3.2 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 Project. Mitigation is developed as necessary to reduce significant air quality impacts to the extent feasible.

The Sacramento Metropolitan Air Quality Management District (SMAQMD) submitted a comment in response to the notice of preparation (NOP). The letter included recommendations for what to evaluate in this air quality analysis. Specifically, the comment letter recommended that the Project be reviewed for consistency with applicable plans and potential cancer risk. Consistency with applicable plans is evaluated in the impact discussions in this section. Table 3.2-5 presents data regarding potential annual incremental health incidences, and toxic air contaminant (TAC) exposure is discussed under Impact 3.2-3.

3.2.1 Regulatory Setting

Air quality in the Project area is regulated through the efforts of various federal, State, regional, and local government agencies. These agencies work jointly, as well as individually, to improve air quality through legislation, planning, policymaking, education, and a variety of programs. The agencies responsible for improving the air quality in the air basin in which the Project area is located are discussed below.

FEDERAL

In *Massachusetts et al. v. Environmental Protection Agency et al.,* 549 U.S. 497 (2007), the Supreme Court of the United States ruled that CO_2 is an air pollutant as defined under the federal Clean Air Act (CAA) and that the US Environmental Protection Agency (EPA) has the authority to regulate greenhouse gas (GHG) emissions. In 2010, the EPA started to address GHG emissions from stationary sources through its New Source Review permitting program, including operating permits for "major sources" issued under Title V of the CAA.

The National Highway Traffic Safety Administration (NHTSA) also regulates vehicle emissions through the Corporate Average Fuel Economy (CAFE) Standards.

The CAFE Standards, which were first enacted by Congress in 1975, set fleet-wide averages that must be achieved by each automaker for its car and truck fleet. The purpose of the CAFE Standards is to reduce energy consumption by increasing the fuel economy of cars and light trucks. On April 1, 2022, Transportation Secretary Pete Buttigieg unveiled new CAFE standards for 2024–2026 model year passenger cars and light-duty trucks, requiring new vehicles sold in the US to average at least 40 miles per gallon.

Criteria Air Pollutants

The CAA required EPA to establish the national ambient air quality standards (NAAQS) (42 United States Code Section 7409). As shown in Table 3.2-1, EPA has established primary and secondary NAAQS for the following criteria air pollutants: ozone, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide, respirable particulate matter with an aerodynamic diameter of 10 micrometers or less (PM_{10}), fine particulate matter with an aerodynamic diameter of 2.5 micrometers or less ($PM_{2.5}$), and lead. The primary standards protect public health, and the secondary standards protect public welfare. The CAA also requires each state to prepare a State Implementation Plan (SIP) for attaining and maintaining the NAAQS. The federal CAA amendments of 1990 added requirements for states with nonattainment areas to revise their SIPs to incorporate additional control measures to reduce air pollution. Individual SIPs are modified periodically to reflect the latest emissions inventories, planning documents, and rules and regulations of the air basins as reported by their jurisdictional agencies. EPA is responsible for reviewing all SIPs to determine whether they conform to the mandates of the CAA and its amendments and whether implementation will achieve air quality goals. If EPA determines a SIP to be inadequate, a federal implementation plan that imposes additional control measures may be prepared for the nonattainment area. If an approvable SIP is not submitted or implemented within the mandated time frame, sanctions may be applied to transportation funding and stationary air pollution sources in the air basin.

Table 3.2-1 National and California Ambient Air Quality Standards

Pollutant	Averaging Time	California (CAAQS)[a,b]	National (NAAQS)[c]	
			Primary[b,d]	Secondary[b,e]
Ozone	1-hour	0.09 ppm (180 µg/m^3)	–	Same as primary standard
	8-hour	0.070 ppm (137 µg/m^3)	0.070 ppm (147 µg/m^3)	
Carbon monoxide (CO)	1-hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	Same as primary standard
	8-hour	9 ppm[f] (10 mg/m^3)	9 ppm (10 mg/m^3)	
Nitrogen dioxide (NO_2)	Annual arithmetic mean	0.030 ppm (57 µg/m^3)	53 ppb (100 µg/m^3)	Same as primary standard
	1-hour	0.18 ppm (339 µg/m^3)	100 ppb (188 µg/m^3)	—
Sulfur dioxide (SO_2)	24-hour	0.04 ppm (105 µg/m^3)	—	—
	3-hour	—	—	0.5 ppm (1300 µg/m^3)
	1-hour	0.25 ppm (655 µg/m^3)	75 ppb (196 µg/m^3)	—
Respirable particulate matter (PM_{10})	Annual arithmetic mean	20 µg/m^3	—	Same as primary standard
	24-hour	50 µg/m^3	150 µg/m^3	
Fine particulate matter ($PM_{2.5}$)	Annual arithmetic mean	12 µg/m^3	12.0 µg/m^3	15.0 µg/m^3
	24-hour	—	35 µg/m^3	Same as primary standard
Lead [f]	Calendar quarter	—	1.5 µg/m^3	Same as primary standard
	30-Day average	1.5 µg/m^3	—	—
	Rolling 3-Month Average	–	0.15 µg/m^3	Same as primary standard
Hydrogen sulfide	1-hour	0.03 ppm (42 µg/m^3)	No national standards	
Sulfates	24-hour	25 µg/m^3		
Vinyl chloride [f]	24-hour	0.01 ppm (26 µg/m^3)		
Visibility-reducing particulate matter	8-hour	Extinction of 0.23 per km		

Notes: µg/m^3 = micrograms per cubic meter; km = kilometers; ppb = parts per billion; ppm = parts per million.

[a] California standards for ozone, carbon monoxide, SO_2 (1- and 24-hour), NO_2, particulate matter, and visibility-reducing particles are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

[b] Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based on a reference temperature of 25 degrees Celsius (°C) and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

[c] National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic means) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration in a year, averaged over three years, is equal to or less than the standard. The PM_{10} 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m^3 is equal to or less than one. The $PM_{2.5}$ 24-hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact the US Environmental Protection Agency for further clarification and current federal policies.

[d] National primary standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

[e] National secondary standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[f] The California Air Resources Board has identified lead and vinyl chloride as toxic air contaminants with no threshold of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

Source: CARB 2016a.

Toxic Air Contaminants/Hazardous Air Pollutants

TACs, or, in federal parlance, hazardous air pollutants (HAPs), are a defined set of airborne pollutants that may pose a present or potential hazard to human health. A TAC is defined as an air pollutant that may cause or contribute to an increase in mortality or in serious illness, or that may pose a hazard to human health. A substance that is listed as a HAP pursuant to subsection (b) of Section 112 of the CAA (42 United States Code Section 7412[b]) is considered a TAC. TACs are usually present in minute quantities in the ambient air; however, their high toxicity or health risk may pose a threat to public health even at low concentrations.

A wide range of sources, from industrial plants to motor vehicles, emit TACs. The health effects associated with TACs are quite diverse and generally are assessed locally, rather than regionally. TACs can cause long-term health effects, such as cancer, birth defects, neurological damage, asthma, bronchitis, and genetic damage, or short-term acute effects, such as eye-watering, respiratory irritation (a cough), running nose, throat pain, and headaches.

For evaluation purposes, TACs are separated into carcinogens and noncarcinogens based on the nature of the physiological effects associated with exposure to the pollutant. Carcinogens are assumed to have no safe threshold below which health impacts would not occur. This contrasts with criteria air pollutants, for which acceptable levels of exposure can be determined and for which ambient standards have been established (Table 3.2-1). Cancer risk from TACs is expressed as excess cancer cases per one million exposed individuals, typically over a lifetime of exposure.

EPA and, in California, the California Air Resources Board (CARB) regulate HAPs and TACs, respectively, through statutes (i.e., 42 United States Code Section 7412[b]) and regulations that generally require the use of the maximum achievable control technology or best available control technology (BACT) for toxics to limit emissions.

STATE

CARB is the agency responsible for coordination and oversight of State and local air pollution control programs in California and for implementing the California Clean Air Act (CCAA). The CCAA, which was adopted in 1988, required CARB to establish California ambient air quality standards (CAAQS) (Table 3.2-1).

Criteria Air Pollutants

CARB has established CAAQS for sulfates, hydrogen sulfide, vinyl chloride, visibility-reducing particulate matter, and the above-mentioned criteria air pollutants. In most cases, the CAAQS are more stringent than the NAAQS. Differences in the standards are generally explained by the health effects studies considered during the standard-setting process and the interpretation of the studies. In addition, the CAAQS incorporate a margin of safety to protect sensitive individuals.

The CCAA requires that all local air districts in the State endeavor to attain and maintain the CAAQS by the earliest date practical. It specifies that local air districts should focus particular attention on reducing the emissions from transportation and areawide emission sources, and it provides air districts with the authority to regulate indirect emission sources.

CARB regulates the emission of criteria air pollutants through several programs, regulations, and plans. The 2022 State SIP Strategy (2022 SIP) serves as a compilation document of all actions taken by CARB and local air districts to further the attainment of the NAAQS. Pertinent regulations to the Project included in the 2022 SIP include but are not limited to, the Advanced Clean Cars II Program, Advanced Clean Fleets, and Zero-Emissions Trucks Measure, which all serve to electrify the transportation sector through sales requirements for benchmark years (CARB 2022).

Toxic Air Contaminants

TACs in California are regulated primarily through the Tanner Air Toxics Act (Assembly Bill [AB] 1807, Chapter 1047, Statutes of 1983) and the Air Toxics Hot Spots Information and Assessment Act of 1987 (AB 2588, Chapter 1252, Statutes of 1987). AB 1807 sets forth a formal procedure for CARB to designate substances as TACs. Research, public participation, and scientific peer review are required before CARB can designate a substance as a TAC. To date, CARB has identified more than 21 TACs and adopted EPA's list of HAPs as TACs. Most recently, particulate matter (PM) exhaust from diesel engines (diesel PM) was added to CARB's list of TACs.

After a TAC is identified, CARB then adopts an airborne toxics control measure for sources that emit that particular TAC. If a safe threshold exists for a substance at which there is no toxic effect, the control measure must reduce exposure below that threshold. If no safe threshold exists, the measure must incorporate the best available control technology for toxics to minimize emissions.

The Hot Spots Act requires that existing facilities that emit toxic substances above a specified level prepare an inventory of toxic emissions, prepare a risk assessment if emissions are significant, notify the public of significant risk levels, and prepare and implement risk reduction measures.

CARB has adopted diesel exhaust control measures and more stringent emissions standards for various transportation-related mobile sources of emissions, including transit buses, and off-road diesel equipment (e.g., tractors, generators). Over time, the replacement of older vehicles will result in a vehicle fleet that produces substantially lower levels of TACs than under current conditions. Mobile-source emissions of TACs (e.g., benzene, 1-3-butadiene, diesel PM) have been reduced significantly over the last decade and will be reduced further in California through a progression of regulatory measures (e.g., Low Emission Vehicle/Clean Fuels and Phase II reformulated gasoline regulations) and control technologies. With the implementation of CARB's Risk Reduction Plan and other regulatory programs, it is estimated that emissions of diesel PM will be less than half of those in 2010 by 2035 (CARB 2020). Adopted regulations are also expected to continue to reduce formaldehyde emissions emitted by cars and light-duty trucks. As emissions are reduced, it is expected that risks associated with exposure to the emissions will also be reduced.

LOCAL

Sacramento Metropolitan Air Quality Management District

Criteria Air Pollutants

SMAQMD is the primary agency responsible for planning to meet NAAQS and CAAQS in Sacramento County. SMAQMD works with other local air districts in the Sacramento region to maintain the region's portion of the SIP for ozone. The SIP is a compilation of plans and regulations that govern how the region and State will comply with the CAA requirements to attain and maintain the NAAQS for ozone. The Sacramento Region has been designated as a "moderate" 2015 8-hour ozone nonattainment area with an extended attainment deadline of June 15, 2019 (EPA 2020a). The 2018 Sacramento Regional 2008 8-Hour Ozone Attainment and Further Reasonable Progress Plan was approved by CARB on November 16, 2017. The previous 2013 Update to the 8-Hour Ozone Attainment and Reasonable Further Progress Plan was approved and promulgated by EPA for the 1997 8-Hour Ozone Standard. EPA has not released a notice of approval and promulgation of the 2017 SIP (CARB 2017). At a public meeting to be held on October 26, 2023, CARB will consider the approval of the 2023 Sacramento Regional Plan for the 2015 70-ppb 8-Hour Ozone Standard (2023 Plan). The 2023 Plan was prepared by the five local air districts of the Sacramento Federal Non-attainment Area (Sacramento Region, or SFNA), with the support of CARB.

SMAQMD has developed a set of guidelines for use by lead agencies when preparing environmental documents. The guidelines contain thresholds of significance for criteria pollutants and TACs, and also make recommendations for conducting air quality analyses. After SMAQMD guidelines have been consulted and the air quality impacts of a project have been assessed, the lead agency's analysis undergoes a review by SMAQMD. SMAQMD submits comments and suggestions to the lead agency for incorporation into the environmental document.

All projects are subject to adopted SMAQMD rules and regulations in effect at the time of construction. Specific rules relevant to the construction of future development under the Project may include the following:

- Rule 201: General Permit Requirements. Any project that includes the use of equipment capable of releasing emissions to the atmosphere may be required to obtain permit(s) from SMAQMD before equipment operation. The Applicant, developer, or operator of a project that includes an emergency generator, boiler, or heater should contact SMAQMD early to determine whether a permit is required, and to begin the permit application process. Portable construction equipment (e.g., generators, compressors, pile drivers, lighting equipment) with an internal combustion engine greater than 50 horsepower must have a SMAQMD permit or CARB portable equipment registration.

- Rule 202: New Source Review. The purpose of this rule is to provide for the issuance of authorities to construct and permits to operate at new and modified stationary air pollution sources and to provide mechanisms, including emission offsets, by which authorities to construct such sources may be granted without interfering with the attainment or maintenance of ambient air quality standards.
- Rule 207: Federal Operating Permit. The purpose this rule is to establish an operating permitting system consistent with the requirements of Title V of the United States Code and pursuant to 40 FR Part 70. Stationary sources subject to the requirements of this rule are also required to comply with any other applicable federal, state, or SMAQMD orders, rules and regulations, including requirements pertaining to prevention of significant deterioration pursuant to Rule 203, requirements to obtain an authority to construct pursuant to Rule 201, or applicable requirements under SMAQMD's new source review rule in the SIP.
- Rule 402: Nuisance. A person shall not discharge from any source whatsoever such quantities of air contaminants or other materials which cause injury, detriment, nuisance or annoyance to any considerable number of persons or the public, or which endanger the comfort, repose, health or safety of any such persons or the public, or which cause or have natural tendency to cause injury or damage to business or property.
- Rule 403: Fugitive Dust. The developer or contractor is required to control dust emissions from earthmoving activities or any other construction activity to prevent airborne dust from leaving the project site. Fugitive dust controls include the following:
  - Water all exposed surfaces two times daily.
  - Cover or maintain at least two feet of free board on haul trucks transporting soil, sand, or other loose material on the site.
  - Use wet power vacuum street sweepers to remove any visible trackout mud or dirt onto adjacent public roads at least once a day.
  - Limit vehicle speeds on unpaved roads to 15 miles per hour.
  - All roadways, driveways, sidewalks, parking lots to be paved should be completed as soon as possible. In addition, building pads should be laid as soon as possible after grading unless seeding or soil binders are used.
  - Minimize idling time either by shutting equipment off when not in use or reducing the time of idling to 5 minutes.
  - Maintain all construction equipment in proper working condition according to manufacturer's specifications.
- Rule 442: Architectural Coatings. The purpose of this rule is to limit the emissions of volatile organic compounds from the use of architectural coatings supplied, sold, offered for sale, applied, solicited for application, or manufactured for use within Sacramento County.
- Rule 902: Asbestos. The developer or contractor is required to notify SMAQMD of any regulated renovation or demolition activity. Rule 902 contains specific requirements for surveying, notification, removal, and disposal of material containing asbestos.

In addition, if modeled construction-generated emissions for a project are not reduced to levels below SMAQMD's mass emission threshold (of 85 pounds per day [lb/day] for nitrogen oxide [NO_X], 80 lb/day or 13.2 tons per year (tpy) for PM_{10}, and 82 lb/day or 15 tpy for $PM_{2.5}$) after the standard construction mitigation is applied, then SMAQMD requires an offsite construction mitigation fee to purchase offsite emissions reductions. Such purchases are made through SMAQMD's Heavy Duty Incentive Program, through which select owners of heavy-duty equipment in Sacramento County can repower or retrofit their old engines with cleaner engines or technologies (SMAQMD 2019).

As discussed in greater detail under, "Thresholds of Significance," and "Methodology," the Thresholds of Significance have been developed in consideration of long-term regional air quality planning. Projects that are found to emit emissions in exceedance of these bright-line thresholds would generate a cumulatively considerable contribution of regional air pollution which could obstruct the region's attainment of the NAAQS and/or CAAQS or cause a localized exceedance of these concentration-based standards within the Sacramento Valley Air Basin (SVAB). Conversely,

projects that emit levels of air pollution below these thresholds would not affect the SVAB's ability to attain the NAAQs and/or CAAQS.

Also discussed in greater detail under, "Methodology," SMAQMD has released several versions of guidance in response to the California Supreme Court Case *Sierra Club v. County of Fresno* (2018) 6 Cal.App.5th 503 (herein referred to as the Friant Ranch Decision). The Final Guidance, released in October 2020, is discussed in greater detail under, "Methodology."

Toxic Air Contaminants

At the local level, air districts may adopt and enforce CARB control measures for TACs. Under SMAQMD Rule 201 ("General Permit Requirements"), Rule 202 ("New Source Review"), and Rule 207 ("Federal Operating Permit"), all sources that possess the potential to emit TACs are required to obtain permits from SMAQMD. Permits may be granted to these operations if they are constructed and operated in accordance with applicable regulations, including New Source Review standards and air toxics control measures. SMAQMD limits emissions and public exposure to TACs through a number of programs. SMAQMD prioritizes TAC-emitting stationary sources based on the quantity and toxicity of the TAC emissions and the proximity of the facilities to sensitive receptors. Sensitive receptors are people, or facilities that generally house people (e.g., schools, hospitals, residences), that may experience adverse effects from unhealthful concentrations of air pollutants.

Odors

Although offensive odors rarely cause any physical harm, they can be very unpleasant, leading to considerable stress among the public and often generating citizen complaints to local governments and SMAQMD. SMAQMD's Rule 402 ("Nuisance") regulates odors.

City of Elk Grove General Plan

The following policies in the Elk Grove General Plan are relevant to the analysis of air quality effects (City of Elk Grove 2019).

- **Policy NR-4-1:** Require all new development projects which have the potential to result in substantial air quality impacts to incorporate design, and/or operational features that result in a reduction in emissions equal to 15 percent compared to an "unmitigated baseline project." An unmitigated baseline project is a development project which is built and/or operated without the implementation of trip reduction, energy conservation, or similar features, including any such features which may be required by the Zoning Code or other applicable codes.
- **Policy NR-4-3:** Implement and support programs that reduce mobile source emissions.
- **Policy NR-4-4:** Promote pedestrian/bicycle access and circulation to encourage residents to use alternative modes of transportation in order to minimize direct and indirect emissions of air contaminants.
- **Policy NR-4-5:** Emphasize demand management strategies that seek to reduce single-occupant vehicle use in order to achieve State and federal air quality plan objectives.
- **Policy NR-4-8:** Require that development projects incorporate best management practices during construction activities to reduce emissions of criteria pollutants.
- **Policy NR-5-2:** Improve the health and sustainability of the community through improved regional air quality and reduction of greenhouse gas emissions that contribute to climate change.
- **Policy N-1-7:** The standards outlined in Table 8-4 shall not apply to transportation- and City infrastructure-related construction activities as long as construction occurs between the hours of 7 a.m. and 7 p.m., Monday through Friday, and 8 a.m. and 5 p.m. on weekends and federally recognized holidays. Work may occur beyond these time frames for construction safety or because of existing congestion that makes completing the work during these time frames infeasible.

City of Elk Grove Municipal Code

Elk Grove Municipal Code (EGMC) Chapter 16.07 provides permitting guidance for electric vehicle (EV) charging stations. Municipal Code Sections 16.07.200 through 16.07.500 summarize the streamlined permitting process for the installation of EV charging stations, including provisions pertaining to the completion of a technical review checklist that ensures that installation of an EV charging station would not result in any adverse environmental or health effects. As stated in EGMC Section 16.07.400, "the intent of this chapter [is] to encourage the installation of electric vehicle charging stations by removing obstacles to permitting for charging stations so long as the action does not supersede the Building Official's authority to address higher priority, life-safety situations."

EGMC Section 23.58.120 requires nonresidential developments with over 200 parking spaces to have a minimum of 20 percent of the parking spaces to be EV capable and 25 percent of EV capable spaces to be EV ready parking spaces. This section also implements the requirements of Part 6 of the 2022 Title 24 California Building Code (CalGreen Code) for multi-family residential units and non-residential land uses.

EGMC 6.32 details the City's noise standards, including allowed hours for construction. Consistent with General Plan Policy Noise Policy NO-1-7, EGMC Section 6.32.100 limits construction activities within the proximity of sensitive receptors to 7 a.m. to 7 p.m., thus minimizing exposure of air pollution to nearby receptors. Section 6.32.100 states that construction activities not located near residential uses may be allowed to occur daily between 6 a.m. and 8 p.m. Additionally, when an unforeseen or unavoidable condition occurs during a construction project and the nature of the project necessitates that work in progress be continued until a specific phase is completed, the contractor or owner shall be allowed to continue work after 7 p.m. and to operate machinery and equipment necessary until completion of the specific work in progress can be brought to conclusion under conditions which will not jeopardize inspection acceptance or create undue financial hardships for the contractor or owner.

EGMC 23.60.050 directs development to comply with the relevant rules and regulations pertaining to odors and particulate matter overseen by SMAQMD. EGMC 23.60.050 also directs sources of odors to be modified to prevent the release of noxious odorous emissions, with the exception of agricultural operations.

3.2.2 Environmental Setting

The Project site is located within the SVAB. The SVAB includes all of Butte, Colusa, Glenn, Sacramento, Shasta, Sutter, Tehama, Yolo, and Yuba Counties. The ambient concentrations of air pollutant emissions are determined by the number of emissions released by the sources of air pollutants and the atmosphere's ability to transport and dilute such emissions. Natural factors that affect transport and dilution include terrain, wind, atmospheric stability, and sunlight. Therefore, existing air quality conditions in the area are determined by such natural factors as topography, meteorology, and climate, in addition to the number of emissions released by existing air pollutant sources, as discussed separately below.

CLIMATE, METEOROLOGY, AND TOPOGRAPHY

The SVAB is a relatively flat area bordered by the north Coast Ranges to the west and the northern Sierra Nevada to the east. Air flows into the SVAB through the Carquinez Strait, the only breach in the western mountain barrier, and moves across the Sacramento River–San Joaquin River Delta (Delta) from the San Francisco Bay area.

The Mediterranean climate type of the SVAB is characterized by hot, dry summers and cool, rainy winters. During the summer, daily temperatures range from 50 degrees Fahrenheit (°F) to more than 100°F. The inland location and surrounding mountains shelter the area from much of the ocean breezes that keep the coastal regions moderate in temperature. Most precipitation in the area results from air masses that move in from the Pacific Ocean, usually from the west or northwest, during the winter months. More than half the total annual precipitation falls during the winter rainy season (November through February); the average winter temperature is a moderate 49°F. Also characteristic of SVAB winters are periods of dense and persistent low-level fog, which are most prevalent between storms. The prevailing winds are moderate in speed and vary from moisture-laden breezes from the south to dry land flows from the north.

The mountains surrounding the SVAB create a barrier to airflow, which leads to the entrapment of air pollutants when meteorological conditions are unfavorable for transport and dilution. The highest frequency of poor air movement occurs in the fall and winter when high-pressure cells are often present over the SVAB. The lack of surface wind during these periods, combined with the reduced vertical flow caused by a decline in surface heating, reduces the influx of air and leads to the concentration of air pollutants under stable metrological conditions. Surface concentrations of air pollutant emissions are highest when these conditions occur in combination with agricultural burning activities or with temperature inversions, which hamper dispersion by creating a ceiling over the area and trapping air pollutants near the ground.

May through October is ozone season in the SVAB. This period is characterized by poor air movement in the mornings with the arrival of the Delta sea breeze from the southwest in the afternoons. In addition, longer daylight hours provide a plentiful amount of sunlight to fuel photochemical reactions between reactive organic gases (ROG) and NO_X, which result in ozone formation. Typically, the Delta breeze transports air pollutants northward out of the SVAB; however, a phenomenon known as the Schultz Eddy prevents this from occurring during approximately half of the time from July to September. The Schultz Eddy phenomenon causes the wind to shift southward and blow air pollutants back into the SVAB. This phenomenon exacerbates the concentration of air pollutant emissions in the area and contributes to the area violating the ambient air quality standards.

The local meteorology of the Project site and surrounding area is represented by measurements recorded at the Western Regional Climate Center (WRCC) Sacramento Executive Airport Station. The normal annual precipitation is approximately 17.24 inches. January temperatures range from a normal minimum of 37.8°F to a normal maximum of 53.5°F. July temperatures range from a normal minimum of 58.2°F to a normal maximum of 92.7°F (WRCC 2016). The prevailing wind direction is from the south (WRCC 2002).

CRITERIA AIR POLLUTANTS

Concentrations of criteria air pollutants are used to indicate the quality of the ambient air. A brief description of key criteria air pollutants in the SVAB is provided below. Emission source types and health effects are summarized in Table 3.2-2. Sacramento County's attainment status for the CAAQS and the NAAQS are shown in Table 3.2-3.

Ozone

Ozone is a photochemical oxidant (a substance whose oxygen combines chemically with another substance in the presence of sunlight) and the primary component of smog. Ozone is not directly emitted into the air but is formed through complex chemical reactions between precursor emissions of ROG and NO_X in the presence of sunlight. ROG are volatile organic compounds that are photochemically reactive. ROG emissions result primarily from incomplete combustion and the evaporation of chemical solvents and fuels. NO_X are a group of gaseous compounds of nitrogen and oxygen that result from the combustion of fuels.

Emissions of the ozone precursors ROG and NO_X have decreased over the past several years because of more stringent motor vehicle standards and cleaner burning fuels. Emissions of ROG and NO_X decreased from 2000 to 2010 and are projected to continue decreasing from 2010 to 2035 (CARB 2013).

Nitrogen Dioxide

NO_2 is a brownish, highly reactive gas that is present in all urban environments. The major human-made sources of NO_2 are combustion devices, such as boilers, gas turbines, and mobile and stationary reciprocating internal combustion engines. Combustion devices emit primarily nitric oxide (NO), which reacts through oxidation in the atmosphere to form NO_2. The combined emissions of NO and NO_2 are referred to as NO_X and are reported as equivalent NO_2. Because NO_2 is formed and depleted by reactions associated with photochemical smog (ozone), the NO_2 concentration in a particular geographical area may not be representative of the local sources of NO_X emissions (EPA 2012).

Particulate Matter

Respirable particulate matter with an aerodynamic diameter of 10 micrometers or less is referred to as PM_{10}. PM_{10} consists of particulate matter emitted directly into the air, such as fugitive dust, soot, and smoke from mobile

and stationary sources, construction operations, fires and natural windblown dust, and particulate matter formed in the atmosphere by reaction of gaseous precursors (CARB 2013). Fine particulate matter ($PM_{2.5}$) includes a subgroup of smaller particles that have an aerodynamic diameter of 2.5 micrometers or less. PM_{10} emissions in the SVAB are dominated by emissions from area sources, primarily fugitive dust from vehicle travel on unpaved and paved roads, farming operations, construction and demolition, and particles from residential fuel combustion. Direct emissions of PM_{10} are projected to remain relatively constant through 2035. Direct emissions of $PM_{2.5}$ have steadily declined in the SVAB between 2000 and 2010 and then are projected to increase very slightly through 2035. Emissions of $PM_{2.5}$ in the SVAB are dominated by the same sources as emissions of PM_{10} (CARB 2013).

Table 3.2-2 Sources and Health Effects of Criteria Air Pollutants

Pollutant	Sources	Acute[1] Health Effects	Chronic[2] Health Effects
Ozone	Secondary pollutant resulting from the reaction of ROG and NO_X in the presence of sunlight. ROG emissions result from incomplete combustion and evaporation of chemical solvents and fuels; NO_X results from the combustion of fuels	increased respiration and pulmonary resistance; cough, pain, shortness of breath, lung inflammation	permeability of respiratory epithelia, the possibility of permanent lung impairment
Carbon monoxide (CO)	Incomplete combustion of fuels; motor vehicle exhaust	headache, dizziness, fatigue, nausea, vomiting, death	permanent heart and brain damage
Nitrogen dioxide (NO_2)	combustion devices, e.g., boilers, gas turbines, and mobile and stationary reciprocating internal combustion engines	coughing, difficulty breathing, vomiting, headache, eye irritation, chemical pneumonitis or pulmonary edema; breathing abnormalities, cough, cyanosis, chest pain, rapid heartbeat, death	chronic bronchitis, decreased lung function
Sulfur dioxide (SO_2)	coal and oil combustion, steel mills, refineries, and pulp and paper mills	Irritation of the upper respiratory tract, increased asthma symptoms	Insufficient evidence linking SO_2 exposure to chronic health impacts
Respirable particulate matter (PM_{10}), Fine particulate matter ($PM_{2.5}$)	fugitive dust, soot, smoke, mobile and stationary sources, construction, fires, and natural windblown dust, and formation in the atmosphere by condensation and/or transformation of SO_2 and ROG	breathing and respiratory symptoms, aggravation of existing respiratory and cardiovascular diseases, premature death	alterations to the immune system, carcinogenesis
Lead	metal processing	reproductive/ developmental effects (fetuses and children)	numerous effects including neurological, endocrine, and cardiovascular effects

Notes: NO_X = oxides of nitrogen; ROG = reactive organic gases.

[1] "Acute" refers to the effects of short-term exposures to criteria air pollutants, usually at fairly high concentrations.

[2] "Chronic" refers to the effects of long-term exposures to criteria air pollutants, usually at lower, ambient concentrations.

Sources: EPA 2016.

Table 3.2-3 Attainment Status Designations for Sacramento County

Pollutant	National Ambient Air Quality Standard	California Ambient Air Quality Standard
Ozone	Attainment (1-hour)[1]	Nonattainment (1-hour) Classification-Serious[2]
	Nonattainment (8-hour)[3] Classification=Moderate	Nonattainment (8-hour) Nonattainment (8-hour)
Respirable particulate matter (PM_{10})	Attainment (24-hour)	Nonattainment (24-hour)
		Nonattainment (Annual)
Fine particulate matter ($PM_{2.5}$)	Nonattainment (24-hour)	(No State Standard for 24-Hour)
	Attainment (Annual)	Attainment (Annual)
Carbon monoxide (CO)	Attainment (1-hour)	Attainment (1-hour)
	Attainment (8-hour)	Attainment (8-hour)
Nitrogen dioxide (NO_2)	Unclassified/Attainment (1-hour)	Attainment (1-hour)
	Unclassified/Attainment (Annual)	Attainment (Annual)
Sulfur dioxide (SO_2)[5]	(Attainment Pending) (1-Hour)	Attainment (1-hour)
		Attainment (24-hour)
Lead (Particulate)	Attainment (3-month rolling avg.)	Attainment (30-day average)
Hydrogen Sulfide	No Federal Standard	Unclassified (1-hour)
Sulfates		Attainment (24-hour)
Visibly Reducing Particles		Unclassified (8-hour)
Vinyl Chloride		Unclassified (24-hour)

[1] Air Quality meets federal 1-hour Ozone standard (77 FR 64036). EPA revoked this standard, but some associated requirements still apply. SMAQMD attained the standard in 2009. SMAQMD has requested EPA recognize attainment to fulfill the requirements.

[2] Per Health and Safety Code Section 40921.5(c), the classification is based on 1989–1991 data, and therefore does not change.

[3] 2015 Standard.

[4] 2010 Standard.

Source: CARB 2019b.

TOXIC AIR CONTAMINANTS

According to the 2013 Edition of the California Almanac of Emissions and Air Quality, health risks from TACs can largely be attributed to relatively few compounds, the most important being diesel PM (CARB 2013:5-2 to 5-4). Diesel PM differs from other TACs in that it is not a single substance, but rather a complex mixture of hundreds of substances. Although diesel PM is emitted by diesel-fueled internal combustion engines, the composition of the emissions varies depending on engine type, operating conditions, fuel composition, lubricating oil, and whether an emissions control system is being used. Unlike the other TACs, no ambient monitoring data are available for diesel PM because no routine measurement method currently exists. The TACs for which data are available that pose the greatest existing ambient risk in California are benzene, 1,3-butadiene, acetaldehyde, carbon tetrachloride, hexavalent chromium, para-dichlorobenzene, formaldehyde, methylene chloride, and perchloroethylene. Diesel PM poses the greatest health risk among the 10 TACs mentioned. Overall, Statewide emissions of diesel PM are forecasted to decline by 71 percent between 2000 and 2035 (CARB 2013: 3-8). The Project is not located within 1,000 feet from any stationary or major TAC-emitting roadways.

ODORS

Odors are generally regarded as an annoyance rather than a health hazard. However, manifestations of a person's reaction to foul odors can range from psychological (e.g., irritation, anger, or anxiety) to physiological (e.g., circulatory and respiratory effects, nausea, vomiting, and headache).

With respect to odors, the human nose is the sole sensing device. The ability to detect odors varies considerably among the population and overall is quite subjective. Some individuals can smell very minute quantities of specific substances; others may not have the same sensitivity but may have sensitivities to odors of other substances. In addition, people may have different reactions to the same odor; an odor that is offensive to one person may be perfectly acceptable to another (e.g., fast food restaurant). It is important to also note that an unfamiliar odor is more easily detected and is more likely to cause complaints than a familiar one. This is because of the phenomenon known as odor fatigue, in which a person can become desensitized to almost any odor, and recognition only occurs with an alteration in the intensity.

Odor sources of concern include wastewater treatment plants, sanitary landfills, composting facilities, recycling facilities, petroleum refineries, chemical manufacturing plants, painting operations, rendering plants, food packaging plants, and cannabis (SMAQMD 2016). The Project site is not within the vicinity of any of these sources of odors.

SENSITIVE RECEPTORS

Sensitive receptors are generally considered to include those land uses where exposure to pollutants could result in health-related risks to sensitive individuals, such as children or the elderly. Residential dwellings, schools, hospitals, playgrounds, and similar facilities are of primary concern because of the presence of individuals particularly sensitive to pollutants and/or the potential for increased and prolonged exposure of individuals to pollutants. Sensitive receptors near the New Zoo include residences and a playground east of the Project site along Lotz Parkway.

3.2.3 Impacts and Mitigation Measures

METHODOLOGY

Criteria Air Pollutants

The analysis in this section is consistent with the recommendations of SMAQMD's Guide to Air Quality Assessment in Sacramento County (CEQA Guide) (SMAQMD 2021). The analysis primarily focuses on the extent to which the Project would conflict with air quality planning efforts. The net increase in criteria air pollutant (PM_{10} and $PM_{2.5}$) and ozone precursor (ROG and NO_X) emissions (i.e., pollutants for which the region is in nonattainment of ambient air quality standards) generated by the Project was estimated based on predicted vehicle miles traveled and maximum development under the Project (i.e., buildout of Phases 1–4), identified in Table 2-1 of Chapter 2, "Project Description," to address the largest extent of potential air quality impacts. The Project's emissions are compared to SMAQMD's thresholds of significance.

Both short-term construction and long-term operational emissions of criteria air pollutants and precursors were calculated using the California Emissions Estimator Model (CalEEMod) Version 2022.1.1.16 computer program, as recommended by SMAQMD's CEQA Guide. Modeling was based on Project-specific information (e.g., size, 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 the Project's location and land use type. Construction would be separated into Phases 1A, 1B, 1C, 2, 3, and 4. Phase 1A is anticipated to begin as early as summer 2025, and Phase 4 is anticipated to be completed by the end of 2042. Emissions from trips associated with moving the animals are speculative at the time of this analysis. The animals housed at the New Zoo would be from either the Sacramento Zoo or another AZA accredited zoo. The decision of where animals at the New Zoo would arrive from would be determined closer to the opening of the New Zoo and subsequent phases. Therefore, quantifying emissions from these vehicle trips would be speculative and is not included in this analysis.

The Project would include land use designations, such as for animal habitats and animal care quarters, that are not available in CalEEMod; in such cases, land uses were assigned that most closely resemble them. With respect to operational emissions, mobile source emissions were estimated using Project-estimated annual vehicle miles traveled derived from the study prepared for the Project (see Section 3.13, "Transportation"). The Project would be fully electric (i.e., no on-site natural gas use); therefore, this air quality analysis assumes that no emissions would be generated on-site from energy consumption. See Section 3.7, "Greenhouse Gases and Climate Change," for the assessment of emissions from the use of energy off the grid. In accordance with SMAQMD's guidance operational GHG emissions were modeled at the initial zoo opening in 2029 and as at one phase assuming operation of full buildout in 2043. Specific model assumptions, inputs, and land use equivalencies for these calculations can be found in Appendix D.

Health Effects

The California Supreme Court issued a ruling in *Sierra Club v. County of Fresno*, 6 Cal.5th 502 (2018) regarding an air quality analysis prepared for the Friant Ranch Development Project EIR in December 2018. The court asserted that the air quality analysis performed for the project did not adequately explain the nature and magnitude of long-term air quality impacts from emissions of criteria pollutants and ozone precursors. The court held that the EIR lacked "sufficient detail to enable those who did not participate in its preparation to understand and consider meaningfully the issues the proposed project raises."

The court expressed the need to determine whether there was a connection between the significant project emissions and the human health impacts associated with such emissions. According to the court, one pathway would be to estimate the level of ozone that would be produced from the project, measure to what extent human health would be affected, and describe where daily exceedances of the NAAQS and CAAQS would occur in an air basin. This detailed approach to modeling is founded on the assumption that such an exercise would produce estimates of meaningful accuracy.

In response to this court case, a discussion of the development of air quality thresholds of significance for criteria pollutants and ozone precursors and their connection to attainment of the NAAQS and CAAQS, as well as a discussion of the applicability of regional air pollution modeling, is provided below.

Typically, air districts develop thresholds of significance for CEQA evaluation (summarized below) in consideration of maintaining or achieving attainment under the NAAQS and CAAQS for the geographical area they oversee (long-term regional air quality planning). These thresholds are tied to a SIP for an air district in nonattainment for criteria air pollutants within a cumulative context. These SIPs, which are submitted to CARB, contain an inventory of existing ambient air pollutant concentrations and, if applicable, a suite of measures to reduce air pollution and a projected date of achieving attainment under the NAAQS and CAAQS. Air quality plans identify a budget that accounts for new future sources of pollution from land use development and stationary sources. These budgets inform the development of CEQA thresholds of significance and represent an allowable level of pollution that, when emitted in volumes below such thresholds, would not conflict with an air district's long-term regional air quality planning or attainment date.

As discussed previously, the NAAQS and CAAQS represent concentrations of criteria air pollutants protective of human health and are substantiated by extensive scientific evidence. EPA and CARB recognize that ambient air quality below these concentrations would not cause adverse health impacts on exposed receptors. In connecting an air district's (e.g., SMAQMD's) thresholds of significance to its anticipated date of attainment, projects that demonstrate levels of construction and/or operational emissions below the applicable thresholds would be consistent with long-term regional planning efforts. These projects would not result in emissions that would conflict with an area achieving future attainment status under the NAAQS and CAAQS as outlined by an applicable air quality plan.

Similarly, projects that demonstrate emissions levels in exceedance of an applicable threshold could contribute to the continued nonattainment designation of a region or potentially degrade a region from attainment to nonattainment, resulting in acute or chronic respiratory and cardiovascular illness associated with exposure to concentrations of criteria air pollutants above what EPA and CARB consider safe. Symptoms can include coughing, difficulty breathing, chest pain, eye and throat irritation, and, in extreme cases, death caused by exacerbation of existing respiratory and cardiovascular disease, cancer, or impaired immune and lung function.

However, modeling with a high degree of accuracy the exact location and magnitude of specific health impacts that could occur as a result of project-level construction- or operation-related emissions is infeasible. Although dispersion modeling of project-generated PM may be conducted to evaluate resulting ground-level concentrations, the secondary formation of PM is similar in complexity to ozone formation, and because emissions can be transported, localized impacts of directly emitted PM do not always equate to local PM concentrations. Ozone is a secondary pollutant formed from the oxidation of ROG and NO_X in the presence of sunlight. Rates of ozone formation are a function of a variety of complex physical factors, including topography, building influences on airflow (e.g., downwash), ROG and NO_X concentration ratios, multiple meteorological conditions, and sunlight exposure (Seinfeld and Pandis 1996: 298). For example, rates of ozone formation are highest in elevated temperatures and when the ratio of ROG to NO_X is 5.5:1. When temperatures are lower and this ratio shifts, rates of ozone formation are stunted (Seinfeld and Pandis 1996: 299–300). In addition, ROG emissions are composed of many compounds that have different levels of reactivity leading to ozone formation. Methane, for instance, is the most common ROG compound, yet it has one of the lowest reactivity potentials (Seinfeld and Pandis 1996: 309, 312). Moreover, some groups may develop more severe health impacts than others. For instance, infants, children, the elderly, and individuals with preexisting medical conditions are more susceptible to developing illnesses from exposure to air pollutants.

Notably, during the litigation process in the Friant Ranch case, the San Joaquin Valley Air Pollution Control District (SJVAPCD) (a leading air district governing air quality planning in the San Joaquin Valley Air Basin) submitted an amicus curiae brief that provided scientific context and expert opinion regarding the feasibility of performing regional dispersion modeling for ozone. Although SJVAPCD does not regulate air pollution in the SVAB, it has the technical and scientific expertise to comment on the feasibility of performing photochemical regional dispersion modeling for project-level CEQA analyses. In the brief, SJVAPCD states that "CEQA does not require an EIR to correlate a project's air quality emissions to specific health impacts, because such an analysis is not reasonably feasible." SJVAPCD reiterates that (SJVAPCD 2015):

> the Air District has based its thresholds of significance for CEQA purposes on the levels that scientific and factual data demonstrate that the [SJVAB] can accommodate without affecting the attainment date for the NAAQS. The Air District has tied its CEQA significance thresholds to the level at which stationary pollution sources must "offset" their emissions…. Thus the CEQA air quality analysis for criteria air pollutants is not really localized, project-level impact analysis but one of regional "cumulative impacts."

The brief asserts that these CEQA thresholds of significance are not intended to be applied such that any localized human health impact associated with a project's emissions could be identified. Rather, CEQA thresholds of significance are used to determine whether a project's emissions would obstruct a region's capability of attaining the NAAQS and CAAQS according to the emissions inventory prepared in a SIP, which is then submitted and reviewed by CARB and EPA. This sentiment is corroborated in an additional brief submitted by the South Coast Air Quality Management District (SCAQMD 2015).

SMAQMD developed Final Friant Ranch Guidance based on modeling that estimates the incremental health effects of a project's emissions of criteria air pollutants and ozone precursors (SMAQMD 2020). The Minor Project Health Effects Screening Tool contained in the guidance was used to project and evaluate the Project's incremental health effects because Project-related emission rates of ROG, NO_X, and $PM_{2.5}$ are anticipated to match the lowest (i.e., most stringent) thresholds of significance for air districts in the area. The most stringent thresholds of significance applied in this tool include 82 lb/day of $PM_{2.5}$ (derived from SMAQMD), 82 lb/day for PM_{10} (derived from the Placer County Air Pollution Control District), and 82 lb/day for ROG and NO_X (derived from the El Dorado County Air Quality Management District).

The Minor Projects Health Effects Screening Tool estimates the mean incidence of health outcomes, such as mortality, hospital admissions, emergency room visits, and heart attacks (acute myocardial infarction), in the SVAB that may result from emissions from a new project that emits 82 lb/day of NO_X, ROG, or PM. Projects with emissions lower than these thresholds of significance would have lower estimated health effects. Based on the impact determinations summarized below, the Project's associated adverse health outcomes were estimated only for operational emissions.

Toxic Air Contaminants

A Health Risk Assessment (HRA) was prepared to quantify and evaluate TAC impacts from construction. Construction-related emissions of diesel PM were determined by conducting detailed construction emissions modeling for the Project using the SMAQMD's-approved CalEEMod, Project-specific details (e.g., construction phasing, building sizes, excavation estimates), and model defaults where Project-specific information was not available. Emissions were quantified for all phases of Project construction that are anticipated to occur across the areas of the Project site for the entire duration of Project buildout (i.e., 17 years). Mass emissions were averaged over the anticipated construction duration, in accordance with SMAQMD's guidance and consistent with the district's adopted average daily mass emissions thresholds. Outputs from the mass emissions calculations conducted with CalEEMod were used to conduct the HRA.

Dispersion modeling was conducted with the CARB-approved American Meteorological Society/EPA Regulatory Model Improvement Committee modeling system (AERMOD), Version 11.2.0 (EPA 2022). Dispersion modeling was conducted in AERMOD to estimate ground-level TAC concentrations at each receptor location. This approach enabled the output files assign an appropriate emission rates to estimate diesel PM (PM_{10} exhaust) concentrations, as well as resulting cancer and noncancer risk levels, at each receptor location, to be estimated. Residential receptor locations were modeled, and the health risk at each individual sensitive receptor location was estimated by scaling the CalEEMod and AERMOD emissions in Excel.

The modeling included all standard regulatory default options, including the use of rural dispersion parameters and local terrain. Project specifics, such as meteorological data inputs and selection of emission sources and receptors, were used to perform airborne dispersion modeling and the assessment of health risks related to diesel PM resulting from Project construction. Full modeling assumptions and inputs can be found in Appendix E.

Odors

Impacts related to odors were also assessed qualitatively, based on proposed construction activities, equipment types and duration of use, overall construction schedule, zoo operations such as maintaining animal habitats and enclosure, handling of animal waste, and distance to nearby sensitive receptors. To evaluate an odor impact, SMAQMD recommends that the lead agency provide the buffer distance and a description of the land features and topography in the buffer zone that separates nearby sensitive receptors and the odor source.

THRESHOLDS OF SIGNIFICANCE

An air quality impact would be significant if implementation of the Project would:

- conflict with or obstruct implementation of the applicable air quality plan;
- result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is nonattainment under an applicable federal or State ambient air quality standard;
- expose sensitive receptors to substantial pollutant concentrations; or
- result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.

For the Project, the significance criteria used to evaluate project impacts on air quality under CEQA are based on Appendix G of the State CEQA Guidelines and thresholds of significance adopted by SMAQMD. SMAQMD's air quality thresholds of significance are tied to achieving or maintaining attainment designations with the NAAQS and CAAQS, which are scientifically substantiated, numerical concentrations of criteria air pollutants considered to be protective of human health. Implementing the Project would have a significant impact related to air quality such that human health would be adversely affected if it would (SMAQMD 2021):

- cause construction-generated criteria air pollutant or precursor emissions to exceed the SMAQMD-recommended thresholds of 85 lb/day for NO_X, 80 lb/day or 13.2 tpy for PM_{10}, and 82 lb/day or 15 tpy for $PM_{2.5}$ after SMAQMD's Basic Construction Emission Control Practices (construction BMPs) have been implemented;

- result in a net increase in long-term operational criteria air pollutant or precursor emissions that exceed the SMAQMD-recommended thresholds of 65 lb/day for ROG and NO_X, 80 lb/day or 13.2 tpy for PM_{10}, and 82 lb/day or 15 tpy for $PM_{2.5}$ after SMAQMD's BACT) and operational BMPs have been applied;
- result in long-term operational local mobile-source CO emissions that would violate or contribute substantially to concentrations that exceed the 1-hour CAAQS of 20 parts per million (ppm) or the 8-hour CAAQS of 9 ppm;
- result in an incremental increase in cancer risk (i.e., the risk of contracting cancer) greater than 10 in one million at any off-site receptor and/or a noncarcinogenic hazard index of 1.0 or greater; or
- result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.

IMPACTS NOT DISCUSSED FURTHER

Carbon Monoxide Hotspots

Implementation of the Project would introduce new vehicle trips to the Project area. Based on the transportation analysis prepared for the Project, the Project would result in a maximum of 1,100 new trips per day at any one intersection. This level of trips would contribute CO to the SVAB, however, as stated in SMAQMD's CEQA Guide, "pollutants such as carbon monoxide (CO), sulfur dioxide, and lead are of less concern because operational activities are not likely to generate substantial quantities of these criteria air pollutants and the Sacramento Valley Air basin has been in attainment for these criteria air pollutants for multiple years" (SMAQMD 2021: 4-1). SMAQMD no longer has a recommended screening criteria for assessing the potential of a CO hotspot; however, other air districts, such as the Bay Area Air Quality Management District (BAAQMD), have numerical screening criteria available. Based on BAAQMD's guidance, which can be applied to projects within SMAQMD's jurisdiction for determining localized CO hotspot impacts, projects meeting the following criteria would not result in a CO hotspot (BAAQMD 2023):

- Project-generated traffic would not increase traffic volumes at affected intersections to more than 44,000 vehicles per hour, and
- Project-generated traffic would not increase traffic volumes at affected intersections to more than 24,000 vehicles per hour where vertical and/or horizontal mixing is substantially limited (e.g., tunnel, parking garage, bridge underpass, natural or urban street canyon, below-grade roadway).

The Project would not introduce new vehicle trips to an intersection meeting these criteria. Thus, a CO hotspot would not result from Project implementation. Moreover, CO emissions have historically decreased due to the advent of catalytic converters and progressively more stringent fuel economy standards. Because the Project would not meet the applicable screening criteria and the long-term CO attainment designation of the SVAB, CO hotspots have been dismissed from the analysis. This issue is not discussed further.

Stationary Source Toxic Air Contaminants

The Project would not include activities that generate long-term operational emissions of TACs and does not propose any permitted sources. Additionally, the Project would not include any onsite natural gas infrastructure and would install two solar arrays to ensure the Project is fully electric. Stationary sources of TACs include industrial land uses that would be permitted through SMAQMD and subject to BACT. Therefore, stationary source TAC emissions have been dismissed from the analysis. This issue is not discussed further.

Construction-Related Odors

The Project would introduce construction-generated odors from the use of diesel-powered equipment. However, diesel odors would dissipate rapidly and would not be located in one area for an extended period of time. Construction-related odors are inherently short-term, therefore, the likelihood of an adverse odor affecting a receptor is minimal. The Project's emissions would be further regulated by SMAQMD's Rule 402, "Nuisance." Thus, construction-related odor impacts have been dismissed from the analysis. This issue is not discussed further.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Impact 3.2-1: Generate Short-Term Construction-Related Emissions of ROG, NO_X, CO, SO_X, PM_{10}, and $PM_{2.5}$

Consistent with SMAQMD's guidance, average daily construction-generated emissions were quantified for the Project. The Project would not generate construction emissions of NO_X that would exceed SMAQMD's daily mass emissions thresholds of significance. These thresholds are inherently tied to long-term regional air quality planning for ozone attainment (i.e., SMAQMD's air quality management plans), which demonstrates that the Project would not conflict with the applicable air quality plans as they relate to ozone. However, because the Project does not incorporate SMAQMD's construction BMPs into the Project description, emissions of PM_{10} and $PM_{2.5}$ would exceed SMAQMD's recommended thresholds of 0 lb/day. Implementation of Mitigation Measure 3.2-1 would require the Project to implement SMAQMD's construction BMPs (which adjusts SMAQMD's PM_{10} and $PM_{2.5}$ thresholds to 80 and 82 lb/day, respectively) and would be sufficient to reduce this impact to a **less-than-significant** level.

Although impacts from construction-related air pollutant emissions are temporary, such emissions can have a significant air quality impact. Construction activities, such as grading, excavation, building construction, and paving, can generate substantial amounts of air pollution. Emissions from construction equipment engines also contribute to elevated concentrations of ROG, NO_X, PM_{10}, $PM_{2.5}$, CO, and SO_X.

Several pieces of diesel-powered heavy equipment would operate during construction of the Project. Site preparation activity emissions have been estimated based on the maximum fleet recommended by SMAQMD. Exhaust and fugitive dust emissions would be generated by excavation and grading, construction vehicle traffic, wind blowing over exposed earth, construction workers traveling to and from the construction sites, heavy-duty construction equipment operation, and application of architectural coatings.

Dust from construction activities can cause impacts both locally and regionally. The dry climate of the area during summer, combined with regional fine and silty soils, creates a high potential for dust generation. Therefore, increased dust fall and locally elevated PM_{10} levels near the construction activity are anticipated. Depending on the weather, soil conditions, the amount of activity taking place at any one time, and the nature of dust control efforts, these impacts could affect existing land uses near the Project site. See the discussion in the "Methodology" section and Appendix D for additional modeling information.

In addition to fugitive dust, implementing the Project would result in ROG, nitrogen oxide (NO_X), PM_{10}, $PM_{2.5}$, CO, and sulfur oxides (SO_X) during construction. Table 3.2-4, summarizes the estimated average daily construction emissions by years compared to applicable SMAQMD's thresholds of significance.

As shown in Table 3.2-4, emissions of NO_X would not exceed SMAQMD's construction thresholds of significance. Because emissions of NO_X (a pollutant that contributes to the secondary formation of ozone) would be below SMAQMD's thresholds of significance, which are developed in consideration of long-term regional air quality planning, the Project would not conflict with the *Sacramento Regional 2008 NAAQS 8-Hour Ozone Attainment and Reasonable Further Progress Plan* (EDCAQMD et al. 2017).

Maximum construction emissions of PM_{10} and $PM_{2.5}$ were estimated to be 29 and 16 lb/day, respectively. Emissions of PM_{10} and $PM_{2.5}$ would thus exceed SMAQMD's thresholds of 0 lb/day without the implementation of construction BMPs for fugitive dust control. Mitigation Measure 3.2-1 contains SMAQMD Basic Construction Emissions Control Practices, also referred to as SMAQMD's construction BMPs. The Project would be required to implement fugitive dust BMPs, such as limiting vehicle speeds, watering unpaved surfaces, and construction equipment maintenance. Implementation of these construction BMPs would change SMAQMD's construction thresholds of significance for PM_{10} and $PM_{2.5}$ to 80 and 82 lb/day. Because construction emissions of PM_{10} and $PM_{2.5}$ would be reduced to less than SMAQMD's 80 and 82 lb/day thresholds of significance, as shown in Table 3.2-4, with the implementation of the construction BMPs provided in Mitigation Measure 3.2-1, this impact would be reduced to **less than significant.**

Table 3.2-4 Maximum Emissions of Criteria Pollutants and Precursors Associated with Construction of the Project

Year	Phase(s)	ROG (lb/day)	NO_X (lb/day)	CO (lb/day)	SO_X (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Maximum Daily Emissions							
2025	1A, 1B	5	48	47	<1	29	16
2026	1A, 1B	2	21	26	<1	1	1
2027	1A, 1B	2	20	25	<1	1	1
2028	1A, 1B	53	19	25	<1	1	1
2029	1B, 1C	3	26	29	<1	21	11
2030	1C	1	9	13	<1	<1	<1
2031	1C	1	8	13	<1	<1	<1
2032	1C	1	8	13	<1	<1	<1
2033	1C, 2	3	21	25	<1	21	11
2034	2	8	8	13	<1	<1	<1
2035	3	1	9	15	<1	6	3
2036	3	<1	3	7	<1	<1	<1
2037	3	<1	3	7	<1	<1	<1
2038	3	<1	3	7	<1	<1	<1
2039	3	1	4	7	<1	<1	<1
2040	4	2	16	20	<1	20	11
2041	4	1	7	13	<1	<1	<1
2042	4	8	7	13	<1	<1	<1
SMAQMD Thresholds of Significance		None	65	None	None	0/80[1]	0/82[1]
Exceeds Thresholds of Significance?		N/A	No	N/A	N/A	Yes[1]	Yes[1]

Notes: lb/day = pounds per day; ROG = reactive organic gases; NO_X = oxides of nitrogen; CO = carbon monoxide; SO_X = sulfur oxides; PM_{10} = respirable particulate matter; $PM_{2.5}$ = fine particulate matter; SMAQMD = Sacramento Metropolitan Air Quality Management District; N/A = not applicable.

[1] SMAQMD recommends using a 0 lb/day threshold of significance for evaluating construction-related emissions of PM_{10} and $PM_{2.5}$ before the implementation of best management practices. Following the implementation of best management practices and/or the best available control technology, construction emissions of PM_{10} are evaluated against a threshold of significance of 80 lb/day, and $PM_{2.5}$ is evaluated against a threshold of significance of 82 lb/day.

Source: Modeling performed by Ascent Environmental in 2023.

Mitigation Measures

Mitigation Measure 3.2-1: Implement SMAQMD's Basic Construction Emissions Control Practices

SMAQMD requires construction projects to implement basic construction emissions control practices to control fugitive dust and diesel exhaust emissions. These basic construction emissions control practices are considered best management practices, as recommended by SMAQMD. The New Zoo shall implement the following control measures during Project construction:

- Control fugitive dust as required by SMAQMD Rule 403 and enforced by SMAQMD staff.
- Water all exposed surfaces twice daily. Exposed surfaces include but are not limited to soil piles, graded areas, unpaved parking areas, staging areas, and access roads.

- Cover or maintain at least 2 feet of freeboard space on haul trucks transporting soil, sand, or other loose material on the site. Any haul trucks that would travel along freeways or major roadways should be covered.
- Use wet power vacuum street sweepers to remove any visible track-out of mud or dirt from adjacent public roads at least once a day. Use of dry power sweeping is prohibited.
- Complete all roadways, driveways, sidewalks, and parking lots to be paved as soon as possible. In addition, lay building pads as soon as possible after grading unless seeding or soil binders are used.
- Limit vehicle speeds on unpaved roads to 15 miles per hour.
- Minimize idling time, either by shutting equipment off when it is not in use or by reducing the time of idling to 5 minutes (required by 13 CCR Sections 2449[d][3] and 2485). Provide clear signage that posts this requirement for workers at the site entrances.
- Maintain all construction equipment in proper working condition according to the manufacturers' specifications. The equipment must undergo a one-time inspection by a certified mechanic and be determined to be running in proper condition before the start of construction activities.

Significance after Mitigation

Less than significant.

Impact 3.2-2: Generate Long-Term Operational Emissions of ROG, NO_X, CO, SO_X, PM_{10}, and $PM_{2.5}$

Operation of the Project would not generate emissions of ROG or NO_X in exceedance of SMAQMD's daily mass emissions thresholds of significance during the opening phase in 2029 or at full buildout in 2043. However, operation would exceed SMAQMD's 0 lb/day PM_{10} and $PM_{2.5}$ threshold because it would emit 16 lb/day of PM_{10} and 4 lb/day of $PM_{2.5}$ at full buildout Nevertheless, the Project would comply with SMAQMD's operational BMPs for operational PM for land use development projects, including compliance with the mandatory measures of Parts 6 and 11 of the Title 24 California Building Code, which would result in the readjustment of SMAQMD's thresholds for PM_{10} and $PM_{2.5}$ to 80 and 82 lb/day, respectively. Project emissions of PM_{10} and $PM_{2.5}$ after compliance with the California Building Code would be below SMAQMD's operational emissions thresholds of significance of 80 and 82 lb/day for PM_{10} and $PM_{2.5}$, respectively (SMAQMD's thresholds when operational BMPs and BACTs are applied). Therefore, the impact related to operational emissions would be **less than significant**.

Significance of Operational Emissions

Implementation of the Project would result in a new zoo in the City of Elk Grove, which would in turn increase the emission of criteria air pollutants and ozone precursors in an area currently designated as nonattainment for several of the NAAQS and CAAQS.

Emissions would be generated from vehicles trips to and from the Project site and from the use of landscaping equipment. The Project would be fully electric; therefore, the Project would not produce emissions from the combustion of on-site natural gas use. Table 3.2-5 summarized the total modeled operational emissions associated with the Project at opening year of the New Zoo in 2029 following the completion of Phase 1 construction. Table 3.2-6 summarizes the total modeled operational emissions associated with the full buildout of the Project for the assumed first full year of operation (i.e., 2043).

As shown in Tables 3.2-5 and 3.2-6, the Project would not generate emissions of ROG or NO_X exceeding SMAQMD's operational mass emissions thresholds of significance. In addition, the Project would comply with the mandatory requirements of Parts 6 and 11 of the Title 24 California Building Code (the recommended BMP for operation emissions of PM_{10} and $PM_{2.5}$ for land use development projects) as a component of the Project's design. These project design features include the implementation of EV parking spaces, the prohibition of onsite natural gas infrastructure, and the installation of two solar arrays to ensure the Project. With these Project design features, the Project would be fully electric, would receive renewable energy procured onsite, and would provide the infrastructure for visitors and employees to charge their EVs while accessing the Project site. Therefore, SMAQMD's thresholds of 80 and 82 lb/day for PM_{10} and $PM_{2.5}$ have been applied in this analysis. In addition, as shown in Tables 3.2-5 and 3.2-6, at the initial opening in 2029 and at full

buildout in 2043, the Project would not generate operational emissions of PM_{10} and $PM_{2.5}$ in exceedance of SMAQMD's thresholds of 80 and 82 lb/day for PM_{10} and $PM_{2.5}$, respectively. This impact would be **less than significant**.

Table 3.2-5 Maximum Annual Emissions of Criteria Pollutants and Precursors Associated with Operation of the Project at the Initial Opening (2029)

Sector	ROG	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
Mobile	<1	<1	3	<1	<1	<1
Area	<1	<1	1	0	0	0
Energy	0	0	0	0	0	0
Total	**<1**	**<1**	**4**	**<1**	**<1**	**<1**
SMAQMD CEQA Significance Threshold	65	65	None	None	80[1]	82[1]
Exceeds Threshold?	No	No	N/A	N/A	No	No

Notes: lb/day = pounds per day; ROG = reactive organic gases; NO_X = oxides of nitrogen; CO = carbon monoxide; SO_X = sulfur oxides; PM_{10} = respirable particulate matter; $PM_{2.5}$ = fine particulate matter; SMAQMD = Sacramento Metropolitan Air Quality Management District; N/A = not applicable.

[1] SMAQMD recommends using a 0 lb/day threshold of significance for evaluating construction-related emissions of PM_{10} and $PM_{2.5}$ before implementation of best management practices or best available control technology. Following the implementation of best management practices and/or the best available control technology, operational emissions of PM_{10} are evaluated against a threshold of significance of 80 lb/day, and $PM_{2.5}$ is evaluated against a threshold of significance of 82 lb/day. The Project would comply with the mandatory requirements of Parts 6 and 11 of the Title 24 California Building Code (the recommended best management practice for operational emissions of PM_{10} and $PM_{2.5}$ for land use development projects); therefore, SMAQMD's thresholds of 80 and 82 lb/day for PM_{10} and $PM_{2.5}$ have been applied in this analysis.

Source: Modeling performed by Ascent Environmental in 2023.

Table 3.2-6 Maximum Annual Emissions of Criteria Pollutants and Precursors Associated with Operation of the Project at full buildout (2043)

Sector	ROG	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
Mobile	6	5	73	<1	21	5
Area	19	<1	4	0	<1	<1
Energy	0	0	0	0	0	0
Total	**25**	**5**	**77**	**<1**	**21**	**5**
SMAQMD CEQA Significance Threshold	65	65	None	None	80[1]	82[1]
Exceeds Threshold?	No	No	N/A	N/A	No	No

Notes: lb/day = pounds per day; ROG = reactive organic gases; NO_X = oxides of nitrogen; CO = carbon monoxide; SO_X = sulfur oxides; PM_{10} = respirable particulate matter; $PM_{2.5}$ = fine particulate matter; SMAQMD = Sacramento Metropolitan Air Quality Management District; N/A = not applicable.

[1] SMAQMD recommends using a 0 lb/day threshold of significance for evaluating construction-related emissions of PM_{10} and $PM_{2.5}$ before implementation of best management practices or best available control technology. Following the implementation of best management practices and/or the best available control technology, operational emissions of PM_{10} are evaluated against a threshold of significance of 80 lb/day, and $PM_{2.5}$ is evaluated against a threshold of significance of 82 lb/day. The Project would comply with the mandatory requirements of Parts 6 and 11 of the Title 24 California Building Code (the recommended best management practice for operational emissions of PM_{10} and $PM_{2.5}$ for land use development projects); therefore, SMAQMD's thresholds of 80 and 82 lb/day for PM_{10} and $PM_{2.5}$ have been applied in this analysis.

Source: Modeling performed by Ascent Environmental in 2023.

Health Effects

Consistent with SMAQMD's Final Friant Ranch Guidance, the potential annual incremental health incidences of the Project were estimated using SMAQMD's Minor Project Health Effects Screening Tool. Using the best approximate GPS coordinates and the estimated operational air pollutant emissions, $PM_{2.5}$- and ozone exposure–related health incidences were calculated as shown in Table 3.2-7. The percent of background health incidences represents the mean health incidence within the boundaries of the SVAB; the total number of health incidences is an estimate of the average number of people who are affected by the health endpoint in a given population over a given period. In this case, these background incidence are specific to the SVAB and were derived using the Benefits Mapping and Analysis (BenMAP) program (SMAQMD 2020).

Based on this modeling, operational emissions from implementation of the Project would represent approximately 0.035 percent of all total incidences from exposure to ozone and $PM_{2.5}$ in the context of an incident background of 184,505, or approximately 0.65 health incidence in total. Notably, SMAQMD's Minor Project Health Effects Screening Tool projects new health incidences (represented in Table 3.2-6) for projects that emit criteria air pollutants in volumes equaling 82 lb/day for ROG, NO_X, PM_{10}, and $PM_{2.5}$. However, as shown in Tables 3.2-5 and 3.2-6, the Project would emit substantially less ROG, NO_X, PM_{10}, and $PM_{2.5}$ than what the Minor Project Health Effects Screening Tool characterizes. Therefore, the potential new health incidences overstate the likely new adverse health outcomes that could occur from Project operations.

There is no established threshold of significance that addresses anticipated incidences; however, consistent with guidance from the Friant Ranch Decision and SMAQMD in its Final Friant Ranch Guidance, this information has been included to provide a meaningful level of detail to readers of this Draft EIR. Notably, there is inherent difficulty in evaluating the exact location and degree of adverse health outcomes from Project-level emissions. Moreover, the Minor Project Health Effects Screening Tool cannot account for personal information such as age, preexisting conditions, genetic propensities, and lifestyle choices that may contribute to a receptor's sensitivity to air pollution.

Table 3.2-7 Potential Annual Incremental Health Incidences for the Project

$PM_{2.5}$ Health Endpoint	Age Range	Incidences (Mean)	Percent of Background Incidences	Total Number of Health Incidences (per Year)[1]
Respiratory				
Emergency room visits	0–99	0.82	0.0045%	18,419
Hospital admissions, asthma	0–64	0.054	0.0029%	1,846
Hospital admissions, all respiratory	65–99	0.26	0.0013%	19,644
Cardiovascular				
Hospital admissions, all cardiovascular (less myocardial infarctions)	65–99	0.15	0.00061%	24,037
Acute myocardial infarction, nonfatal	18–24	0.000069	0.0018%	4
Acute myocardial infarction, nonfatal	25–44	0.0061	0.0020%	308
Acute myocardial infarction, nonfatal	45–54	0.016	0.0021%	741
Acute myocardial infarction, nonfatal	55–64	0.026	0.0021%	1,239
Acute myocardial infarction, nonfatal	65–99	0.094	0.0019%	5,052
Mortality				
Mortality, all causes	30–99	1.8	0.0040%	44,766
Ozone Health Endpoint	**Age Range**	**Incidences (Mean)**	**Percent of Background Incidences**	**Total Number of Health Incidences (per Year)**
Respiratory				
Hospital admissions, all respiratory	65–99	0.065	0.00033%	19,644
Emergency room visits, asthma	0–17	0.39	0.0066%	5,859
Emergency room visits, asthma	18–99	0.59	0.0047%	12,560
Mortality				
Mortality, nonaccidental	0–99	0.042	0.00014%	30,386
Total Incidences	**0–99**	**4.31**	**0.035%**	**184,505**

Note: $PM_{2.5}$ = fine particulate matter.

[1] These numbers represent the total background health incidences per year in the Sacramento Region and not incidences created by the Project.

Source: Modeling conducted by Ascent Environmental in 2023.

Summary

As shown in Tables 3.2-5 and 3.2-6 the Project would not generate emissions of ROG, NO_X, PM_{10}, and $PM_{2.5}$ in exceedance of SMAQMD's mass emissions thresholds, under either opening year of full buildout scenarios, with compliance with the mandatory provisions of Parts 6 and 11 of the Title 24 California Building Code. Therefore, the impact related to operational emissions would be **less than significant**.

Mitigation Measures

No mitigation is required.

Impact 3.2-3: Expose Receptors to TAC Concentrations Adversely Affecting a Substantial Number of People

Based on the HRA prepared for the Project, construction would produce substantial diesel PM such that SMAQMD's threshold for TAC cancer risk exposure of 10 in 1 million would be exceeded. Using this numerical threshold, the Project would generate substantial emissions of TACs, causing an adverse health impact from TAC exposure. Implementation of Mitigation Measure 3.2-3 would direct the zoo construction activities to use CARB-certified Tier 4 engines for diesel-powered construction equipment during construction of the Project. Mitigation Measure 3.2-3 would be sufficient to reduce TAC levels to below SMAQMD's 10 in 1 million threshold of significance. With mitigation, this impact would be reduced to a **less-than-significant** level.

SMAQMD has developed a quantitative threshold of significance for carcinogenic risk exposure (i.e., 10 in 1 million) in consideration of dosage, risk exposure, background risk levels, and guidance established by AB 2588, the Air Toxics "Hot Spots" Information and Assessment Act.

In addition, AB 2588 directs each air district to establish a prioritization score threshold for stationary sources of TACs. To assist the districts with this requirement, the California Air Pollution Control Officers Association (CAPCOA) Toxics Committee, in cooperation with the Office of Environmental Health Hazard Assessment (OEHHA) and CARB, developed the Air Toxics "Hot Spots" Program, Facility Prioritization Guidelines (July 1990). The purpose of the guideline is to provide districts with suggested procedures for prioritizing facilities. However, districts may develop and use prioritization methods that differ from the CAPCOA guidelines. In 2015, CAPCOA updated these guidelines to incorporate the changes made to the OEHHA risk assessment methodology.

Construction-related activities would result in temporary, short-term Project-generated emissions of diesel PM from the exhaust of off-road heavy-duty diesel equipment used for site preparation (e.g., demolition, clearing, grading), paving, application of architectural coatings, and other miscellaneous activities. The dose to which receptors are exposed is the primary factor used to determine health risk (i.e., potential exposure to TAC emission levels that exceed applicable standards). Dose is a function of the concentration of a substance or substances in the environment and the duration of exposure to the substance. Dose is positively correlated with time, meaning that a longer exposure period would result in a higher exposure level for any exposed receptor. Therefore, the risks estimated for an exposed individual are higher if a fixed exposure occurs over a longer period. According to guidance from OEHHA's *The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments*, a 30-year exposure duration is used for estimating cancer risk at residential land uses (OEHHA 2015). Construction activity is anticipated to take place over a 17.5-year timeframe for the Project and would not result in intensive construction activities for any one extended period during Project construction.

The TAC that is the focus of this analysis is diesel PM because it is known that diesel PM would be emitted during Project construction. Construction-related activities that would result in temporary, intermittent emissions of diesel PM from the exhaust of off-road heavy-duty diesel equipment for site preparation (e.g., demolition, clearing, grading), paving, application of architectural coatings, and other miscellaneous activities. Particulate exhaust emissions from diesel PM were identified as a TAC by CARB in 1998. 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 do not operate at any one location for extended periods such that they would expose a single receptor to excessive diesel PM

emissions. Nevertheless, a construction HRA was prepared to evaluate potential TAC exposure from Project construction (Appendix E). Table 3.2-8 summarizes the findings of the HRA.

Based on the findings of the HRA, the lifetime cancer risk for the maximally exposed individual resident (identified as a residence across the street, approximately 75 feet from the Project site) was estimated to be 26.77 in one million, which is above SMAQMD's significance threshold of 10 in one million. To reduce this impact, additional mitigation is required. The Tier 4 engine standards enumerated in Mitigation Measure 3.2-3 would be sufficient to reduce this impact to **less than significant**.

Table 3.2-8 Maximum Cancer Risk under an Unmitigated Project Scenario

Receptor	Unmitigated Scenario Cancer Risk (Chances in One Million)
MEIR (On-Site)	26.77
SMAQMD Significance Threshold	10.0
Threshold Exceeded?	**Yes**

Note: MEIR = maximally exposed individual resident.

Source: Modeling performed by Ascent Environmental in 2023.

Mitigation Measure 3.2-3: Apply Tier-4 Emission Standards to All Diesel-Powered Off-Road Equipment

The New Zoo shall require the construction contractor to use only off-road construction equipment that meets EPA's Tier 4 emission standards, as defined in 40 CFR 1039, and to comply with the appropriate test procedures and provisions contained in 40 CFR Parts 1065 and 1068. This measure can also be achieved by using battery-electric off-road equipment as it becomes available. Implementation of this measure shall be required in the contract the Project applicant establishes with its construction contractors. The New Zoo shall demonstrate its plan to fulfill the requirements of this measure in a report or in Project improvement plan details submitted to the City before the use of any off-road diesel-powered construction equipment on the site.

Significance after Mitigation

Implementation of Mitigation Measure 3.2-3 would reduce the Project's emissions of diesel PM by requiring the use of Tier 4 engines. Table 3.2-9 summarizes the Project's emissions following the implementation of Mitigation Measure 3.3-3.

Table 3.2-9 Maximum Cancer Risk under a Mitigated Project Scenario

Receptor	Mitigated Scenario Cancer Risk (Chances in One Million)
MEIR (On-Site)	5.23
SMAQMD Significance Threshold	10.0
Threshold Exceeded?	**No**

Note: MEIR = maximally exposed individual resident.

Source: Modeling performed by Ascent Environmental in 2023.

As shown in Table 3.2-9, implementation of Mitigation Measure 3.2-3 would reduce the Project's incremental cancer risk to 5.23 in one million, which is below SMAQMD's recommended threshold of 10 in one million. This impact would be **less than significant** with mitigation.

Impact 3.2-4: Generate Other Emissions (Such as Those Leading to Odors) Adversely Affecting a Substantial Number of People

The Project would not introduce an odor source identified by SMAQMD that could result in an adverse odor impact. Because of the unusual character of the Project (i.e., a zoo sheltering and feeding exotic species), data acquired from the existing Sacramento Zoo has been used to characterize the potential for an adverse odor to occur from Project implementation. SMAQMD records odor complaint history for existing odor-generated sources. SMAQMD has not received an odor complaint regarding the Sacramento Zoo's operations since commencing operations. Given that the Project would entail operational activities similar to those of the Sacramento Zoo, it is foreseeable that the Project also would not receive odor complaints. This impact would be **less than significant**.

According to SMAQMD's CEQA Guide, each project that would generate odors should be evaluated to determine the likelihood that it would result in nuisance odors. SMAQMD recognizes the subjective nature of odor impacts and recommends that each project be assessed on a "case-by-case" basis, taking into consideration all available pertinent information to qualitatively determine whether a significant impact is likely to occur, such as information regarding the characteristics of the buffer zone between the sensitive receptor(s) and the odor source(s), local meteorological conditions, and the nature of the odor source. To facilitate the evaluation of odors, SMAQMD has produced a list of common types of facilities, along with the distance from the source within which odors could possibly be significant. The list provides a qualitative assessment of a project's potential to adversely affect off-site receptors. Table 3.2-10 presents the list of common facilities and the minimum distance from the source below which the odor impacts may be significant. The Project does not include any uses identified by the SMAQMD as being associated with odors; thus, the Project would not result in odors adversely affecting a substantial number of people.

Table 3.2-10 Sacramento Metropolitan Air Quality Management District Screening Levels for Potential Odors Sources

Type of Facility	Distance
Wastewater Treatment Facility	2 miles
Wastewater Pumping Facilities	1 mile
Sanitary Landfill	1 mile
Transfer Station	1 mile
Composting Facility	2 miles
Petroleum Refinery	2 miles
Asphalt Batch Plant	2 miles
Chemical Manufacturing	1 mile
Fiberglass Manufacturing	1 mile
Painting/Coating Operations	1 mile
Rending Plant	4 miles
Coffee Roaster	1 mile
Food Processing Facility	1 mile
Feed Lot/Dairy	1 mile
Green Waste and Recycling Operations	2 miles
Metal Smelting Plants	1 mile

Source: SMAQMD 2009.

However, the Project is a unique land use that may emit natural odors from animal enclosures and care facilities. This analysis uses odor data acquired from the existing Sacramento Zoo to determine whether the New Zoo would generate adverse odors. The Sacramento Zoo is bordered by the Holy Spirit Elementary School. The school provides

outdoor activities for its students, who could be subjected to unpleasant odors. Odors from current operations at the Sacramento Zoo are not detectable at the boundary between the existing Sacramento Zoo and school. At the New Zoo, two compostable animal waste and five non-compostable animal waste low boys or hoppers located on the project site. Two collector areas at the northeast and northwest portions of the site would include a 20 yard dumpster for animal waste compost and three hoppers for trash, recycling, and compost. Animal waste would be picked up every one to two days. However, SMAQMD has not received an odor complaint from zoo activities at the Sacramento Zoo since commencing operations (Carter, pers comm., 2023). The Project involves development of a New Zoo in Elk Grove that would generate odors similar to those generated at the existing Sacramento Zoo. Based on the nonexistent complaint history of the Sacramento Zoo, the Project would likely not generate odors or other emissions that would adversely affect a substantial number of people. The main source of odors at the New Zoo would be animal waste, which would be picked up and trucked off the site several times a week. Furthermore, the Project's odor emissions would be regulated by SMAQMD's Rule 402, "Nuisance." This impact would be **less than significant**.

Mitigation Measures

No mitigation is required.