

## 3.8 GREENHOUSE GAS EMISSIONS AND CLIMATE CHANGE

This section discusses greenhouse gas (GHG) emissions caused by proposed development of the Orchard Park Redevelopment component of the 2018 LRDP. 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.

Public comments of the NOP included concerns regarding the GHG impacts associated with growth planned under the 2018 LRDP, construction, and consistency with regional growth plans and the University's greenhouse gas reduction plans. Concerns related to growth focused on the potential for the 2018 LRDP to result in increased students and staff vehicles emissions due to having to live outside of the City of Davis (City) because of limited housing availability on-campus and within the City. As they pertain to implementation of the Orchard Park Redevelopment component of the 2018 LRDP, these impacts are described and addressed within this section.

### 3.8.1 Regulatory Setting

Plans, policies, regulations, and laws (applicable to and/or considered for the Orchard Park Redevelopment component) are provided in Volume 1 of this EIR. As the regulatory setting provided in Volume 1 considers potential development, including the Orchard Park Redevelopment component, within the entirety of the UC Davis campus as envisioned through the 2018 LRDP, no additional regulatory setting is provided for the Orchard Park Redevelopment component.

### 3.8.2 Environmental Setting

Refer to Section 3.8, "Greenhouse Gas Emissions and Climate Change," in Volume 1 of this EIR for a discussion of the regional environmental setting for the UC Davis campus, including the Orchard Park site. Due to the global nature of climate change, the Orchard Park Redevelopment component is similarly affected by climate change as for the entire campus. Section 3.8 of Volume 1 also discusses the scopes associated with different GHG emission sources. GHG emissions from the Orchard Park site and other public-private partnership projects are not included in UC Davis's GHG inventory.

### 3.8.3 Environmental Impacts and Mitigation Measures

#### SIGNIFICANCE CRITERIA

Refer to Section 3.8, "Greenhouse Gas Emissions and Climate Change," in Volume 1 of the 2018 LRDP for a discussion of applicable Significance Criteria.

## ANALYSIS METHODOLOGY

### Construction

Construction-related emissions of criteria air pollutants and precursors were calculated using the California Emissions Estimator Model (CalEEMod) Version 2016.3.2 computer program (SCAQMD 2017), as recommended by Yolo Solano Air Quality Management District (YSAQMD) and other air districts in California. Modeling was based on project-specific information (e.g., land use types, traffic modelling, building sizes), where available, reasonable assumptions based on typical construction activities, and default values in CalEEMod that are based on the project's location and land use type. CalEEMod accounts for a variety of state, federal, and local programs and policies that affect construction-related emissions, such as local air district rules on architectural coatings and federal emission standards for off-road equipment, but these regulations primarily affect criteria pollutants. For a detailed description of model input and output parameters, and assumptions, refer to Appendix C in Volume 1.

Construction of the Orchard Park Redevelopment component is assumed to start as early as August 2018 and last 24 months. Based on information provided in Chapter 2, "Project Description," the Orchard Park Redevelopment component would construct sufficient apartment units to support 1,200 student beds, an additional 200 students and their dependents, 480 vehicle parking spaces, and 1,400 bicycle parking spaces. An additional acre of paved roadway is assumed to be constructed as part of the infrastructure required for the Orchard Park Redevelopment component. Using CalEEMod default occupancy rates for mid-rise apartments and an estimated rate of 430 apartment square feet (sf) per student, a total of 555 dwelling units and 642,000 sf of apartment space is assumed to be constructed under the Orchard Park Redevelopment component. It was also assumed that all roadways used by worker, vendor, and hauling trips would be paved because the existing site is already fully developed. For a detailed description of model input and output parameters, and assumptions, refer to Appendix C.

### Operation

Operation-related emissions of criteria air pollutants and precursors were calculated using CalEEMod Version 2016.3.2. Modeling was based on project-specific information (e.g., land use types, traffic modelling, building sizes), where available, reasonable assumptions based on typical construction activities, and default values in CalEEMod that are based on the project's location and land use type. Operation of the Orchard Park Redevelopment component is assumed to begin in 2020. CalEEMod also accounts for policies that may affect operational emissions factors, such as state and federal vehicle emission standards and building energy efficiency standards, discussed further below. These policies are accounted for in modeling results, unless otherwise noted. For a detailed description of model input and output parameters, and assumptions, refer to Appendix C.

With respect to building energy use, electricity and natural gas use would result in indirect and direct GHG emissions, respectively. Buildings anticipated under the 2018 LRDP would require electricity and natural gas usage for lighting, space and water heating, appliances, and landscaping maintenance equipment. Building energy use was mainly estimated using CalEEMod, assuming that the land uses within the campus would have energy use factors that are 20 percent more efficient than the 2016 Building Energy Efficiency Standards under Title 24, as required in the UC Sustainable Practices Policy goals to be achieved by the 2018 LRDP (University of California Office of the President 2016).

With respect to emissions from electricity use, UC Davis procures its electricity from the Western Area Power Association (WAPA), a federally-run utilities company that markets and transmits wholesale electricity from multi-use water projects (hydropower). UC Davis contracts with WAPA for both base resource power (hydrogeneration power) and custom product power. WAPA's supply of

hydropower is contingent upon atmospheric conditions and precipitation events, and therefore varies widely year to year. Due to the inherent uncertainty of hydropower availability, WAPA procures through the open market on behalf of UC Davis to supplement power requirements contracted by UC Davis. As such, WAPA-specific emissions factors are not available. Therefore, indirect, electricity-related operational emissions of GHGs for the existing site and Orchard Park Redevelopment component were calculated using emissions factors generated by the EPA's Emissions and Generation Resource Integrated Database (eGRID) for the WECC California subregion CAMX factor. As recommended by EPA, annual non-baseload output emissions rates were used to calculate the GHG emissions associated with electricity use for the existing and future conditions of the site (EPA 2014). It should be noted that indirect emissions of GHGs associated with the existing site and project do not reflect use of hydropower, which has an emissions factor of zero for CO<sub>2</sub>; therefore, estimates are conservative. Total natural gas use during Orchard Park Redevelopment operation was based on defaults for the new land uses planned for the Orchard Park Redevelopment component.

With respect to emissions offsets from solar electricity generation, WAPA emission factors were applied to the estimated electricity generation. On-site solar electricity generation was based off generation rates typical to the Sacramento region using default values in the National Research Energy Laboratory's (NREL) PV Watts Calculator web tool (NREL 2018). Assuming a standard module type, fixed array, a 20 percent tilt, and a commercial-type array, a 1 megawatt (MW) solar system would generate 1,535 megawatt-hours per year on a 1.45-acre footprint. This result was scaled to Orchard Park Redevelopment's available rooftop space assuming 20 percent of the space is taken up by solar thermal water heating and other rooftop structures or utilities. The component's square footage (300,000 sf of family apartments and 342,000 sf of student apartment) was divided by the maximum number of stories by apartment type (two-story family apartments and six-story student apartment) to give a total of 165,600 sf of available rooftop space for solar.

With respect to mobile sources, California Air Resources Board's (CARB) emission factor model (EMFAC) (v. EMFAC2017), was used to estimate annual GHG emissions from VMT generated by the Orchard Park Redevelopment component, which was available from the traffic analysis included as Appendix H and prepared for this component by Fehr and Peers (CARB 2017). EMFAC2017 is CARB's latest update to the EMFAC model series and considers effects of future policies and economic forecasts. The modeled emission factors reflect Yolo County's vehicle mix and usage rates forecast for 2021, which is the first full year of operation for the Orchard Park Redevelopment component. Fehr and Peers provided daily VMT estimates for the Orchard Park Redevelopment component and apportioned the VMT by speed bin and three general vehicle categories (passenger cars and light duty trucks, trucks with 2 axles, and trucks with three axles or more). These three vehicle categories were matched to EMFAC's vehicle categories based on the general vehicle category descriptions; and the daily VMT estimates were converted to annual levels based on a calculated factor of 287 academic-day equivalents per year (see Appendix C for details). The VMT estimates only include on-road vehicle trips beginning and ending in the UC Davis campus (Behrens, pers. comm., 2018). To estimate the emissions attributable to the Orchard Park Redevelopment component, calendar year 2021 emission factors from EMFAC2017 were applied to the new VMT associated with the Orchard Park Redevelopment component. See Appendix H for the vehicle category matches, emission factors, VMT, and emission calculation details, including estimates for the 2016 existing conditions.

The Orchard Park Redevelopment component is expected to plant result in new tree plantings of approximately 282 new trees. This quantity is based on a cursory review of the current tree density on campus of approximately 20 trees per acre, excluding parking lot acreage. The change in carbon sequestration potential was analyzed using CalEEMod's vegetation module.

## **ISSUES NOT EVALUATED FURTHER**

The following impacts were identified as part of the analysis of the 2018 LRDP, and are either 1) adequately evaluated at the program level of analysis of the 2018 LRDP or 2) not applicable to the project.

### **Considerable Contribution to Climate Change**

Impact 3.8-1 of Volume 1 of this EIR evaluated the potential increase in GHG emissions associated with the 2018 LRDP, including the project-level analysis of both the West Village Expansion and Orchard Park Redevelopment components. The results of the modeling conducted, including those from the Orchard Park Redevelopment component, are presented in Table 3.8-5 of Volume 1 of this EIR. Based on the analysis conducted, the 2018 LRDP, including both the West Village Expansion and Orchard Park Redevelopment components, would result in a net reduction of emissions, equivalent to 59 percent below 1990 levels by 2030. This would achieve the UC and state goals of reducing emissions to 40 percent below 1990 levels by 2030 and would not impede the state goal of achieving statewide emissions equivalent to 80 percent below 1990 levels by 2050. Therefore, the Orchard Park Redevelopment component of the 2018 LRDP would be consistent with statewide GHG reduction goals and would not considerably contribute to climate change. This impact would be less than significant and no additional project-specific analysis is required.

### **Conflict with Plans, Policies, Regulations Intended to Reduce Greenhouse Gas Emissions**

As noted above and in Impact 3.8-1 of Volume 1 of this EIR, the Orchard Park Redevelopment component of the 2018 LRDP would not prevent UC Davis from achieving reduction targets, established by the UC Sustainable Practices Policy. Further, in doing so, the Orchard Park Redevelopment component would not impede the ability of the region and the state to achieve targets established through regional and statewide planning efforts and regulations. Therefore, the Orchard Park Redevelopment component would not conflict with applicable plans, policies, or regulations intended to reduce GHG emissions. No impact would occur and no additional project-specific analysis is required.

## **PROJECT-SPECIFIC IMPACTS AND MITIGATION MEASURES**

Consistent with the GHG analysis in Volume 1 of this EIR, there are no potentially significant impacts identified related to greenhouse gas emissions for the Orchard Park Redevelopment component of the 2018 LRDP. No project-specific mitigation is necessary.