

3.6 GEOLOGY AND SOILS

This section describes current conditions relative to geology and soils in Elk Grove. It includes a description of geologic soil conditions, analysis of environmental impacts, and recommendations for mitigation measures for any significant or potentially significant impacts. The primary source of information used for this analysis is the *City of Elk Grove General Plan Update Draft Environmental Impact Report* (City of Elk Grove 2018).

No comments pertaining to geology and soils were received in response to the notice of preparation (NOP).

3.6.1 Regulatory Setting

FEDERAL

National Earthquake Hazards Reduction Act

In October 1977, the U.S. Congress passed the Earthquake Hazards Reduction Act (42 United States Code Sections 7701–7706) to reduce the risks to life and property from future earthquakes in the United States. To accomplish this reduction in risk, the act established the National Earthquake Hazards Reduction Program (NEHRP). The mission of the NEHRP includes improved understanding, characterization, and prediction of hazards and vulnerabilities; improved building codes and land use practices; risk reduction through post-earthquake investigations and education; development and improvement of design and construction techniques; improved mitigation capacity; and accelerated application of research results. The NEHRP designates the Federal Emergency Management Agency as the lead agency of the program and assigns several planning, coordinating, and reporting responsibilities.

STATE

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act of 1972 (Alquist-Priolo Act) (PRC Sections 2621–2630) intends to reduce the risk to life and property from surface fault rupture during earthquakes by regulating construction in active fault corridors and by prohibiting the location of most types of structures intended for human occupancy across the traces of active faults. The act defines criteria for identifying active faults, giving legal support to terms such as “active” and “inactive,” and it establishes a process for reviewing building proposals in Earthquake Fault Zones. Under the Alquist-Priolo Act, faults are zoned, and construction along or across these zones is strictly regulated if they are “sufficiently active” and “well-defined.” A fault is considered sufficiently active if one or more of its segments or strands shows evidence of surface displacement during Holocene time (defined for purposes of the act as within the last 11,000 years). A fault is considered well defined if its trace can be clearly identified by a trained geologist at the ground surface or in the shallow subsurface, using standard professional techniques, criteria, and judgment (Bryant and Hart 2007). Before a project can be permitted in a designated Alquist-Priolo Earthquake Fault Zone, the relevant city or county must require a geologic investigation to demonstrate that proposed buildings would not be constructed across active faults. The law addresses only the hazard of surface fault rupture and is not directed toward other earthquake hazards.

Seismic Hazards Mapping Act

The intention of the Seismic Hazards Mapping Act of 1990 (PRC Sections 2690–2699.6) is to reduce damage resulting from earthquakes. Whereas the Alquist-Priolo Act addresses surface fault rupture, the Seismic Hazards Mapping Act addresses other earthquake-related hazards, including ground shaking, liquefaction, and seismically induced landslides. The act’s provisions are similar to those of the Alquist-Priolo Act: The State is charged with identifying and mapping areas at risk of strong ground shaking, liquefaction, landslides, and other corollary hazards, and cities and counties are required to regulate development within mapped Seismic Hazard Zones. Under the Seismic Hazards Mapping Act, permit review is the primary mechanism for local regulation of development.

California Building Code

The California Building Code (CBC) (CCR Title 24) is based on the International Building Code, but it reflects California conditions and has more detailed or more stringent regulations than the International Building Code. Specific minimum seismic safety and structural design requirements are set forth in Chapter 16 of the CBC. The CBC identifies seismic factors that must be considered in structural design. Chapter 18 of the CBC regulates the excavation of foundations and retaining walls, while Chapter 18A regulates construction on unstable soils, such as expansive soils and areas subject to liquefaction. Appendix J of the CBC regulates grading activities, including drainage and erosion control.

National Pollutant Discharge Elimination System Construction General Permit for Stormwater Discharges Associated with Construction Activity

The State Water Resources Control Board has adopted a Statewide National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges Associated with Construction Activity (SWRCB Construction General Permit Order 2009-0009-DWQ). The State requires that projects disturbing more than 1 acre of land during construction file a Notice of Intent with the regional water quality control board (RWQCB) to be covered under this permit. Construction activities subject to the general permit include clearing, grading, stockpiling, and excavating. Dischargers are required to eliminate or reduce non-stormwater discharges to storm sewer systems and other waters. A storm water pollution prevention plan (SWPPP) must be developed and implemented for each site covered by the permit. The SWPPP must include best management practices (BMPs) designed to prevent construction pollutants from contacting stormwater and keep products of erosion from moving off-site into receiving waters throughout the construction and life of the project; the BMPs must address source control and, if necessary, pollutant control.

Regulations Regarding Paleontological Resources

Paleontological resources on private property are considered the property of the landowner and receive no particular legal protection unless otherwise addressed in the conditions of approval of a land development permit, as mitigation in an applicable CEQA document, or through local policy and/or regulation (see below). Paleontological resources on public lands are protected by State statute (PRC Chapter 1.7, Section 5097.5, Archeological, Paleontological, and Historical Sites and Appendix G). This statute states:

A person shall not knowingly and willfully excavate upon, or remove, destroy, injure, or deface, any historic or prehistoric ruins, burial grounds, archaeological or vertebrate paleontological site, including fossilized footprints, inscriptions made by human agency, rock art, or any other archaeological, paleontological or historical feature, situated on public lands, except with the express permission of the public agency having jurisdiction over the lands.

LOCAL

City of Elk Grove General Plan

The City of Elk Grove General Plan contains the following policies and standards related to geology, soils, and seismicity that apply to the Project (City of Elk Grove 2019):

- ▶ **Policy NR-3-1:** Ensure that the quality of water resources (e.g. groundwater, surface water) is protected to the extent possible.
- ▶ **Policy NR-3-2:** Integrate sustainable stormwater management techniques in site design to reduce stormwater runoff and control erosion.
 - **Standard NR-3-2.b:** Roads and structures shall be designed, built, and landscaped so as to minimize erosion during and after construction.
- ▶ **Policy NR-3-3:** Implement the City's National Pollutant Discharge Elimination System permit through the review and approval of development projects and other activities regulated by the permit.

City of Elk Grove Municipal Code

Chapter 16.04 (California Building Code)

Chapter 16.04 of the Municipal Code consists of the adoption of the 2019 edition of the CBC, Title 24, Part 2, Volumes 1 and 2, published by the International Code Council, administrative sections, Chapter 29, Appendices C, I, and O; and amendments, as adopted by the Building Standards Commission of the State of California and codified at Title 24, Part 2, in the CCR.

Chapter 16.44 (Land Grading and Erosion Control)

Chapter 16.44 of the Municipal Code establishes administrative procedures, minimum standards of review, and implementation and enforcement procedures for controlling erosion, sedimentation, and other pollutant runoff, including construction debris and hazardous substances used on construction sites, and disruption of existing drainage and related environmental damage caused by land clearing, grubbing, grading, filling, and land excavation activities. The chapter applies to projects that would disturb 350 cubic yards or more of soil. The intent of the ordinance is to minimize damage to surrounding properties and public rights-of-way, minimize degradation of water quality in watercourses, minimize disruption of natural or City-authorized drainage flows caused by construction activities, and make projects comply with the provisions of the City's NPDES Permit Number CA0082597, issued by the RWQCB. The City of Elk Grove is a co-permittee on an NPDES permit, along with Sacramento County and the Cities of Sacramento, Folsom, Galt, and Citrus Heights.

The reader is referred to Section 3.9, "Hydrology and Water Quality," for a discussion of Municipal Code Chapter 15.12 (Stormwater Management and Discharge Control).

3.6.2 Environmental Setting

REGIONAL GEOLOGY

Elk Grove is located within the Sacramento Valley and lies centrally in the Great Valley geomorphic province of California. The Great Valley geomorphic province is an alluvial plain approximately 50 miles wide and 400 miles long located in central California, bounded on the north by the Klamath and Cascade mountain ranges, on the east by the Sierra Nevada and the Foothills Fault Zone, and on the west by the Great Valley Fault Zone and Coast Ranges. Sediments consisting of Cenozoic non-marine (continental) sedimentary rocks and alluvium (loose, unconsolidated soil) have been deposited in the Great Valley geomorphic province almost continuously since the Jurassic period, approximately 160 million years ago. Siltstone, claystone, and sandstone are the primary types of sedimentary deposits. The Sacramento River, which drains the east side of the Great Valley into the Sacramento-San Joaquin Delta, is located west of the City, and is the region's major northern drainage (City of Elk Grove 2018:5.6-1).

LOCAL GEOLOGY AND TOPOGRAPHY

Elk Grove is primarily underlain by the Riverbank Formation. A section of the Laguna Formation runs north to south through the center of the City. The Laguna Formation consists of lenticular cobble gravel, sand, and small amounts of reddish to yellowish brown silt from metamorphic, granitic, and volcanic sources. This sediment is located only in the east and northeast portions of the city (City of Elk Grove 2018:5.6-5).

Sediments in the Riverbank Formation consist of weathered reddish gravel, sand, and silt that form alluvial terraces and fans. In the Sacramento Valley, this formation contains more mafic igneous rock fragments than the San Joaquin Valley, and thus tends toward stronger soil profile developments that are more easily distinguishable from the Modesto Formation which overlies the Riverbank Formation. The Riverbank Formation is Pleistocene in age, but is considerably older than the Modesto Formation; estimates place it between 130,000 and 450,000 years BP. Similar to the Modesto Formation, the Riverbank Formation forms alluvial fans and terraces of the Feather and Bear Rivers; however, Riverbank fans and terraces are higher in elevation and generally have a more striking topography than

those formed by the Modesto Formation. Most of the sediments in the Planning Area are Riverbank Formation (City of Elk Grove 2018:5.6-5).

Elk Grove is flat, with little variation in topography. Elevations range from 10 feet above average sea level in the west to 150 feet in the east (City of Elk Grove 2018:5.6-1).

GROUNDWATER

Elk Grove is situated within the Sacramento Valley Groundwater Basin, South American Subbasin. Within the South American Subbasin, there are three groundwater basins in Sacramento County, North, Central, and South; Elk Grove overlies the Central Basin. The Central Basin also includes areas of Sacramento County and the City of Sacramento (City of Elk Grove 2018:5.9-14).

Groundwater in the Central Basin generally occurs in a shallow aquifer zone (Laguna or Modesto Formation) or in an underlying deeper aquifer zone (Mehrten Formation). There is some potential for movement of groundwater between the two aquifers, usually the result of heavy groundwater pumping, and the effects on groundwater levels are a function of whether the pumping occurs in the shallow aquifer or the deeper aquifer (City of Elk Grove 2018:5.9-14).

SOILS

The City of Elk Grove General Plan Update identified 38 soil types within the City. The San Joaquin soil series is the most prevalent in Elk Grove. Along with similar soil types, these account for nearly 85 percent of soils in the City. The San Joaquin series is alluvium deposits from mostly granitic rocks. It has a breadth of characteristics that can vary from loam to clay, depending on soil depth. Typically, these soils are well- or moderately well-drained with medium to very high runoff potential and very slow permeability (City of Elk Grove 2018:5.6-3).

EXPANSIVE SOILS

Expansive soils (also known as shrink-swell soils) are soils that contain expansive clay minerals that can absorb significant amounts of water. The presence of these clay minerals makes the soil prone to large changes in volume in response to changes in water content. When an expansive soil becomes wet, water is absorbed and it increases in volume, and as the soil dries it contracts and decreases in volume. This repeated change in volume over time can produce enough force and stress on buildings, underground utilities, and other structures to damage foundations, pipes, and walls.

The quantity and type of expansive clay minerals affects the potential for the soil to expand or contract. The San Joaquin soil group, the main soil series in the Planning Area, has potential for expansion because of its high proportion of clay, especially at depths of 16 inches or greater (City of Elk Grove 2018:5.6-4).

SUBSIDENCE

Land subsidence is the gradual settling or sinking of an area with little horizontal motion. Subsidence can be induced by both natural and human phenomena. Natural phenomena include shifting of tectonic plates and dissolution of limestone, resulting in sinkholes. Human-related activity that can cause subsidence includes pumping water, oil, and gas from underground reservoirs; collapse of underground mines; drainage of wetlands; and soil compaction.

Elk Grove is located over a principal groundwater basin in a potential subsidence area, making groundwater pumping the City's largest potential cause for subsidence (City of Elk Grove 2018:5.6-4). The U.S. Geological Survey (USGS) provides an interactive map that identifies documented areas of land subsidence (USGS 2020). The closest areas of reported land subsidence are located west of Sacramento, in Davis and Woodland, and west of Lodi, within the Sacramento–San Joaquin Delta (Luhdorff & Scalmanini 2014). Therefore, the risk from regional subsidence at the site is considered low.

LIQUEFACTION AND LATERAL SPREADING

Liquefaction is a phenomenon in which loose, saturated, granular soil deposits lose a significant portion of their shear strength because of excess pore water pressure buildup. An earthquake typically causes the increase in pore water pressure and subsequent liquefaction. These soils are behaving like a liquid during seismic shaking and re-solidify when shaking stops. The potential for liquefaction is highest in areas with high groundwater and loose, fine, sandy soils at depths of less than 50 feet. Liquefaction may also lead to lateral spreading. Lateral spreading (also known as expansion) is the horizontal movement or spreading of soil toward an "open face," such as a streambank, the open side of fill embankments, or the sides of levees. It often occurs in response to liquefaction of soils in an adjacent area. The potential for failure from lateral spreading is highest in areas where there is a high groundwater table, where there are relatively soft and recent alluvial deposits, and where creek banks are relatively high.

The soils underlying the city are relatively dense/stiff and the upper 50 feet of soil are above the depth of groundwater; therefore, the potential for liquefaction in Elk Grove is considered low. The potential for ground lurching, differential settlement, or lateral spreading to occur during or after seismic events in Elk Grove is also considered low (City of Elk Grove 2018:5.6-3).

PALEONTOLOGICAL RESOURCES

Significant nonrenewable vertebrate and invertebrate fossils and unique geologic units have been documented throughout California. The fossil-yielding potential of a particular area is highly dependent on the geologic age and origin of the underlying rocks. Paleontological potential refers to the likelihood that a rock unit will yield a unique or significant paleontological resource. All sedimentary rocks, some volcanic rocks, and some low-grade metamorphic rocks have potential to yield significant paleontological resources. Depending on location, the paleontological potential of subsurface materials generally increases with depth beneath the surface, as well as with proximity to known fossiliferous deposits.

Pleistocene or older (older than 11,000 years) continental sedimentary deposits are considered to have a high paleontological potential, while Holocene-age deposits (less than 10,000 years old) are generally considered to have a low paleontological potential because they are geologically immature and are unlikely to have fossilized the remains of organisms. Metamorphic and igneous rocks have a low paleontological potential, either because they formed beneath the surface of the earth (such as granite), or because they have been altered under high heat and pressures, chaotically mixed or severely fractured. Generally, the processes that form igneous and metamorphic rocks are too destructive to preserve identifiable fossil remains.

The Great Valley geomorphic province is composed of thousands of feet of sedimentary deposits that have undergone periods of subsidence and uplift over millions of years. During the Jurassic and Cretaceous periods of the Mesozoic era, the Great Valley existed in the form of an ancient ocean. By the end of the Mesozoic, the northern portion of the Great Valley began to fill with sediment as tectonic forces caused uplift of the basin. By the time of the Miocene epoch, approximately 24 million years ago, sediments deposited in the Sacramento Valley were mostly of terrestrial origin. Most of the surface of the Great Valley is covered with Holocene and Pleistocene alluvium composed of sediments from the Sierra Nevada and the Coast Range. Elk Grove is primarily underlain by two formations that are sensitive for paleontological resources (City of Elk Grove 2018:5.6-5).

The Laguna Formation consists of lenticular cobble gravel, sand, and small amounts of reddish to yellowish brown silt from metamorphic, granitic, and volcanic sources. This formation is known to produce Pliocene fossils. As a result, this formation has a high sensitivity rating. The Riverbank Formation in the Elk Grove area is known to produce vertebrate fossils dating to the late Pleistocene. The fossils recovered to date from the Riverbank Formation are typically large, late Pleistocene vertebrates, although fish, frogs, snakes, turtles, and a few plants such as prune, sycamore, and willow are known as well. The typically large, Rancholabrean vertebrates include bison, horse, camel, mammoth, ground sloth, and wolf. The Rancholabrean fauna and flora are well known in California, and they typically include many more species than reported from Sacramento County. As a result, this formation has a high sensitivity rating (City of Elk Grove 2018:5.6-5).

3.6.3 Environmental Impacts and Mitigation Measures

METHODOLOGY

The following impact analysis is based primarily on review of the information and analysis presented in the General Plan EIR as well as available literature, including documents published by the City of Elk Grove, State and federal agencies, and published information dealing with geotechnical conditions in the Elk Grove area. Where the General Plan EIR concluded that there would be no impacts or impacts would be less than significant impacts are not evaluated in detail herein.

Further, in response to 2018 revisions to the State CEQA Guidelines (Public Resources Code Section 15126.2) and the 2015 California Supreme Court case, *California Building Industry Association v. Bay Area Air Quality Management District* (2015) 62 Cal.4th 369, impacts associated with exposure of a project to environmental hazards are not considered significant effects unless the project would exacerbate the risks from such hazards. However, because lead agencies retain the authority, separate and apart from CEQA, to include a review of potential impacts of the environment on a project, the analysis of geologic hazards in this section considers whether the Housing Element and Safety Element Update could cause or exacerbate geologic hazards impacts.

THRESHOLDS OF SIGNIFICANCE

A geology and soils impact is considered significant if implementation of the Project would do any of the following:

- ▶ directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death through the rupture of a known earthquake fault or strong seismic ground shaking;
- ▶ result in substantial soil erosion or the loss of topsoil;
- ▶ locate project facilities on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on-site or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse;
- ▶ locate project facilities on expansive soil, creating substantial direct or indirect risks to property;
- ▶ have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems; and/or
- ▶ directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.

ISSUES NOT DISCUSSED FURTHER

Seismic Hazards

The City is not within an Alquist-Priolo Earthquake Fault Zone and would not be subject to hazards associated with significant fault surface rupture. However, the City could experience strong seismic ground shaking and seismic-related ground movement from earthquakes on active faults in the region and state. Impact 5.6.1 of the General Plan EIR evaluated the seismic hazards within the City. CBC standards, as implemented by the City through City of Elk Grove Municipal Code Section 16.04.010 would address seismic hazards. There are no aspects of the proposed Housing Element and Safety Element Update that would increase the potential for seismic activity, or the inherent risks associated with such activity. Therefore, no significant impact would occur and this issue is not discussed further.

Wastewater Disposal Systems

Effects on wastewater disposal systems were addressed in Impact 5.6.4 of the General Plan EIR that of septic or alternative wastewater treatment systems is anticipated to be minimal, and if such systems are used, they would be required to obtain a permit from Sacramento County in accordance with Chapter 6.32 of the Sacramento County Code. With implementation of proposed General Plan policies and existing regulations, implementation of the

General Plan would not result in conditions where soils would not be capable of adequately supporting the use of septic tanks or alternative wastewater disposal systems. All of the proposed housing sites identified in the Housing Element Update are expected to obtain public wastewater service and are located in the Sacramento Area Sewer District boundaries. Therefore, no significant impact would occur and this issue is not discussed further.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Impact 3.6-1: Result in Substantial Soil Erosion

The General Plan EIR determined that the potential for erosions resulting from future development activities would be mitigated to a less-than-significant level through implementation of City Municipal Code Chapter 16.44 and the requirements of NPDES Permit Number CA0082597 that provides standards for erosion control. Grading and excavation activities resulting from implementation of the Housing Element and Safety Element Update would be required to comply with these standards and would not result in a new or substantially more severe impact to soil erosion that was addressed in the General Plan EIR. Project impacts would be **less than significant**.

Construction of subsequent housing under the Housing Element Update and implementation of the Safety Element Update could require the demolition of structures, trenching, and grading and excavation. These construction activities would result in temporary disturbance of soil and would expose disturbed areas to storm events. Rain of sufficient intensity and duration could dislodge soil particles, generate runoff, and cause localized erosion and sedimentation. Soil disturbance during the summer months could result in loss of topsoil due to wind erosion and runoff from thunderstorm events. Erosion poses two hazards: (1) it removes soils, thereby undermining roads and buildings and producing unstable slopes, and (2) it deposits eroded soil in reservoirs, lakes, drainage structures, and on roads as mudslides. Natural erosion is frequently accelerated by human activities such as site preparation for construction and alteration of topographic features. These soil erosion impacts from construction activities were identified in Impact 5.6.2 of the General Plan EIR.

Project proponents must comply with the CBC and federal NPDES program, which would require implementation of BMPs that reduce the potential for erosion and loss of topsoil. Because implementation of the Project could result in construction that may disturb more than 1 acre of soil, construction would be subject to the Statewide Construction General NPDES Permit Number CA0082597. Coverage under this permit requires preparation and implementation of a SWPPP, as discussed in Section 3.9, "Hydrology and Water Quality." SWPPPs would be required to identify temporary BMPs to prevent the transport of earthen materials from construction sites during periods of precipitation or runoff, and temporary BMPs would be required to prevent wind erosion of earthen materials.

In addition, all construction from implementation of the Project would be required to comply with City Municipal Code Chapter 16.44, which requires submission of a grading plan that describes:

- ▶ the location of on-site and surrounding watercourses and wetlands, existing and proposed drainage systems, and drainage area boundaries and acreages;
- ▶ accurate contours at 2-foot intervals for slopes up to 10 percent;
- ▶ elevations, location, extent, and slope of all proposed grading and location of any disposal areas, fills, or other special features;
- ▶ description and volumes of excavation and fill work;
- ▶ delineation of the area to be cleared and grubbed; and
- ▶ the location, implementation schedule, and maintenance schedule of all erosion control measures and sediment control measures to be implemented or constructed before, during, or after the proposed activity.

Municipal Code Section 16.44.250 requires that if activity is ceased at the site for any reason for a period of 15 days or more, the site must be graded to blend with adjacent terrain and be stabilized to prevent erosion or sediment deposition (sedimentation). Before issuance of the construction permit, the applicant must also provide a security deposit in an

amount estimated to be the cost of stabilizing the site if the project is abandoned. The City permit conditions provide verification of compliance with the SWRCB NPDES permit conditions and an additional layer of oversight to ensure that the project would not result in excessive erosion or sedimentation. These requirements would also be applied to potential emergency access improvements that may occur from implementation of the Safety Element Update.

Although future construction activities from implementation of the Project would create ground disturbance, the potential for increased erosion would be addressed through compliance with the City and SWRCB erosion control requirements and permit conditions. There is no new significant effect and the impact is not more severe than the impact identified in the General Plan EIR. Thus, this impact would be **less than significant**.

Mitigation Measures

No additional mitigation is required beyond compliance with City Municipal Code Chapter 16.44 and the requirements of NPDES Permit Number CA0082597.

Impact 3.6-2: Locate Project Facilities on Expansive or Unstable Soils, Creating Substantial Risks to Life or Property

General Plan EIR Impact 5.6.3 determined that potential impacts from unstable soils on future development activities would be mitigated to a less-than-significant level through compliance with the CBC that is implemented by Chapter 16.04 of the Municipal Code through special design and construction methods. Implementation of the Housing Element and Safety Element Update would be required to comply with these standards and would not result in a new or substantially more severe soil stability impacts that was addressed in the General Plan EIR. Project impacts would be **less than significant**.

Expansive soils have high shrink/swell properties and expand when wet and shrink when dry. These soils have high clay content and can cause structural damage to foundations and roads that do not have proper structural engineering and are generally less suitable or desirable for development than non-expansive soils. Soil properties vary throughout the City of Elk Grove and should be evaluated to determine shrink/swell potential. The San Joaquin soil group, the main soil series in the City, has potential for expansion because of its high proportion of clay, especially at depths of 16 inches or greater. These soil erosion impacts from construction activities were identified in Impact 5.6.3 of the General Plan EIR.

Land subsidence is the gradual settling or sinking of an area with little horizontal motion. Although the closest areas of reported land subsidence are located west of Sacramento, the City of Elk Grove is located over a principal groundwater basin in a potential subsidence area, making groundwater pumping the City's largest potential cause for subsidence. The soils underlying the City are relatively dense/stiff and the upper 50 feet of soil are above the depth of groundwater; therefore, the potential for liquefaction in Elk Grove is considered low, as is the potential for ground lurching, differential settlement, or lateral spreading.

Implementation of the Housing Element and Safety Element Update would include the construction of residential structures to accommodate population growth and potential emergency access improvements within the Elk Grove area. Construction activities over expansive or unstable soils could result in substantial damage to structures and increased risk to site users. As noted above, the City has adopted the 2019 Edition of the CBC, Title 24, Part 2, Volumes 1 and 2 (City of Elk Grove Municipal Code Section 16.04.010). Pursuant to the CBC, future housing projects or projects involving emergency access improvements would be required to prepare geotechnical reports for the site. Based on conditions at the site, the geotechnical study would identify appropriate construction and structural design methods to reduce the potential for damage from unstable soil conditions that would be incorporated in the subsequent project design.

Compliance with the CBC and State and local policies and regulations would ensure appropriate design and proper foundation and excavation to minimize impacts related to expansive or unstable soils. There is no new significant effect and the impact is not more severe than the impact identified in the General Plan EIR. This impact would be **less than significant**.

Mitigation Measures

No additional mitigation is required beyond compliance with Municipal Code Chapter 16.04 which implements the CBC.

Impact 3.6-3: Loss of a Unique Paleontological Resource or Geologic Feature

General Plan EIR Impact 5.6.5 identified that implementation of the General Plan could result in impacts to paleontological resources and identified that implementation of Mitigation Measure 5.6.5 would reduce this impact to a less-than-significant level. All projects within the City would be subject to adopted General Plan Mitigation Measure 5.6.5. Grading and excavation activities resulting from implementation of the Housing Element and Safety Element Update would be required to comply with this mitigation measure and would not result in a new or substantially more severe impact to paleontological resources that what was addressed in the General Plan EIR. With implementation of adopted General Plan Mitigation Measure 5.6.5, the project would result in a **less-than-significant** impact to paleontological resources.

Earthmoving activities could occur in formation that are sensitive for paleontological resources. The City is located within the Riverbank and Laguna formations. The Laguna Formation is known to produce Pliocene fossils; as a result, this formation has a high sensitivity rating. The Riverbank Formation is Pleistocene in age; Pleistocene-age alluvial deposits are sedimentary in nature; sedimentary alluvial deposits frequently contain fossils. Because numerous vertebrate fossils have been recovered from the Riverbank Formation in northern and central California, including localities that are close to the City, this formation is considered to be paleontologically sensitive. This impact identified in Impact 5.6.5 of the General Plan EIR and the following mitigation measure was adopted to mitigate the impact to a less-than-significant level.

Adopted Mitigation Measure 5.6.5

Before the start of any earthmoving activities, the project owner shall retain a qualified scientist (e.g., geologist, biologist, paleontologist) to train all construction personnel involved with earthmoving activities, including the site superintendent, regarding the possibility of encountering fossils, the appearance and types of fossils likely to be seen during construction, and proper notification procedures should fossils be encountered. Training on paleontological resources shall also be provided to all other construction workers but may use videotape of the initial training and/or written materials rather than in-person training.

If any paleontological resources (fossils) are discovered during grading or construction activities within the project area, work shall be halted immediately within 50 feet of the discovery, and the City Planning Division shall be immediately notified. The project owner will retain a qualified paleontologist to evaluate the resource and prepare a recovery plan in accordance with Society of Vertebrate Paleontology guidelines (SVP 2010). The recovery plan may include but is not limited to a field survey, construction monitoring, sampling and data recovery procedures, museum storage coordination for any specimen recovered, and a report of findings. Recommendations in the recovery plan that are determined by the City to be necessary and feasible will be implemented by the applicant before construction activities resume in the area where the paleontological resources were discovered.

Excavation and grading activities associated with implementation of the Housing Element and Safety Element Update would be subject to adopted General Plan Mitigation Measure 5.6.5, which would reduce or avoid potential impacts to paleontological resources. This mitigation measure would be implemented through subsequent housing application submittals to the City for design review or projects involving emergency access improvements that include training and requirements on project improvement plans for the protection of discovered resources. There is no new significant effect and the impact is not more severe than the impact identified in the General Plan EIR. With implementation of adopted General Plan Mitigation Measure 5.6.5, the Housing Element and Safety Element Update would result in a **less-than-significant** impact to paleontological resources.

Mitigation Measures

No new mitigation is required beyond implementation of adopted General Plan EIR Mitigation Measure 5.6.5.

This page intentionally left blank.