies must determine what constitutes a significant impact. In the absence of regulatory standards for GHG emissions or other scientific data to clearly define what constitutes a "significant impact," individual lead agencies may undertake a project-by-project analysis, consistent with available guidance and current CEQA practice.*
> - *The potential effects of a project may be individually limited but cumulatively considerable. Lead agencies should not dismiss a proposed project's direct and/or indirect climate change impacts without careful consideration, supported by substantial evidence. Documentation of available information and analysis should be provided for any project that may significantly contribute new GHG emissions, either individually or cumulatively, directly or indirectly (e.g., transportation impacts).*
> - *Although climate change is ultimately a cumulative impact, not every individual project that emits GHGs must necessarily be found to contribute to a significant cumulative impact on the environment. CEQA authorizes reliance on previously approved plans and mitigation programs that have adequately analyzed and mitigated GHG emissions to a less than significant level as a means to avoid or substantially reduce the cumulative impact of a project.*

OPR's Guidance did not require Executive Order S-3-05 to be used as a significance threshold under CEQA. Rather, OPR recognized that, until ARB establishes a state-wide standard, selecting an appropriate threshold is within the discretion of the lead agency.

CEQA Guidelines Section 15064.4 was later added, in 2010, to address GHGs. The Guidelines state:

> (a) The determination of the significance of GHG emissions calls for a careful judgment by the lead agency consistent with the provisions in Section 15064. A lead agency should make a good-faith effort, based to the extent possible on scientific and factual data, to describe, calculate or estimate the amount of GHG emissions resulting from a project.

(b) A lead agency should consider the following factors, among others, when assessing the significance of impacts from GHG emissions on the environment:

(1) The extent to which the project may increase or reduce GHG emissions as compared to the existing environmental setting;

(2) Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project;

(3) The extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of GHG emissions. Such requirements must be adopted by the relevant public agency through a public review process and must reduce or mitigate the project's incremental contribution of GHG emissions. If there is substantial evidence that the possible effects of a particular project are still cumulatively considerable notwithstanding compliance with the adopted regulations or requirements, an EIR must be prepared for the project.

Thus, one threshold that may be used to analyze the project's GHG emissions is whether the project would conflict with or obstruct the goals or strategies of the California Global Warming Solutions Act of 2006 (AB 32) or its governing regulation (Health & Safety Code, §§ 38500-38599). The City of Davis established a more ambitious (than AB 32) goal in its D-CAAP, which is achievement of net zero carbon emissions by 2050, along a sliding trajectory downward from 2015 targets.

Applicable Greenhouse Gas Thresholds

In accordance with Appendix G of the State CEQA Guidelines, the project would result in a potentially significant impact on climate change if it would:

- generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment; or
- conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of GHGs.
- The City of Davis does not currently have formally adopted thresholds of significance for GHG emissions for land use developments. However, as the lead agency, the City has determined that consistency with the D-CAAP shall be used to determine the significance of a project within the City's jurisdiction. Thus, in line with OPR's guidance mentioned previously, Appendix G of the State CEQA Guidelines, and YSAQMD recommendations, the applicable GHG significance thresholds are as follows:
  - with respect to a significant impact on the environment, and
  - for the evaluation of short-term construction-related emissions, a project would not have a significant impact on the environment if construction emissions do not exceed 1,100 $MTCO_2e$/year.
- For the evaluation of operational emissions of a land development, operational emissions of a project would not have a significant impact on the environment if the project meets the following:
  - operational emissions do not exceed 1,100 $MTCO_2e$/year, as recommended by YSAQMD via SMAQMD guidance (Jones, pers. comm., 2015b; SMAQMD 2015); or
  - operational emissions are shown to be on a trajectory towards carbon neutrality by 2050, pursuant to the D-CAAP targets.

- Thus, even if operational emissions exceed 1,100 $MTCO_2e$/year, if the project can show that operational emissions can demonstrate a trajectory to emitting a net of zero GHG emissions per year by 2050, the project would be less-than-significant.

- With respect to conflicting with an applicable plan, policy, or regulation of an agency adopted for the purpose of reducing emissions of GHGs, a project would have a significant impact on climate change if the project does any of the following:

  - impedes attainment of AB 32 2020 GHG emissions reduction goal;

  - impedes attainment of statewide intermediate GHG emissions reductions goal for 2040 as set in EO B-30-15;

  - is inconsistent with regional SACOG MTP/SCS goals to reduce per capita transportation emissions by 9 percent and 16 percent by 2035 from 2005 levels; or

  - is inconsistent with or would impede attainment of City's CAAP, including targets for 2020, 2040, and 2050

These thresholds compare the project's performance to the applicable statewide, regional, and local GHG reduction plans and policies.

Energy

Based on Appendix F and G of the State CEQA Guidelines, the proposed project would result in a potentially significant impact on energy use if it would:

- require or result in the construction of new energy production, and/or transmission facilities or expansion of existing facilities, the construction of which could cause significant environmental effects;

  - impact analysis may include whether the project may result in:

    - significant adverse impacts related to project energy requirements,

    - energy use inefficiencies, and/or

    - energy intensiveness of materials by amount and fuel type for each stage of the project including construction, operations, maintenance, and/or removal.

- result in the wasteful or inefficient use of energy as a result of project construction or operation;

  - result in significant adverse impacts on local and regional energy supplies and on requirements for additional capacity,

  - result in significant adverse impacts on peak and base period demands for electricity and other forms of energy,

  - fail to comply with existing energy standards,

  - result in significant adverse impacts on energy resources, or

  - result in significant adverse impacts related to transportation energy use requirements of the project and use of transportation alternatives; or

- conflict, or create an inconsistency, with any applicable plan, policy, or regulation adopted for the purpose of avoiding or mitigating environmental effects related to energy use.

METHODS AND ASSUMPTIONS

Components of the Nishi Sustainability Implementation Plan That Could Affect Project Impacts

The following goals and objectives from the Nishi Sustainability Plans are applicable to the evaluation of GHG and energy impacts:

Goal 1: Serve as a model for low-carbon, climate-resilient development that also enhances the fiscal and equitable sustainability of the broader community.

- **Objective 1.1**: Achieve substantially lower GHG emissions per capita for both residents and employees of the District compared to baseline levels, in support of the City of Davis' and UC Davis' long-term goals to achieve carbon neutrality.
- **Objective 1.2:** Encourage innovative site and building design that encourages a healthy and interconnected natural and built environment, conserves natural resources, and promotes equitable and efficient communities.
- **Objective 1.3**: Contribute to resource conservation during construction through the use of sustainable materials and cost-effective resource conservation methods.
- **Objective 1.4**: Promote and demonstrate resiliency to the effects of climate change and other challenges through project design.

Goal 2: Strive for carbon neutral transportation through the use of innovative designs, technologies, and programs.

- **Objective 2.1**: Reduce automobile dependency and reduce vehicle trips generated within the District by 10 percent compared to original project trip generation forecasts [3], working towards the communitywide goal of achieving 50 percent non-single-occupancy-vehicle (SOV) mode share for residential and commercial development by 2035.
- **Objective 2.2**: Achieve a 20 percent reduction in project-related vehicle miles traveled (VMT), compared to original project VMT forecasts.
- **Objective 2.3**: Achieve maximum connectivity and safety for pedestrians, bicyclists, and transit users.
- **Objective 2.4**: Incentivize the use of clean, energy-efficient, active (i.e., human powered), and economically sustainable means of travel.
- **Objective 2.5**: Achieve an average vehicle ridership (AVR) of 1.5 for peak period commute trips by employees of the project office uses.

Goal 3: Design and construct high-performance buildings, public lighting, and on-site renewable energy systems that work towards achieving zero net energy (ZNE) by Nishi development build-out.

- **Objective 3.1**: High-performance buildings will achieve a minimum 30 percent compliance margin relative to the 2013 Title 24 Building Energy Efficiency Standards, or equivalent. High-performance buildings will also incorporate energy consumption feedback mechanisms in order to encourage resident and employee engagement and minimize wasted energy use.
- **Objective 3.2**: Other building loads not covered by Title 24 will also be high efficiency, (i.e., 100 percent high efficiency lighting, ENERGY STAR appliances and equipment), and lighting will be adaptive where practicable.

- **Objective 3.3**: Design the Nishi development to achieve ZNE such that all site energy use is offset with renewable energy generation on an annual basis. To the extent possible, on-site generation will be used to meet this objective; however, off-site generation and purchase of renewable energy offsets will also be considered. Site energy use to be offset includes building energy use, all street and area site lighting, and other community related energy uses such as pools and community buildings. It does not include mobile sources / transportation-related energy use.

Goal 4: Maximize water and wastewater efficiency through the use of conservation, reuse and integrated landscaping and stormwater management strategies.

- **Objective 4.1**: Meet or exceed 2013 CALGreen Tier 1 water use efficiency requirements for indoor water use.

- **Objective 4.2**: Minimize use of potable water in outdoor landscaping and maximize the use of non-potable water.

- **Objective 4.3**: Work towards achieving zero net water usage through use of best management practices and innovative technologies.

Goal 5: Create synergy with other project design goals and existing community sustainability initiatives.

- **Objective 5.6**: Incorporate opportunities to educate and empower future residents and employees in the District to increase awareness of resource consumption and their carbon footprint.

Impact Assessment Methodology

As noted in Chapter 3, "Project Description," this EIR evaluates development of the Nishi site at a project level and potential redevelopment that may occur within West Olive Drive as a result of rezoning/redesignation at a programmatic level. Impacts were assessed in accordance with YSAQMD-recommended methodologies (Jones, pers. comm., 2015a). Only CO_2, CH_4, and N_2O emissions were considered. Other GHGs were considered to be negligible. GWP factors from the IPCC Fifth Assessment Report were applied to calculate CO_2e.

Construction

Short-term construction-generated GHG emissions were calculated using the California Emissions Estimator Model (CalEEMod) Version 2013.2 computer program (SCAQMD 2013), as recommended by YSAQMD and other air districts in California. Modeling was based on project-specific information (e.g., size, construction phasing, construction seasons, area to be graded, area to be paved), where available; reasonable assumptions based on typical construction activities; and default values in CalEEMod that are based on project location and land use types. Construction GHG emissions were estimated using the same assumptions as outlined in Chapter 4.3, "Air Quality."

Construction-generated N_2O emissions from mobile sources was not available from CalEEMod, but is planned for future versions (SCAQMD 2013). It is anticipated that N_2O emissions from construction would be minimal.

Regarding energy use (e.g., fuel use) during construction, it is assumed that only diesel fuel would be used in construction equipment and a mix of diesel and gasoline fuel would be used in on-road vehicles used to haul materials or carry workers to and from the site. Although CalEEMod was used to calculate emissions from construction activities, CalEEMod does not provide fuel estimates for construction activities. Having assumed that construction equipment only uses diesel fuel, we can estimate construction-related fuel use based on emissions estimated shown later in Table 4.7-2 using emissions factors from the Climate Registry (10.21 kg CO_2 per gallon of diesel, 8.78 kg CO_2 per gallon of gasoline) (Climate Registry 2014: Table 13:1).

Operations

Operational GHG emissions were estimated using a variety of sources and models. Project-generated GHG emissions from electricity use, on-site natural gas combustion, area sources, waste, and mobile sources were calculated.

With regard to building energy use, annual electricity and natural gas usage estimated for the project was provided by the energy technical study conducted for the City of Davis and this project by Davis Energy Group (Davis Energy Group 2015). Davis Energy Group assumed that the residential and non-residential buildings would operate at 30 percent better than 2013 Title 24 standards. The energy study also accounted for outdoor lighting, three spas, a recreational pool, and electricity-generating solar panels, in addition to the land uses identified in the project description.

Indirect GHG emissions from on-site electricity use (and generation) was calculated apart from any models by applying estimated future emission PG&E factors that would be applicable by 2022, the first estimated full build-out year of operation. It was assumed that, by 2020, 33 percent of electricity sold by PG&E would be from renewable sources, based on requirements in the state's Renewable Portfolio Standard (RPS). Although Phase 1 would be operational in 2019, operational GHG emissions are analyzed on a long-term basis starting from the full build-out year. In 2013, 23.8 percent of PG&E electricity was from renewable sources with an emission factor of 167 lb CO_2/MWh (Climate Registry 2013, CPUC 2015). CH_4 and N_2O emission factors were also adjusted to reflect the statewide RPS goal and were based on the "CAMX" region emission factors from EPA's eGrid2010 database (USEPA 2014).

CalEEMod was used to calculate annual CO_2, CH_4, and N_2O emissions from the natural gas use, area sources, indirect electricity use from on-site water demand, and waste. Projected natural gas and water usage were taken from project-specific studies conducted as part of the sustainability planning effort for the project (Davis Energy Group 2015; Cunningham Engineering 2015). Area source and waste emissions were based off of CalEEMod defaults for the project's land use types and sizes.

ARB's emissions factor model, EMFAC2014, was used to estimate annual CO_2 and CH_4 emissions from vehicle miles travelled (VMT) generated by the project, which was available from Fehr and Peers (Grandy Pers. Comm., 2015); see Section 4.14 of this EIR. Fehr and Peers estimated that the project would generate 45,200 VMT per day, not accounting for any trip reduction measures. EMFAC2014 is ARB's latest update to the EMFAC model series and takes into account effects of future policies and economic forecasts. The modeled emission factors reflect the county average vehicle mix and usage rates forecast for 2022 for Yolo County, which are assumed to be reflective of the city, absent of city-specific data. N_2O emissions were not available from EMFAC2014 and are expected to be negligible.

The loss in sequestered carbon was also estimated in CalEEMod using the vegetation module. The types and amounts of vegetation that would be removed permanently because of construction were based on information available from the project description as well as assumptions based on discussions with the City. With respect to CalEEMod's prescribed vegetative land use categories, it was assumed that the project would remove 46.9 acres of cropland and add 15.9 acres of grassland, representing planned park land; approximately 4 acres of wetland, representing the planned detention basin; and no less than 20 trees, although the actual number of trees planted as part of the project would likely be more. For the purposes of presenting a conservative analysis, any planting improvements that may occur as part of the project along the Putah Creek channel were not considered as part of this analysis. Total one-time GHG emissions from the net loss in carbon sequestration were then amortized over the operational life of the project (assumed to be 40 years for this analysis) and considered in combination with on-going operational emissions. Accounting for the loss in sequestered carbon in this way allows for the evaluation of whether ongoing operation of the proposed land uses would be efficient enough to "recoup" these one-time emissions.

ISSUES NOT EVALUATED FURTHER

All GHG and energy issues addressed in the significance criteria are evaluated below.

PROJECT-SPECIFIC IMPACTS AND MITIGATION MEASURES

Impact 4.7-1: Considerably contribute to climate change through project-generated greenhouse gas emissions during construction.

Nishi Site

Annual GHG emissions from project construction would range from a low of 578 MT CO_2e to a high of 980 MT CO_2e over an estimated 5 year period. Peak-year construction-generated GHG emissions would not exceed YSAQMD's recommended GHG emission threshold of 1,100 MT CO_2e for construction projects. Therefore, GHG emissions from project-related construction would be not be substantial. This impact would be **less than significant**.

Construction-related activities that would generate GHGs include worker commute trips, haul trucks carrying supplies and materials to and from the West Parcel development area, and off-road construction equipment (e.g., dozers, loaders, excavators). Construction of the land uses on the Nishi site would occur over five years. Construction of Phase 1 would involve demolition of two structures on West Olive, mass grading, utilities construction, and construction of the bridge between the Nishi site and West Olive Drive in 2017 and building[2] and roadway construction spanning from the end of 2017 through 2019. Phase 1 would provide most of the grading and infrastructure also needed for the construction of Phase 2. It is anticipated that construction would follow the general phasing schedule outlined available in Appendix C.

Annual construction emissions are summarized in Table 4.7-2. The GHG emissions are the greatest during 2017 and 2020 because of the respective grading phases at the beginning of Phase 1 and Phase 2. Refer Chapter 4.3," Air Quality," for additional details on the construction schedule. Refer to Appendix C for a detailed summary of the modeling assumptions, inputs, and outputs. As shown in Table 4.7-2, Annual GHG emissions from project construction would range from a low of 578 MT CO_2e to a high of 980 MT CO_2e over an estimated 5-year period.

Table 4.7-2 Annual Emissions of Greenhouse Gas Emissions Associated with Project Construction by Construction Year

Construction Year	CO_2e (MT/year)
2017	922
2018	980
2019	657
2020	951
2021	578
YSAQMD recommended Threshold of Significance	1,100

Notes: YSAQMD recommends using SMAQMD Thresholds of Significance for greenhouse gas emissions (Jones, pers. comm., 2015b). SMAQMD thresholds are 1,100 MT CO_2e per year. Numbers in **bold** indicate exceedances of thresholds. CO_2e are calculated using IPCC Fifth Assessment 100 year lifetime global warming potential factors.

CO_2e = carbon dioxide equivalents
MT = metric tons
YSAQMD = Yolo County Air Quality Management District
IPCC = International Panel on Climate Change

Source: Data provided by Ascent Environmental, Inc. in 2015 based on modeling using CalEEMod v. 2013.2.2

*Peak-year construction-generated GHG emissions would not exceed YSAQMD's recommended GHG emission threshold of 1,100 MT CO_2e for construction projects. Therefore, GHG emissions from project-related construction would be not be substantial. This impact would be **less than significant**.*

[2] Including paving and architectural coating phases

Mitigation Measures

No mitigation measures are required.

West Olive Drive

Construction-related activities associated with the redevelopment of parcels along West Olive Drive would result in temporary, short-term GHG emissions. However, specific construction details related to the site are not yet available and would be market dependent. Given that the project would be at least half the size of the Nishi site and would not require new infrastructure development due to existing utilities serving the site, short-term construction GHG emissions are not anticipated to exceed YSAQMD thresholds. Therefore, this impact is **less than significant**.

Construction activities associated with potential redevelopment of West Olive Drive would generate GHG emissions during the operation of construction equipment and movement of materials to and from West Olive Drive. However, based on the anticipated net increase in square footage within West Olive Drive, which would be approximately 4.5 percent of the anticipated square footage within the Nishi site, emissions associated with redevelopment would be substantially less than that of the proposed development within the Nishi site. As noted above in Table 4.7-2, GHG emissions associated with development of the Nishi site would be less than applicable annual thresholds. Construction activities associated with potential redevelopment within West Olive Drive would likely not occur until the Nishi site is built out and thus would not be considered additive with the proposed Nishi site development. Further, based on anticipated redevelopment potential within West Olive Drive, emissions are reasonably anticipated to be less than those identified above for the Nishi site and less than applicable thresholds.

Future construction GHG emissions from the West Olive Drive redevelopment would likely have less annual emissions than Nishi and; consequently, would not exceed thresholds. Therefore, this impact is ***lessthan significant.***

Mitigation Measures

No mitigation measures are required.

Impact 4.7-2: Considerably contribute to climate change through project-generated greenhouse gas emissions during operation.

Nishi Site

Annual GHG emissions from project operation would exceed YSAQMD-recommended emission threshold of 1,100 MT CO_2e/year. Despite the development's energy efficient design and ideal location close to major destinations in the City, such as University of California at Davis (UC Davis) and downtown Davis, there is no guarantee that future emissions generated by the development could be net zero carbon by 2050. Therefore, operation of the project has the potential to result in a substantial contribution to GHG emissions. This impact would be **potentially significant**.

Operation of the project would result in GHG emissions associated with motor vehicle trips to and from the Nishi development area; combustion of natural gas for space and water heating; consumption of electricity and water; conveyance, treatment, and discharge of wastewater; decomposition of solid waste; and use of equipment for landscaping. The removal of trees and vegetation would also result in the loss of sequestered carbon. Table 4.7-3 summarizes all the direct and indirect sources of GHG emissions associated with the Nishi project upon full buildout in 2022. The emissions estimates provided below assume the project would attain building efficiencies that are 30 percent better than 2013 CalGreen Title 24 building standards based on the results of the sustainability planning effort conducted by the City, ARB vehicle emission factors forecasted for 2022, electricity emission factors that reflect PG&E's likely attainment of the state's 33 percent renewable goal, and offsets related to electricity generation from planned solar photovoltaic panels.

As shown in Table 4.7-3, upon full buildout in 2022, total net GHG emissions associated with the operation of the project would be 12,846 $MTCO_2e$ per year, above YSAQMD-recommended mass emissions threshold of 1,100 $MTCO_2e$/year. Eighty-five percent of unmitigated operational emissions, apart from offsets from solar generation, are estimated to be from mobile sources generated by the project. GHG emissions from natural gas combustion account for another 11 percent of estimated operational emissions. Also, 87 percent of annual emissions, 547 out of 647 $MTCO_2e$, related to on-site electricity use is anticipated to be offset by proposed on-site solar electricity generation, thus accounting for the low percentage of emissions related to electricity use. A relatively small amount of emissions are further generated by solid waste, water and wastewater treatment and conveyance, landscaping, and through carbon sequestration losses through net reductions in vegetation.

Table 4.7-3 Summary of Unmitigated Annual Greenhouse Gas Emissions Associated with Nishi-Gateway Long-Term Operation at full buildout in 2022

Emissions Source	CO_2e (MT/year)	Percent of Total
Mobile	10,933	85%
Natural Gas	1,404	11%
Solid Waste	415	3%
Net Electricity Use with Solar Generation	80	1%
Water and Wastewater	14	<1%
Landscaping	8	<1%
Amortized Net Lost Carbon Sequestration[1]	5	<1%
Total	**12,852**	100%
YSAQMD recommended Threshold of Significance	1,100	

Note: Summation may not equal totals due to rounding. Electricity, natural gas, and mobile emissions modeled separately from CalEEMod. Electricity emissions assume PG&E will attain 33 percent renewables by 2020. Water and wastewater emissions account for supply, conveyance, and treatment electricity use. Solid waste emissions account for decomposition emissions, as modeled within CalEEMod. Mobile source emissions are based on 45,200 VMT per day for 365 days per year. CO_2e are calculated using IPCC Fifth Assessment 100 year lifetime global warming potential factors.

YSAQMD recommends using SMAQMD Thresholds of Significance for greenhouse gas emissions (Jones, pers. comm., 2015b). SMAQMD thresholds are 1,100 MT CO_2e per year. Numbers in **bold** indicate exceedances of thresholds. CO_2e are calculated using IPCC Fifth Assessment 100 year lifetime global warming potential factors.

[1] Accounts for removal of 46.9 acres of cropland and an addition of 6.5 20 new trees and Per CalEEMod guidance, one-time loss in emissions is amortized over the anticipated life of the project, assumed to be 40 years.

CO_2e = carbon dioxide equivalents
MT = metric tons
CalEEMod = California Emissions Estimator Model v. 2013.2.2
IPCC = International Panel on Climate Change

Source: Data provided by Ascent Environmental, Inc. in 2015 based on modeling using CalEEMod v. 2013.2.2 and EMFAC 2014 and using data from Davis Energy Group, Cunningham Engineering, and Fehr and Peers. (Davis Energy Group 2015, Cunningham Engineering 2015, Grandy, Pers. Comm., 2015, IPCC 2013)

However, with respect to the Nishi development's trajectory toward carbon neutrality by 2050, there are three major factors involved: (1) GHG-efficient design and operation of the development, (2) facilitation of denser urban development, and (3) external changes in technology, policy, and social behavior. At the project-level, the Nishi development is designed to be as energy efficient as feasible based on its proposed level of efficiency (30 percent better than 2013 CalGreen Title 24 building standards). As mentioned, 87 percent of on-site electricity use would be offset by the proposed solar panels. Based on current mobile source emission rates, which allow for some estimation of future mobile-related GHG emissions, it is anticipated that the mobile source emissions identified above in Table 4.7-3 would reduce over time. However, as it is impossible to predict the impact of legislation and policy that has yet to come, an accurate prediction of 2050 emissions is not possible. Using current mobile emission rates, mobile source emissions are anticipated to be 9,159 $MTCO_2e$/year, a reduction of 16 percent compared to buildout conditions. Assuming that no other improvements/reductions would occur under 2050 conditions, annual project-related GHG emissions would be 11,078 $MTCO_2e$/year. Therefore, the development could still generate significant GHG emissions.

At the regional-level, the development could reduce emissions when compared to the same residential and commercial growth that could occur elsewhere in the City or region. The development is adjacent to both the UC Davis campus and downtown Davis, allowing for shorter trip lengths and greater non-motorized mode shares (e.g. biking) for UC Davis students, staff, and faculty as well as other residents that may live on the Nishi site travelling between the site, campus, and downtown Davis. In anticipation of an update to UC Davis' Long Range Development Plan, the university anticipates an enrollment growth of an additional 7,000 students between 2025 and 2030 (UC Davis 2015). Given that approximately 75 percent of UC Davis students currently live in off-campus housing, siting new housing closer to campus would allow more students to travel shorter distances to campus when compared to most other off-campus housing situations (UC Davis 2015). Also, commercial land uses sited at Nishi are aimed at businesses and research/development facilities that may have or desire to have strong ties with UC Davis and the Davis community. These land uses would be close to both UC Davis and available on-site residences for employees and generate lower VMT than similar businesses located elsewhere in Davis or outside of Davis.

At the state and global level, improvements in technology, policy, and social behavior can also influence and reduce operational emissions generated by a project. The state is currently on a pathway to achieving the Renewable Portfolio Standards goal of 33 percent renewables by 2020 (CPUC 2015). Governor recently issued an Executive Order to increase the state's energy goals to derive 50 percent of electricity from renewable sources by 2030 (Office of Governor Brown 2015). Despite these goals, the majority of the project's emissions would still be from mobile sources, especially as electricity use would be nearly offset by on-site solar electricity generation. Future mobile source are greatly dependent on changes in vehicle technology, fuels, and social behavior, which can be influenced by policies to varying degrees. Taking known future policies into account, ARB estimates that over 80 percent of future vehicles in Yolo County would still run on gasoline even with increased electric vehicle mode shares (ARB 2015a). This is assumed to also be applicable to Davis vehicle fleet, absent data that may suggest otherwise. Due to these external factors, average emissions from transportation in 2050 would mostly still generate GHG emissions, but the quantity is uncertain in light of potential changes in technology and policy over the next 35 years.

Although the future of transportation emissions generated by the Nishi development may be uncertain, the buildings and facilities are designed to be operated as efficiently as feasible. With the variety of factors involved and without further action on the Nishi site to reduce mobile source emissions or purchase GHG emissions offsets, it is uncertain that the Nishi development could be on a trajectory to achieving net zero carbon emissions by 2050. Therefore, this impact is ***potentially significant****.*

Mitigation Measures

Implement Mitigation Measure 4.14-5 (Transportation Demand Management program).

Mitigation Measure 4.7-2a: Each individual project or subdivision developed/constructed as a part of the Nishi Gateway Project shall demonstrate consistency with the D-CAAP by achieving a downward trajectory in GHG emissions, towards the City goal of zero net GHG emissions by the year 2050. The project must achieve the target in place for the year in which the application (for any development within the Nishi site) is filed.

At the City's discretion, compliance with this mitigation measure for different development activities associated with the same approval may occur at different stages in the development process depending on the nature of the project and may be based on the year that physical improvements are anticipated. GHG emissions associated with all activities must demonstrate consistency with this measure at the time of or before building permits are issued. Mitigation for buildings shall occur at the time the building permit is issued, and the amount of mitigation shall be based on the year the building permit is issued. Mitigation for other emissions from a project may occur at an earlier approval but no later than issuance of entitlements. The applicant may file and City may consider and approve a GHG mitigation plan that lays out the mitigation for different stages of development within the same subsequent project approval.

Prior to issuance of any subsequent entitlement or permit in the Nishi development, or alternatively prior to any approval taking effect, the applicant shall implement the following steps unless these steps have already been undertaken for the project through a prior approval or action:

1. Using CalEEMod or another model accepted for this purpose by the City, calculate total expected GHG emissions (all sectors) for the proposed project under two scenarios: a) 1990 emissions rates; and, b) emission rates applicable at the time of the application, taking into account applicable building standards and other adopted regulatory requirements, as well as building design, use of renewable energy, etc.

2. Calculate the difference between these two scenarios in step 1 as a percentage of the 1990 project emissions.

3. Compare the difference in emissions from step 2 to the required minimum emissions reduction schedule provided below:

Applications Filed On or Before	Minimum Required Reduction in GHG Emissions From Calculated 1990 Emissions
12/31/16	22.5
12/31/17	25.0
12/31/18	27.5
12/31/19	30.0
12/31/20	32.5
12/31/21	35.0
12/31/22	37.5
12/31/23	40.0
12/31/24	42.5
12/31/25	45.0
12/31/26	47.5
12/31/27	50.0
12/31/28	52.5
12/31/29	55.0
12/31/30	57.5… (2.5% increased reduction per year)
12/31/35	70.0… (2.5% increased reduction per year)
12/31/40	82.5… (2.5% increased reduction per year)
12/31/45	95.0… (2.5% increased reduction per year)
12/31/50	100.0

4. If the difference calculated in step 2 is greater than the required reduction in step 3, the Nishi development may “bank” this as a credit to use with later projects.

5. If the difference calculated in step 2 does not demonstrate the required reduction in step 3, applicant shall identify feasible actions to achieve the required reductions using the following priority:

   First priority – building specific actions
   Second priority – onsite (within Nishi site) actions
   Third priority – community based (within Davis) actions
   Fourth priority – pay GHG reduction fees (carbon offsets) into a qualified existing local program, if one is in place
   Fifth priority – other demonstrated method of reducing emissions

6. Calculate, using acceptable methods, the measurable GHG reduction value of each proposed action.

7. Provide a Technical Memorandum of Compliance (TMC) documenting the following minimum items: modeling (step 1); emissions calculations (step 2); applicable reduction (step 3); chosen feasible actions to achieve required reduction (step 4); and measurable GHG reduction value of each action (step 5). The TMC and all steps of the process are subject to review and authorization by the City of Davis Department of Community Development and Sustainability.

8. Implement the authorized actions and provide evidence of this to the City of Davis Department of Community Development and Sustainability. The City upon review and acceptance of implementation, shall issue the subject entitlement, permit, or approval.

Mitigation Measure 4.7-2b: Every 5 years the Nishi development shall submit a GHG Emissions Reduction Accounting and Program Effectiveness Report for the entire innovation center. The report shall be submitted by 12/31 of each fifth year starting in 2020. First report due by 12/31/20, second report due by 12/31/25, etc., through 2050.

The report shall identify the following minimum items. Other documentation requirements may be added by the City if found to be necessary to satisfy this mitigation measure.

1. Projected annual GHG emissions for the Nishi development, total and by sector, from the project EIR

2. GHG emissions from all uses collectively operating at the Nishi development, total and by sector, at the time of reporting.

3. GHG emissions from each occupied building within the Nishi development, total and by sector.

4. Summary of prior TMCs and 5-year reports

5. Running total of Nishi development emissions reductions and reduction credits, in total and by building

6. Comprehensive data base and summary of implemented reduction actions

Significance after Mitigation

Through the implementation of Mitigation Measure 4.14-5, which requires the development and implementation of a transportation demand management program, the Nishi development could reduce VMT generated by the project by up to 20 percent from 45,200 to 36,160 daily VMT. This could reduce mobile source emissions to 8,746 $MTCO_2e$ in 2022. Using ARB-forecasted vehicle emission factors, these emissions could be reduced to 7,328 $MTCO_2e$ by 2050. Additional incentives for low-carbon vehicles, such as electric charging stations, could reduce emissions further by increasing the percentage of vehicles that emit lower GHG emissions per mile, but these estimates are qualitative. Implementation of Mitigation Measures 4.7-2a and 4.7-2b sets GHG reduction targets and accountability for the Nishi Development, but would not guarantee reductions that show that the development would be able to achieve the City's carbon neutral target by 2050. Therefore, this impact would be **significant and unavoidable.**

West Olive Drive

The operation of potential redevelopment of uses within West Olive Drive could increase GHG emissions compared to existing conditions depending on the type and size of land uses that could be on site as well as the type and size of land use that may be replaced. Redevelopment of West Olive Drive has the potential to increase the intensity of current land uses either by building more densely or just serving a growing population resulting in the potential for increased GHG emissions over existing conditions. Therefore, this would be a **potentially significant** impact.

The level of operation of potential redevelopment of uses within West Olive Drive could increase from existing conditions depending on the type and size of land uses that could be on-site, as well as the type and size of land uses being removed. The design of the redeveloped buildings would need to comply with the latest building codes, and overall emissions from energy use would be determined by the carbon intensity of PG&E's supplied electricity and any on-site renewable energy generation. Carbon intensities of supplied electricity is anticipated to decrease over time as the state aims to exceed the current 33 percent RPS goal by 2020. It is reasonable to assume that redevelopment within West Olive Drive would be GHG efficient compared to existing development, however the extent to which it would achieve GHG reductions in accordance with GHG reduction targets is unclear.

Because redevelopment of West Olive Drive has the potential to increase the intensity of current land uses, either by building more densely or just serving a growing population, GHG operational emissions from the site could increase over existing conditions. Therefore, this would be a ***potentially significant*** *impact.*

Mitigation Measures

Implement Mitigation Measures 4.14-5 (Transportation Demand Management program), 4.7-2a (GHG Reduction Targets), and 4.7-2b (GHG Reduction Accountability).

Significance after Mitigation

Through the implementation of Mitigation Measure 4.14-5, which requires the development and implementation of a transportation demand management program, the West Olive Drive redevelopment could reduce VMT generated by the on-site land uses, but the ability to which the land uses can implement the TDM measures would depend on physical, logistical, fiscal constraints determined by each redeveloped land use. Implementation of Mitigation Measures 4.7-2a and 4.7-2b sets GHG reduction targets and accountability for the Nishi Development, but would not guarantee reductions that show that the development would be able to achieve the City's carbon neutral target by 2050. Due to these uncertainties, this impact would be **significant and unavoidable.**

Impact 4.7-3: Conflict with or impede attainment of goals established in applicable climate action plans or greenhouse gas reduction plans.

Nishi Site

Operation of the Nishi development would not conflict with or impede the goals of EO B-30-15 or the D-CAAP. However, unmitigated emissions from the proposed Nishi development would exceed AB 32 2020 reduction targets compared to BAU conditions and SACOG MTP/SCS per capita targets. Thus, this impact is **potentially significant**.

AB 32 has a goal of reducing the state's GHG emissions to 21.7 percent below the projected 2020 business-as-usual (BAU) scenario by 2020. Under the BAU scenario, policies, such as energy efficiency measures renewable portfolio standards for electricity production, would not be in place. The Nishi development would create a GHG efficient land use that is consistent with the development goals of AB 32, by achieving close to net zero electricity use and reducing mobile source emissions from BAU scenarios when compared to developing elsewhere in the City or region. As mentioned previously, the project is designed to be as energy efficient as feasible, potentially achieving 30 percent lower energy use than equivalent buildings meeting the 2013 Title 24 standards, as estimated by Davis Energy Group. When compared to a BAU scenario where similar land uses on the same site would only meet 2013 Title 24 standards for building energy efficiency, the proposed Nishi development would generate 10 percent less GHG emissions than a BAU scenario, as show below in Table 4.7-4. Thus, the unmitigated emissions associated with the Nishi development would conflict with or impede the goals of AB32.

Table 4.7-4 Comparison of Unmitigated Annual Greenhouse Gas Emissions Associated with Nishi-Gateway Long-Term Operation at Full Buildout and Business as Usual Scenarios

Emissions Source	BAU	Nishi (at Full Buildout)	Percent Below BAU
Electricity with Solar Generation	946	80	92%
Natural Gas	1,956	1,404	28%
Solid Waste	415	415	0%
Water-Related Electricity Use (includes wastewater)	15	11	29%
Transportation	10,933	10,933	0%
Other (e.g. landscaping)	8	8	1%
TOTAL	14,274	12,851	10%

Note: BAU scenario is a conservative scenario in which buildings would achieve a 2013 Title 24 energy efficiency standard. The Nishi development, as planned, would reflect a 30 percent better than 2013 Title 24 standard and application of water efficient fixtures. CO_2e are calculated using IPCC Fifth Assessment 100 year lifetime global warming potential factors. Potential to increase or reduce carbon sequestration potentials is not included due to no BAU scenario for sequestration available from AB32.

Summation may not equal totals due to rounding. Electricity, natural gas, and mobile emissions modeled separately from CalEEMod. Electricity emissions assume PG&E will attain 33 percent renewables by 2020. Water and wastewater emissions account for supply, conveyance, and treatment electricity use. Solid waste emissions account for decomposition emissions, as modeled within CalEEMod. Mobile source emissions are based on 45,200 VMT per day for 365 days per year. CO_2e are calculated using IPCC Fifth Assessment 100 year lifetime global warming potential factors.

BAU = Business as Usual
CO_2e = carbon dioxide equivalents
MT = metric tons
CalEEMod = California Emissions Estimator Model v. 2013.2.2
IPCC = International Panel on Climate Change

Source: Data provided by Ascent Environmental, Inc. in 2015 based on modeling using CalEEMod v. 2013.2.2 and EMFAC 2014 and using data from Davis Energy Group, Cunningham Engineering, and Fehr and Peers. (Davis Energy Group 2015, Cunningham Engineering 2015, Grandy, pers. comm., 2015, IPCC 2013)

Through EO B-30-15, the state aims to reduce statewide emissions by 40 percent below 1990 levels by 2030, with a trajectory toward achieving 80 percent below 1990 levels by 2050. Moreover, the D-CAAP aims to exceed state goals by setting a carbon neutral target for the City to achieve by 2050. Goals 1 through 4 and their respective objectives set forth in the Nishi Sustainability Plans are designed to support the City of Davis' and UC Davis' long-term goals to achieve carbon neutrality by 2050, encourage sustainable design, and promote resource conservation. Although the Nishi development itself may not be able to achieve carbon neutrality by 2050, as discussed in Impact 4.7-3, the development would serve as a model for the rest of community in sustainable low-carbon land use development. Thus, the Nishi development would not conflict with or impede the goals of EO B-30-15 or the D-CAAP.

Pursuant to SB 375, the current SACOG 2012-2035 MTP/SCS aims to reduce per capita transportation emissions in the region by 9 percent by 2020 and 16 percent by 2035 from 2005 levels. This translates to a regional target of 20.8 lb CO_2e per capita per day by 2020 and 19.7 lb CO_2e per capita per day by 2035, or 3.4 MT CO_2e per capita by 2020 and 3.3 MT CO_2e per capita by 2035. As discussed in the Chapter 4.10 "Population and Housing", the proposed Nishi development would host 1,920 new residents and up to 854 employees, with a total service population of 2,774. Using the estimated annual mobile source GHG emissions from Table 4.7-3, 10,933 MT CO_2e per year, the Nishi development would achieve 3.9 MT CO_2e per capita per year, or 23.5 MT CO_2e, starting in the 2022 full buildout year. Thus, the Nishi development would conflict with SACOG MTP/SCS transportation emission reduction goals.

Based on the discussion above, unmitigated emissions associated with the operation of the Nishi development would not conflict with or impede the goals of EO B-30-15, or the D-CAAP. However, unmitigated emissions from the proposed Nishi development would exceed AB 32 2020 reduction targets compared to BAU conditions and SACOG MTP/SCS per capita targets. Thus, this impact is ***potentially significant****.*

Mitigation Measures

Implement Mitigation Measure 4.14-5 (Transportation Demand Management program).

Significance after Mitigation

Through the implementation of Mitigation Measure 4.14-5, which requires the development and implementation of a transportation demand management program, the project would reduce VMT generated by the project by up to 25 percent from 45,200 to 36,160 daily VMT. This would reduce mobile source emissions to 8,746 $MTCO_2e$ in 2022 (see Table 4.7-5). This reduction would result in transportation-based emissions of 3.1 MT CO_2e per capita per year or 18.8 lb CO_2e per capita per day, meeting SACOG's 2035 regional target of 19.7 lb CO_2e per capita per day for mobile source GHG emissions. As a result, mitigated transportation-related GHG emissions would not exceed SACOG's 2020 and 2035 targets. Further, overall annual GHG emissions associated with the Nishi development and proposed mitigation would achieve a 25 percent reduction compared to the BAU scenario, which would be consistent with AB 32 2020 reduction targets. As a result, implementation of Mitigation Measure 4.14-5 would reduce this impact to **less than significant**.

Table 4.7-5 Comparison of Mitigated Annual Greenhouse Gas Emissions Associated with Nishi-Gateway Long-Term Operation at full buildout in 2022 and Business as Usual Scenarios

Emissions Source	BAU	Nishi (at Full Buildout in 2022)	Percent Savings
Electricity with Solar Generation	946	80	92%
Natural Gas	1,956	1,404	28%
Solid Waste	415	415	0%
Water-Related Electricity Use (includes wastewater)	15	11	29%
Transportation	10,933	8,746	20%
Other (e.g. landscaping)	8	8	1%
TOTAL	14,274	10,664	25%

Note: BAU scenario is a conservative scenario in which buildings would achieve a 2013 Title 24 energy efficiency standard. The Nishi development, as mitigated, would reflect a 30 percent better than 2013 Title 24 standard, application of water efficient fixtures, and 20 percent reduction in VMT, per Mitigation Measure 4.14-5 and CO_2e are calculated using IPCC Fifth Assessment 100 year lifetime global warming potential factors. Potential to increase or reduce carbon sequestration potentials is not included due to no BAU scenario for sequestration available from AB32.

Summation may not equal totals due to rounding. Electricity, natural gas, and mobile emissions modeled separately from CalEEMod. Electricity emissions assume PG&E will attain 33 percent renewables by 2020. Water and wastewater emissions account for supply, conveyance, and treatment electricity use. Solid waste emissions account for decomposition emissions, as modeled within CalEEMod. Unmitigated mobile source emissions are based on 45,200 VMT per day for 365 days per year. CO_2e are calculated using IPCC Fifth Assessment 100 year lifetime global warming potential factors.

BAU = Business as Usual
CO_2e = carbon dioxide equivalents
MT = metric tons
CalEEMod = California Emissions Estimator Model v. 2013.2.2
IPCC = International Panel on Climate Change

Source: Data provided by Ascent Environmental, Inc. in 2015 based on modeling using CalEEMod v. 2013.2.2 and EMFAC 2014 and using data from Davis Energy Group, Cunningham Engineering, and Fehr and Peers. (Davis Energy Group 2015, Cunningham Engineering 2015, Grandy, Pers. Comm., 2015, IPCC 2013)

West Olive Drive

Redevelopment of West Olive Drive has the potential to increase the intensity of current land uses, either by building more densely or serving a growing population. There is no guarantee of whether new land uses would impede or be inconsistent with AB32, EO B-15-30, SACOG MTP/SCS per capita targets, or the D-CAAP. Therefore, this impact is **potentially significant**.

The level of operation of potential redevelopment of uses within West Olive Drive could increase from existing conditions depending on the type and size of land uses that could be on site. Increased activity along West Olive Drive could contribute to increased energy demand and vehicle trips. However the design

of the redeveloped buildings would need to comply with the latest building codes, and overall emissions from energy use would be determined by the carbon intensity of PG&E's supplied electricity and any on-site renewable energy generation. Carbon intensities of supplied electricity is anticipated to decrease over time as the state aims to exceed the current 33 percent RPS goal by 2020. Average vehicle emission factors are also anticipated to decrease over time, as forecasted by ARB (ARB 2015a). Further, the anticipated redevelopment (neighborhood mixed use) would likely provide uses/services that may increase pedestrian and alternative transportation in the area, thereby further reducing VMT and transportation-related GHG emissions. It is reasonable to assume that redevelopment within West Olive Drive would be GHG efficient compared to existing development, however the extent to which it would achieve GHG reductions in accordance with GHG reduction targets is unclear.

Redevelopment of West Olive Drive has the potential to increase the intensity of current land uses, either by building more densely or serving a growing population. There is no guarantee of whether new land uses would impede or be inconsistent with AB32, EO B-15-30, SACOG MTP/SCS per capita targets, or the D-CAAP. Therefore, this impact is ***potentially significant.***

Mitigation Measures

Implement Mitigation Measures 4.14-5 (Transportation Demand Management program), 4.7-2a (GHG Reduction Targets), and 4.7-2b (GHG Reduction Accountability).

Significance after Mitigation

Through the implementation of Mitigation Measure 4.14-5, which requires the development and implementation of a transportation demand management program, the West Olive Drive redevelopment could reduce VMT generated by the on-site land uses, but the ability to which the land uses can implement the TDM measures would depend on physical, logistical, fiscal constraints determined by each redeveloped land use. Implementation of Mitigation Measures 4.7-2a and 4.7-2b would set GHG reduction targets and accountability for the redevelopment along West Olive Drive. While dedicated GHG reduction targets would allow the redevelopment to be consistent with the goals of AB32, EO B-15-30, and the D-CAAP, it remains to be seen whether future proposed land uses along West Olive Drive would be able to apply applicable TDM measures from Mitigation Measure 4.14-5. Due to the uncertainty related to the ability of West Olive Drive redevelopment to achieve SACOG MTP/SCS per capita transportation emission targets, this impact would be **significant and unavoidable.**

Impact 4.7-4: Result in unnecessary, inefficient, and wasteful use of energy.

Nishi Site

Development of the Nishi site would increase energy demands as a result of operation of on-site uses. However, compliance with existing City code requirements, as well as efficiency design measures resulting from the sustainability planning effort completed by the City, would ensure that the project would not result in an inefficient or wasteful expenditure of energy. This would be a **less-than-significant** impact.

Appendix F of the State CEQA Guidelines requires consideration of the potentially significant energy implications of a project. CEQA requires mitigation measures to reduce "wasteful, inefficient and unnecessary" energy usage (Public Resources Code Section 21100, subdivision [b][3]). However, neither the law nor the State CEQA Guidelines establish thresholds that define wasteful, inefficient, or unnecessary use. Compliance with California's Title 24 Energy Efficiency Standards would generally promote energy efficiency of structures during operation. However, compliance with building codes does not adequately address all potential energy impacts during project construction and operation. For example, energy would be required to transport people to and from the project site.

Development of the Nishi site would result in energy use as a result of both short-term construction and long-term operational activities. Mobile energy use would include consumption of gasoline, diesel, natural gas, electricity, or other fuels to be used in motor vehicles. Stationary energy use, which would occur

predominantly during operation of the project, would include electricity and natural gas in building heating and cooling systems, lighting, appliances, or other activities within buildings or site infrastructure; as well as off-site energy use for pumping water and wastewater.

Construction activities at the project site would occur periodically for a period of approximately 5-7 years and would occur in two phases (approximately 30 months in duration each.) During construction, energy used during project construction and operation would be expended in the form of electricity, gasoline, and diesel fuel, which would be used primarily by construction equipment and haul trucks travelling to and from the project site during construction. The energy used for project construction would not require significant additional capacity or significantly increase peak or base period demands for electricity and other forms of energy. There are no unusual project characteristics that would necessitate the use of construction equipment that would be less energy efficient than those used at comparable construction sites in other parts of the State. Idling of on-site equipment during construction would be limited to no more than five minutes in accordance with YSAQMD requirements. Further, on-site construction equipment may include alternatively-fueled vehicles (such as natural gas) where feasible. Furthermore, the selected construction contractors would use the best available engineering techniques, construction and design practices, and equipment operating procedures, thereby ensuring that the wasteful consumption of fuels and use of energy would not occur. Energy efficiency is also expected for the off-site production of construction materials, based on the economic incentive for efficiency. Non-renewable energy would not be consumed in a wasteful, inefficient, or unnecessary manner when compared to other construction sites in the region.

Project operation would be typical of residential and R&D uses, requiring electricity and natural gas for lighting, climate control, and day-to-day activities. Operational energy use would also include landscape maintenance. Indirect energy use would include wastewater treatment and solid waste removal. As noted in Chapter 3, "Project Description," and Impact 4.7-3 above, the project would be required to exceed 2013 Title 24 standards for energy efficiency by 30 percent. As noted above, implementation of the California Building Efficiency Standards (Title 24, Section 6) typically achieves 25 percent greater energy efficiency than buildings constructed under previous energy efficiency standards developed in 2008 (CEC 2012a). As the project would achieve 30 percent greater efficiency than 2013 Title 24 standards, it would represent some of the most energy efficient structures built in the state to date. Further, the 2016 Title 24 standards, which will not be effective until January 1, 2017, are projected to be 28 percent more efficient than the current 2013 Title 24 standards (CEC 2015a). Therefore, compared to 2013 Title 24 standards, the project would be more efficient than building standards that have yet to take effect. Furthermore, the project would include additional on-site efficiency measures, including rooftop and surface parking lot solar panels to reduce electricity consumption and increase efficiency further. As a result, the project would be among the most efficient developments from an on-site energy perspective.

With respect to energy/fuel consumption related to vehicle usage, the project would include design measure to encourage the use of pedestrian and bicycle trails and transit opportunities, such as connection to existing facilities within the Putah Creek channel, along Richards Boulevard, and on UC Davis campus. Further, Mitigation Measure 4.14-5 would reduce project-related VMT by 20 percent through transportation demand management, thereby increasing the efficiency of fuel consumption.

According to Appendix F of the CEQA Guidelines, the means to achieve the goal of conserving energy include decreasing overall energy consumption, decreasing reliance on natural gas and oil, and increasing reliance on renewable energy sources. While the project would increase the overall energy demand in the City of Davis, the project would reduce energy use compared to similar and existing development within UC Davis, thereby providing a relatively energy efficient community, and would encourage use of renewable energy sources and alternatives to travel by personal vehicle. As a result, the project would not result in an inefficient or wasteful consumption of energy. This impact would be ***less than significant****.*

Mitigation Measures

No mitigation measures are required.

West Olive Drive

Potential redevelopment of the Nishi site would increase energy demands as a result of operation of on-site uses. However, compliance with existing City code requirements and building standards employed at the time redevelopment is proposed would ensure that the project would not result in an inefficient or wasteful expenditure of energy. This would be a **less-than-significant** impact.

Similar to what was noted above for the Nishi site, construction and operation associated with the potential redevelopment of West Olive Drive may increase energy consumption. However, compared to the Nishi site, the scale of the increase in energy consumption are anticipated to be less based on the potential level of redevelopment that could occur. Construction associated with redevelopment of West Olive Drive is anticipated to be conducted in a manner similar to that of the Nishi site, including adherence to idling limitations and the use of best available construction techniques. Operation of potential redeveloped uses within West Olive Drive would result in the replacement of older, less efficient structures with more energy efficient buildings that would be intended to dovetail with existing and proposed (Nishi) development in the area. This may result in increased trip reduction through the provision of necessary commercial uses in proximity to residents. Nonetheless, as potential redevelopment would involve the operation of more energy efficient structures, consistent with building standards required at the time of construction, than currently exist on-site, the operation of more energy efficient uses would not result in the wasteful or unnecessary use of energy.

*Because the potential redevelopment of West Olive Drive would result in the replacement of existing on-site structures with more energy efficient uses, the rezoning and redevelopment of West Olive Drive (and associated redevelopment) would not result in the wasteful, inefficient, or unnecessary use of energy resources. This would be a **less-than-significant** impact.*

Mitigation Measures

No mitigation measures are required.

Impact 4.7-5: Conflict, or create an inconsistency, with any applicable plan, policy, or regulation adopted for the purpose of avoiding or mitigating environmental effects related to greenhouse gas emissions or energy.

Nishi Site

Implementation of the project within the Nishi site would be consistent with the policies of the City of Davis General Plan related to energy and GHG emissions. This would be a **less-than-significant** impact.

The City of Davis General Plan includes policies to protect environmental resources, including energy resources and GHG emissions. The development's consistency with GHG emission policies as discussed in the General Plan's Transportation element is addressed in Impact 4.14-10. The features of the proposed development of the Nishi site and mitigation measures discussed in this document are consistent with the policies of the City of Davis General Plan as shown in Table 4.7-6.

*Development of the Nishi site as part of the project would not conflict with any local policies or ordinances protecting air quality. Impacts would be **less than significant**.*

Table 4.7-6 City of Davis General Plan Policy Consistency

Policy	Project Consistency
Policy ENERGY 1.3 Promote the development and use of advanced energy technology and building materials in Davis.	The Nishi development would be designed to exceed 2013 Title 24 building standards by 30 percent and also include on-site solar electricity generation that could offset 87 percent of on-site electricity demand. Redevelopment of West Olive Drive would involve the replacement of on-site structures with more energy efficient buildings in compliance with energy requirements employed at the time of redevelopment. As a result, the project would be consistent with this policy.
Policy ENERGY 1.5 Encourage the development of energy-efficient subdivisions and buildings.	Refer to discussion above for Policy ENERGY 1.3.

Mitigation Measures

No mitigation measures are required.

West Olive Drive

Redevelopment that could occur as a result of the redesignation/rezoning of parcels located in West Olive Drive would be consistent with the policies of the City of Davis General Plan related to energy and GHG emissions. This would be a **less-than-significant** impact.

Similar to what was discussed above, potential redevelopment of West Olive Drive would not create conflicts or result in inconsistencies with the policies of the City General Plan related to energy and GHG emissions. The redevelopment's consistency with the General Plan's Transportation element is addressed in Impact 4.14-10.

*Potential redevelopment associated with the proposed General Plan Amendment and zoning change of West Olive Drive would not conflict with any regulations established for the protection of energy. Impacts would be **less than significant**.*

Mitigation Measures

No mitigation measures are required.