

## 3.7 GREENHOUSE GAS EMISSIONS AND CLIMATE CHANGE

This section presents a summary of the current state of climate change science and greenhouse gas (GHG) emissions sources in California, a summary of applicable regulations, quantification of GHG emissions generated by the New Zoo, a discussion about their potential contribution to global climate change, and mitigation recommended as necessary. For the purposes of this analysis, GHG emissions are measured as metric tons of carbon dioxide equivalent (MTCO<sub>2</sub>e). The atmospheric impact of a GHG is based on the global warming potential (GWP) of that gas. GWP is a measure of the heat trapping ability of one unit of a gas over a certain timeframe relative to one unit of carbon dioxide (CO<sub>2</sub>). The GWP of CO<sub>2</sub> is one (IPCC 2014). Consistent with the methodology used by the California Air Resources Board (CARB) in estimating statewide GHG emissions, this analysis uses GWP values from the Fourth Assessment Report Values by the Intergovernmental Panel on Climate Change (IPCC).

Comments made during the notice of preparation scoping period that pertain to the Project's contribution to global climate change include a recommendation to procure food for the proposed restaurant from local resources and to abide by the Sacramento Metropolitan Air Quality Management District's (SMAQMD) recommendations for evaluating the significance of GHG emissions in its Guide to Air Quality Assessment in Sacramento County (CEQA Guide). These issues are considered below.

### 3.7.1 Regulatory Setting

#### FEDERAL

In *Massachusetts et al. v. Environmental Protection Agency et al.*, 549 U.S. 497 (2007), the Supreme Court of the United States (US) ruled that CO<sub>2</sub> 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 GHG emissions. In 2010, 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 regulates vehicle emissions through the Corporate Average Fuel Economy (CAFE) Standards. On April 1, 2022, the Secretary of Transportation unveiled new CAFE standards for 2024–2026 model year passenger cars and light-duty trucks. These new standards require new vehicles sold in the US to average at least 40 miles per gallon and apply to all states except those that enforce stricter standards.

#### STATE

Plans, policies, regulations, and laws established by the state agencies are generally presented in the order they were established.

#### Statewide GHG Emission Targets and Climate Change Scoping Plan

Reducing GHG emissions in California has been the focus of the State government for approximately two decades. GHG emission targets established by the State legislature include reducing statewide GHG emissions to 1990 levels by 2020 (AB 32 of 2006) and reducing them to 40 percent below 1990 levels by 2030 (SB 32 of 2016). Executive Order S-3-05 calls for statewide GHG emissions to be reduced to 80 percent below 1990 levels by 2050. This target was superseded by AB 1279, which codifies a goal for carbon neutrality and reduce emissions by 85 percent below 1990 levels by 2045. These targets are in line with the scientifically established levels needed in the U.S. to limit the rise in global temperature to no more than 2 degrees Celsius, the warming threshold at which major climate disruptions, such as super droughts and rising sea levels, are projected; these targets also pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius (United Nations 2015).

CARB adopted the *Final 2022 Scoping Plan for Achieving Carbon Neutrality* (2022 Scoping Plan) on December 16, 2022, which traces the State's the pathway to achieve its carbon neutrality and an 85 percent reduction in 1990

emissions goal by 2045 using a combined top-down, bottom-up approach under various scenarios. It identifies the reductions needed by each GHG emission sector (e.g., transportation [including off-road mobile source emissions], industry, electricity generation, agriculture, commercial and residential, pollutants with high global warming potential, and recycling and waste) to achieve these goals (CARB 2022a).

The state has also passed more detailed legislation addressing GHG emissions associated with transportation, electricity generation, and energy consumption, as summarized below.

### **Transportation-Related Standards and Regulations**

As part of its Advanced Clean Cars program, CARB established more stringent GHG emission standards and fuel efficiency standards for fossil fuel-powered on-road vehicles than EPA. The program's initial goal requiring zero-emission vehicle (ZEV) regulation (i.e., battery, fuel cell, and plug-in hybrid electric vehicles [EVs]) to account for up to 15 percent of California's new vehicle sales by 2025 was superseded by Executive Order N-79-20, which directed the state to scale out the sales of internal combustion engines to 100 percent ZEV sales by 2035. The Advanced Clean Cars II Program was adopted by CARB in August 2022, and provides the regulatory framework for ensuring the sales requirement goal of Executive Order N-79-20 to ultimately reach 100 percent ZEV sales in the state by 2035.

Executive Order B-48-18, signed into law in January 2018, requires all State entities to work with the private sector to have at least 5 million ZEVs on the road by 2030, as well as 200 hydrogen-fueling stations and 250,000 EV-charging stations installed by 2025. It specifies that 10,000 of these charging stations must be direct-current fast chargers.

CARB adopted the Low Carbon Fuel Standard (LCFS) in 2007 to reduce the carbon intensity (CI) of California's transportation fuels. Low-CI fuels emit less CO<sub>2</sub> than other fossil fuel-based fuels such as gasoline and fossil diesel. The LCFS applies to fuels used by on-road motor vehicles and off-road vehicles, including construction equipment (Wade, pers. comm., 2017).

In addition to regulations that address tailpipe emissions and transportation fuels, the state legislature has passed regulations to address the amount of driving by on-road vehicles. Since passage of SB 375 in 2008, CARB requires metropolitan planning organizations (MPOs) to develop and adopt sustainable communities strategies (SCSs) as a component of the federally-prepared regional transportation plans (RTPs) to show reductions in GHG emissions from passenger cars and light-duty trucks in their respective regions for 2020 and 2035 (CARB 2018). These plans link land use and housing allocation to transportation planning and related mobile-source emissions.

The Sacramento Area Council of Governments (SACOG) serves as the MPO for Sacramento, Placer, El Dorado, Yuba, Sutter, and Yolo counties, excluding those lands located in the Tahoe Basin. The Project site is in Sacramento County. Under the most recent targets of SB 375 (i.e., achieve a 7-percent and 19-percent below 2005 per capita reduction in automobile emissions by 2020 and 2035, respectively), SACOG completed and adopted its most recent 2020 MTP/SCS in November 2019 (SACOG 2019). CARB's technical evaluation of the 2020 MTP/SCS confirmed that the plan is sufficient to meet the reduction targets of SB 375 (CARB 2020).

### **Legislation Associated with Electricity Generation**

The State has passed legislation requiring the increasing use of renewables to produce electricity for consumers. California utilities are required to generate 33 percent of their electricity from renewables by 2020 (SB X1-2 of 2011); 52 percent by 2027 (SB 100 of 2018); 60 percent by 2030 (also SB 100 of 2018); and 100 percent by 2045 (also SB 100 of 2018).

### **Building Energy Efficiency Standards (Title 24, Part 6)**

The energy consumption of new residential and nonresidential buildings in California is regulated by the California Energy Code. The code was established by California Energy Commission (CEC) in 1978 in response to a legislative mandate to create uniform building codes to reduce California's energy consumption and provide energy-efficiency standards for residential and nonresidential buildings. CEC updates the California Energy Code every 3 years, typically including more stringent design requirements for reduced energy consumption, which results in the generation of fewer GHG emissions.

The 2022 California Energy Code went into effect on January 1, 2023. The 2022 California Energy Code advances the onsite energy generation progress started in the 2019 California Energy Code by encouraging electric heat pump technology and use, establishing electric-ready requirements when natural gas is installed, expanding solar photovoltaic (PV) system and battery storage standards, and strengthening ventilation standards to improve indoor air quality. CEC estimates that the 2022 California Energy Code will save consumers \$1.5 billion and reduce GHGs by 10 million MTCO<sub>2e</sub> over the next 30 years (CEC 2021).

### **California Green Building Standards (Title 24, Part 11)**

The California Green Building Standards, also known as CALGreen, is a reach code (i.e., optional standards that exceed the requirements of mandatory codes) developed by CEC that provides green building standards for statewide residential and nonresidential construction. The current version is the 2022 CALGreen Code, which took effect on January 1, 2023. As compared to the 2019 CalGreen Code, the 2022 CalGreen Code strengthened sections pertaining to EV and bicycle parking, water efficiency and conservation, and material conservation and resource efficiency, among other sections of the CalGreen Code. The CALGreen Code sets design requirements equivalent to or more stringent than those of the California Energy Code for energy efficiency, water efficiency, waste diversion, and indoor air quality. These codes may be adopted by local agencies that enforce building codes and used as guidelines by state agencies for meeting the requirements of Executive Order B-18-12.

## **LOCAL**

### **Sacramento Metropolitan Air Quality Management District**

SMAQMD is the primary agency responsible for addressing air quality concerns in all of Sacramento County—its role is discussed further in Section 3.2, “Air Quality,” of this Draft EIR. SMAQMD recommends methods for analyzing project-generated GHGs in CEQA analyses and offers multiple potential GHG reduction measures for land use development projects. SMAQMD developed thresholds of significance to provide a uniform scale to measure the significance of GHG emissions from land use and stationary source projects in compliance with CEQA to align with the statewide GHG target of 40 percent below 1990 levels by 2030 with the passage of SB 32 for land use development projects (SMAQMD 2021).

SMAQMD’s newly published guidance to address GHGs was released in February 2021. SMAQMD recommends that a 1,100 MTCO<sub>2e</sub> be applied as a bright-line threshold of significance for evaluating construction emissions of GHGs. SMAQMD also recommends a tiered approach to evaluating the significance of operational emissions. All projects are required to implement the following tier 1 best management practices (BMP):

- ▶ BMP 1 – Projects shall be designed and constructed without natural gas infrastructure.
- ▶ BMP 2 – Projects shall meet the current CalGreen Tier 2 standards, except all-electric vehicle capable spaces shall instead be electric vehicle ready.

Projects can be screened out by comparing their attributes to the SMAQMD’s operational screening levels table (equivalent to 1,100 MTCO<sub>2e</sub>/year), including the implementation of tier 1 BMPs. If the project emissions exceed the screening level, or the project fails to implement tier 1 BMPs, projects must implement tier 2 BMP 3, which consists of reducing the project’s vehicle miles traveled (VMT) to meet the following requirements of the standards developed by the Governor’s Office of Planning and Research (OPR) pursuant to SB 743 (see Section 3.13, “Transportation,” for a summary of this bill):

- ▶ BMP 3 – Achieve the following VMT reduction targets compared to a county regional average:
  - 15 percent for residential projects,
  - 15 percent for office projects, and
  - a no net increase in VMT for retail projects.

Projects that cannot meet the tier 2 BMP 3 requirements must implement all feasible mitigation to reduce emissions.

Notably, while SMAQMD's guidance was developed in consideration of nearer-term statewide GHG reduction goals (i.e., a 40 percent reduction from 1990 statewide inventory by 2030), SMAQMD's recommended BMPs are highly reflexive of the Bay Area Air Quality Management District's (BAAQMD's) thresholds for determining significance in its 2022 CEQA Air Quality Guidelines. As stated in its Justification Report, BAAQMD's thresholds were designed to ensure that local governments do their "fair share" to contribute to the statewide goal of achieving carbon neutrality by 2045, as codified in AB 1279 (BAAQMD 2022). Moreover, SMAQMD's tier 1 and tier 2 BMPs are similar to the direction provided in Appendix D, "Local Actions," of the 2022 Scoping Plan which identifies building decarbonization, VMT reductions, and the electrification of the mobile source sector as key priority areas that local jurisdictions can target to do their "fair share" in assisting the state in meeting its long-term goal of carbon neutrality by 2045 (CARB 2022b).

Because SMAQMD's tier 1 and tier 2 BMPs would result in building decarbonization, VMT reductions, and the infrastructure to support EVs, they are considered appropriate thresholds for use in this analysis.

### City of Elk Grove General Plan

The *City of Elk Grove General Plan* contains the following policies and standards related to climate change that apply to the Project (City of Elk Grove 2019a):

- ▶ **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 NR-6-1:** Promote energy efficiency and conservation strategies to help residents and businesses save money and conserve valuable resources.
- ▶ **Policy NR-6-3:** Promote innovation in energy efficiency.
- ▶ **Policy NR-6-5:** Promote energy conservation measures in new development to reduce on-site emissions and seek to reduce the energy impacts from new residential and commercial projects through investigation and implementation of energy efficiency measures during all phases of design and development.
- ▶ **Policy NR-6-6:** Encourage renewable energy options that are affordable and benefit all community members.
- ▶ **Policy NR-6-7:** Encourage the use of solar energy systems in homes, commercial businesses, and City facilities as a form of renewable energy.
- ▶ **Policy H-2-3:** Support energy-conserving programs in the production and rehabilitation of affordable housing to reduce household energy costs, improve air quality, and mitigate potential impacts of climate change in the region.
- ▶ **Policy ER-6-11:** Seek to provide the community with information relating to sustainability, climate change, and innovative development strategies.

### City of Elk Grove Climate Action Plan

The *City of Elk Grove Climate Action Plan 2019 Update (CAP)*, adopted in February 2019 and amended in December 2019 and December 2022 by the City, was incorporated into the current General Plan (discussed above). The CAP includes GHG emission reduction targets, strategies, and implementation measures developed to help the City reach these targets. Reduction strategies address GHG emissions associated with transportation and land use, energy, water, waste management and recycling, agriculture, and open space. Through the deployment of measures included in the CAP, as well as reductions achieved by statewide regulatory schemes, consistent with direction from SB 32, the City would achieve a per capita emissions target of 4.1 MTCO<sub>2e</sub> per year by 2030. However, based on projection within the CAP, the City would be expected to reduce per capita emissions to 3.0 MTCO<sub>2e</sub> per year by 2050, which exceeds the State's 2050 reduction target of 1.4 MTCO<sub>2e</sub> per year (City of Elk Grove 2019b: 4-3). As discussed in the CAP, "additional technological advances across multiple sectors would be required to reduce emission further, combined with additional regulatory actions at the State or federal levels." Further, the City "would identify new or modified GHG reduction measures that would achieve longer-term, post-2030 targets that may be set by the State or others in the future" (City of Elk Grove 2018: 5.7-37). The following GHG reduction actions would apply to the Project:

- ▶ **BE-1. Building Stock: Promote Energy Conservation.** Promote energy conservation by residents and businesses in existing structures in close coordination with other agencies and local energy providers, including the Sacramento Municipal Utility District (SMUD) and Pacific Gas and Electric (PG&E).
- ▶ **BE-4. Building Stock: Encourage or Require Green Building Practices in New Construction.** Encourage new construction projects to comply with CALGreen Tier 1 standards, including a 15 percent improvement over minimum Title 24 Part 6 Building Energy Efficiency Standards. For projects that the City determines are not exempt from CEQA (i.e., an environmental document is required) and that qualify for project-level GHG analysis streamlining under CEQA Guidelines Section 15183.5, compliance with CALGreen Tier 1 may be required as a mitigation measure, unless other measures are determined by the City to achieve equivalent GHG reductions such that the CAP remains on track to achieving the overall GHG reduction target.
- ▶ **BE-5. Building Stock: Phase in Zero Net Energy Standards in New Construction.** Phase in zero net energy (ZNE) standards for new construction, beginning in 2020 for residential projects and 2030 for commercial projects. Specific phase-in requirements and ZNE compliance standards will be supported by updates in the triennial building code updates, beginning with the 2019 update.
- ▶ **BE-7. Building Stock: Solar Photovoltaics in New and Existing Residential and Commercial Development.** Encourage and require installation of on-site solar photovoltaic (PV) in new single-family and low-rise multi-family developments. Promote installation of on-site PV systems in existing residential and commercial development.
- ▶ **BE-8. SMUD Greenergy and SolarShares Programs.** Encourage participation in SMUD's offsite renewable energy programs (i.e., Greenergy, SolarShares), which allow building renters and owners to opt into cleaner electricity sources.
- ▶ **TACM-6. Limit Vehicle Miles Traveled.** Achieve a 15 percent reduction in daily VMT compared to existing conditions (2015) for all new development in the City, consistent with state-mandated VMT reduction targets for land use and transportation projects.
- ▶ **TACM-9: EV Charging Requirements.** Adopt an electric vehicle (EV) charging station ordinance that establishes minimum EV charging standards for all new residential and commercial development. Increase the number of EV charging stations at municipal facilities throughout the City. In 2022, the City amended its municipal code to implement 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.

The City is currently in the process of updating the existing CAP to align with long-term GHG reduction goals set forth by AB 1279. The aforementioned CAP aligns with the regulatory setting in place at the time of its adoption and includes policies capable of assisting the City in meeting the targets codified by SB 32 (40 percent reduction from 1990 emissions by 2030). The new CAP intends to include policies that will extend beyond 2030.

### 3.7.2 Environmental Setting

#### THE PHYSICAL SCIENTIFIC BASIS OF GREENHOUSE GAS EMISSIONS AND CLIMATE CHANGE

Certain gases in the earth's atmosphere, classified as GHGs, play a critical role in determining the earth's surface temperature. Solar radiation enters the atmosphere from space. A portion of the radiation is absorbed by the earth's surface, and a smaller portion of this radiation is reflected toward space. The absorbed radiation is then emitted from the earth as low-frequency infrared radiation. Most solar radiation passes through GHGs; however, infrared radiation is absorbed by these gases. As a result, radiation that otherwise would have escaped back into space is instead "trapped," resulting in a warming of the atmosphere. This phenomenon, known as the greenhouse effect, is responsible for maintaining a habitable climate on earth.

Prominent GHGs contributing to the greenhouse effect are CO<sub>2</sub>, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Human-caused emissions of these GHGs in excess of natural ambient concentrations are found to be responsible for intensifying the greenhouse effect and leading to a trend of unnatural warming of the earth's climate, known as global climate change or global warming. It is "extremely likely" that more than half of the observed increase in global average surface temperature from 1951 to 2010 was caused by the anthropogenic increase in GHG concentrations and other anthropogenic forcing (IPCC 2014).

Climate change is a global problem. GHGs are global pollutants, unlike criteria air pollutants and toxic air contaminants, which are pollutants of regional and local concern. Whereas most pollutants with localized air quality effects have relatively short atmospheric lifetimes (approximately 1 day), GHGs have long atmospheric lifetimes (1 year to several thousand years). GHGs persist in the atmosphere long enough to be dispersed around the globe. Although the lifetime of any GHG molecule depends on multiple variables and cannot be determined with any certainty, it is understood that more CO<sub>2</sub> is emitted into the atmosphere than is sequestered by ocean uptake, vegetation, and other forms of sequestration. Of the total annual human-caused CO<sub>2</sub> emissions, approximately 55 percent are estimated to be sequestered through ocean and land uptake every year, averaged over the last 50 years, whereas the remaining 45 percent of human-caused CO<sub>2</sub> emissions remain stored in the atmosphere (IPCC 2013).

The quantity of GHGs in the atmosphere responsible for climate change is not precisely known, but it is considered to be enormous. No single project alone would measurably contribute to an incremental change in the global average temperature or to global or local climates or microclimates. From the standpoint of CEQA, GHG impacts relative to global climate change are inherently cumulative.

## GREENHOUSE GAS EMISSION SOURCES

Emissions of CO<sub>2</sub> are byproducts of fossil fuel combustion. Methane, a highly potent GHG, primarily results from off-gassing (the release of chemicals from nonmetallic substances under ambient or greater pressure conditions) and is largely associated with agricultural practices, landfills, and forest fires. Nitrous oxide is also largely attributable to agricultural practices and soil management. CO<sub>2</sub> sinks, or reservoirs, include vegetation and the ocean, which absorb CO<sub>2</sub> through sequestration and dissolution (CO<sub>2</sub> dissolving into the water) and are two of the most common processes for removing CO<sub>2</sub> from the atmosphere.

As discussed previously, GHG emissions are attributable in large part to human activities. The total GHG inventory for California in 2020 was 370 MMTCO<sub>2</sub>e (CARB 2022c). This is less than the 2020 target of 431 MMTCO<sub>2</sub>e (CARB 2021).

A GHG inventory for the City is provided in the City's CAP and summarized in Table 3.7-1. As shown below, on-road vehicles and residential, commercial, and industrial energy consumption constitute the greatest sources of emissions.

**Table 3.7-1 City of Elk Grove's Greenhouse Gas Emissions Inventory for 2013 and Business-as-Usual Forecast Years (MTCO<sub>2</sub>e)**

Emissions Sector	2013	2020	2030	2050
On-Road Vehicles	730,340	645,542	844,317	1,241,867
Residential Energy	231,400	257,171	310,017	413,560
Commercial/Industrial Energy	129,860	147,685	196,037	293,532
Off-Road Vehicles	93,340	102,776	123,896	165,275
Solid Waste	26,260	36,181	39,817	47,781
Wastewater	3,854	4,283	5,163	6,888
Water-Related	2,708	3,010	3,628	4,840
Agriculture	1,030	2,585	1,061	299
Total	918,790	1,199,232	1,523,936	2,174,042

Notes: Totals may not equal the sum of the numbers because of independent rounding.

MTCO<sub>2</sub>e = metric tons of carbon dioxide equivalent.

Source: City of Elk Grove 2019b: Appendix A.

## EFFECTS OF CLIMATE CHANGE ON THE ENVIRONMENT

According to IPCC, which was established in 1988 by the World Meteorological Organization and the United Nations Environment Programme, global average temperature will increase by 3.7 to 4.8 degrees Celsius (°C) (6.7 to 8.6 degrees Fahrenheit [°F]) by the end of the century unless additional efforts to reduce GHG emissions are made (IPCC 2014:10). According to *California's Fourth Climate Change Assessment*, with global GHGs reduced at a moderate rate California will experience average daily high temperatures that are warmer than the historic average by 2.5 °F from 2006 to 2039, by 4.4 °F from 2040 to 2069, and by 5.6 °F from 2070 to 2100; and if GHG emissions continue at current rates then California will experience average daily high temperatures that are warmer than the historic average by 2.7 °F from 2006 to 2039, by 5.8 °F from 2040 to 2069, and by 8.8 °F from 2070 to 2100 (OPR et al. 2018).

Since its previous climate change assessment in 2012, California has experienced several of the most extreme natural events in its recorded history: a severe drought from 2012–2016, an almost non-existent Sierra Nevada winter snowpack in 2014–2015, increasingly large and severe wildfires, and back-to-back years of the warmest average temperatures (OPR et al. 2018). According to California Natural Resource Agency's *Safeguarding California Plan: 2018 Update*, California experienced the driest 4-year statewide precipitation on record from 2012 through 2015; the warmest years on average in 2014, 2015, and 2016; and the smallest and second smallest Sierra snowpack on record in 2015 and 2014 (CNRA 2018). According to the National Oceanic and Atmospheric Administration and the National Aeronautics and Space Administration, 2016, 2017, and 2018 were the hottest recorded years in history (NOAA 2019). In contrast, the northern Sierra Nevada experienced one of its wettest years on record during the 2016–2017 water year (CNRA 2018). The changes in precipitation exacerbate wildfires throughout California through a cycle of high vegetative growth coupled with dry, hot periods which lowers the moisture content of fuel loads. As a result, the frequency, size, and devastation of forest fires has increased. In November 2018, the Camp Fire completely destroyed the town of Paradise in Butte County and caused 85 fatalities, becoming the state's deadliest fire in recorded history, and the largest fires in the state's history have occurred in the 2018–2020 period. Moreover, changes in the intensity of precipitation events following wildfires can also result in devastating landslides. In January 2018, following the Thomas Fire, 0.5 inch of rain fell in 5 minutes in Santa Barbara causing destructive mudslides formed from the debris and loose soil left behind by the fire. These mudslides resulted in 21 deaths.

As temperatures increase, the amount of precipitation falling as rain rather than snow also increases, which could lead to increased flooding because water that would normally be held in the snowpack of the Sierra Nevada and Cascade Range until spring would flow into the Central Valley during winter rainstorm events. This scenario would place more pressure on California's levee/flood control system (CNRA 2018). Furthermore, in the extreme scenario involving the rapid loss of the Antarctic ice sheet and the glaciers atop Greenland, the sea level along California's coastline is expected to rise 54 inches by 2100 if GHG emissions continue at current rates (OPR et al. 2018).

Temperature increases and changes to historical precipitation patterns will likely affect ecological productivity and stability. Existing habitats may migrate from climatic changes where possible, and those habitats and species that lack the ability to retreat will be severely threatened. Altered climate conditions will also facilitate the movement of invasive species to new habitats thus outcompeting native species. Altered climatic conditions dramatically endanger the survival of arthropods (e.g., insects, spiders) which could have cascading effects throughout ecosystems (Lister and Garcia 2018). Conversely, a warming climate may support the populations of other insects such as ticks and mosquitos, which transmit diseases harmful to human health such as the Zika virus, West Nile virus, and Lyme disease (European Commission Joint Research Centre 2018).

Changes in temperature, precipitation patterns, extreme weather events, wildfires, and sea-level rise have the potential to threaten transportation and energy infrastructure, crop production, forests and rangelands, and public health (CNRA 2018; OPR et al. 2018). The effects of climate change will also have an indirect adverse impact on the economy as more severe natural disasters cause expensive, physical damage to communities and the state.

Additionally, adjusting to the physical changes associated with climate change can produce mental health impacts such as depression and anxiety.

### 3.7.3 Environmental Impacts and Mitigation Measures

#### METHODOLOGY

Short-term construction-generated GHG emissions were calculated using the California Emissions Estimator Model (CalEEMod), Version 2022.1.1.14, as recommended by SMAQMD and other air districts in California (CAPCOA 2023). Modeling was based on Project-specific information (e.g., building size, area to be graded, area to be paved, energy information) where available; assumptions based on typical construction activities; and default values in CalEEMod that are based on the Project location and land use types. The land use types proposed for the Project were translated into the available land uses in CalEEMod. Construction of Phase 1 of the Project was assumed to commence in the Summer of 2025 and end in 2032. Construction of Phase 2 was assumed to begin following the completion of Phase 1 and end in 2042. Emissions from trips associated with moving animals for the New Zoo 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.

Operation-related emissions of GHGs were estimated using CalEEMod for the following sources: area sources (e.g., landscape maintenance equipment), energy use (i.e., electricity consumption), water use, solid waste generated, and mobile sources. Although the Sacramento Zoo would eventually be decommissioned or repurposed, the future land use that would operate at the repurposed Sacramento Zoo is unknown at the time of this analysis; therefore, the GHG emissions that would be reduced or increased from the decommissioning or repurposing of the Sacramento Zoo were not taken into account in this analysis. The New Zoo would open and be operational after the completion of the first phase in 2029, unless there is a rolling opening in 2027, but would be fully operational at full buildout in 2043. Operation-related mobile-source GHG emissions were modeled based on the estimated level of increased VMT by employees, visitors, and vendors above baseline conditions (i.e., above what is currently occurring at the existing Sacramento-based zoo). VMT estimates were derived from data generated during Kimley-Horn's *New Zoo in Elk Grove –VMT Analysis* conducted for the Project (see Section 3.13, "Transportation"). Mobile-source emissions were calculated using CalEEMod for the net increase in VMT from the existing Sacramento Zoo for the opening of the New Zoo in 2029, as well as full buildout of the New Zoo in 2043. Indirect emissions associated with electricity and natural gas consumption were estimated using GHG emissions factors for the SMUD. The Project's level of electricity use was based on data procured by the New Zoo in consideration of the Sacramento Zoo's existing electrical load. The Project would be fully electric and the Project's expected GHG reduction achieved from the proposed 14 and 20 kilowatt (kW) array photovoltaic solar systems were estimated using the National Renewable Energy Laboratory's PVWatts Calculator. Since it is unknown at this time how or if the Sacramento Zoo would be decommissioned, emissions from area sources, energy consumption, water consumption and wastewater treatment, solid waste generation, and refrigerants were modeled as new sources instead of net increases over baseline existing conditions at the Sacramento Zoo. Therefore, the GHG estimates for these sources are inherently conservative. In accordance with SMAQMD's guidance operational GHG emissions were modeled for the earliest year where operational emissions are anticipated to commence (i.e., 2029). Additionally, operational emissions were modeled at full buildout of the New Zoo in 2043.

Detailed model assumptions and inputs for these calculations are presented in Appendix D.

#### THRESHOLDS OF SIGNIFICANCE

The significance criteria used to evaluate Project impacts on climate change under CEQA are based on Section 15064 of the CEQA statute and relevant portions of Appendix G of the State CEQA Guidelines, which recommend that a lead agency consider a project's consistency with relevant, adopted plans and discuss any inconsistencies with applicable regional plans, including plans to reduce GHG emissions. Implementation of the Project would result in a cumulatively considerable contribution to climate change if it would:



- ▶ generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment; or
- ▶ conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs.

With respect to GHG emissions, the CEQA Guidelines Section 15064.4(a) states that lead agencies “shall make a good-faith effort, based to the extent possible on scientific and factual data, to describe, calculate or estimate” GHG emissions resulting from a project. The CEQA Guidelines note that an agency has the discretion to either quantify a project’s GHG emissions or rely on a “qualitative analysis or performance-based standards” (Section 15064.4[a]). A lead agency may use a “model or methodology” to estimate GHG emissions and has the discretion to select the model or methodology it considers “most appropriate to enable decision makers to intelligently take into account the project’s incremental contribution to climate change” (Section 15064.4[c]). The CEQA Guidelines provide that the lead agency should consider the following when determining the significance of impacts from GHG emissions on the environment (Section 15064.4[b]):

- ▶ The extent a project may increase or reduce GHG emissions as compared to the existing environmental setting.
- ▶ Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project.
- ▶ The extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of GHG emissions.

CEQA Guidelines Appendix G is a sample Initial Study checklist that includes a number of factual inquiries related to the subject of climate change, as it does on a whole series of additional environmental topics. Notably, lead agencies are under no obligation to use these inquiries in fashioning thresholds of significance on these subjects, or indeed on any subject addressed in the checklist. (*Save Cuyama Valley v. County of Santa Barbara* (2013) 213 Cal.App.4th 1059, 1068.) Rather, with few exceptions, “CEQA grants agencies discretion to develop their own thresholds of significance.” (*Ibid.*) Even so, it is a common practice for lead agencies to take the language from the inquiries set forth in Appendix G and to use that language in fashioning thresholds. The City has done so here.

Since California’s legislative mandate to reduce total projected GHG emissions to 1990 levels by the year 2020 has been achieved, the focus is now on reducing emissions 40 percent below 1990 levels by the year 2030 (SB 32), 85 percent below 1990 levels by 2045 (AB 1279), and carbon neutrality by 2045 (AB 1279). To achieve these targets, future development must be planned and implemented in the most GHG-efficient manner possible. As noted above under the Heading, “City of Elk Grove Climate Action Plan,” in Section 3.7.1, “Regulatory Setting,” the City has a currently adopted CAP.

The City updated its CAP concurrently with the General Plan in 2019 (the 2019 CAP). The 2019 CAP is intended to carry out the 2019 General Plan goals and policies to reduce GHG emissions and address the impacts of climate change. The City’s GHG emissions inventory and forecasts were updated to reflect new activity data and both current and projected population, housing, and employment demographic information consistent with the General Plan. The 2019 CAP includes GHG emissions reduction targets of 7.6 MTCO<sub>2</sub>e per capita by 2020, and 4.1 MTCO<sub>2</sub>e per capita by 2030. These targets are consistent with guidance provided to local governments in the 2017 Scoping Plan on setting plan-level GHG reduction goals that are consistent with the state’s efforts to achieve the 2030 target established by SB 32. However, as noted in Section 3.5.1, “Regulatory Setting,” the CAP is currently being updated to comply with the 2022 Scoping Plan Update, recently adopted by CARB in December 2022. At the time of preparing this analysis, the new CAP has not been adopted.

Development under the Project would extend beyond 2030 (i.e., 2042). Because the 2019 CAP achieves its 2030 target, which is aligned with the, then current, 2030 target of SB 32, and has not been updated yet to demonstrate consistency with the goals of AB 1279, the existing 2019 CAP has not been used as the threshold for determining the Project’s significance in this analysis.

As discussed previously under, “Sacramento Metropolitan Air Quality Management District,” in Section 3.7.1, “Regulatory Setting,” SMAQMD recommends tier 1 and 2 BMPs to reduce operational GHG impacts from projects. These BMPs align with the direction provided in Appendix D of the 2022 Scoping Plan, which calls for building

carbonization, VMT reductions, and the electrification of the mobile source sector. As such, these are considered appropriate BMPs to assess the Project's cumulative contribution to global climate change.

Using SMAQMD's guidance, the Project would result in a cumulatively significant climate change effect if it would:

- ▶ generate construction emissions exceeding 1,100 MTCO<sub>2</sub>e/year for any year of construction.
- ▶ generate operational emissions exceeding 1,100 MTCO<sub>2</sub>e/year following the implementation of SMAQMD's tier 1 BMPs (i.e., the prohibition of natural gas infrastructure and meeting the current CalGreen Tier 2 Standards for EV charging)
- ▶ for projects exceeding 1,100 MTCO<sub>2</sub>e/year following the implementation of SMAQMD's tier 1 BMPs, fail to achieve the VMT reduction targets set forth by OPR under SB 743.

## ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

### Impact 3.7-1: Project-generated GHG emissions and consistency with plans and regulations

Construction of the Project would generate 8,242 MTCO<sub>2</sub>e over the course of the Project's 17-construction-year period (2025–2042). The Project's construction emissions would not exceed SMAQMD's 1,100 MTCO<sub>2</sub>e/year threshold of significance for evaluating construction-related climate change impacts for each year of construction. As part of operations the Project would include EV charging spaces. However, the number proposed EV charging spaces does not meet the Tier 2 requirements of the CalGreen Code (SMAQMD's tier 1 BMP 2). While opening year emissions would not exceed SMAQMD thresholds, at full buildout Project emissions would be above SMAQMD's bright-line threshold of significance of 1,100 MTCO<sub>2</sub>/year that triggers the need for the Project to implement SMAQMD's tier 2 BMP. With implementation of Mitigation Measures 3.7-1 and Mitigation Measures 3.13-2a and 3.13-2b the Project would be required to reduce mobile emissions associated with the Project to meet SMAQMD's thresholds. However, operational emissions would remain significant and conflict with the long-term goal of achieving carbon neutrality by 2045 as mandated by AB 1279. This impact would be **significant and unavoidable**.

#### Construction

Construction-related activities would generate emissions of GHGs from the operation of off-road equipment, material delivery, worker commute trips, and other miscellaneous activities. Construction activities in the modeling were assumed to occur over 17 years (2025–2042). GHG emissions from construction equipment are anticipated to become progressively less as emissions factors for off-road construction equipment improves and the availability of higher-tiered engines increases. For specific construction assumptions and modeling inputs, refer to Appendix D. Based on the modeling performed for the Project, construction of the Project would generate a total of approximately 8,242MTCO<sub>2</sub>e over the 17-year construction period. However, Project construction emissions would not exceed SMAQMD's construction threshold of significance of 1,100 MTCO<sub>2</sub>e per year for each year. Table 3.7-2 summarizes Project construction emissions. Construction-generated GHG emissions would be **less than significant**.

**Table 3.7-2 Summary of Maximum Construction-Generated Emissions of Greenhouse Gas Emissions from the Project (2025–2042)**

Construction Year	MTCO <sub>2</sub> e/year
2025	976
2026	857
2027	851
2028	428
2029	406
2030	367
2031	366

Construction Year	MTCO <sub>2</sub> e/year
2032	240
2033	401
2034	314
2034	198
2035	195
2036	195
2037	195
2038	144
2039	445
2040	398
2041	290
2042	976
<b>SMAQMD threshold</b>	<b>1,100</b>
<b>Exceeds thresholds?</b>	<b>No</b>

Notes: MTCO<sub>2</sub>e = metric tons of carbon dioxide equivalent; SMAQMD = Sacramento Metropolitan Air Quality Management District.

Source: Modeling performed by Ascent Inc. in 2023.

### Operation

The New Zoo would become operational in 2029 after construction of Phase 1, and be fully operational by 2043 (i.e., completion of Phases 1 through 4). Project operations would generate GHG emissions from travel to and from the New Zoo and landscaping equipment. GHGs would be indirectly emitted from electricity consumption, solid waste disposal at the landfills, water and wastewater treatment, and refrigerants. The Project would be fully electric (i.e., no natural gas). Based on the modeling prepared for the Project at opening year the Project would generate approximately 270 MTCO<sub>2</sub>e/year. At full buildout, Project operations would generate a total of approximately 3,499 MTCO<sub>2</sub>e/year. Mobile emissions for the Project account for the net increase in emissions as compared to mobile emissions from operation of the Sacramento Zoo. However, emissions from the area, energy, water, solid waste, and refrigerants sectors estimated for the Project conservatively do not account for the existing operations of the Sacramento Zoo.

The Project would be all electric and thus be consistent with SMAQMD's tier 1 BMP 1 (i.e., the prohibition of on-site natural gas infrastructure). The Project would include 313 EV capable spaces, comprising 20 percent of the total proposed parking spaces. Of those 313 EV capable spaces, 80 would be EVCS (20 percent of the EV capable spaces), seven EV standard accessible spaces, two EV van accessible spaces, and five EV ambulatory spaces. SMAQMD's tier 1 BMP 2 requires that projects meet the tier 2 standards of the most recent CalGreen Code. To meet the most recent 2022 CalGreen Code tier 2 requirements for EV charging spaces the Project would need to construct 729 EV capable parking spaces (i.e., 45 percent of the Project's total parking spaces) and 240 EVSE spaces (i.e., EV spaces supportive Level 2 or Direct Current Fast Chargers; 33 percent of the total EV capable spaces). Because the Project would not meet the tier 1 BMP 2 standards pertaining to the EV requirements of the CalGreen Code, the Project would be required to implement Mitigation Measure 3.7-1. Implementation of Mitigation Measure 3.7-1 would require installation of EV capable and EVSE spaces consistent with the tier 2 requirements of the CalGreen Code.

With the application of SMAQMD's tier 1 BMP 1 and failure to meet SMAQMD's tier 1 BMP 2, without implementation of Mitigation Measure 3.7-1, Project operational emissions would exceed SMAQMD's operational threshold of significance of 1,100 MTCO<sub>2</sub>e/year in 2043. Tables 3.7-3 and 3.7-4 summarize the Project's operational emissions by sector for the opening year of the New Zoo in 2029 and at full buildout in 2043. For specific operational assumptions and modeling inputs, refer to Appendix D.

**Table 3.7-3 Project-Generated Greenhouse Gas Emissions in 2029**

Emissions Sector	MTCO <sub>2</sub> e
Mobile Source	144
Area Sources	<1
Energy Consumption	62
Water Consumption and Wastewater Treatment	21
Solid Waste Generation	42
Refrigerants	<1
<b>Total Operational GHG Emissions</b>	<b>270</b>
<b>SMAQMD threshold</b>	<b>1,100</b>
<b>Exceeds thresholds?</b>	<b>No</b>

Notes: MTCO<sub>2</sub>e = metric tons of carbon dioxide equivalent; SMAQMD = Sacramento Metropolitan Air Quality Management District.

Source: Modeling performed by Ascent Inc. in 2023.

**Table 3.7-4 Project-Generated Greenhouse Gas Emissions in 2043**

Emissions Sector	MTCO <sub>2</sub> e
Mobile Source	3,126
Area Sources	3
Energy Consumption	40
Water Consumption and Wastewater Treatment	29
Solid Waste Generation	288
Refrigerants	14
<b>Total Operational GHG Emissions</b>	<b>3,499</b>
<b>SMAQMD threshold</b>	<b>1,100</b>
<b>Exceeds thresholds?</b>	<b>Yes</b>

Notes: MTCO<sub>2</sub>e = metric tons of carbon dioxide equivalent; SMAQMD = Sacramento Metropolitan Air Quality Management District.

Source: Modeling performed by Ascent Inc. in 2023.

As shown in Table 3.7-3, Project operational emissions would not exceed SMAQMD's threshold of significance of 1,100 MTCO<sub>2</sub>e/year following the application of SMAQMD's tier 1 BMP 1 upon opening of Phase 1 of the New Zoo in 2029. However, as shown in Table 3.7-4, Project operations would exceed SMAQMD's threshold of significance at full buildout. The Project would not meet the requirements of SMAQMD's tier 1 BMP 2. The emissions estimates summarized above are inherently conservative as the emissions associated with the area, energy, water and wastewater, solid waste, and refrigerants sectors have been considered new emissions although the existing Sacramento Zoo, which currently generates emissions from these sources, would no longer generate GHG emissions from those sectors.

As discussed above under, "Thresholds of Significance," SMAQMD recommends projects that continue to have emissions above the 1,100 MTCO<sub>2</sub>e/year threshold demonstrate that they are reducing VMT to meet OPR's targets pursuant to SB 743. As discussed in Impact 3.13-2 in Section 3.13, "Transportation," the Project's incremental increase in VMT would exceed the City's VMT requirements resulting in a significant impact. Mitigation Measures 3.13-2a and 3.13-2b are included in Section 3.13, "Transportation" to reduce VMT. These measures would require increased vehicle occupancy, a commute reduction program, and a local transit stop to decrease vehicle trips. However, these measures would not be sufficient to reduce the Project's contribution of VMT below the VMT threshold of significance (i.e., an increase in VMT above baseline conditions).

The Project has committed to various design features that reduce the Project's contribution of GHGs above what SMAQMD recommends. For example, the Project would include 120 bicycle parking spaces, which has the potential to reduce GHG emissions from the mobile sector by as much as 4.4 percent (137.5 MTCO<sub>2</sub>e/year), as well as two 20 and 14 kW photovoltaic solar arrays to provide on-site electricity to the Project site resulting in an annual decrease of 54 MTCO<sub>2</sub>e/year. The Project would also introduce and operate the Animal Browse Program, which would entail gathering and processing green waste from around the City's parks and rural communities to feed the zoo animals, thus decreasing the purchasing needs of the Project to procure feed from designated agricultural sources. This would result in decreased emissions from water usage to grow crops as well as avoided potential fugitive methane production from the anaerobic decomposition of organic matter at landfills.

Notably, the Project would result in the expansion of habitat to support zoo animals compared to the existing Sacramento Zoo. This would allow the Project to support a greater number of animals that may generate fugitive methane emissions. As discussed in Section 3.7.2, methane is a GHG with a high GWP as compared to CO<sub>2</sub> and endures in the atmosphere for a substantially shorter duration. Ruminants (hoofed herbivorous animals with a unique digestive system comprising four stomachs) are a suborder of the Animalia kingdom that contributes the highest percentage of fugitive methane from animal digestion due to the complex nature of their digestive processes. Types of ruminants that may inhabit the Project include, but are not limited to, giraffes, African buffalo, oryx, kudu, and ibex, which would produce methane from the digestion of herbivorous compounds. However, while methane emissions from ruminants contributes significantly to global climate change, this methane is primarily emitted from human-controlled agricultural processes (i.e., cattle raised for meat and dairy products). While there would be an increase in methane emissions from Project implementation as compared to those occurring from ruminant digestion at the Sacramento Zoo, in the global context of methane production, these emissions would be negligible.

The City of Elk Grove CAP is designed to reduce GHG emissions and thus, the Project includes various project design features that are consistent with the following measures in the CAP:

- ▶ **BE-3. Building Stock: Nonresidential Appliances in Existing Development.** Equip City businesses to reduce operational expenses and maximize energy efficiency using energy-efficient and cost-effective indoor and outdoor appliances and equipment.
- ▶ **BE-7. Building Stock: Solar Photovoltaics in New and Existing Residential and Commercial Development.** Encourage and require installation of on-site solar photovoltaic (PV) in new single-family and low-rise multi-family developments. Promote installation of on-site PV systems in existing residential and commercial development.
- ▶ **BE-8. SMUD Greenergy and SolarShares Programs.** Encourage participation in SMUD's offsite renewable energy programs (i.e., Greenergy, SolarShares), which allow building renters and owners to opt into cleaner electricity sources.
- ▶ **TACM-4. Pedestrian and Bicycle Travel.** Provide for safe and convenient pedestrian and bicycle travel through implementation of the Bicycle, Pedestrian, and Trails Master Plan and increased bicycle parking standards.
- ▶ **TACM-9. EV Charging Requirements.** Adopt an electric vehicle (EV) charging station ordinance that establishes minimum EV charging standards for all new residential and commercial development. Increase the number of EV charging stations at municipal facilities throughout the City.

The Project would be consistent with CAP Measure BE-3 by eliminating on-site natural gas and using the solar array that would be installed on the site. Similarly, the Project would be consistent with CAP Measures BE-7 and BE-8 by promoting the future PV installations. Although the renewable energy would not be generated by SMUD, the Project would be consistent with BE-8 by generating renewable energy through installation of PV. By installing bike parking stalls, the Project would be consistent with CAP Measure TACM-4. Lastly, by installing 327 EV-capable parking spaces, the Project would be consistent with CAP Measure TACM-9.

Nevertheless, as shown in Table 3.7-4, the Project's emissions would continue to be above SMAQMD's 1,100 MTCO<sub>2</sub>e/year after implementation of tier 1 BMP 1. Mitigation Measures 3.13-2a and 3.13-2b, as included in Section 3.13, "Transportation," would be required to reduce VMT, and would also reduce Project GHG emissions. As

calculated using methods in the CAPCOA Handbook, Mitigation Measures 3.13-2a and 3.13-2b could reduce emissions by a maximum of 1,322 MTCO<sub>2</sub>e/year during the Project's first full year of operation (i.e., 2043). After creating these reductions, the Project would emit 2,177 MTCO<sub>2</sub>e/year, which would be above SMAQMD's 1,100 MTCO<sub>2</sub>e/year threshold of significance for operational emissions. However, the percent reductions associated with these measures, as defined by CAPCOA, are interpreted as the maximum GHG benefit and are not additive when multiple measures are applied. Therefore, there would be diminishing GHG reductions when these measures are implemented congruently (CAPCOA 2021). It cannot be assured that the Project, with mitigation, would produce emissions sufficiently low enough to not conflict with the state's long-term GHG reduction goal of carbon neutrality by 2045 established by AB 1279. The Project would not meet SMAQMD's tier 2 BMP to meet OPR's VMT reduction target. Therefore, with implementation of Mitigation Measure 3.7-1, and Mitigation Measures 3.13-2a and 3.13-2b from Section 3.13, "Transportation" impacts would remain **significant and unavoidable**. As described in Section 3.13, "Transportation," there are no other feasible measures available to reduce Project mobile emissions.

## Mitigation Measures

### **Mitigation Measure 3.7-1a: Install EV Capable and EVSE Spaces Consistent with the Tier 2 Requirements of the 2022 CalGreen Code**

The Zoo shall equip 45 percent of the Project's total parking spaces with EV capable infrastructure. Of the EV capable spaces, 33 percent shall support EVSE infrastructure with Level 2 or Direct Current Fast Chargers.

### **Mitigation Measure 3.7-1b: Implement Mitigation Measure 3.13-2a: Subsidize Transit for New Zoo Employees**

### **Mitigation Measure 3.7-1bc: Implement Mitigation Measure 3.13-2b: Provide a Local Transit Stop.**

#### Significance after Mitigation

This impact would be **significant and unavoidable**.