3.5 Geology, Soils, and Paleontological Resources

This section addresses potential impacts of the proposed project on geology, soils, seismicity, and paleontological resources. The section describes existing local conditions, summarizes pertinent regulations, and analyzes the potential impacts of project construction and operation. Where appropriate, mitigation measures are provided to address potential impacts. The resource-specific study area for these impacts is defined as the project site and vicinity, including all areas of temporary and/or permanent ground disturbance.

Analyses in this section are based partly on the following prior geotechnical investigations that were performed within the project site boundary[1]:

- *Diridon Station – Project Spartan, Preliminary Geotechnical Assessment for Lots A, B, and C*[2]
- *Diridon Station – Project Spartan, Preliminary Geotechnical Exploration for Lot D*[3]
- *Proposed Mixed-Use Development, 138 Stockton Avenue, San Jose, California Geotechnical Investigation. October 2016*[4]
- *Geotechnical Engineering Investigation, Proposed Orchard Supply Hardware Store, 720 West San Carlos Street, San Jose, California*[5]

3.5.1 Environmental Setting

Geology and Soils

Regional and Local Geology

The project area lies within the geologically complex Coast Ranges Geomorphic Province[6] in the City of San José. The tectonics of the San Andreas Fault and other major faults in the western part of California have played a major role in the geologic history of the area, driven by the interaction of the Pacific and North American Tectonic Plates. The region is marked by northwest-trending elongated ranges and narrow valleys that roughly parallel the coast and the San Andreas Fault Zone. Geologic materials are mostly composed of marine sedimentary deposits, metamorphic rocks, and volcanic rocks.

The geotechnical reports by ENGEO and Moore Twining indicate that there is undocumented fill beneath the project site, ranging in depth from 1 foot to 30 feet. These reports indicate that the elevation at the project site ranges from 80 to 100 feet. Geologic mapping indicates that the

1 These four geotechnical reports were selected to represent the geological conditions throughout the entire project site. Each report represents the conditions at the northern, central, and southern portions of the project site.
2 ENGEO, *Diridon Station—Project Spartan, Preliminary Geotechnical Assessment for Lots A, B, and C*, 2018.
3 ENGEO, *Diridon Station—Project Spartan, Preliminary Geotechnical Exploration for Lot D*, 2018.
4 Silicon Valley Soil Engineering, *Proposed Mixed-Use Development, 138 Stockton Avenue, San Jose, California Geotechnical Investigation*, October 2016.
5 Moore Twining Associates Inc., *Geotechnical Engineering Investigation, Proposed Orchard Supply Hardware Store, 720 West San Carlos Street, San Jose, California*, 2013.
6 A geomorphic province is a regional area that possesses similar bedrock, structure, history, and age.

project site is underlain by Holocene-age[7] alluvium of four types, described in **Table 3.5-1**.[8] Additionally, while not mapped at the surface on the project site, older surficial sediments are mapped in the region and may be present at depth.

TABLE 3.5-1
GEOLOGIC UNITS IN THE STUDY AREA

Symbol	Unit Name	Epoch (Age, from youngest to oldest)	Description
Units Mapped Within the Project Site			
Qhb	Basin deposits	Holocene	Dark-colored clay and very fine silty clay, rich in organic material.
Qhl	Levee deposits	Holocene	Sandy and clayey silt ranging to sandy and silty clay, loose and moderately- to well-sorted.
Qht	Stream terrace deposits	Holocene	Unconsolidated sand, silt, and gravel, poorly to well-sorted.
Qhf2	Alluvial fan deposits (Older)	Holocene	Brown gravelly sand and sandy and clayey gravel; deposited by flood steams; includes terrace deposits; subdivided into younger and older deposits.
Units Mapped in Proximity to the Project Site			
Qhf1	Alluvial fan deposits (Younger)	Holocene	Morphologically distinct young fans that overlie larger Holocene or older deposits.
Qhfp	Floodplain deposits	Holocene	Gray, dense, sandy to silt clay; may locally contain lenses of silt and fine gravel.
Qpf	Alluvial fan deposits	Upper Pleistocene	Tan- to reddish-brown gravel. Clasts typically cobble-sized in clayey and sandy matrix; crudely bedded.
Qof	Older alluvial fan deposits	Middle to Upper Pleistocene	Tan- to reddish-brown gravely and clayey sand and clayey gravel.
QTi	Irvington gravels	Pleistocene	Poorly to well-consolidated, distinctly bedded conglomerate, gray conglomeratic sandstone, and gray, coarse-grained, cross-bedded sandstone. The gravels have yielded several Pleistocene vertebrate fossils.

SOURCE: U.S. Geological Survey, *Preliminary Geologic Map of the San José 30x60-Minute Quadrangle, California: A Digital Database*, compiled by C. Wentworth, M. Blake R. McLaughlin, and R. Graymer, Open-File Report 98-795, 1999. Map Scale 1:100000.

Faults and Seismicity

This section characterizes the region's existing faults, describes historical earthquakes, estimates the likelihood of future earthquakes, and describes probable ground shaking effects.

Earthquake Terminology and Concepts

Earthquake Mechanisms and Fault Activity

Faults are planar features within the earth's crust that have formed to release strain caused by the dynamic movements of the earth's major tectonic plates. An earthquake on a fault is produced when these strains overcome the inherent strength of the earth's crust, and the rock ruptures. The rupture causes seismic waves that propagate through the earth's crust, producing the ground-

[7] Holocene time is from the present to 11,700 years ago.
[8] U.S. Geological Survey, *Preliminary Geologic Map of the San José 30x60-Minute Quadrangle, California: A Digital Database*, compiled by C. Wentworth, M. Blake R. McLaughlin, and R. Graymer, Open-File Report 98-795, 1999. Map Scale 1:100000.

shaking effect known as an earthquake. The rupture also causes variable amounts of slip along the fault, which may or may not be visible at the earth's surface. Geologists commonly use the age of offset rocks as evidence of fault activity: The younger the displaced rocks, the more recently earthquakes have occurred. To evaluate the likelihood that a fault would produce an earthquake, geologists examine the magnitude and frequency of recorded earthquakes and evidence of past displacement along a fault.

The California Geological Survey (CGS) defines an active fault as one that has had surface displacement within Holocene time (within the last 11,700 years). A Quaternary fault is defined as a fault that has shown evidence of surface displacement during the Quaternary period (the last 2.6 million years), unless direct geologic evidence demonstrates inactivity for all of the Holocene or longer.

This definition does not mean that a fault lacking evidence of surface displacement is necessarily inactive. For the purpose of delineating fault rupture zones, CGS historically sought to zone faults defined as potentially active, meaning that they have shown evidence of surface displacement during the Quaternary period. In late 1975, the State Geologist made a policy decision to zone only those faults that had a relatively high potential for ground rupture, determining that a fault should be considered for zoning only if it was sufficiently active and "well defined."[9] Faults that are confined to pre-Quaternary rocks are considered inactive and incapable of generating an earthquake.

Earthquake Magnitude

When an earthquake occurs along a fault, its size can be determined by measuring the energy released during the event. A network of seismographs records the amplitude and frequency of the seismic waves that an earthquake generates. Richter magnitude was historically the primary measure of earthquake magnitude; however, seismologists now use Moment Magnitude (M_w) as the preferred way to express the size of an earthquake. The M_w scale is related to the physical characteristics of a fault, including the rigidity of the rock, the size of fault rupture, and the style of movement or displacement across the fault. Although the formulae of the scales are different, they both contain a similar continuum of magnitude values, except that M_w can reliably measure larger earthquakes and do so from greater distances. The M_w scale, like the Richter scale, is a logarithmic scale with a theoretical maximum value of M_w 10.0, although the largest recorded earthquake was M_w 9.5 in Chile in 1960.[10]

Faults

The magnitude and nature of fault rupture can vary for different faults or even along different strands of the same fault. Future faulting is generally expected along different segments of faults with recent activity.[11] Structures, transportation facilities, and utility systems crossing fault traces are at risk during a major earthquake due to ground rupture caused by differential lateral and vertical movement on opposite sides of the active fault trace. This region of California is

[9] A fault is well-defined if its trace is clearly detectable by a trained geologist as a physical feature at or just below the ground surface.
[10] U.S. Geological Survey, *20 Largest Earthquakes in the World*, 2012.
[11] California Geological Survey, *Guidelines for Evaluating and Mitigation Seismic Hazards*, CGS Special Publication 117A, 2008.

seismically active, but no active faults cross the project site (refer to **Figure 3.5-1**). **Table 3.5-2** lists the nearest active and potentially active faults.

TABLE 3.5-2
FAULTS NEAR THE STUDY AREA

Fault Name	Approximate Distance (miles) from Study Area and Direction (relative to study area)	Status
San José Fault	1.5 miles southwest	Quaternary—Potentially Active
Silver Creek Fault	1.5 miles east	Quaternary—Potentially Active
Hayward Fault Zone (Southeast Extension section)	5.0 miles east	Historic—Active (151 years since last event)
Monte Vista Fault	8.0 miles west	Holocene—Active
Calaveras Fault Zone (Central Calaveras section)	9.0 miles east	Historic—Active (35 years since last event)
San Andreas Fault Zone (Peninsula Section)	14.5 miles west	Historic—Active (113 years since last event)

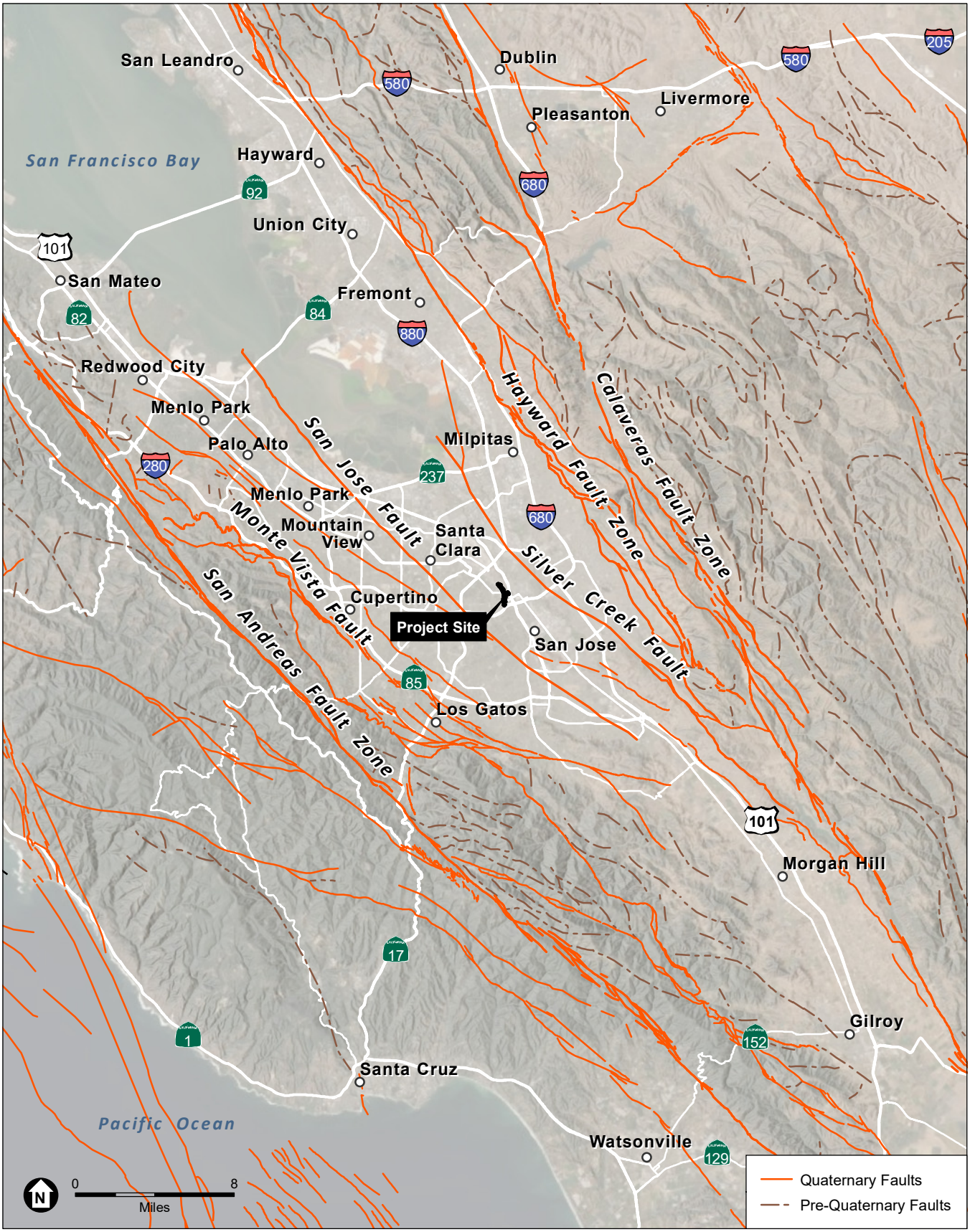
SOURCES:
California Geological Survey, Fault Activity Map of California interactive map, 2010. Available online at https://maps.conservation.ca.gov/cgs/fam/app/. Accessed September 25, 2019.
E.H. Field, G.P. Biasi, P. Bird, T.E. Dawson, K.R. Felzer, D.D. Jackson, K.M. Johnson, T.H. Jordan, C. Madden, A.J. Michael, K.R. Milner, M.T. Page, T. Parsons, P.M. Powers, B.E. Shaw, W.R. Thatcher, R.J. Weldon II, and Y. Zeng, Long-Term Time-Dependent Probabilities for the Third Uniform California Earthquake Rupture Forecast (UCERF3), *Bulletin of the Seismological Society of America* 105(2A):511–543, April 2015.

The closest active fault to the project site is the Southeast Extension section of the Hayward fault zone. This fault is located approximately 5 miles east of the project site, and has the potential to produce an earthquake with an estimated M_w of 7.5.[12] The Hayward, San Andreas, and Calaveras fault zones have been identified as Earthquake Fault Zones (Alquist-Priolo Zones) by CGS. Given the distances from the project site, any surface rupture of these faults would not affect the site.

Ground Shaking

The Working Group on California Earthquake Probabilities (WGCEP) is a collaboration between the U.S. Geological Survey (USGS), CGS, and the Southern California Earthquake Center. The WGCEP recently evaluated the probability of one or more earthquakes of M_w 6.7 or higher occurring in California over the next 30 years. The WGCEP estimated that the San Francisco Bay Area as a whole has a 72 percent chance of experiencing an earthquake of M_w 6.7 or higher over the next 30 years, with the Hayward and San Andreas Faults being the most likely to cause such an event.[13]

[12] California Geological Survey, Hayward Fault Fact Sheet, 2008.
[13] E.H. Field, G.P. Biasi, P. Bird, T.E. Dawson, K.R. Felzer, D.D. Jackson, K.M. Johnson, T.H. Jordan, C. Madden, A.J. Michael, K.R. Milner, M.T. Page, T. Parsons, P.M. Powers, B.E. Shaw, W.R. Thatcher, R.J. Weldon II, and Y. Zeng, Long-Term Time-Dependent Probabilities for the Third Uniform California Earthquake Rupture Forecast (UCERF3), *Bulletin of the Seismological Society of America* 105(2A):511–543, April 2015. doi: 10.1785/0120140093.



SOURCES: Esri, 2015; CGS, 2018; ESA, 2019

Downtown West Mixed-Use Plan

Figure 3.5-1
Regional Faults

The entire San Francisco Bay Area region, including the project site, could be subject to strong ground shaking during earthquakes. ShakeMap is a product of the USGS Earthquake Hazards Program; ShakeMap earthquake scenarios represent one realization of a potential future earthquake by assuming a particular magnitude and location.[14] According to the ShakeMaps that correspond with the earthquake planning scenario generated by USGS, if a large earthquake were to occur on any of the active faults in the region (the Hayward, Calaveras, and/or San Andreas Faults), the project site would be subjected to strong to very strong seismic ground shaking.[15,16,17]

Liquefaction and Lateral Spreading

Liquefaction is a phenomenon in which unconsolidated, water-saturated sediments become unstable as a result of the effects of strong seismic shaking. During an earthquake, these sediments can behave like a liquid, potentially causing severe damage to overlying structures.

Lateral spreading is a variety of minor landslide that occurs when unconsolidated liquefiable material breaks and spreads due to the effects of gravity, usually down gentle slopes. Liquefaction-induced lateral spreading is defined as the finite, lateral displacement of gently sloping ground as a result of pore-pressure buildup or liquefaction in a shallow underlying deposit during an earthquake. The occurrence of this phenomenon is dependent on many complex factors, including the intensity and duration of ground shaking, particle-size distribution, and density of the soil.

The potential damaging effects of liquefaction include differential settlement, loss of ground support for foundations, ground cracking, heaving and cracking of structure slabs due to sand boiling, and buckling of deep foundations due to ground settlement. Dynamic settlement (pronounced consolidation and settlement from seismic shaking) may also occur in loose, dry sands above the water table, resulting in settlement of and possible damage to overlying structures. In general, a relatively high potential for liquefaction exists in loose, sandy soils that are within 50 feet of the ground surface and are saturated (below the groundwater table). Lateral spreading can move blocks of soil, placing strain on buried pipelines that can lead to leaks or pipe failure.

According to geotechnical investigations performed throughout the project site, the site is underlain by sediments (i.e., loose, sandy material that is water saturated) that are susceptible to

[14] U.S. Geological Survey, Earthquake Hazards Program—ShakeMap and Earthquake Scenarios. Available at https://earthquake.usgs.gov/scenarios/. Accessed March 6, 2020.
[15] U.S. Geological Survey, Earthquake Planning Scenario (M 6.8 Scenario Earthquake—Hayward-Rodgers Creek; Hayward S.—ShakeMap, 2016. Scale unknown. Accessed September 30, 2019.
[16] U.S. Geological Survey, Earthquake Planning Scenario (M 6.4 Scenario Earthquake—Calaveras Central—ShakeMap, 2016. Scale unknown. Accessed September 30, 2019.
[17] U.S. Geological Survey, Earthquake Planning Scenario (M 7.2 Scenario Earthquake—N. San Andreas Peninsula—ShakeMap, 2016. Scale unknown. Accessed September 30, 2019.

liquefaction.[18,19,20,21] The Liquefaction Susceptibility Map published by USGS indicates that the project site is in an area susceptible to liquefaction as well.[22]

Subsidence

Subsidence is the gradual lowering of the land surface due to compaction of underlying materials. Subsidence can result from extraction of groundwater and oil, which can cause subsurface clay layers to compress and lower the overlying land surface. Subsidence occurs because the presence of water in the pore spaces in between grains helps to support the skeletal structure of the geologic unit. If the water is removed, the structure becomes weaker and can subside. Long-term, post-construction dewatering is not anticipated at the project site. Subsidence should be minimal and only occur during dewatering for construction.

Landslides

Landslides are one of the various types of downslope movements in which rock, soil, and other debris are displaced by the effects of gravity. The potential for material to detach and move down slope depends on a variety of factors including the type of material, water content, steepness of terrain, and more. The Landslide Inventory Map of the San José West Quadrangle by Weigers indicates that there are no active or historic landslides within the project site;[23] therefore, there is no landslide hazard.

Soils

Expansive Soils

Expansive soils are soils that possess a "shrink-swell" characteristic, also referred to as linear extensibility. Shrink-swell is the cyclic change in volume (expansion and contraction) that occurs in fine-grained clay sediments from the process of wetting and drying; the volume change is reported as a percent change for the whole soil. Changes in soil moisture can result from rainfall, landscape irrigation, utility leakage, roof drainage, or perched groundwater.[24] Expansive soils are typically very fine-grained and have a high to very high percentage of clay. Structural damage may occur incrementally over a long period of time, usually as a result of inadequate soil and foundation engineering or the placement of structures directly on expansive soils.

Linear extensibility is used to determine the shrink-swell potential of soils. If the linear extensibility is more than 3 percent, shrinking and swelling may cause damage to building, roads, and other

18 ENGEO, *Diridon Station—Project Spartan, Preliminary Geotechnical Assessment for Lots A, B, and C*, 2018.
19 ENGEO, *Diridon Station—Project Spartan, Preliminary Geotechnical Exploration for Lot D*, 2018.
20 Silicon Valley Soil Engineering, *Proposed Mixed-Use Development, 138 Stockton Avenue, San Jose, California Geotechnical Investigation*, October 2016.
21 Moore Twining Associates Inc., *Geotechnical Engineering Investigation, Proposed Orchard Supply Hardware Store, 720 West San Carlos Street, San Jose, California*, 2013.
22 U.S. Geological Survey, *Maps of Quaternary Deposits and Liquefaction Susceptibility in the Central San Francisco Bay Region, California—Liquefaction Susceptibility*, 2006. Scale 1:200,000.
23 M.O. Weigers, *Landslide Inventory Map of the San Jose West Quadrangle, Santa Clara County, California*, 2011. Scale 1:24,000.
24 Perched groundwater is a local saturated zone above the water table that typically exists above an impervious layer (such as clay) of limited extent.

structures.[25] According to the geotechnical investigations performed for several parcels within the project boundary, the soils underlying the project site are considered highly expansive.[26,27]

Paleontological Resources

Paleontological resources are the fossilized remains of plants and animals: vertebrates (animals with backbones; e.g., mammals, birds, fish), invertebrates (animals without backbones; e.g., starfish, clams, coral), and microscopic plants and animals (microfossils). Paleontological resources can include mineralized body parts, body impressions, or footprints and burrows. They are valuable, non-renewable, scientific resources used to document the existence of extinct life forms and to reconstruct the environments in which they lived.

Fossils can be used to determine the relative ages of the depositional layers in which they occur and of the geologic events that created those deposits. The age, abundance, and distribution of fossils depend on the geologic formation in which they occur and the topography of the area in which they are exposed. The geologic environments within which plants or animals became fossilized usually were quite different from the present environments in which the geologic formations exist.

The Society of Vertebrate Paleontology (SVP) established guidelines for the identification, assessment, and mitigation of adverse impacts on non-renewable paleontological resources.[28] Most practicing paleontologists in the United States adhere closely to the SVP's assessment, mitigation, and monitoring requirements as outlined in these guidelines, which were approved through a consensus of professional paleontologists. Many federal, state, county, and city agencies have either formally or informally adopted the SVP's standard guidelines for the mitigation of adverse construction-related impacts on paleontological resources.

The SVP has helped define the value of paleontological resources. In particular, the SVP indicates that geologic units of high paleontological potential are those from which vertebrate or significant invertebrate or plant fossils have been recovered in the past (i.e., are represented in institutional collections). Geologic units of low paleontological potential are those that are not known to have produced a substantial body of significant paleontological material. As such, the sensitivity of an area with respect to paleontological resources hinges on its geologic setting and whether significant fossils have been discovered in the area or in similar geologic units.

Paleontological sensitivity is defined as the potential for a geologic formation to produce scientifically important fossils. This is determined by the rock type, the past history of the geologic unit in producing significant fossils, and the fossil localities recorded from that unit.

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25 Natural Resources Conservation Service, *National Soil Survey Handbook*, 2018. Title 430-VI; Part 618, Soil Properties and Qualities; Subpart B, Exhibits; Section 618.80, Guides for Estimating Risk of Corrosion Potential for Uncoated Steel, p. 618-B.1.

26 ENGEO, *Diridon Station—Project Spartan, Preliminary Geotechnical Exploration for Lot D*, 2018.

27 Silicon Valley Soil Engineering, *Proposed Mixed-Use Development, 138 Stockton Avenue, San Jose, California Geotechnical Investigation*, October 2016.

28 Society of Vertebrate Paleontology, *Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources*, prepared by SVP Impact Mitigation Guidelines Revision Committee, 2010.

Paleontological sensitivity is derived from the known fossil data collected from the entire geologic unit, not just from a specific survey. In its *Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources*, the SVP[29] defines four categories of paleontological sensitivity for rock units, reflecting their potential for containing additional significant paleontological resources:

1. *High Potential:* Rock units from which vertebrate or significant invertebrate, plant, or trace fossils have been recovered;
2. *Low Potential:* Rock units that are poorly represented by fossil specimens in institutional collections, or that based on general scientific consensus only preserve fossils in rare circumstances, with the presence of fossils being the exception, not the rule;
3. *Undetermined Potential:* Rock units for which little information is available concerning their paleontological content, geologic age, and depositional environment; and
4. *No Potential:* Rock units such as high-grade metamorphic rocks (e.g., gneisses and schists) and plutonic igneous rocks (e.g., granites and diorites) that will not preserve fossil resources.

Previous Studies

As mentioned above, geologic mapping indicates that the surficial geology within the project site consists of four Holocene-age deposits (described below), with several other similar aged deposits in the surrounding area. Mapping also indicates Pleistocene-age deposits (also described below) in proximity to the project site. While not mapped at the surface, the Pleistocene-age deposits are present at depth. While in some cases Pleistocene deposits may be several feet beneath the surface, recent vertebrate fossil discoveries in the Guadalupe River (within one mile of the project site) indicate that Pleistocene-age deposits are close to the surface around the project area.[30]

In 2016, Kaitlin Maguire and Patricia Holroyd documented three new vertebrate fossil localities in Santa Clara County that have yielded several specimens, including mammoth, horse, sloth, and bison fossils.[31]

Holocene-Age Deposits Within the Project Site (Qhb, Qhl, Qht, Qhf2)

As presented in Table 3.5-1, these deposits date to the Holocene and generally consist of sand, silt, and clay.[32] These sediments are present across the project site. Generally, because of the age of these deposits, they have low paleontological sensitivity at the surface; however, these sediments increase in age—and in paleontological potential—with depth. Therefore, fossil

[29] Society of Vertebrate Paleontology, *Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources*, prepared by SVP Impact Mitigation Guidelines Revision Committee, 2010.
[30] K. Maguire and P. Holroyd, Pleistocene Vertebrates of Silicon Valley (Santa Clara County, California), *PaleoBios* 33, 2016.
[31] K. Maguire and P. Holroyd, Pleistocene Vertebrates of Silicon Valley (Santa Clara County, California), *PaleoBios* 33, 2016.
[32] U.S. Geological Survey, *Preliminary Geologic Map of the San José 30x60-Minute Quadrangle, California: A Digital Database*, compiled by C. Wentworth, M. Blake R. McLaughlin, and R. Graymer, Open-File Report 98-795, 1999. Map Scale 1:100000.

resources may be encountered in the deeper levels of this unit (i.e., depths that correspond to 5,000 radiocarbon years or older).

The depth at which the units transition from Holocene to Pleistocene[33] alluvium is approximately between 40 and 50 feet below ground surface;[34] however, fossils have been discovered in central California as shallow as 5 to 10 feet below ground surface.[35,36,37] Additionally, new Pleistocene-age vertebrate discoveries in Santa Clara County indicate that Pleistocene-age sediments are much closer to the surface than previously thought.[38] Alluvial sediments that date to the middle Holocene or beyond have a rich fossil history in California, very similar to that discussed for older alluvium below.

Holocene and Pleistocene Deposits Outside of the Project Site (Qhf1, Qhfp, Qpf, Qof, QTi)

Pleistocene alluvial sediments have a rich fossil history in central California.[39,40] The most common Pleistocene terrestrial mammal fossils include the bones of mammoth, bison, deer, and small mammals. Other taxa have been reported, including horse, lion, cheetah, wolf, camel, antelope, peccary, mastodon, capybara, and giant ground sloth,[41] as well as amphibians and reptiles such as frogs, salamanders, and snakes.[42] These deposits are similar to the Holocene deposits discussed above, but older, dating to the Pleistocene.[43] Older alluvium occurs at the surface outside of the project site; these sediments are present underlying the Holocene alluvium, at approximately 40 to 50 feet below ground surface in some places, and as close to the surface as approximately 10 feet near the Guadalupe River. Several vertebrate fossils have recently been uncovered from the Guadalupe River, downstream from the Norman Y. Mineta San José International Airport, specifically, mammoth, horse, and camel fossils.[44]

33 Pleistocene time is from 11,700 to 2.58 million years ago.
34 ENGEO, *Diridon Station—Project Spartan, Preliminary Geotechnical Exploration for Lot D*, 2017.
35 G.T. Jefferson, A Catalogue of Late Quaternary Vertebrates from California: Part One, Nonmarine Lower Vertebrate and Avian Taxa, *Natural History Museum of Los Angeles County Technical Reports* No. 5, 1991.
36 G.T. Jefferson, A Catalogue of Late Quaternary Vertebrates from California: Part Two, Mammals, *Natural History Museum of Los Angeles County Technical Reports* No. 7, 1991.
37 K. Maguire and P. Holroyd, Pleistocene Vertebrates of Silicon Valley (Santa Clara County, California), *PaleoBios* 33, 2016.
38 K. Maguire and P. Holroyd, Pleistocene Vertebrates of Silicon Valley (Santa Clara County, California), *PaleoBios* 33, 2016.
39 R.G. Dundas, F.J. Harmsen, and J. Wakabayashi, *Mammuthus and Camelops from Pleistocene Strata along the Caltrans State Route 180 West Project, Fresno, California*, Geological Society of America Annual Meeting, Portland, Paper No. 32–49, 2009.
40 M.M. Ngo, J.A. Canchola, and R.G. Dundas, Avifaunas of the Middle Pleistocene Irvingtonian and Fairmead Landfill Localities in California, *Geological Society of America Cordilleran Section Meeting* 45:10, 2013.
41 R.W. Graham and E.L. Lundelius, FAUNMAP: A Database Documenting the Late Quaternary Distributions of Mammal Species in the United States, *Illinois State Museum Scientific Papers* XXV (1).
42 D. Hudson and B. Brattstrom, A Small Herpetofauna from the Late Pleistocene of Newport Beach Mesa, Orange County, California, *Bulletin of the Southern California Academy of Sciences* 76:16–20, 1977.
43 U.S. Geological Survey, *Preliminary Geologic Map of the San José 30x60-Minute Quadrangle, California: A Digital Database*, compiled by C. Wentworth, M. Blake R. McLaughlin, and R. Graymer, Open-File Report 98-795, 1999. Map Scale 1:100000.
44 K. Maguire and P. Holroyd, Pleistocene Vertebrates of Silicon Valley (Santa Clara County, California), *PaleoBios* 33, 2016.

Known Resources and Sensitivity Assessment

The online collections database of the University of California Museum of Paleontology (UCMP) was searched for fossil localities from the geologic units mapped within the project site. Data provided through the UCMP's online database include taxonomic identification, locality number and name, age, and county, and sometimes geologic formation. Precise locality data are not provided; in some cases, however, the locality name can be used to further refine the general vicinity of the locality within the county. Holocene Alluvium has low-to-high paleontological potential, increasing with depth. The older Pleistocene-age deposits have a high potential as well.

Holocene-Age Alluvium Within the Project Site (Qhb, Qhl, Qht, Qhf2)

Generally, Holocene-age deposits have a low to high paleontological sensitivity, which increases with depth. Recent research by Maguire and Holroyd[45] indicates that the Holocene-age deposits found at the project site are closer to early Holocene in age, and would have a higher potential to yield significant fossils.

The UCMP database lists 10 invertebrate fossil specimens from 21 localities in Holocene-aged sediments in Santa Clara County.[46] Of the localities for which more precise location could be inferred from the locality name, several are located within 10 miles of the project site.

Holocene and Pleistocene Units Outside of the Project Site (Qhf1, Qhfp, Qpf, Qof, QTi)

While the Holocene deposits are mapped at the surface, the highly sensitive Pleistocene deposits are mapped in the surrounding area and are present at depth. The research from Maguire and Holroyd indicates that the Pleistocene-age deposits are much closer to the surface than originally thought, which increases the likelihood of fossil deposits close to the surface.

The UCMP database lists 12 vertebrate fossil specimens and two invertebrate fossil specimens from 14 localities in Pleistocene-aged sediments in Santa Clara County.[47] Of the localities for which more precise location could be inferred from the locality name, several are located within 10 miles of the project site.

3.5.2 Regulatory Framework

Federal

Clean Water Act

In 1972, the Clean Water Act (CWA) established the basic structure for regulating discharges of pollutants into the waters of the U.S. and gave the U.S. Environmental Protection Agency (EPA) the authority to implement pollution control programs. The CWA sets water quality standards for contaminants in surface waters. The statute employs a variety of regulatory and non-regulatory tools to reduce direct pollutant discharges into waterways, to finance municipal wastewater

45 K. Maguire and P. Holroyd, Pleistocene Vertebrates of Silicon Valley (Santa Clara County, California), *PaleoBios* 33, 2016.
46 University of California Museum of Paleontology (UCMP), UCMP fossil locality database, 2019.
47 University of California Museum of Paleontology (UCMP), UCMP fossil locality database, 2019.

treatment facilities, and to manage polluted runoff. EPA has delegated responsibility for implementation of portions of the CWA, including water quality control planning and programs, in California to the State Water Resources Control Board and the nine Regional Water Quality Control Boards (Regional Water Boards).

Section 402 of the CWA authorizes EPA to establish a nationwide surface water discharge permit program for municipal and industrial point sources known as the National Pollutant Discharge Elimination System (NPDES) program. Under Section 402, the Regional Water Board has set standard conditions for each permittee including construction requirements, as discussed further below in the *State* subsection.

Clean Water Act Section 404, which is administered by the U.S. Army Corps of Engineers (USACE), regulates the discharge of dredged and fill material into waters of the United States. USACE has established a series of nationwide permits that authorize certain activities in waters of the United States, provided that the proposed activity can demonstrate compliance with standard conditions. Normally, USACE requires an individual permit for an activity that would affect an area in excess of 0.3 acres of waters of the United States. Projects that result in impacts on less than 0.3 acres of waters of the United States can normally be conducted under one of the nationwide permits, if consistent with the standard permit conditions. Use of any nationwide permit is contingent on compliance with Section 7 of the federal Endangered Species Act (FESA).

More detailed information regarding the CWA is presented in Section 3.8, *Hydrology and Water Quality*.

State

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act (Alquist-Priolo Act) was enacted in 1972 to mitigate the hazard of surface faulting to structures for human occupancy. In accordance with the Alquist-Priolo Act, the State Geologist established regulatory zones, called "Earthquake Fault Zones," around the surface traces of active faults and published maps showing the earthquake fault zones. Within the fault zones, buildings for human occupancy cannot be constructed across the surface trace of active faults. Each earthquake fault zone extends approximately 200 to 500 feet on either side of the mapped fault trace because many active faults are complex and consist of more than one branch that may experience ground surface rupture. California Code of Regulations (CCR) Title 14, Section 3601(e) defines buildings intended for human occupancy as those that would be inhabited for more than 2,000 hours per year.

The project site is not mapped within an active earthquake fault zone under the Alquist-Priolo Special Studies Zone Act.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act was enacted in 1990 after the Loma Prieta earthquake to reduce threats to public health and safety and minimize property damage caused by earthquakes.

This act requires the State Geologist to delineate various seismic hazard zones, and cities, counties, and other local permitting agencies to regulate certain development projects within these zones. For projects that would locate structures for human occupancy within designated Zones of Required Investigation, the Seismic Hazards Mapping Act requires project applicants to perform a site-specific geotechnical investigation to identify the potential site-specific seismic hazards and corrective measures, as appropriate, before receiving building permits.[48] The *CGS Guidelines for Evaluating and Mitigating Seismic Hazards* (Special Publication 117A) provides guidance for evaluating and mitigating seismic hazards.[49] CGS is in the process of producing official maps based on USGS topographic quadrangles, as required by the Act.

California Building Code

The California Building Code (CBC), codified in CCR Title 24, Part 2, was promulgated to safeguard the public health, safety, and general welfare by establishing minimum standards for structural strength, means of egress to facilities (entering and exiting), and general stability of buildings. The purpose of the CBC is to regulate and control the design, construction, quality of materials, use/occupancy, location, and maintenance of all buildings and structures within its jurisdiction.

CCR Title 24 is administered by the California Building Standards Commission, which, by law, is responsible for coordinating all building standards. Under state law, all building standards must be centralized in Title 24 or they are not enforceable. The provisions of the CBC apply to the construction, alteration, movement, replacement, location, and demolition of every building or structure or any appurtenances connected or attached to such buildings or structures throughout California.

The 2019 edition of the CBC is based on the 2018 International Building Code published by the International Code Council, which replaced the Uniform Building Code. The code is updated triennially; the 2019 edition of the CBC was published by the California Building Standards Commission on July 1, 2019, and took effect starting January 1, 2020. The 2019 CBC contains California amendments based on the American Society of Civil Engineers (ASCE) Minimum Design Standard ASCE/SEI 7-16, *Minimum Design Loads for Buildings and Other Structures*. The CBC provides requirements for general structural design and includes means for determining earthquake loads, as well as other loads (such as wind loads), for inclusion in building codes.

CBC Chapter 18 covers the requirements of geotechnical investigations (Section 1803), excavation, grading, and fills (Section 1804), load bearing of soils (Section 1806) and foundations (Section 1808), shallow foundations (Section 1809), and deep foundations (Section 1810).

Requirements for geotechnical investigations are included in CBC Appendix J, Section J104, *Engineered Grading Requirements*. As outlined in Section J104, applications for a grading permit must be accompanied by plans, specifications, and supporting data consisting of a soils engineering report and engineering geology report. Additional requirements for subdivisions

[48] California Department of Conservation, *Seismic Hazards Mapping Act 1990, California Public Resources Code* Division 2, Geology, Mines, and Mapping, 2007.
[49] California Geological Survey, *Guidelines for Evaluating and Mitigation Seismic Hazards*, CGS Special Publication 117A, 2008.

requiring tentative and final maps and for other specified types of structures are in California Health and Safety Code Sections 17953–17955 and in 2019 CBC Section 1802. Samples from subsurface investigations, such as from borings or test pits, must undergo testing. Studies must be done as needed to evaluate slope stability, soil strength, position and adequacy of load-bearing soils, the effect of moisture variation on load-bearing capacity, compressibility, liquefaction, differential settlement, and expansiveness.

The design of the proposed project's buildings, structures, and infrastructure would be required to comply with CBC requirements, which would make the proposed project consistent with the CBC.

California Occupational Safety and Health Administration

Occupational safety standards exist in federal and state laws to minimize worker safety risks from both physical and chemical hazards in the workplace. In California, the California Division of Occupational Safety and Health (Cal/OSHA) and the federal Occupational Safety and Health Administration (OSHA) are the agencies responsible for ensuring worker safety in the workplace.

The OSHA Excavation and Trenching standard (Code of Federal Regulations Title 29, Section 1926.650) covers requirements for excavation and trenching operations, which are among the most hazardous construction activities. OSHA requires protecting all excavations in which employees could potentially be exposed to cave-ins, by sloping or benching the sides of the excavation, supporting the sides of the excavation, or placing a shield between the side of the excavation and the work area. Cal/OSHA is the implementing agency for both federal and state OSHA standards. All contractors must comply with OSHA regulations, which would make the proposed project consistent with OSHA.

National Pollutant Discharge Elimination System Construction General Permit

Construction for the proposed project would disturb more than one acre of land surface, potentially affecting the quality of stormwater discharges into waters of the United States. The project would therefore be subject to the National Pollutant Discharge Elimination System (NPDES) *General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities* (Order 2009-0009-DWQ, NPDES No. CAS000002, Construction General Permit; as amended by Orders 2010-0014-DWQ and 2012-006-DWQ).

The Construction General Permit regulates discharges of pollutants in stormwater associated with construction activity to waters of the United States from construction sites that disturb one or more acres of land surface, or that are part of a common plan of development or sale that disturbs more than one acre of land surface. The permit regulates stormwater discharges from construction or demolition activities, such as clearing and excavation; construction of buildings; and linear underground projects, including installation of water pipelines and other utility lines.

The Construction General Permit requires that construction sites be assigned a risk level of 1 (low), 2 (medium), or 3 (high), based both on the sediment transport risk at the site and the risk to receiving waters during periods of soil exposure (e.g., grading and site stabilization). The sediment risk level reflects the relative amount of sediment that could be discharged to receiving

water bodies, and is based on the nature of the construction activities and the location of the site relative to receiving water bodies. The receiving-waters risk level reflects the risk to receiving waters from the sediment discharge. Depending on the risk level, the construction projects could be subject to the following requirements:

- Effluent standards
- Good site management "housekeeping"
- Non-stormwater management
- Erosion and sediment controls
- Run-on and runoff controls
- Inspection, maintenance, and repair
- Monitoring and reporting requirements

The Construction General Permit requires the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP) that includes specific best management practices (BMPs) designed to prevent sediment and pollutants from coming into contact with stormwater and moving off-site into receiving waters. The BMPs fall into several categories, including erosion control, sediment control, waste management, and good housekeeping. They are intended to protect surface water quality by preventing eroded soil and construction-related pollutants from migrating off-site from the construction area. Routine inspection of all BMPs is required under the Construction General Permit. In addition, the SWPPP must contain a visual monitoring program, a chemical monitoring program for non-visible pollutants, and a sediment monitoring plan if the site discharges directly to a water body listed on the 303(d) list for sediment.

The SWPPP must be prepared before construction begins. The SWPPP must contain a site map(s) that delineates the construction work area, existing and proposed buildings, parcel boundaries, roadways, stormwater collection and discharge points, general topography both before and after construction, and drainage patterns across the project area. The SWPPP must list BMPs and the placement of those BMPs that the applicant would use to protect stormwater runoff.

Examples of typical construction BMPs include scheduling or limiting certain activities to dry periods, installing sediment barriers such as silt fence and fiber rolls, and maintaining equipment and vehicles used for construction. Non-stormwater management measures include installing specific discharge controls during certain activities, such as paving operations, and washing and fueling of vehicles and equipment. The Construction General Permit also sets post-construction standards (i.e., implementation of BMPs to reduce pollutants in stormwater discharges from the site after construction).

In the project area, the Construction General Permit is implemented and enforced by the San Francisco Bay Regional Water Quality Control Board, which administers the stormwater permitting program. Dischargers must electronically submit a notice of intent and permit registration documents to obtain coverage under this Construction General Permit. Dischargers are to notify the San Francisco Bay Regional Water Quality Control Board of violations or incidents of non-compliance, and submit annual reports identifying deficiencies in the BMPs and explaining how the deficiencies were corrected. The risk assessment and SWPPP must be prepared by a State Qualified SWPPP Developer, and implementation of the SWPPP must be overseen by a State Qualified SWPPP Practitioner. A legally responsible person, who is legally authorized to sign and certify permit registration documents, is responsible for obtaining coverage under the permit.

Public Resources Code Sections 5097.5 and 30244

California Public Resources Code (PRC) Sections 5097.5 and 30244 specify state requirements for paleontological resource management. These statutes prohibit the removal of any paleontological site or feature from public lands without permission of the jurisdictional agency, defining their removal as a misdemeanor. PRC Sections 5097.5 and 30244 require reasonable mitigation of adverse impacts on paleontological resources from developments on public (state, county, city, district) lands.

Local

The Diridon Station Area Plan (DSAP)

The Diridon Station Area Plan (DSAP) outlined specific measures that would be required for future projects constructed under the DSAP. The proposed project would implement the following standard measures during construction. In cases where impacts would remain significant after implementation of the standard measures, mitigation measures are recommended as necessary to reduce impacts to less-than-significant levels.

Standard Measures for Erosion Control

Projects under the DSAP would be required to implement the following standard measures during construction:

- Standard erosion control and grading BMPs will be implemented during construction to prevent substantial erosion from occurring during site development. The BMPs shall be included in all construction documents, and are listed below:
    a. Restrict grading to the dry season or meet City requirements for grading during the rainy season.
    b. Use effective, site-specific erosion and sediment control methods during the construction periods. Provide temporary cover of all disturbed surfaces to help control erosion during construction. Provide permanent cover as soon as is practical to stabilize the disturbed surfaces after construction has been completed.
    c. Cover soil, equipment, and supplies that could contribute non-visible pollution prior to rainfall events or perform monitoring of runoff with secure plastic sheeting or tarps.
    d. Implement regular maintenance activities such as sweeping driveways between the construction area and public streets. Clean sediments from streets, driveways, and paved areas on-site using dry sweeping methods. Designate a concrete truck washdown area.
    e. Dispose of all wastes properly and keep site clear of trash and litter. Clean up leaks, drips, and other spills immediately so that they do not contact stormwater.
    f. Place fiber rolls or silt fences around the perimeter of the site. Protect existing storm and sewer inlets in the project area from sedimentation with filter fabric and sand or gravel bags.
- Prior to issuance of a Public Works Clearance, the project applicant must obtain a grading permit before commencement of excavation and construction. In accordance with General Plan Policy EC-4.12, the project applicant may be required to submit a Grading

Plan and/or Erosion Control Plan for City review and approval, prior to issuance of a grading permit (Note: It its assumed that the project applicant will be required to submit Grading Plans and Erosion Control Plans).

- Projects over 1 acre in size would be required to prepare an SWPPP under the NPDES Construction General Permit and City Municipal Code, and to file a notice of intent.

Measures to Reduce and Avoid Impacts during Dewatering

Consistent with mitigation measures identified in the Strategy 2000 EIR,[50] future projects that involve dewatering will be required to implement the following:

- If dewatering is necessary during construction, a design-level geotechnical investigation shall be prepared to evaluate the underlying sediments and determine the potential for settlement to occur. If unacceptable settlements may occur, then alternative groundwater control systems shall be required.

Envision San José 2040 General Plan

The Envision San José 2040 General Plan (General Plan) contains goals and policies related to geologic and seismic hazards. The following policies are relevant to the proposed project:

Policy EC-3.1: Design all new or remodeled habitable structures in accordance with the most recent California Building Code and California Fire Code as amended locally and adopted by the City of San José, including provisions regarding lateral forces.

Policy EC-3.3: The City of San José Building Official shall require conformance with state law regarding seismically vulnerable unreinforced masonry structures within the city.

Policy EC-3.4: The City of San José will maintain up-to-date seismic hazard maps with assistance from the California Geological Survey (or other state agencies) under the Alquist-Priolo Earthquake Fault Zoning Act and the California Seismic Hazards Mapping Act.

Policy EC-3.10: Require that a Certificate of Geologic Hazard Clearance be issued by the Director of Public Works prior to issuance of grading and building permits within defined geologic hazards zones related to seismic hazards.

Policy EC-4.1: Design and build all new or remodeled habitable structures in accordance with the most recent California Building Code and municipal code requirements as amended and adopted by the City of San José, including provisions for expansive soil, and grading and storm water controls.

Policy EC-4.2: Approve development in areas subject to soils and geologic hazards, including un-engineered fill and weak soils and landslide-prone areas, only when the severity of hazards have been evaluated and if shown to be required, appropriate mitigation measures are provided. New development proposed within areas of geologic hazards shall not be endangered by, nor contribute to, the hazardous conditions on the site or on adjoining properties. The City of San José Geologist will review and approve geotechnical and geological investigation reports for projects within these areas as part of the project approval process.

[50] In 2005, the City of San José approved the San José Downtown Strategy 2000 Project ("Strategy 2000" and associated Program EIR ("Strategy EIR"). The Downtown Strategy was prepared to guide development and redevelopment in the greater downtown area. The DSAP tiers off of the Strategy 2000 EIR.

Policy EC-4.3: Locate new public improvements and utilities outside of areas with identified soils and/or geologic hazards (e.g., deep seated landslides in the Special Geologic Hazard Study Area and former landfills) to avoid extraordinary maintenance and operating expenses. Where the location of public improvements and utilities in such areas cannot be avoided, effective mitigation measures will be implemented.

Policy EC-4.4: Require all new development to conform to the City of San José's Geologic Hazard Ordinance.[51]

Policy EC-4.5: Ensure that any development activity that requires grading does not impact adjacent properties, local creeks and storm drainage systems by designing and building the site to drain properly and minimize erosion. An Erosion Control Plan is required for all private development projects that have a soil disturbance of one acre or more, are adjacent to a creek/river, and/or are located in hillside areas. Erosion Control Plans are also required for any grading occurring between October 15 and April 15.

Policy EC-4.6: Evaluate development proposed in areas with soils containing naturally occurring asbestos (i.e., serpentinite) that would require ground disturbance and/or development of new residential or other sensitive uses, for risks to people from airborne asbestos particles during construction and post-construction periods. Hazards shall be assessed, at minimum, using guidelines and regulations of the Bay Area Air Quality Management District and the California Air Resources Board.

Policy EC-4.7: Consistent with the San José Geologic Hazard Ordinance, prepare geotechnical and geological investigation reports for projects in areas of known concern to address the implications of irrigated landscaping to slope stability and to determine if hazards can be adequately mitigated.

Policy EC-4.10: Require a Certificate of Geologic Hazard Clearance to be issued by the Director of Public Works prior to issuance of grading and building permits within defined geologic hazard zones.

Policy EC-4.11: Require the preparation of geotechnical and geological investigation reports for projects within areas subject to soils and geologic hazards, and require review and implementation of mitigation measures as part of the project approval process.

Policy EC-4.12: Require review and approval of grading plans and erosion control plans (if applicable) prior to issuance of a grading permit by the Director of Public Works.

City of San José Geological Hazard Review

For development sites located within a City Geologic Hazard Zone or within the State of California Seismic Hazard Zone of Required Investigation for Earthquake Induced Landslides, a Geologic Hazard Clearance must be obtained from the Director of Public Works before any discretionary approval for development, including site development, special use, lot line adjustment, zoning approval, or grading or building permits. For development sites located within a State of California Seismic Hazard Zone of Required Investigation for Liquefaction, a Geologic Clearance approval must be obtained from the City Geologist prior issuance of a grading or

[51] See Chapter 17.10, *Geologic Hazard Regulations*, within the City of San José Code of Ordinances. Available at https://library.municode.com/ca/san_jose/codes/code_of_ordinances?nodeId=TIT17BUCO_CH17.10GEHARE.

building permit. Because the Project site is within City Geologic Hazard Zones for ground shaking and liquefaction, these geologic clearances would apply.

City of San José Grading Ordinance

All construction and/or demolition projects must comply with the City of San José's Grading Ordinance, which requires the use of erosion and sediment controls to protect water quality while the site is under construction. The ordinance applies to any project that would involve excavation, grading, or installation of on-site storm drainage or construction retaining walls within the City of San José. Before the issuance of a permit for grading activity slated to occur during the rainy season (October 15–April 15), an Erosion Control Plan must be submitted to the San José Department of Public Works detailing BMPs that would prevent the discharge of stormwater pollutants. The City of San José inspects construction sites regularly.

City of San José Municipal Code

San José Municipal Code Title 24 adopts the 2019 California Building, Plumbing, Mechanical, Electrical, Existing Building, and Historical Building Codes. The Building Codes include requirements for building foundations, walls, and seismic resistant design. Requirements for building safety and earthquake hazard reduction are also addressed in City Municipal Code Chapter 17.40, Dangerous Buildings, and Chapter 17.10, Geologic Hazards Regulations. Requirements for grading, excavation, and erosion control are included in Chapter 17.04 (Building Code, Part 6, Excavation and Grading). In accordance with the Municipal Code, the Director of Public Works must issue a Certificate of Geologic Hazard Clearance before the issuance of grading and building permits within defined geologic hazard zones.

San José Standard Conditions of Approval

The City's Standard Conditions of Approval (SCAs) relevant to the proposed project's geology, soils, and paleontological resources impacts are presented below. If the proposed project is approved by the City, all applicable SCAs would be adopted as conditions of approval; the project applicant would be required, as applicable, to implement the SCAs during project construction and operation to address impacts related to geology, soils, and paleontological resources. The SCAs are incorporated and required as part of the project, so they are not listed as mitigation measures.

> **SCA GE-1: Paleontological Resources.** If vertebrate fossils are discovered during construction, all work on the site shall stop immediately, the Director of Planning, Building and Code Enforcement (PBCE) or the Director's designee shall be notified, and a qualified professional paleontologist shall assess the nature and importance of the find and recommend appropriate treatment. Treatment may include, but is not limited to, preparation and recovery of fossil materials so that they can be housed in an appropriate museum or university collection and may also include preparation of a report for publication describing the finds. The project applicant shall be responsible for implementing the recommendations of the qualified paleontologist. A report of all findings shall be submitted to the Director of PBCE or the Director's designee.

3.5.3 Impacts and Mitigation Measures

Significance Criteria

Geology, Soils, and Paleontological Resources

For the purposes of this EIR, a geology and soils impact would be significant if implementation of the proposed project would:

(1) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:

   a. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42;

   b. Strong seismic ground shaking;

   c. Seismic-related ground failure, including liquefaction; or

   d. Landslides.

(2) Result in substantial soil erosion or the loss of topsoil;

(3) Be located 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- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse;

(4) Be located on expansive soil, as defined in California Building Code (2019) Section 1803.5.3, creating substantial direct or indirect risks to life or property;

(5) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater; or

(6) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.

Approach to Analysis

The analysis in this section is based on the conditions described in several different geotechnical investigations performed in various areas of the project site, and on a review of literature research (geologic, seismic, and soils reports and maps), information from geologic and seismic databases, and the General Plan.

The proposed project would be regulated by the various laws, regulations, and policies summarized in Section 3.5.2, *Regulatory Framework*. This analysis assumes compliance by the project with applicable federal, state, and local laws and regulations; state and local agencies would be expected to continue to enforce applicable requirements to the extent that they do so now. Note that compliance with many of the laws and regulations is a condition of permit approval.

For example, the geotechnical reports used for this analysis provide the preliminary geotechnical investigation results and recommendations to address the geotechnical conditions at the project

site. These results inform the ongoing project design and this EIR section. Upon completion of the CEQA documentation, any new development within the project site would be required by the CBC, and the City of San José Building Division (which adopted the 2019 CBC) and Grading Ordinance, to conduct a final geotechnical investigation that would inform the final project design and provide recommendations to address all identified geotechnical issues.

Criteria Requiring No Further Evaluation

Criteria listed above that are not applicable to actions associated with the proposed project are identified below, along with a supporting rationale as to why further consideration is unnecessary and a no-impact determination is appropriate.

1. ***Criterion 1(a): Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault.*** No Earthquake Fault Zones have been delineated on the project site by Alquist-Priolo Earthquake Fault Zoning Maps. Although active and potentially active faults are present in the project vicinity, none of these faults cross the project site. The proposed project would not directly or indirectly cause substantial adverse effects related to fault rupture. **No impact** would occur.
2. ***Criterion 1(d): Landslides.*** The Landslide Inventory Map for the San José West Quadrangle indicates that there are no active or historic landslides within the project site. Because of the project site's relatively flat topography, impacts related to landslides are not expected to affect any project components, nor would the proposed project directly or indirectly cause substantial adverse effects related to landslides, whether seismically induced or gravity-induced. Therefore, relative to landslides, **no impact** would occur.
3. ***Criterion 5: Have soils incapable of supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater.*** As described in Chapter 2, *Project Description*, Section 2.8.2, *Wastewater*, the proposed project would include the option of an on-site water reuse facility (wastewater treatment plant). A private sewage collection network would collect the wastewater and transport it to the facility. If the option is not exercised, then the proposed project would be connected to the existing city sanitary sewer system. The proposed project would not use septic tanks.

   The on-site wastewater treatment facility (if constructed) would rely on a treatment method that does not depend on adequate soils to function properly and, therefore, would not create an impact relative to the geology or soils at the project site. For this reason, the proposed project would not introduce an environmental or public health hazard by building septic tanks or other wastewater disposal systems in soils that are incapable of adequately supporting such systems. There would be **no impact** related to adequate soils for septic tanks or wastewater treatment.

Impact Analysis

Geology and Soils

Impact GE-1: The proposed project could directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking; or seismic-related ground failure, including liquefaction. ***(Less than Significant with Mitigation)***

Strong Seismic Ground Shaking

Strong seismic ground shaking could occur at the project site because there are active fault zones near the project. As discussed in the CBC subsection identified in Section 3.5.2, *Regulatory Framework*, each development that falls under the purview of the CBC would be required to prepare a final, design-level geotechnical investigation and accompanying report. The design-level geotechnical investigation would provide seismic design requirements consistent with the most updated version of the CBC. These seismic design requirements would be implemented during construction and would significantly reduce the damage to structures caused by strong seismic ground shaking.

Seismic-Related Ground Failure, including Liquefaction

According to the Liquefaction Susceptibility map published by USGS, the soils underlying the project site have moderate susceptibility to liquefaction. This finding is corroborated by the geotechnical investigations performed on the project site, which also indicate liquefaction susceptibility ranging from moderate to high.

As mentioned above, new development on the project site would be subject to the CBC and therefore would be required to prepare a final design-level geotechnical report. The final report will evaluate all identified geotechnical hazards, including liquefaction, and provide design recommendations to address the liquefaction risks. However, even with compliance with CBC requirements, the impact of the proposed project related to liquefaction would be **potentially significant**.

Implementing **Mitigation Measure GE-1, Seismic Damage and Seismic-Related Ground Failure, including Liquefaction**, would reduce impacts from seismic ground shaking and seismic-related ground failure. Mitigation Measure GE-1 would implement standard engineering and seismic safety design techniques and require the completion of building design and construction in accordance with the recommendations of an approved geotechnical investigation. The buildings would also need to meet the requirements of applicable Building and Fire Code sections as adopted or updated by the City. Therefore, the impact of the proposed project related to strong seismic ground shaking would be **less than significant with mitigation incorporated**.

Mitigation Measure

Mitigation Measure GE-1: Seismic Damage and Seismic-Related Ground Failure, including Liquefaction

Prior to the issuance of any grading or building permit for new building construction, the project applicant shall implement the following measures:

- To avoid or minimize potential damage from seismic shaking, use standard engineering and seismic safety design techniques for project construction. Complete building design and construction at the site in conformance with the recommendations of an approved geotechnical investigation. The geotechnical investigation report shall be reviewed and approved by the Director of the City of San José Department of Public Works as part of the building permit review and entitlement process. The buildings shall meet the requirements of applicable Building and Fire Codes as adopted or updated by the City. The project shall be designed to withstand soil hazards identified on the site, and designed to reduce the risk to life or property on-site and off-site to the extent feasible and in compliance with the Building Code.
- Construct the project in accordance with standard engineering practices in the California Building Code, as adopted by the City of San José. Obtain a grading permit from the Department of Public Works prior to the issuance of a Public Works Clearance. These standard practices will ensure that future buildings on the site are designed to properly account for soils-related hazards.

Significance after Mitigation: Less than Significant.

Impact GE-2: The proposed project would not result in substantial soil erosion or the loss of topsoil. ***(Less than Significant)***

The entire project site is fully developed and has been for many years. Consequently, there is no topsoil in the sense of valuable agricultural topsoil.

The proposed project would include ground-disturbing construction activities that could increase the risk of erosion or sediment transport. Total ground disturbance would be more than 1.0 acre. Construction would have the potential to result in soil erosion during excavation, grading, trenching, and soil stockpiling. Because construction activities would exceed 1.0 acre, the proposed project would be required to comply with the Construction General Permit, described in Section 3.5.2, *Regulatory Framework*, and discussed further in Section 3.8, *Hydrology and Water Quality*. This state requirement was developed to ensure that stormwater is managed and erosion is controlled on construction sites.

The Construction General Permit requires preparation and implementation of a SWPPP, which requires applying BMPs to control run-on and runoff from construction work sites. The BMPs would include but not be limited to physical barriers to prevent erosion and sedimentation; construction of sedimentation basins; limitations on work periods during storm events; use of infiltration swales; protection of stockpiled materials; and a variety of other measures that would substantially reduce or prevent erosion from occurring during construction.

Through compliance with these independently enforceable existing requirements, the potential impacts of the proposed project associated with soil erosion and loss of topsoil during construction would be **less than significant**.

Mitigation: None required.

Impact GE-3: The proposed project would not be located 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- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse. ***(Less than Significant with Mitigation)***

As discussed in above for Criterion 1(d), the project site is not in an area susceptible to landslides. Subsidence and collapse are typically caused by the withdrawal of groundwater or crude oil. The project would include a negligible amount of groundwater withdrawal and would not include oil extraction.

Dewatering would likely be required during construction for the subsurface parking, as the groundwater level is known to be above 25 feet below ground surface. However, as discussed in Section 3.7, *Hazards and Hazardous Materials*, a dewatering control and disposal plan will be required as part of the Soil and Groundwater Management Plan. The dewatering control and disposal plan would include procedures to control the rate and effect of the dewatering to avoid any possible subsidence.

Liquefaction and lateral spreading are more commonly triggered by a seismic event but can occur without a seismic event. In either case, as discussed above in Impact GE-1, activities associated with the project are not expected to exacerbate this condition. Any new development on the project site would be required to adhere to the most current version of the CBC, which would require that a design-level geotechnical report be prepared and incorporated into the project design. Should the project not account for unstable soils, this would be a potentially significant impact. Implementation of **Mitigation Measure GE-3, Geotechnical Report**, would reduce this impact. The geotechnical report would specifically include recommendations and design requirements to address any unstable soils identified on the project site. The impacts of the proposed project related to unstable soils and their associated hazards would be **less than significant with mitigation incorporated**.

Mitigation Measure

Mitigation Measure GE-3: Geotechnical Report

Prior to or coincident with the submittal of grading and drainage plans for each proposed building or other improvements, the project applicant for the improvements in question shall submit to the City of San José Director of Public Works or his/her designee for review and approval, in accordance with the California Building Code, a geotechnical report for the site under consideration. The applicant for the improvements in question shall comply with the recommendations of the geotechnical report, as approved by the Director of Public Works or his/her designee.

Significance after Mitigation: Less than significant.

Impact GE-4: The proposed project would not be located on expansive soil, as defined in Section 1803.5.3 of the California Building Code (2019), that would create substantial direct or indirect risks to life or property. ***(Less than Significant)***

According to the geotechnical investigations performed for several parcels on the project site, the soils underlying the site are considered highly expansive. If the expansive soils are not addressed, the impacts to life or property associated with expansive soils could be adverse.

As discussed in Section 3.5.2, *Regulatory Framework*, and in Impact GE-1, each new development on the project site would be required to adhere to the most current version of the CBC, which would require that a final, design-level geotechnical report be performed. The CBC requires that the evaluation of expansive soils be incorporated into geotechnical reports for sites with soils known to have expansive properties. For sites with known expansive soils, geotechnical reports provide specific requirements for replacing expansive soils with engineered fill to change the properties of the soils and reduce the risk of expansion.

With adherence to the recommendation provided in the design-level geotechnical investigation, the impact of the proposed project related to expansive soils would be **less than significant**.

Mitigation: None required.

Paleontological Resources

Impact GE-5: The proposed project could directly or indirectly destroy a unique paleontological resource or site or unique geologic feature. ***(Less than Significant with Mitigation)***

Several Holocene-age alluvial deposits are mapped at the surface within the project site. Generally, Holocene-age deposits have low to high paleontological sensitivity, increasing with depth (and therefore also increasing in age). As described in Section 3.5.1, *Environmental Setting*, it is expected that the highly sensitive, early Holocene-age deposits are close to the surface and could be impacted by proposed project construction activities. Also described above, highly sensitive, Pleistocene-age deposits are mapped in the area. These sensitive units are also expected to be close to the surface and could be impacted by proposed project activities.

The loss of a unique paleontological resource or site that could yield information important to prehistory, or that embodies the distinctive characteristics of a type of organism, environment, period of time, or geographic region, would be a significant environmental impact. Direct impacts on paleontological resources primarily concern the potential destruction of nonrenewable paleontological resources and the loss of information associated with these resources. This includes the unauthorized collection of fossil remains. If potentially fossiliferous bedrock or surficial sediments are disturbed, the disturbance could result in the destruction of paleontological resources and subsequent loss of information.

For project sites that are underlain by paleontologically sensitive geologic units, the greater the amount of ground disturbance, the higher the potential for significant impacts on paleontological

resources. Project-related ground disturbance within this formation would result in a significant impact on the paleontological resources in the area if it were to destroy unique paleontological resources. Given the high potential for the presence of such resources, it is assumed that excavation and grading that exceed 2 feet in depth in areas of previously undisturbed sediments would have a high likelihood of destroying paleontological resources.

Fossils have been discovered as shallow as 5 to 10 feet in Holocene-age alluvium, and throughout Pleistocene-age alluvium. Should paleontological resources be encountered during ground-disturbing activities, this would be a **potentially significant** impact. To reduce impacts on paleontological resources, implementation of **SCA GE-1, Paleontological Resources**, and **Mitigation Measures GE-5a, Project Paleontologist**, through **GE-5d, Significant Fossil Treatment**, would be required.

Implementation of SCA GE-1 and Mitigation Measures GE-5a through GE-5d would reduce the potential for significant impacts on paleontological resources by providing paleontological resources sensitivity training for construction workers; implementing a monitoring and mitigation plan to ensure preservation of any paleontological resources encountered during construction; and salvaging and preparing significant fossil finds for curation. Because development of the proposed project with implementation of SCA GE-1 and Mitigation Measures GE-5a through GE-5d would not adversely affect paleontological resources, this impact would be **less than significant with mitigation incorporated**.

Mitigation Measures

Mitigation Measure GE-5a: Project Paleontologist

The project applicant for specific construction work proposed shall retain a qualified professional paleontologist (qualified paleontologist) meeting the Society of Vertebrate Paleontology standards as set forth in the "Definitions" section of Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources (2010) prior to the approval of demolition or grading permits. The qualified paleontologist shall attend the project kickoff meeting and project progress meetings on a regular basis, shall report to the site in the event potential paleontological resources are encountered, and shall implement the duties outlined in Mitigation Measures GE-5b through GE-5d. Documentation of a paleontologist attending the project kickoff meeting and project progress meetings shall be submitted to the Director of the City of San José Department of Planning, Building, and Code Enforcement, or the Director's designee.

Mitigation Measure GE-5b: Worker Training

Prior to the start of any ground-disturbing activity (including vegetation removal, grading, etc.), the qualified paleontologist shall prepare paleontological resources sensitivity training materials for use during the project-wide Worker Environmental Awareness Training (or equivalent). The paleontological resources sensitivity training shall be conducted by a qualified environmental trainer (often the Lead Environmental Inspector or equivalent position, like the qualified paleontologist). In the event construction crews are phased, additional trainings shall be conducted for new construction personnel. The training session shall focus on the recognition of the types of paleontological resources that could be encountered within the project site and the procedures to be followed if they are found, as

outlined in the approved Paleontological Resources Monitoring and Mitigation Plan in Mitigation Measure GE-5c. The project applicant for specific construction work proposed and/or its contractor shall retain documentation demonstrating that all construction personnel attended the training prior to the start of work on the site, and shall provide the documentation to the Director of the City of San José Department of Planning, Building, and Code Enforcement, or the Director's designee.

Mitigation Measure GE-5c: Paleontological Monitoring

The qualified paleontologist shall prepare, and the project applicant for specific construction work proposed and/or its contractors shall implement, a Paleontological Resources Monitoring and Mitigation Plan (PRMMP). The project applicant shall submit the plan to the Director of the City of San José Department of Planning, Building and Code Enforcement, or the Director's designee, for review and approval at least 30 days prior to the start of construction. This plan shall address the specifics of monitoring and mitigation and comply with the recommendations of the Society of Vertebrate Paleontology (SVP) (2010), as follows.

1. The qualified paleontologist shall identify, and the project applicant or its contractor(s) shall retain, qualified paleontological resource monitors (qualified monitors) meeting the SVP standards (2010).
2. The qualified paleontologist and/or the qualified monitors under the direction of the qualified paleontologist shall conduct full-time paleontological resources monitoring for all ground-disturbing activities in previously undisturbed sediments in the project site that have high paleontological sensitivity. This includes any excavation that exceeds 2 feet in depth in previously undisturbed areas. The PRMMP shall clearly map these portions of the proposed project based on final design provided by the project applicant and/or its contractor(s).
3. If many pieces of heavy equipment are in use simultaneously but at diverse locations, each location shall be individually monitored.
4. Monitors shall have the authority to temporarily halt or divert work away from exposed fossils in order to evaluate and recover the fossil specimens, establishing a 50-foot buffer.
5. If construction or other project personnel discover any potential fossils during construction, regardless of the depth of work or location and regardless of whether the site is being monitored, work at the discovery location shall cease in a 50-foot radius of the discovery until the qualified paleontologist has assessed the discovery and made recommendations as to the appropriate treatment.
6. The qualified paleontologist shall determine the significance of any fossils discovered, and shall determine the appropriate treatment for significant fossils in accordance with the SVP standards. The qualified paleontologist shall inform the project applicant of these determinations as soon as practicable. See Mitigation Measure GE-5d regarding significant fossil treatment.
7. Monitors shall prepare daily logs detailing the types of activities and soils observed, and any discoveries. The qualified paleontologist shall prepare a final monitoring and mitigation report to document the results of the monitoring effort and any curation of fossils. The project applicant shall provide the daily logs to the Director of the City of San José Department of Planning, Building, and Code Enforcement, or the Director's designee, upon request, and shall provide the final

report to the Director of the City of San José Department of Planning, Building, and Code Enforcement, or the Director's designee, upon completion.

Mitigation Measure GE-5d: Significant Fossil Treatment

If any find is deemed significant, as defined in the Society of Vertebrate Paleontology (SVP) (2010) standards and following the process outlined in Mitigation Measure GE-5c, the qualified paleontologist shall salvage and prepare the fossil for permanent curation with a certified repository with retrievable storage following the SVP standards, and plans for permanent curation shall be submitted to the Director of the City of San José Department of Planning, Building, and Code Enforcement, or the Director's designee.

Significance after Mitigation: Less than significant.

Cumulative Impacts

This section presents an analysis of the cumulative effects of the proposed project in combination with other past, present, and reasonably foreseeable future projects. The geographic scope of analysis for cumulative geologic impacts encompasses and is limited to the project site and its immediately adjacent area. This is because impacts relative to geologic hazards are generally site-specific. For example, the effect of erosion would tend to be limited to the localized area of a project and could only be cumulative if erosion were to occur as the result of two or more adjacent projects that spatially overlapped. Cumulative projects considered in this analysis (past, approved, pending, under construction) are identified in Chapter 3, Figure 3-1.

The time frame during which the proposed project could contribute to cumulative geologic hazards includes the construction and operations phases. For the proposed project, the operational phase is permanent. However, similar to the geographic limitations discussed above, it should be noted that impacts related to geologic hazards are generally time-specific. Geologic hazards could only be cumulative if two or more geologic hazards were to occur at the same time, and overlap at the same location.

Therefore, as discussed above in *Approach to Analysis* in Section 3.5.3, *Impacts and Mitigation Measures*, the proposed project would have no cumulative impact with respect to fault rupture, landslides, loss of topsoil, or the use of septic tanks or alternative waste disposal systems, and they are not discussed further below.

As discussed in Chapter 3, *Environmental Setting, Impacts, and Mitigation*, under Cumulative Impacts, the Santa Clara Valley Transportation Authority (VTA) BART Silicon Valley Phase II Project is a six-mile extension to the BART train service from Berryessa/North San José through Downtown San José to the City of Santa Clara and will be located adjacent to the south side of West Santa Clara Street, between Autumn Street and the San José Diridon Caltrain Station. This station would consist of a below-ground concourse and boarding platform. Construction is anticipated for 2022 through 2028. This project could potentially contribute cumulatively should the timing of projects coincide.

Impact C-GE-1: The proposed project, in combination with past, present, and reasonably foreseeable future projects, could result in significant cumulative impacts related to geology, soils, or paleontology. *(Less than Significant with Mitigation)*

Geology and Soils

As discussed in Section 3.5.2, *Regulatory Framework*, the NPDES Construction General Permit would require each project involving disturbance of one acre or more of land to prepare and implement a SWPPP. The SWPPP would describe BMPs to control runoff and prevent erosion for each such project. Compliance with this requirement would reduce the potential for erosion impacts.

The Construction General Permit has been developed to address cumulative conditions arising from construction throughout the state, and is intended to maintain cumulative effects of projects subject to this requirement below levels that would be considered significant. For example, two adjacent construction sites would be required to implement BMPs to reduce and control the release of sediment and/or other pollutants in any runoff leaving their respective sites. The runoff water from both sites would be required to achieve the same action levels, measured as a maximum amount of sediment or pollutant allowed per unit volume of runoff water. Thus, even if the runoff waters were to combine after leaving the sites, the sediments and/or pollutants in the combined runoff would still be at concentrations (amount of sediment or pollutants per volume of runoff water) below action levels and would not combine to be cumulatively significant. Therefore, the proposed project would have a **less-than-significant** cumulative impact with respect to soil erosion.

Seismically induced ground shaking, liquefaction and lateral spreading, and expansive or corrosive soils could cause structural damage or pipeline leaks or ruptures during the construction and operational phases. However, state and local building regulations and standards have been established to address and reduce the potential for such impacts. The proposed project and cumulative projects would be required to comply with applicable provisions of these laws and regulations.

Compliance with these requirements would reduce the potential for impacts. The purpose of the CBC (and local ordinances) is to regulate and control the design, construction, quality of materials, use/occupancy, location, and maintenance of all buildings and structures within its jurisdiction. By design, it is intended to reduce the cumulative risks from buildings and structures. Based on compliance with these requirements, the incremental impacts of the project combined with impacts of other projects in the area **would not combine to cause a significant cumulative impact** related to seismically induced ground shaking, liquefaction and lateral spreading, or expansive soils.

Paleontological Resources

As described under Impact GE-5, the potential exists for deeper excavations to affect unique paleontological resources or sites. The surficial sediments of the project area are unlikely to have preserved fossils; however, there is a potential for increased sensitivity with depth.

The VTA BART Silicon Valley Phase II Project, mentioned above, includes ground disturbance and could result in similar impacts on paleontological resources. The incremental impact of the

proposed project, combined with those of the cumulative projects, could result in a cumulative impact on paleontological resources. However, implementation of SCA GE-1 and Mitigation Measures GE-5a through GE-5d (described above) would ensure that the proposed project's contribution toward cumulative effects on paleontological resources would not be cumulatively considerable, and the impact would be **less than significant with mitigation incorporated**.

Mitigation Measures

Mitigation Measure GE-5a, Project Paleontologist (refer to Impact GE-5)

Mitigation Measure GE-5b, Worker Training (refer to Impact GE-5)

Mitigation Measure GE-5c, Paleontological Monitoring (refer to Impact GE-5)

Mitigation Measure GE-5d, Significant Fossil Treatment (refer to Impact GE-5)

Significance after Mitigation: Less than significant.