

## 3.3 AIR QUALITY

This section includes a discussion of existing air quality conditions, a summary of applicable regulations, and an analysis of potential construction and operational air quality impacts caused by proposed development of the Orchard Park Redevelopment component of the 2018 LRDP. Mitigation measures are recommended as necessary to reduce significant air quality impacts to the extent feasible.

Public comments related to air quality that were received during public review of the NOP included emissions associated with potential growth under the 2018 LRDP, including the Orchard Park Redevelopment component; construction emissions; toxic air contaminants from proposed uses; and consistency with regional air quality planning efforts. As they pertain to implementation of the Orchard Park Redevelopment component of the 2018 LRDP, these impacts are described and addressed within this section.

### 3.3.1 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.

### 3.3.2 Environmental Setting

Refer to Section 3.3, “Air Quality,” in Volume 1 of this EIR for a discussion of the regional environmental setting for the UC Davis campus, including the Orchard Park Redevelopment. Due to the regional nature of air quality conditions and the fact that the Orchard Park Redevelopment is located within the boundaries of the campus, the site has the same existing air quality characteristics as for the entire campus.

### 3.3.3 Environmental Impacts and Mitigation Measures

#### **SIGNIFICANCE CRITERIA**

Refer to Section 3.3, Air Quality, in Volume 1 of the this EIR 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 the Yolo Solano Air Quality Management District (YSAQMD). 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 site's location and land use type.

Construction of the Orchard Park Redevelopment component is assumed to start as early as August 2018 and last 24 months. As demolition of the previous Orchard Park Apartments at the site was evaluated as part of an Initial Study/Negative Declaration completed in 2017 and will be completed prior to certification of the 2018 LRDP EIR, no demolition activities associated with the Orchard Park Redevelopment component would occur at the Orchard Park Redevelopment site. Based on information provided in Chapter 2, "Project Description," of this volume, 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 site. It is assumed that a car parking space would be enough for 21 bicycles, thus resulting in a total of 543 vehicle parking space equivalents to be constructed. A total of 555 dwelling units (642,000 square feet [sf]) is assumed to be constructed as part of 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 roads accessing the site are already fully developed. For a detailed description of model input and output parameters, and assumptions, refer to Appendix C in Volume 1.

## 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 site's location and land use type. The first full year of operation of the Orchard Park Redevelopment component is assumed to begin in 2021. For a detailed description of model input and output parameters, and assumptions, refer to Appendix C.

With respect to building energy, only natural gas use would result in direct on-site criteria air pollutants and precursor emissions. Total natural gas use during operation was based on defaults for the new land uses that would operate under the Orchard Park Redevelopment component, which would achieve the U.S. Green Building Council's Leadership in Energy and Environmental Design program Gold certification, consistent with the UC Sustainable Practices Policy and UC Davis requirements. CalEEMod was used to calculate net emissions from the anticipated net change in natural gas use at buildout, assuming the new facilities would be built to a standard that is 20 percent more efficient than 2016 Title 24 standards, per UC Policy on Sustainable Practices (University of California Office of the President). Although Title 24 standards beyond the 2016 standards are not available at the time of this writing, implementation of such standards would likely be more stringent and result in greater emissions reductions than currently required through Title 24. Additionally, although there may be emergency generators operated in the Orchard Park Redevelopment, for the purposes of this analysis, there are not included in this calculation as these generators would be operated only in emergency conditions. No stationary sources would be operated as part of the Orchard Park Redevelopment component.

With respect to mobile sources, California Air Resources Board's (CARB) emission factor model (EMFAC) (v. EMFAC2017), was used to estimate annual and daily criteria air pollutant emissions from vehicle miles traveled (VMT) generated by the Orchard Park Redevelopment component, which was available from Fehr and Peers (Behrens, pers. comm., 2018; CARB 2017). EMFAC2017 is CARB's latest update to the EMFAC model series and considers effects of known policy implementation and economic forecasts, such as the implementation of the CAFE standards and Advanced Clean Cars

program. 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 Orchard Park. Fehr & 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 two 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 component. See Section 3.16, "Transportation, Circulation, and Parking," of this volume for additional analysis of VMT associated with the Orchard Park Redevelopment component. See Appendix C for the vehicle category matches, emission factors, VMT, and emission calculation details.

Area sources, such as reactive organic gas (ROG) emissions from consumer products and reapplication of architectural coating, were based on CalEEMod defaults for the applied land uses. No fireplaces or woodstoves were assumed to be built with the Orchard Park Redevelopment component.

## 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 LRDP, or (2) not applicable to the Orchard Park Redevelopment component.

### Substantial Pollutant Concentrations

Impacts related to substantial pollutant concentrations (carbon monoxide [CO] and toxic air contaminants [TACs]) during operation of land uses identified under the 2018 LRDP, including the Orchard Park Redevelopment component, are evaluated in Volume 1 and determined to be less than significant. Analysis of localized CO impacts from all the traffic associated with the 2018 LRDP (2018 LRDP Impact 3.3-3) shows that the 2018 LRDP-related traffic would not result in a significant localized impact from CO emissions, therefore a project-level analysis of the same impact is not required. The Orchard Park Redevelopment component would be residential in nature, and would not construct any new stationary sources, such as boilers and laboratories, that would generate substantial TACs. Although emergency generators could be operated, their use would be infrequent and only in emergency conditions and were included as part of the operational TAC analysis provided in Volume 1. Furthermore, the Orchard Park Redevelopment site would not be located proximate to I-80 or potential sources of substantial ultra-fine particulates (UFPs), and impacts related to health risks associated with UFPs would not occur as a result of implementation of the Orchard Park Redevelopment component. Additional and/or potentially significant impacts are not anticipated, and no additional project-level analysis is necessary.

### Odors

Potential odor sources that would occur under the 2018 LRDP, including the Orchard Park Redevelopment component, are sufficiently discussed at the plan-level in Volume 1. As a student housing development, no unique or substantial odors are anticipated as a result of implementation of the Orchard Park Redevelopment component. As a result, additional and/or potentially significant impacts are not anticipated, and no additional project-level analysis is necessary.

## PROJECT-SPECIFIC IMPACTS AND MITIGATION MEASURES

### Impact 3.3-1: Construction-generated emissions of ROG, NO<sub>x</sub>, PM<sub>10</sub>.

Construction-generated emissions would exceed YSAQMD's significance thresholds during construction. Therefore, this impact would be **significant**.

Construction of Orchard Park Redevelopment would result in ROG, nitrous oxides (NO<sub>x</sub>), particulate matter (PM<sub>10</sub>), and fine particulate matter (PM<sub>2.5</sub>) emissions, primarily associated with the use of heavy construction equipment and painting/paving activities. Construction emissions are summarized in Table 3.3-1, below. Refer to Appendix C for a detailed summary of the modeling assumptions, inputs, and outputs.

**Table 3.3-1 Summary of Modeled Emissions of Criteria Air Pollutants and Precursors Associated with Project Construction Activities - Unmitigated**

Year of Construction	Annual Emissions		Maximum Daily Emissions	
	ROG (ton/year)	NO <sub>x</sub> (ton/year)	PM <sub>10</sub> (lb/day)	PM <sub>2.5</sub> (lb/day) <sup>a</sup>
2018	0.3	2.1	89.3	10.7 (2.4) <sup>b</sup>
2019	0.5	3.8	89.1	10.5 (1.0) <sup>b</sup>
2020	4.2	1.1	89.0	10.7 (0.8) <sup>b</sup>
YSAQMD Thresholds of Significance	10	10	80	NA
Exceed Threshold of Significance?	No	No	Yes	NA

Notes: Modeled values represent maximum daily and annual emissions that would occur over the duration of the construction period. See Appendix C for detail on model inputs, assumptions, and project specific modeling parameters.

ROG = reactive organic gases; NO<sub>x</sub> = oxides of nitrogen; PM<sub>10</sub> = respirable particulate matter with an aerodynamic diameter of 10 micrometers or less; PM<sub>2.5</sub> = respirable particulate matter with an aerodynamic diameter of 2.5 micrometers or less; lb/day = pounds per day; NA = not available; YSAQMD = Yolo Solano Air Quality Management District

<sup>a</sup> Although YSAQMD does not recommend PM<sub>2.5</sub> thresholds, estimates of PM<sub>2.5</sub> emissions, which are a subset of PM<sub>10</sub> emissions, are shown for information purposes only.

<sup>b</sup> Numbers in parenthesis represent the portion of PM<sub>2.5</sub> emissions from exhaust. Numbers not in parenthesis represent fugitive and exhaust emissions combined.

Source: Modeling conducted by Ascent Environmental in 2018

As shown in Table 3.3-1, construction of the Orchard Park Redevelopment component would result in an exceedance of YSAMQD's threshold for PM<sub>10</sub> during the construction period. Impacts would be considered **less than significant**.

### OPR Mitigation Measure 3.3-1: Reduce construction-generated emissions of ROG, NO<sub>x</sub>, and PM<sub>10</sub>.

Implement 2018 LRDP Mitigation Measure 3.3-1.

Although prior to mitigation, the Orchard Park Redevelopment component would result in construction-related emissions that do not exceed NO<sub>x</sub> and ROG emissions thresholds, the implementation of 2018 LRDP Mitigation Measure 3.3-1 would further reduce ROG and NO<sub>x</sub> emissions along with PM<sub>10</sub> emissions under the construction engine and dust mitigation requirements. Engines with a minimum of a Tier 3 final rating or better are anticipated to decrease ROG, NO<sub>x</sub>, and PM emissions compared to the default engine rating which includes a mix of lower tiered engines.

### Significance after Mitigation

Implementation of OPR Mitigation Measure 3.3-1 would apply to construction activities at Orchard Park to mitigate particular matter emissions, primarily through cleaner engines, limiting trackout of material, and watering of the construction site, and overall construction-related emissions from the overall 2018 LRDP. Implementation of this mitigation measure would result in changes shown in Table 3.3-2 because of rounding. The impact would remain **less than significant**.

**Table 3.3-2 Summary of Modeled Emissions of Criteria Air Pollutants and Precursors Associated with Project Construction Activities – Mitigated**

Year of Construction	Annual Emissions		Maximum Daily Emissions	
	ROG (ton/year)	NO <sub>x</sub> (ton/year)	PM <sub>10</sub> (lb/day)	PM <sub>2.5</sub> (lb/day) <sup>a</sup>
2018	0.1	1.4	6.4	3.0 (1.3) <sup>b</sup>
2019	0.4	3.1	6.4	2.1 (0.8) <sup>b</sup>
2020	2.1	0.9	6.4	2.0 (0.7) <sup>b</sup>
YSAQMD Thresholds of Significance	10	10	80	NA
Exceed Threshold of Significance?	No	No	No	NA

Notes: Modeled values represent maximum daily and annual emissions that would occur over the duration of the construction period. See Appendix C for detail on model inputs, assumptions, and project specific modeling parameters.

ROG = reactive organic gases; NO<sub>x</sub> = oxides of nitrogen; PM<sub>10</sub> = respirable particulate matter with an aerodynamic diameter of 10 micrometers or less; PM<sub>2.5</sub> = respirable particulate matter with an aerodynamic diameter of 2.5 micrometers or less; lb/day = pounds per day; NA = not available; YSAQMD = Yolo Solano Air Quality Management District

<sup>a</sup> Although YSAQMD does not recommend PM<sub>2.5</sub> thresholds, estimates of PM<sub>2.5</sub> emissions, which are a subset of PM<sub>10</sub> emissions, are shown for information purposes only.

<sup>b</sup> Numbers in parenthesis represent the portion of PM<sub>2.5</sub> emissions from exhaust. Numbers not in parenthesis represent fugitive and exhaust emissions combined.

Source: Modeling conducted by Ascent Environmental in 2018

### Impact 3.3-2: Operational emissions of criteria air pollutant and precursor emissions.

Routine activities at the Orchard Park Redevelopment would result in increased operational emissions of criteria air pollutants but would not exceed YSAQMD thresholds. This impact would be **less than significant**.

Operational emissions from overall implementation of the 2018 LRDP, including the emissions from the Orchard Park Redevelopment component are included in 2018 LRDP Impact 3.3-2, which concluded that even with implementation of 2018 LRDP Mitigation Measure 3.3-2, overall plan-related emissions that may occur through implementation of the 2018 LRDP would remain a significant and unavoidable impact. The following describes the emission contribution of just the Orchard Park Redevelopment component to determine whether project-specific mitigation measures could reduce criteria pollutant emission levels.

Sources of criteria pollutants associated with the Orchard Park Redevelopment component include motor vehicles, area sources such as water and space heating, landscaping equipment, and consumer product use. Emissions from each of these sources were calculated using the methods detailed under Analysis Methodology above. Table 3.3-3 summarizes the modeled operation-related emissions of criteria air pollutants and precursors with 2018 LRDP implementation conditions of the Orchard Park Redevelopment component in 2021.

**Table 3.3-3 Summary of Modeled Emissions of Criteria Air Pollutants and Precursors Associated with Orchard Park Redevelopment Component Operation – Unmitigated (2021)**

Emissions Source	Annual Emissions		Maximum Daily Emissions	
	ROG (tpy)	NO <sub>x</sub> (tpy)	PM <sub>10</sub> (lb/day)	PM <sub>2.5</sub> (lb/day) <sup>a</sup>
Area Sources <sup>b</sup>	3.1	0.0	0.3	0.3
Natural Gas	0.6	0.2	0.1	0.1
Mobile	3.6	0.8	0.8	0.4
Total	3.6	1.1	1.2	0.7
YSAQMD Thresholds of Significance	10	10	80	NA
Exceed Threshold of Significance?	No	No	No	NA

Note: Summation may not equal totals because of rounding.

ROG = reactive organic gases; NO<sub>x</sub> = oxides of nitrogen; PM<sub>10</sub> = respirable particulate matter with an aerodynamic diameter of 10 micrometers or less; PM<sub>2.5</sub> = respirable particulate matter with an aerodynamic diameter of 2.5 micrometers or less; tpy = tons per year; lbs/day = pounds per day; NA = not available; YSAQMD = Yolo County Air Quality Management District

<sup>a</sup> Although YSAQMD does not recommend PM<sub>2.5</sub> thresholds, estimates of PM<sub>2.5</sub> emissions, which are a subset of PM<sub>10</sub> emissions, are shown for information purposes only.

<sup>b</sup> Includes architectural coating, consumer products, and landscaping emissions.

Source: Data provided by Ascent Environmental in 2018 based on modeling using CalEEMod v. 2016.3.2, VMT data provided by Fehr & Peers in 2018, and emission factors from EMFAC2017

As the Table 3.3-3 shows, NO<sub>x</sub>, ROG, and PM<sub>10</sub> emissions resulting from the operation of the Orchard Park Redevelopment component would not exceed the YSAQMD significance. Therefore, the impact from activities associated with the Orchard Park Redevelopment component would be **less than significant**.

### **OPR Mitigation Measure 3.3-2: Reduce emissions of ROG and NO<sub>x</sub> from mobile sources.**

Implement 2018 LRDP Mitigation Measures 3.3-2.

Although the project-level impact of operational emissions is less than significant, the Orchard Park Redevelopment component is still subject to 2018 LRDP Mitigation Measure 3.3-2 because the Orchard Park Redevelopment is part of the 2018 LRDP and the plan-level emissions are potentially significant under 2018 LRDP Impact 3.3-2. Reduction of project-level operational emissions will help reduce the impact of plan-level operational emissions.

#### **Significance after Mitigation**

Although this impact is less than significant, the implementation of OPR Mitigation Measure 3.3-2 would result in lower emissions although the degree to which they would reduce is uncertain, as noted in Impact 3.3-2 of Volume 1 regarding the 2018 LRDP. Nonetheless, emissions associated with the Orchard Park Redevelopment component would not exceed YSAQMD thresholds, and the impact would remain **less than significant** with implementation of this measure.

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### **Impact 3.3-3: Short-term construction emissions of toxic air contaminants.**

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Construction-related activities would result in temporary, short-term project-generated emissions of TACs, particularly diesel particulate matter (PM). Overall construction TAC emissions from the Orchard Park Redevelopment component would likely result health risks that are below YSAQMD thresholds. However, because of close proximity of the site to nearby sensitive receptors, and because TAC-emitting construction activity could occur adjacent to sensitive receptors, construction-related TAC emissions could expose sensitive receptors to an incremental increase in cancer risk that exceeds 10 in one million or a HI greater than 1.0. This impact would be **potentially significant**.

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Construction-related activities at the Orchard Park Redevelopment would result in temporary, short-term project-generated emissions of diesel PM from the exhaust of off-road, heavy-duty diesel equipment used during site preparation (e.g., grading, excavating); paving; application of architectural coatings; as well as on-road truck travel and other miscellaneous activities. For construction activity, diesel PM is the primary TAC of concern. On-road diesel-powered haul trucks traveling to and from the construction area to deliver materials and equipment are less of a concern because they would not stay on the site for long durations.

Based on the emission modeling conducted and presented in Table 3.3-1 above, maximum daily diesel exhaust emissions of PM<sub>2.5</sub> from construction equipment would not exceed 2.4 lb/day during the most intense season of construction activity. According to the results of the health risk assessment (HRA) conducted for the 2018 LRDP, discussed in Section 3.3 of Volume 1 under Impact 3.3-5, the estimated health risks are less than one fourth of the YSAQMD health risk thresholds and were calculated based on average daily operational emissions of 5.71 lb/day of diesel PM emissions in addition to other TACs (Yorke Engineering 2018:6,31). Thus, construction activity associated with the Orchard Park Redevelopment component would not likely exceed YSAQMD thresholds related to health risks from air pollutants.

Proximity of nearby sensitive receptors to TAC emissions is another key factor in determining health risk. Studies show that diesel PM is highly dispersive (e.g., diesel PM concentrations decrease by 70 percent at 500 feet from the source) (Zhu et al. 2002:1032), and receptors must be in close proximity to emission sources to result in the possibility of exposure to concentrations of concern. The Orchard Park Redevelopment borders the west side of the existing Russell Park student apartments, at which outdoor playgrounds are located and families with small children may reside, and 650 feet west of La Rue Child Development Center.

Despite the relatively low mass of diesel PM emissions that would be generated during construction and the relatively short duration of construction activities within specific portions of the site, construction-related TAC emissions from the Orchard Park Redevelopment component could occur as close as across the fence line from sensitive receptors at Russel Park. Thus, the implementation of the 2018 LRDP would have a **potentially significant** impact associated impacts to sensitive receptors.

#### **OPR Mitigation Measure 3.3-3: Reduce short-term construction-generated TAC emissions.**

Implement 2018 LRDP Mitigation Measure 3.3-4.

#### **Significance after Mitigation**

The implementation of OPR Mitigation Measure 3.3-3 would reduce TAC emissions from construction activity and reduce exposure of sensitive receptors to these emissions. Further, it would substantially reduce construction-generated emissions of TACs and exposure to more-sensitive individuals to potential health effects associated with TAC emissions. OPR Mitigation Measure 3.3-3 would also

limit exposure of on-site sensitive receptors that may be located directly adjacent to construction activity, such that construction activity is either located further away from the receptors or construction activity would not occur while adjacent sensitive receptors are present. Thus, this impact would be **less than significant**.

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