4.6 Geology, Paleontological Resources, and Mineral Resources

4.6.1 Introduction

This section evaluates the potential for the proposed project, which includes the Housing Element Update (HEU), the Stanford Community Plan (SCP) update, and related rezonings (collectively, the "project") to result in substantial adverse effects related to geology, paleontological resources, and mineral resources. Below, the Environmental Setting portion of this section includes descriptions of existing conditions relevant to geology, paleontological resources, and mineral resources. Further below, existing plans and policies relevant to geology, paleontological resources, and mineral resources associated with implementation of the project are provided in the Regulatory Setting section. Finally, the impact discussion evaluates potential impacts to geology, paleontological resources, and mineral resources that could result from implementation of the project in the context of existing conditions.

Notice of Preparation Comments

A Notice of Preparation (NOP) for the Draft EIR was circulated on August 8, 2022, and a scoping meeting was held on August 23, 2022. A revised NOP reflecting changes to the HEU's list of opportunity sites was circulated on March 21, 2023. Both NOPs circulated for a period of 30 days, and the NOPs and the comments received during their respective comment periods can be found in **Appendix A** of this EIR. No comments relating to geology, paleontological resources, and mineral resources were received during the NOP comment period.

Information Sources

The primary sources of information referenced in this section included those listed below. Please note that a full list of references for this topic can be found at the end of this section.

- Santa Clara County General Plan (1994).
- Stanford University Community Plan (2000).

4.6.2 Environmental Setting

Regional Geology

The HEU lies within the geologically complex Coast Ranges Geomorphic Province[1]. 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.

[1] A geomorphic province is a regional area that possesses similar bedrock, structure, history, and age.

Local Geology

Geologic mapping by D.L. Wagner, E.J. Bortugno, and R.D. McJunkin (Wagner, Bortugno, & McJunkin) indicates that the housing opportunity sites are underlain by Holocene-age alluvium and Pleistocene-age alluvium (Wagner, Bortugno, & McJunkin, 1991). Alluvium consists of a variable mixture of sand, gravel, silt, and clay.

Geologic Hazards

Faulting

Surface Fault Rupture

The State Alquist-Priolo Earthquake Fault Zoning Act (Alquist-Priolo Act) prohibits the development of structures for human occupancy across active fault traces. Under this Act, the California Geological Survey (CGS) has established "Zones of Required Investigation" on either side of an active fault that delimits areas susceptible to surface fault rupture. The zones are referred to as Earthquake Fault Zones (EFZs) and are shown on official maps published by the CGS. In addition, the County of Santa Clara has delineated additional fault rupture zones (County of Santa Clara, 2022). Surface rupture occurs when the ground surface is broken due to fault movement during an earthquake; typically, these types of hazards occur within 50 feet of an active fault.

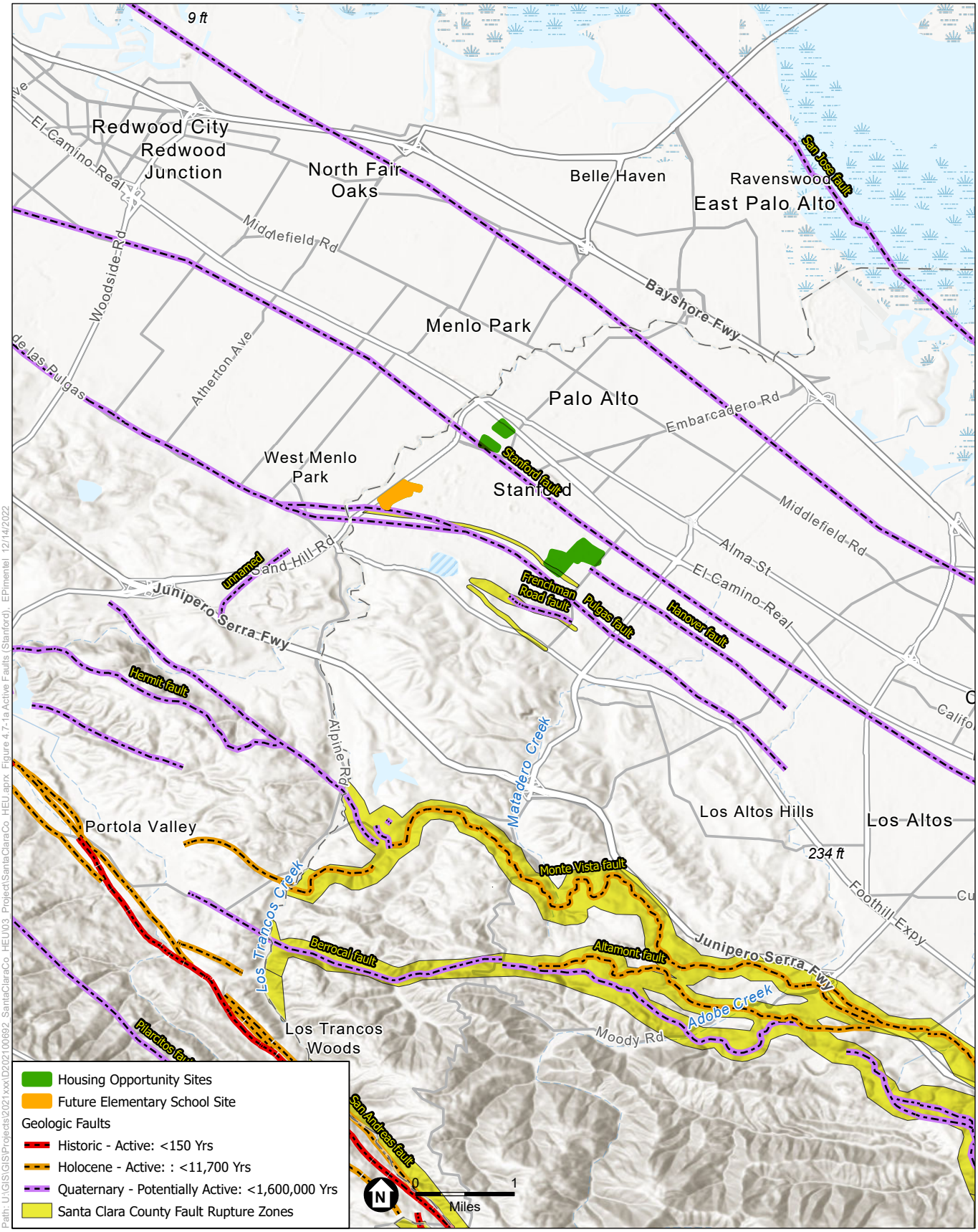
Figure 4.6-1a through **Figure 4.6-1c** depict the established EFZs, County of Santa Clara fault rupture zones, and other potentially active faults in proximity to the housing opportunity sites. All of the housing opportunity sites, except for one of the Alum Rock housing opportunity sites (see Figure 4.6-1b), are outside of established EFZs; one of the Alum Rock sites is within an established EFZ and a County of Santa Clara fault rupture zone due to its proximity to the Evergreen fault, which is part of the Hayward fault zone (see Figure 4.6-1b). In addition, one of the Stanford sites is within a designated County of Santa Clara fault rupture zone (see Figure 4.6-1a).

Seismic Ground Shaking

Ground shaking occurs due to a seismic event and can cause extensive damage to life and property and may affect areas hundreds of miles away from the earthquake's epicenter. The extent of the damage varies by event and is determined by several factors, including (but not limited to) magnitude and depth of the earthquake, distance from epicenter, duration and intensity of the shaking, underlying soil and rock types, and integrity of structures.

The entire San Francisco Bay Area, including the housing opportunity sites, could be subject to strong groundshaking during earthquakes. The 2014 Working Group on California Earthquake Probabilities (WGCEP)[2] concluded that there is a 72 percent probability that a magnitude (M_W) 6.7 earthquake or higher could occur in the San Francisco Bay Area before the year 2045 (Field et al., 2015).

[2] Also referred to as WGCEP 2014, this is a working group comprised of seismologists from the U.S. Geological Survey (USGS), California Geological Survey (CGS), Southern California Earthquake Center (SCEC), and California Earthquake Authority (CEA).



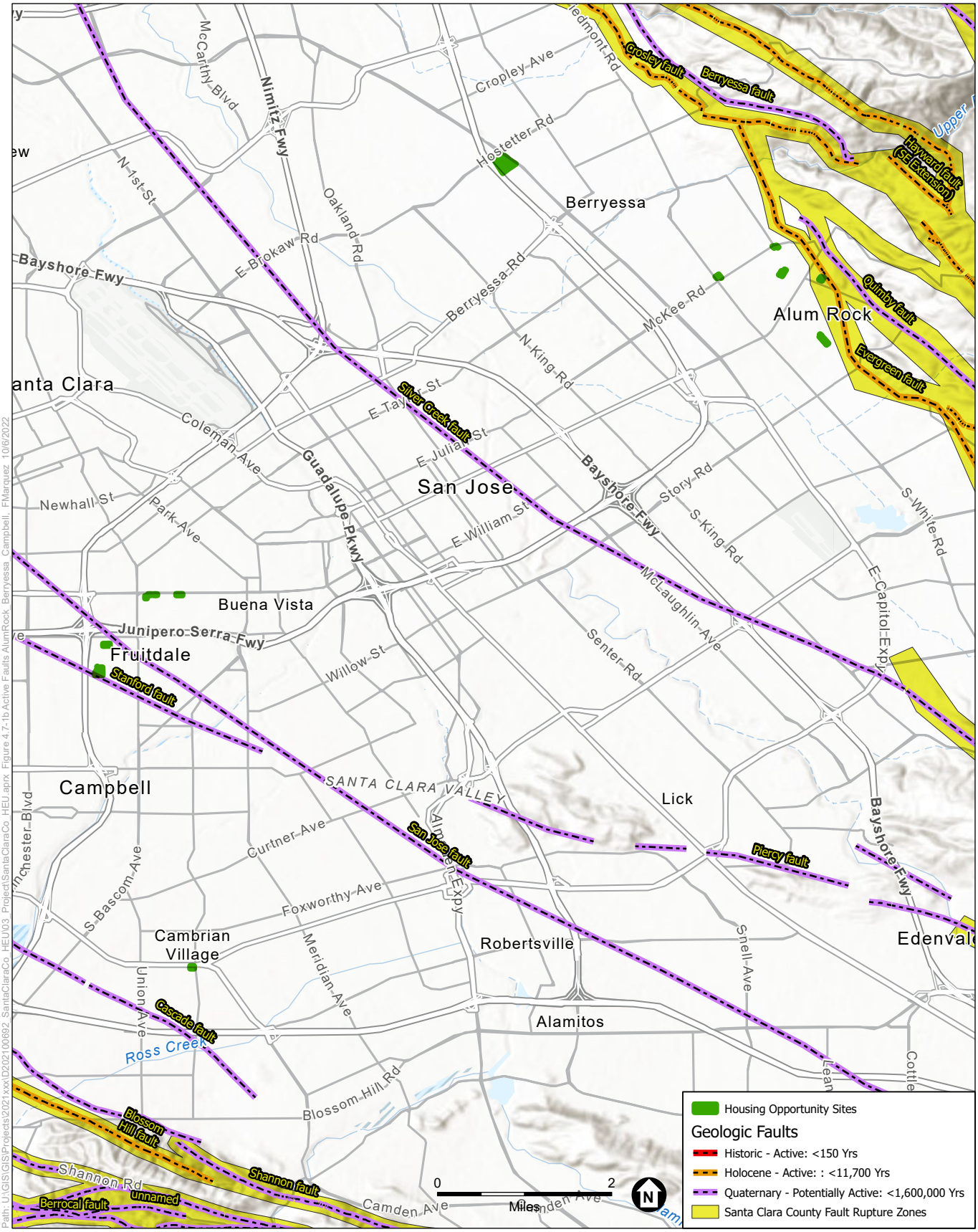
SOURCE: County of Santa Clara, 2022;

Esri, 2022; ESA, 2022; CGS, 2010

Santa Clara County Housing Element and Stanford Community Plan Update

Figure 4.6-1a
Active Faults
Stanford

ESA



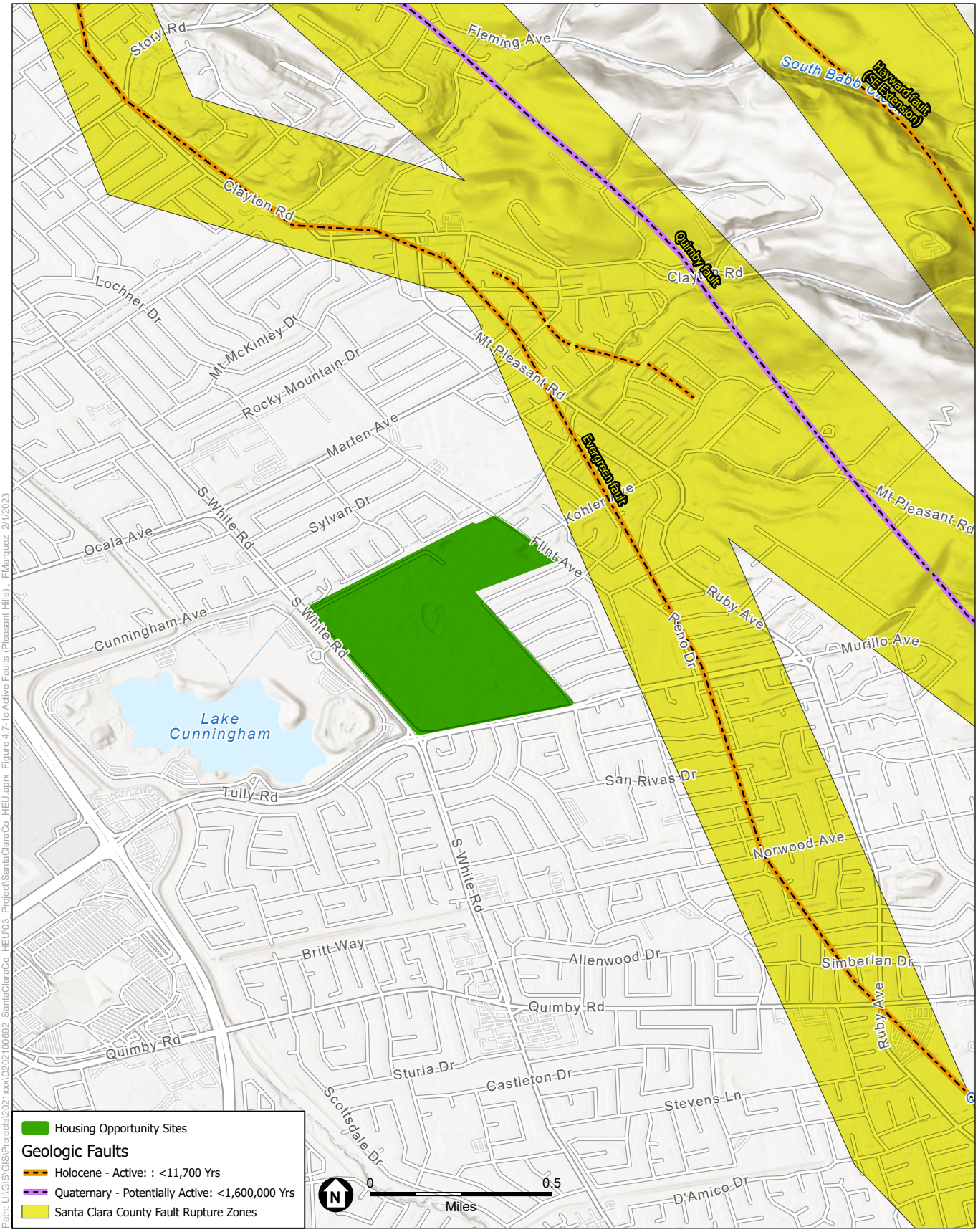
SOURCE: County of Santa Clara, 2022;

Esri, 2022; ESA, 2022; CGS, 2010

Santa Clara County Housing Element and Stanford Community Plan Update

Figure 4.6-1b
Active Faults
Alum Rock, Berryessa and Fruitdale

ESA



SOURCE: ESA, 2022

Santa Clara County Housing Element and Stanford Community Plan Update

Figure 4.6-1c
Active Faults
Pleasant Hills

ESA

As depicted in Figure 4.6-1a through Figure 4.6-1c, all of the housing opportunity sites are in proximity to both active and potentially active faults.

Liquefaction and Lateral Spreading

Liquefaction is a phenomenon in which unconsolidated, water saturated sediments become unstable due to 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.

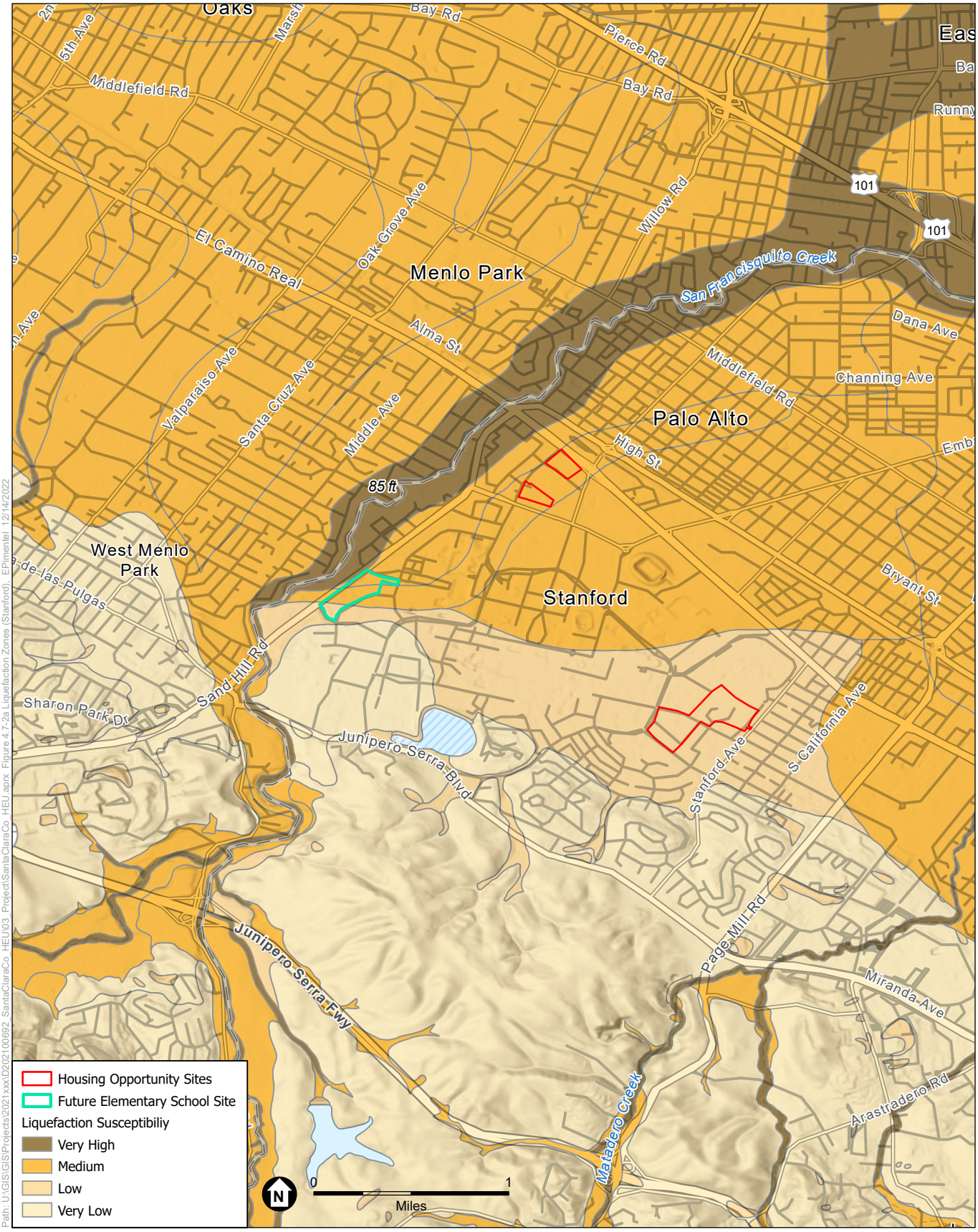
The potential damaging effects of liquefaction include differential settlement, loss of ground support for foundations, ground cracking, heaving and cracking of structure slabs due to sand boiling, and buckling of deep foundations due to ground settlement. Dynamic settlement (i.e., pronounced consolidation 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.

Figures 4.6-2a through **Figure 4.6-2d** depict the known liquefaction hazard zones in proximity to the housing opportunity sites. The liquefaction hazard zones are labelled as either *very low*, *low*, *medium*, *high*, or *very high*. None of the housing opportunity sites are within a high or very high liquefaction hazard zone; the sites are either within a medium, low, or very low liquefaction hazard zone.

Landslides

Landslides are one of the various types of downslope movements in which rock, soil, and other debris are displaced due to the effects of gravity. The potential for material to detach and move down slope depends on multiple factors including the type of material, water content, and steepness of terrain. Generally, earthquake-induced landslides occur within deposits of a moderate to high landslide potential, when ground shaking triggers slope failures during or as a result of a nearby earthquake.

Figure 4.6-3a through **Figure 4.6-3d** depict the known landslide hazard zones in proximity to the housing opportunity sites. None of the housing opportunity sites are within a designated landslide hazard zone.

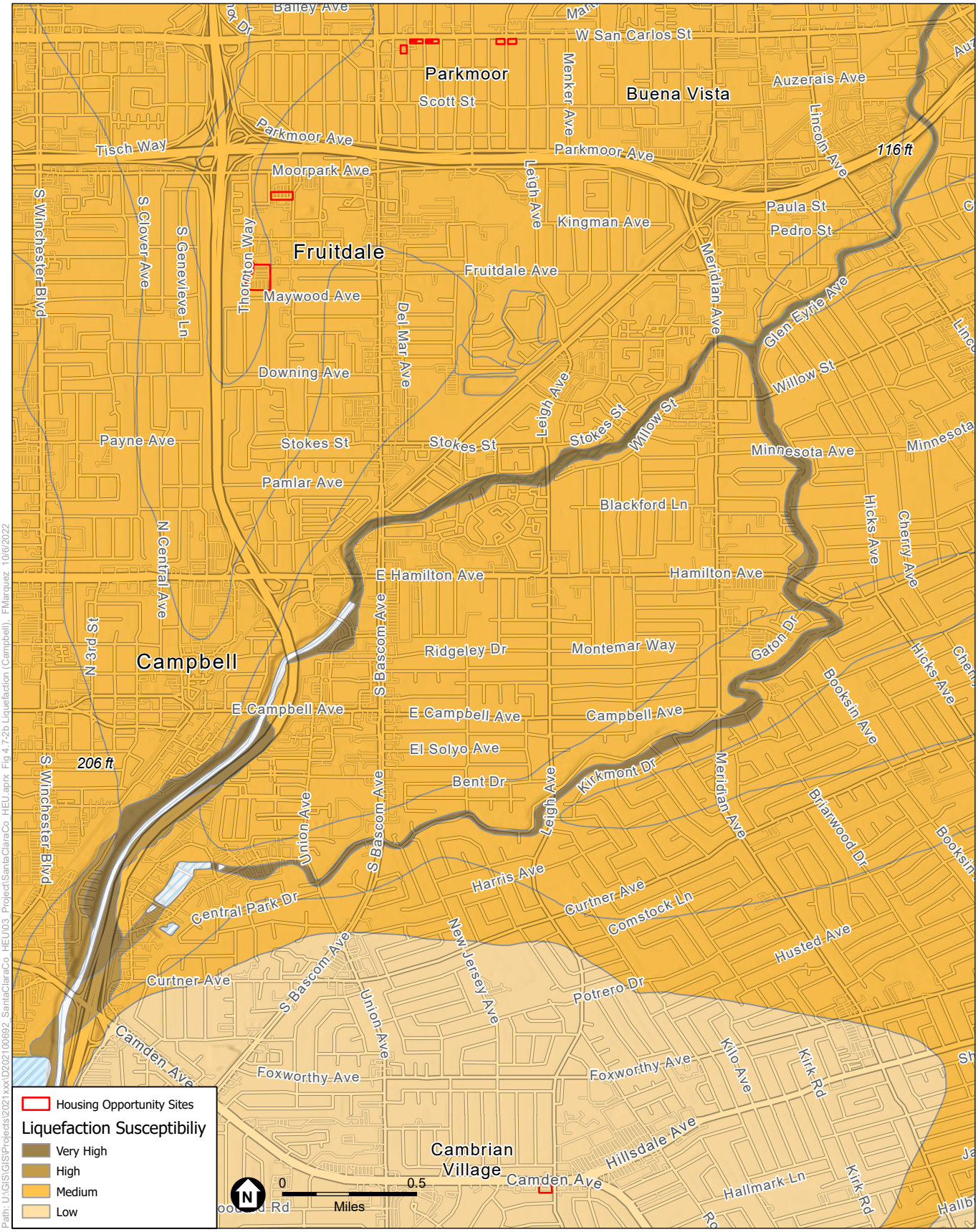


SOURCE: ESA, 2022

Santa Clara County Housing Element and Stanford Community Plan Update

Figure 4.6-2a
Liquefaction Zones
Stanford

ESA

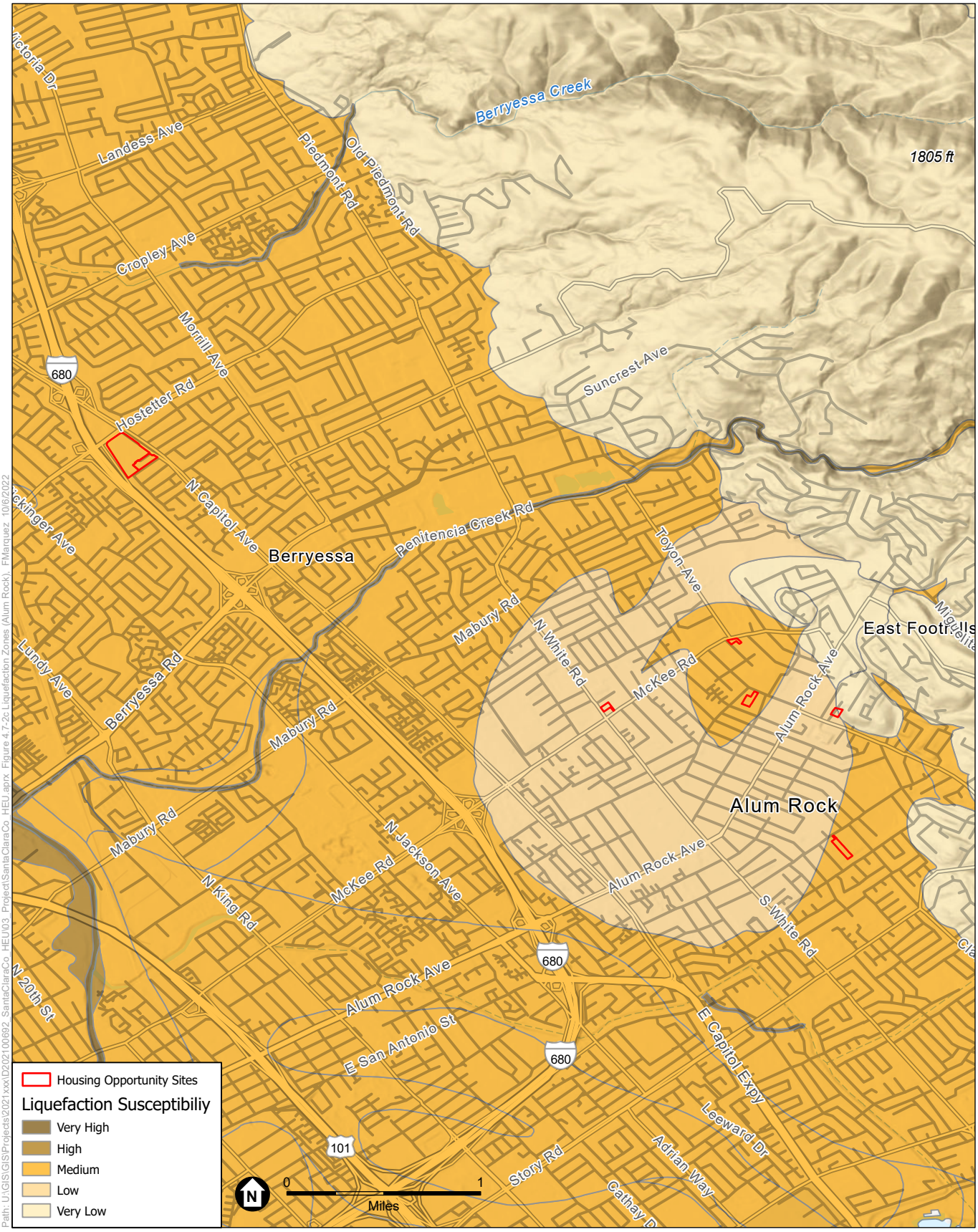


SOURCE: ESA, 2021

Santa Clara County Housing Element and Stanford Community Plan Update

Figure 4.6-2b
Liquefaction Zones
Fruitdale

ESA

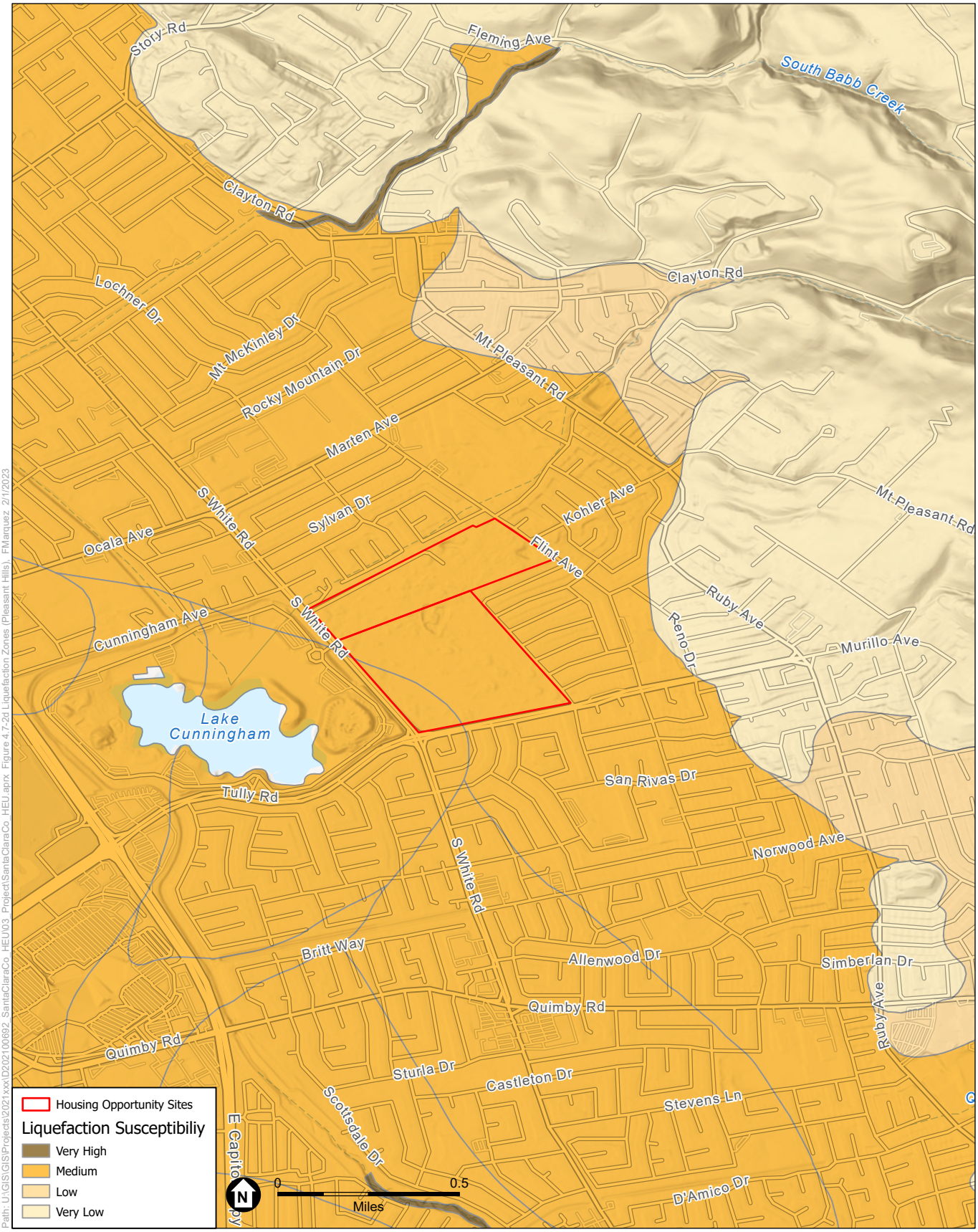


SOURCE: ESA, 2021

Santa Clara County Housing Element and Stanford Community Plan Update

Figure 4.6-2c
Liquefaction Zones
Alum Rock

ESA

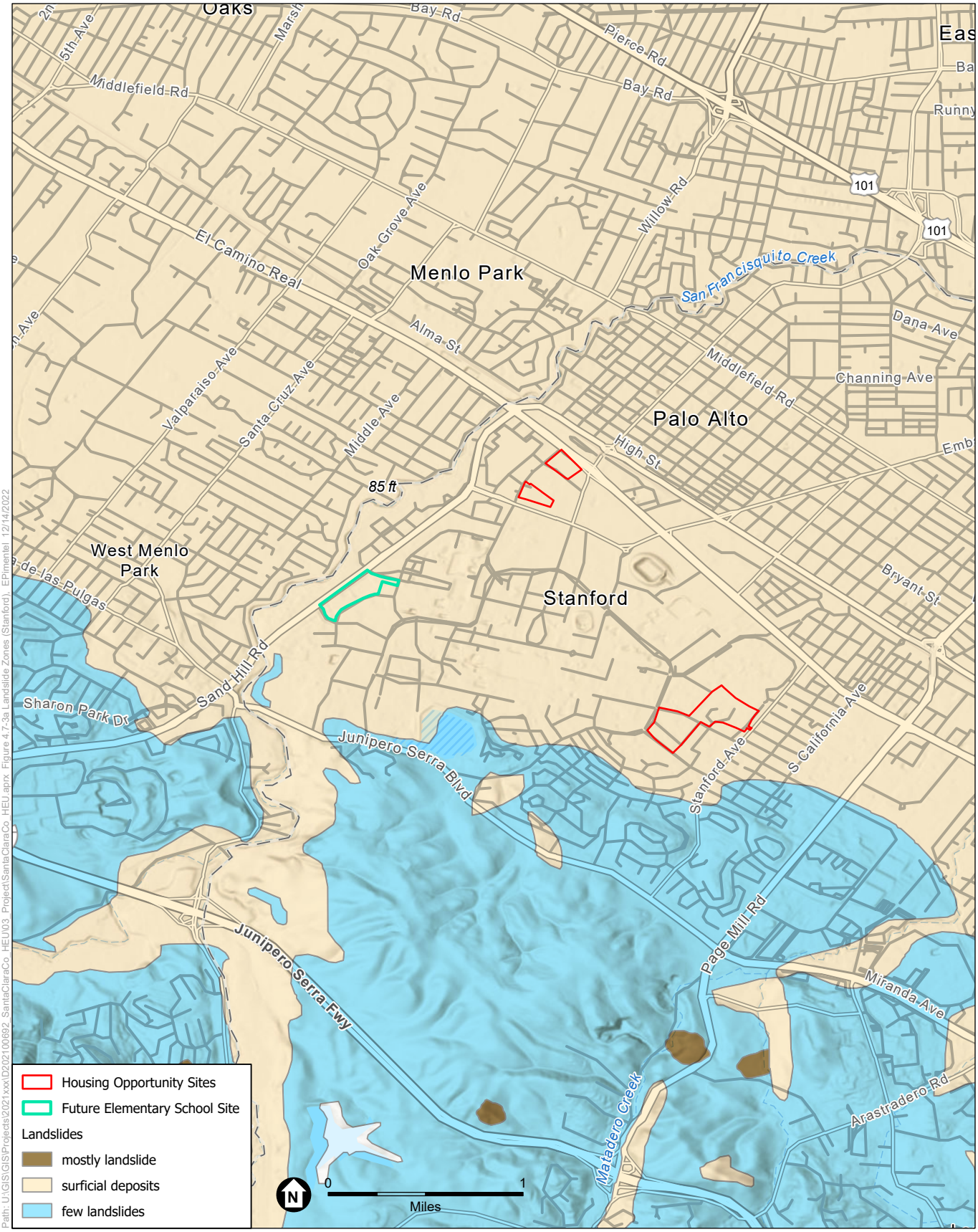


SOURCE: ESA, 2022

Santa Clara County Housing Element and Stanford Community Plan Update

Figure 4.6-2d
Liquefaction Zone
Pleasant Hills

ESA



SOURCE: ESA, 2022

Santa Clara County Housing Element and Stanford Community Plan Update

Figure 4.6-3a
Landslide Zones
Stanford

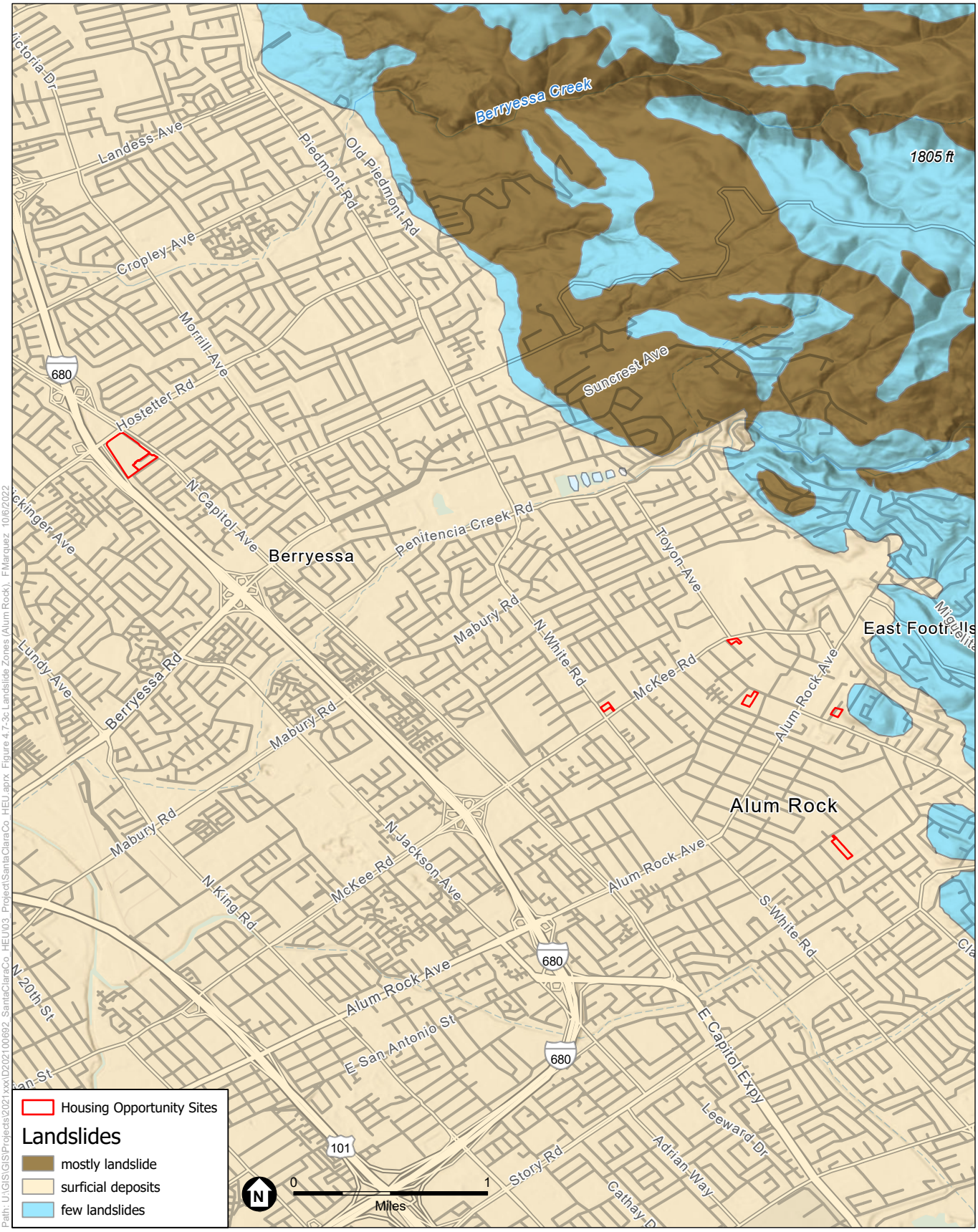
ESA

SOURCE: ESA, 2021

Santa Clara County Housing Element and Stanford Community Plan Update

Figure 4.6-3b
Landslide Zones
Fruitdale

ESA

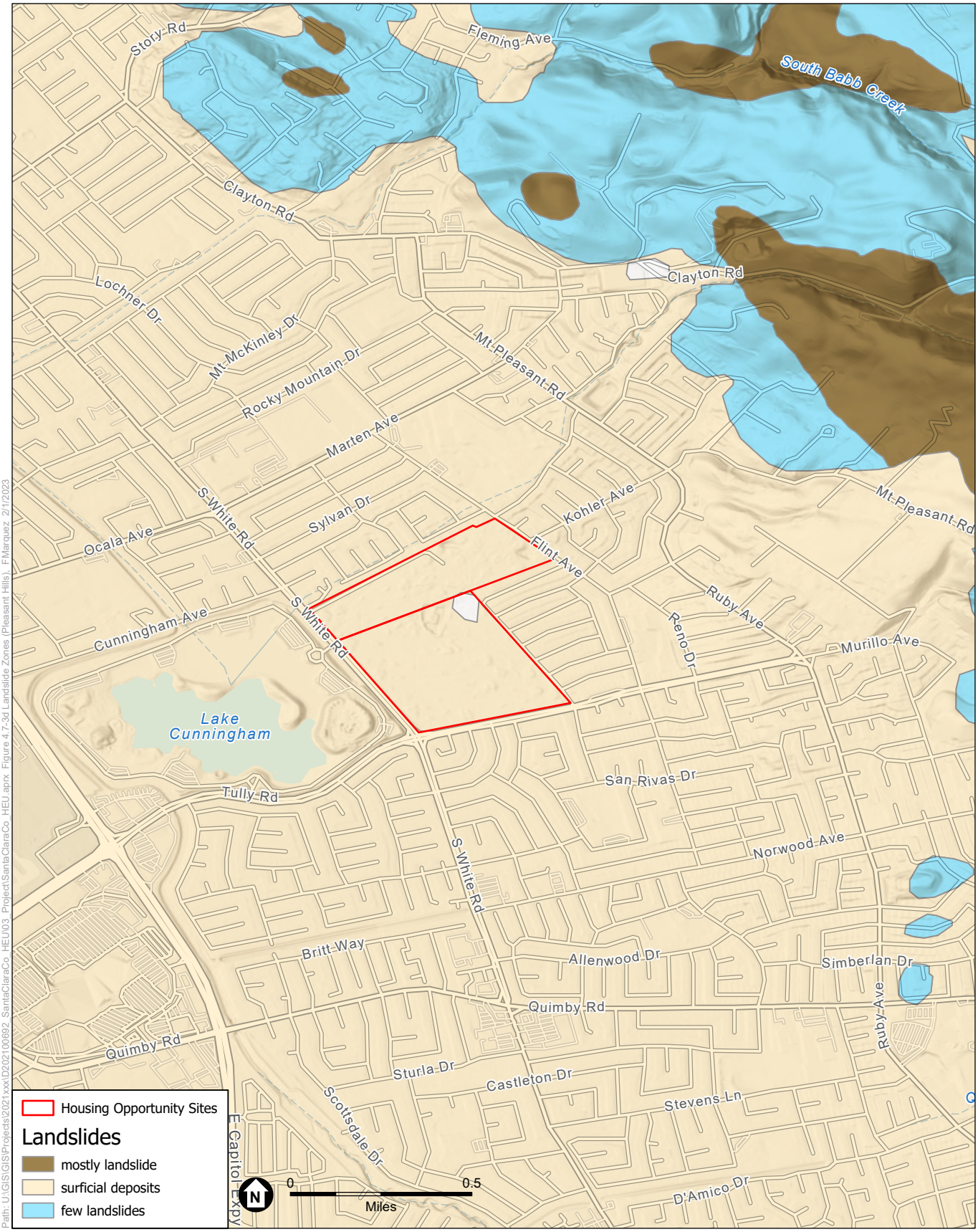


SOURCE: ESA, 2021

Santa Clara County Housing Element and Stanford Community Plan Update

Figure 4.6-3c
Landslide Zones
Alum Rock

ESA



SOURCE: ESA, 2022

Santa Clara County Housing Element and Stanford Community Plan Update

Figure 4.6-3d
Landslide Zones
Pleasant Hills

ESA

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, and/or perched groundwater.[3] This cyclical change in soil volume is measured using the coefficient of linear extensibility (COLE) (NRCS, 2017). The Natural Resources Conservation Service (NRCS) relies on linear extensibility measurements to determine the shrink-swell potential of soils. If the linear extensibility percent is more than 3 percent (COLE=0.03), shrinking and swelling may cause damage to buildings, roads, and other structures (NRCS, 2017). 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.

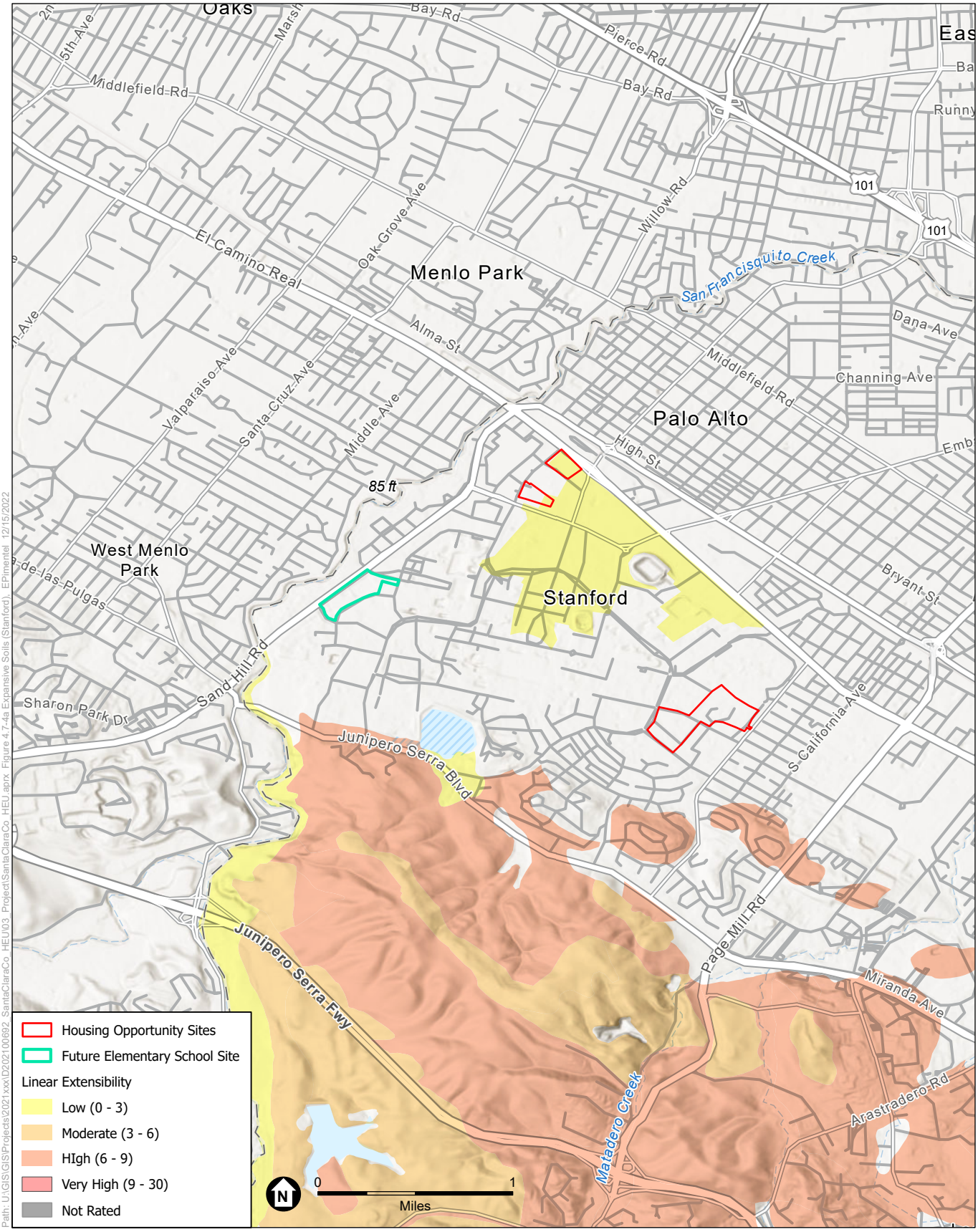
Figure 4.6-4a through **Figure 4.6-4d** depict areas of varying soil expansion potential in proximity to the housing opportunity sites. The project would not include new developments within areas of very high soil expansion potential. The Stanford, Alum Rock, Fruitdale, and Pleasant Hill Golf Course sites are in areas with low to no soil expansion potential.

Paleontological Resources

Paleontological resources are the mineralized (fossilized) remains of prehistoric plants and animals, including body fossils, such as bones, bark or wood, and shell, as well as trace fossils, such as shell, leaf, skin, or feather impressions, footprints, burrows, or other evidence of an organism's life or activity. These resources are located within sedimentary rocks or alluvium and are considered to be nonrenewable.

The Society of Vertebrate Paleontology (SVP) has established standard guidelines that outline professional protocols and practices for conducting paleontological resource assessments and surveys; monitoring and mitigation; data and fossil recovery; sampling procedures; and specimen preparation, identification, analysis, and curation (SVP, 2010). Most practicing professional vertebrate paleontologists adhere closely to the SVP's assessment, mitigation, and monitoring requirements as provided in its standard guidelines.

[3] Perched groundwater is a local saturated zone above the water table that typically exists above an impervious layer (such as clay) of limited extent.

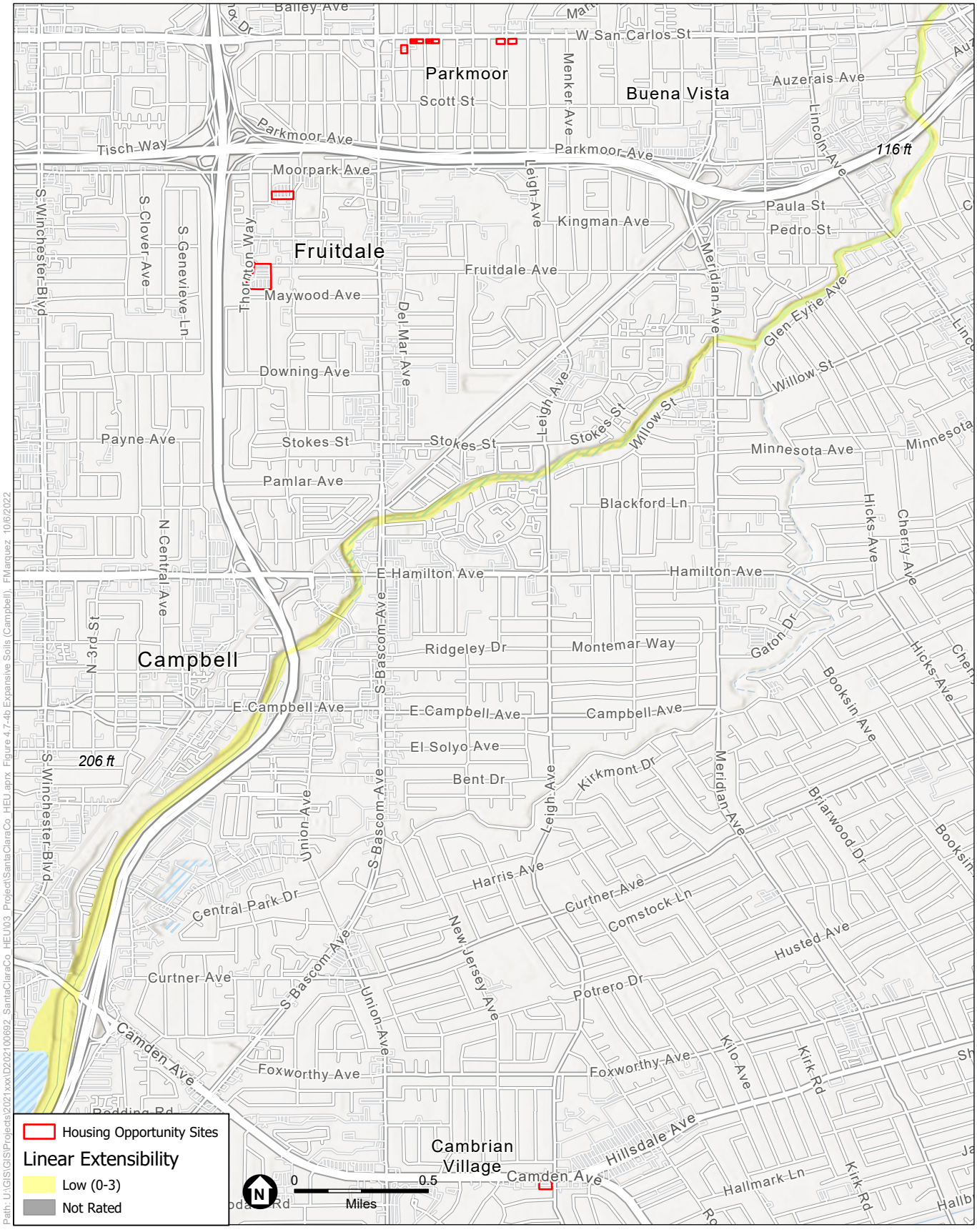


SOURCE: ESA, 2022

Santa Clara County Housing Element and Stanford Community Plan Update

Figure 4.6-4a
Expansive Soils
Stanford

ESA

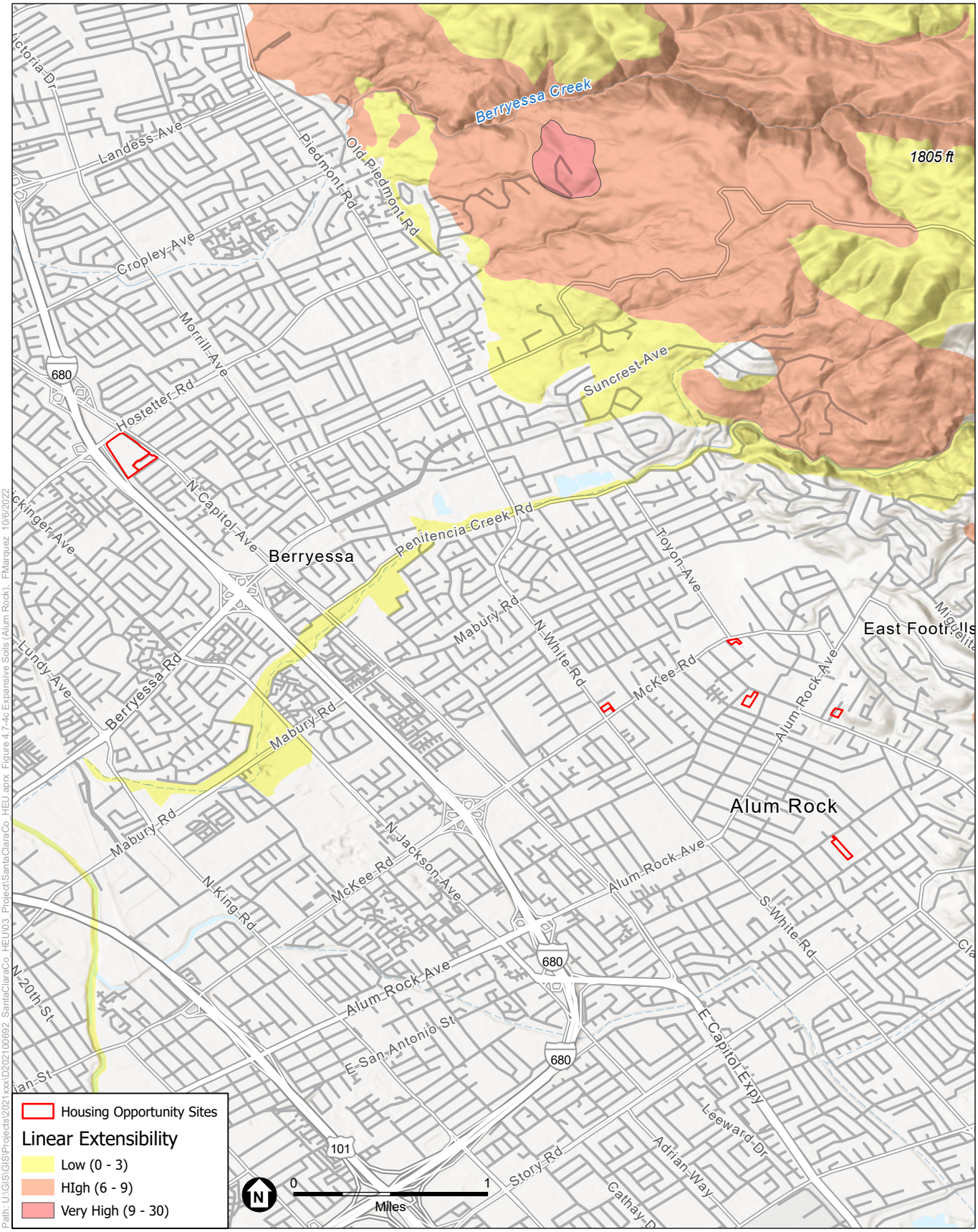


SOURCE: ESA, 2021

Santa Clara County Housing Element and Stanford Community Plan Update

Figure 4.6-4b
Expansive Soils
Fruitdale

ESA



SOURCE: ESA, 2021

Santa Clara County Housing Element and Stanford Community Plan Update

Figure 4.6-4c
Expansive Soils
Alum Rock

ESA

The SVP (SVP, 2010: 11) defines a significant fossil resource as:

> Fossils and fossiliferous deposits, here defined as consisting of identifiable vertebrate fossils, large or small, uncommon invertebrate, plant, and trace fossils, and other data that provide taphonomic, taxonomic, phylogenetic, paleoecologic, stratigraphic, and/or biochronologic information. Paleontological resources are considered to be older than recorded human history and/or older than middle Holocene (i.e., older than about 5,000 radiocarbon years).

Based on the significance definitions of SVP (2010), all identifiable vertebrate fossils are considered to have significant scientific value. This position is adhered to because vertebrate fossils are relatively uncommon, and only rarely would a fossil locality yield a statistically significant number of specimens of the same genus. Therefore, every vertebrate fossil found has the potential to provide significant new information on the taxon it represents, its paleoenvironment,[4] and/or its distribution. Furthermore, all geologic units in which vertebrate fossils have previously been found are considered to have high sensitivity. Identifiable plant and invertebrate fossils are considered significant if found in association with vertebrate fossils or if defined as significant by project paleontologists, specialists, or local government agencies.

Paleontological sensitivity is defined as the potential for a geologic formation to produce scientifically significant fossils. This is determined by rock type, past history of the geologic unit in producing significant fossils, and fossil localities recorded from that unit. 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 Non-renewable Paleontologic Resources,* the SVP (2010:1–2) defines four categories of paleontological sensitivity (potential) for rock units: high, low, undetermined, and no potential:

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

As indicated by geologic mapping, the surficial geology within the project area is composed of Holocene-age alluvium and Pleistocene-age alluvium.

[4] A paleoenvironment is the past environment of an area during a given time period in the past.

As discussed, in general, Holocene-age alluvial deposits are considered to have a low potential to contain significant paleontological resources, based on the relatively recent age of the deposits (SVP, 2010); the youngest Holocene-age deposits (i.e., younger than 5,000 radiocarbon years) have a particularly low potential. Deposits that date to the middle Holocene (i.e., older than 5,000 radiocarbon years) have a potential that increases as the depth into the deposits increases. While the exact depth at which the transition to older sediments is not known for the individual housing opportunity sites, fossils have been discovered in central California as shallow as 5 to10 feet below ground surface (Jefferson, 1991a; Jefferson, 1991b).

In general, Pleistocene-age sedimentary deposits are considered to have a high potential to contain significant paleontological resources, as is evident by the numerous fossil discoveries throughout California (Dundas et al., 2009; Ngo et al., 2013; Sub Terra Consulting, 2017; UCMP, 2022a)—as well as within Santa Clara County (UCMP, 2022b). The exact transition from Holocene- to Pleistocene-age deposits is not known in the project area; however, Pleistocene-age fossils have been encountered in Santa Clara County in deposits mapped as Holocene-age alluvium, indicating fossiliferous deposits have been encountered at shallow depths in Holocene-age alluvium (Maguire & Holroyd, 2016).

Records that are available through the University of California Museum of Paleontology (UCMP) online fossil localities database indicate 12 Pleistocene-age vertebrate fossil localities within Santa Clara County (UCMP, 2022b). While there are no records of Holocene-age vertebrate fossil localities in Santa Clara County (UCMP, 2022b), as discussed above, Pleistocene-age fossils have been recovered from deposits mapped as Holocene-age alluvium.

In summary, the surficial Holocene-age alluvial deposits are considered to have a low potential to contain significant paleontological resources, with the potential increasing to high within the deeper layers of the unit; any Pleistocene-age deposits encountered in the subsurface are considered to have a high potential to encounter significant paleontological resources.

Mineral Resources

According to the Santa Clara County General Plan, there are a number of mineral resource deposits in the County, eight of which are currently being quarried (Santa Clara County, 1994). The mineral resources in the County are construction aggregates (i.e., sand, gravel, and crushed stone), limestone, and—to a lesser extent—salts derived from evaporation ponds at the edge of the San Francisco Bay. An adequate supply of these resources is of local, state, and regional importance (Santa Clara County, 1994).

CGS provides information about California's nonfuel mineral resources and classifies lands throughout the State that contain regionally significant mineral resources as mandated by the Surface Mining and Reclamation Act (SMARA) of 1975. Nonfuel mineral resources include metals such as gold, silver, iron, and copper; industrial metals such as boron compounds, rare-earth elements, clays, limestone, gypsum, salt, and dimension stone; and construction aggregate including sand, gravel, and crushed stone. The classification process involves the determination

of Production-Consumption (P-C) Region boundaries, based on identification of active aggregate operations (Production) and the market area served (Consumption).

The classification of mineral resources is a joint effort of the State and local governments. It is based on geologic factors and requires that the State Geologist classify the mineral resources area as one of the four Mineral Resource Zones (MRZs), described below:

- MRZ-1: Areas where adequate information indicates that no significant mineral deposits are present, or where it is judged that little likelihood exists for their presence.
- MRZ-2: Areas where adequate information indicates that significant mineral deposits are present, or a where it is judged that a likelihood exists for their presence.
- MRZ-3: Areas containing mineral deposits the significance which cannot be evaluated from available data.
- MRZ-4: Areas where available information is inadequate for assignment to any other MRZ.

MRZ-2 areas are where significant mineral deposits are known to be present. None of the housing opportunity sites would be within in an established MRZ-2 (Kohler-Antablin, 1996; Key, 2021). Neither the County's General Plan nor the Stanford Community Plan (SCP) include any data that suggest any of the housing opportunity sites are within an established MRZ-2.

Regulatory Setting

Federal

There are no federal regulations pertaining to Geology and Paleontology that are applicable to the proposed HEU.

State

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act was passed in 1972 to protect structures for human occupancy from the hazard of surface faulting. In accordance with the act, the State Geologist has established regulatory zones—called earthquake fault zones—around the surface traces of active faults and has published maps showing these zones. Buildings for human occupancy cannot be constructed across surface traces of faults that are determined to be active. Because many active faults are complex and consist of more than one branch that may experience ground surface rupture, earthquake fault zones extend approximately 200 to 500 feet on either side of the mapped fault trace.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act was passed in 1990 following the Loma Prieta earthquake to reduce threats to public health and safety and to 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, prior to receiving building permits. The *CGS Guidelines for Evaluating and Mitigating Seismic Hazards* (Special Publication 117A) provides guidance for evaluating and mitigating seismic hazards (CGS 2008).

California Building Code

The California Building Code (CBC), which is codified in Title 24 of the California Code of Regulations, Part 2, was promulgated to safeguard the public health, safety, and general welfare by establishing minimum standards related to 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. 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 2023 edition of the CBC is based on the 2022 International Building Code (IBC) published by the International Code Council, which replaced the Uniform Building Code (UBC). The code is updated triennially, and the 2019 edition of the CBC was published by the California Building Standards Commission on July 1, 2022, and took effect starting January 1, 2023. The 2023 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, provides requirements for general structural design and includes means for determining earthquake loads[5] as well as other loads (such as wind loads) for inclusion into building codes. Seismic design provisions of the building code generally prescribe minimum lateral forces applied statically to the structure, combined with the gravity forces of the dead and live loads of the structure, which the structure then must be designed to withstand. The prescribed lateral forces are generally smaller than the actual peak forces that would be associated with a major earthquake. Consequently, structures should be able to (1) resist minor earthquakes without damage; (2) resist moderate earthquakes without structural damage but with some nonstructural damage; and (3) resist major earthquakes without collapse, but with some structural as well as nonstructural damage. Conformance to the current building code recommendations does not constitute any kind of guarantee that significant structural damage would not occur in the event of a maximum magnitude earthquake; however, it is reasonable to expect that a structure designed in accordance with the seismic requirements of the CBC should not collapse in a major earthquake.

The earthquake design requirements take into account the occupancy category of the structure, site class, soil classifications, and various seismic coefficients, all of which are used to determine

[5] A load is the overall force to which a structure is subjected in supporting a weight or mass, or in resisting externally applied forces. Excess load or overloading may cause structural failure.

a seismic design category (SDC) for a project. The SDC is a classification system that combines the occupancy categories with the level of expected ground motions at the site; SDC ranges from A (very small seismic vulnerability) to E/F (very high seismic vulnerability and near a major fault). Seismic design specifications are determined according to the SDC in accordance with CBC Chapter 16. CBC Chapter 18 covers the requirements of geotechnical investigations (Section 1803), excavation, grading, and fills (Section 1804), load bearing of soils (Section 1806), as well as foundations (Section 1808), shallow foundations (Section 1809), and deep foundations (Section 1810). For SDCs D, E, and F, Chapter 18 requires analysis of slope instability, liquefaction, and surface rupture attributable to faulting or lateral spreading, plus an evaluation of lateral pressures on basement and retaining walls, liquefaction and soil strength loss, and lateral movement or reduction in foundation soil-bearing capacity. It also addresses measures to be considered in structural design, which may include ground stabilization, selecting appropriate foundation type and depths, selecting appropriate structural systems to accommodate anticipated displacements, or any combination of these measures. The potential for liquefaction and soil strength loss must be evaluated for site-specific peak ground acceleration magnitudes and source characteristics consistent with the design earthquake ground motions.

Requirements for geotechnical investigations are included in Appendix J, CBC Section J104, Engineered Grading Requirements. As outlined in Section J104, applications for a grading permit are required to be accompanied by plans, specifications, and supporting data consisting of a soils engineering report and engineering geology report. Additional requirements for subdivisions requiring tentative and final maps and for other specified types of structures are in California Health and Safety Code Sections 17953 to 17955 and in 2013 CBC Section 1802. Testing of samples from subsurface investigations is required, such as from borings or test pits. 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 homes and associated infrastructure would be required to comply with CBC requirements, which would make the HEU consistent with the CBC.

National Pollutant Discharge Elimination System (NPDES) Construction General Permit

Construction associated with the HEU would disturb one acre or more of land surface and could affect the quality of stormwater discharges into waters of the United States; therefore, it would be subject to the *NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities* (Order 2022-0057-DWQ; NPDES No. CAS000002). The Construction General Permit regulates construction-related discharges of pollutants in stormwater to waters of the United States from 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 associated with 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 receiving waters risk during periods of soil exposure (e.g., grading and site stabilization). The sediment risk level reflects the relative amount of sediment that could potentially 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 the 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; or
- Monitoring and reporting requirements.

The Construction General Permit requires the development and implementation of a Stormwater Pollution Prevention Plan (SWPPP) that includes specific best management practices (BMPs) designed to prevent sediment and pollutants from contacting stormwater from moving off site into receiving waters. The BMPs fall into several categories, including erosion control, sediment control, waste management and good housekeeping, and are intended to protect surface water quality by preventing the off-site migration of eroded soil and construction-related pollutants from the construction area. Routine inspection of all BMPs is required under the provisions of the Construction General Permit. In addition, the SWPPP is required to 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 the 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. Additionally, the SWPPP must contain a visual monitoring program; a chemical monitoring program for "non-visible" pollutants to be implemented if there is a failure of BMPs; and a sediment monitoring plan if the site discharges directly to a water body listed on the 303(d) list for sediment. 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, vehicle and equipment washing and fueling. The Construction General Permit also sets post-construction standards (i.e., implementation of BMPs to reduce pollutants in stormwater discharges from the site following 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.

Municipal Regional Stormwater Permit for the San Francisco Bay Region

Discharges of stormwater runoff from municipal separate storm sewer systems (MS4s) are regulated by the Municipal Regional Stormwater NPDES Permit, under Order No. R2-2022-0018; NPDES Permit No. CAS612008, issued by the San Francisco Bay Regional Water Quality Control Board, effective July 1, 2022. An MS4 is a stormwater conveyance system that is owned by a municipality (or other public entity) that discharges to waters of the United States; is not a combined sewer; and not part of a sewage treatment plant or publicly owned treatment works (RWQCB 2022).

Under CWA Section 402(p), stormwater permits are required for discharges from MS4s that serve populations of 100,000 or more. The Municipal Regional Permit (MRP) manages the Phase I Permit Program (serving municipalities of more than 100,000 people), the Phase II Permit Program (for municipalities of fewer than 100,000 people), and the Statewide Storm Water Permit for the California Department of Transportation.

The State Water Board and the individual regional water boards implement and enforce the MRP. Multiple municipalities, including Santa Clara County, along with the City of Santa Clara (County) and Valley Water are co-permittees. These entities formed the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) to collectively address waste discharge requirements (WDRs) and manage stormwater runoff from storm drains and watercourses within their jurisdictions. Member agencies implement pollution prevention, source control, monitoring, and outreach to reduce stormwater pollution in waterways and protect the water quality and beneficial uses of San Francisco Bay and Santa Clara County creeks and rivers (SCVURPPP 2021). Pollutants of concern in the Guadalupe River watershed (where the Project would be located) include mercury, PCBs, and trash, among others.

Public Resources Code Section 5097.5 and Section 30244

State requirements for management of paleontological resources are included in Public Resources Code (PRC) Section 5097.5 and Section 30244. These statutes prohibit the removal of any paleontological site or feature from public lands without permission of the jurisdictional agency, define the removal of paleontological sites or features as a misdemeanor, and require reasonable mitigation of adverse impacts on paleontological resources from developments on public (state, county, city, district) lands.

Local

Santa Clara County Geologic Hazard Ordinance

The Santa Clara County Geologic Hazard Ordinance (Sections C12-600 through C12-624) establishes the minimum requirements for the geologic evaluation of land, based on proposed land uses and geologic hazard zones. Similar to the state Seismic Hazard Zonation Act and the CBC, the ordinance defines the types of geologic reports and establishes requirements for reports, contains procedures for determining whether a geologic report is required and the review of reports, and the recording of acknowledgment statements.

When construction is proposed on property located within a geologic hazard zone, a site-specific geologic investigation must be performed. The report, prepared and signed by a certified engineering geologist, must be submitted for review by the County Geologist, prior to approval of the application.

Santa Clara County General Plan

The Santa Clara County General Plan is a comprehensive long-range general plan for the physical development of the County (County of Santa Clara, 1994). The General Plan contains the current County of Santa Clara Housing Element, which was adopted in 2015. The various elements within the General Plan include goals and policies for the physical development of the County. General Plan strategies and policies related to geologic hazards and relevant to implementation of the HEU are listed below.

Strategy #2: Minimize the Resident Population Within High Hazard Areas

***Policy C-HS 30*:** Local jurisdictions' urban development and land use policies should minimize the resident population within areas subject to high natural hazards in order to reduce: (a) the overall risk to life and property; and (b) the cost to the general public of providing urban services and infrastructure to urban development.

Policy C-HS 31: Cities should not expand Urban Service Areas into undeveloped areas of significant hazards,

Policy C-HS 32: Areas of significant natural hazards shall be designated in the County's General Plan as Resource Conservation Areas with low development densities in order to minimize public exposure to avoidable risks.

Stanford University Community Plan

The current Stanford University Community Plan was adopted in 2000 (County of Santa Clara, 2000). The primary purpose of the Community Plan is to guide future use and development of Stanford lands in a manner that incorporates key County General Plan principles of compact urban development, open space preservation, and resource conservation. The Community Plan was adopted as an amendment of the General Plan in the manner set forth by California Government Code Section 65350 et seq. All revisions to the Community Plan must also be made according to the provisions of State law for adopting and amending general plans. Community

strategies and policies related to geologic hazards and paleontological resources and relevant to implementation of the HEU and Community Plan Update are listed below.

The Resource Conservation (RC) chapter of the plan contains strategies and policies relevant to paleontological resources:

Strategy #7: Inventory and Evaluate Heritage Resources

***Policy SCP-RC 22*:** Maintain informational databases and formal inventories of heritage resources as the basis for local decision-making regarding historic buildings, archaeological and paleontological sites, heritage trees, and landscape features

Strategy #8: Protect Heritage Resources Through Avoidance, Adaptive Reuse, and Sensitive Planning and Design

***Policy SPC-RC 25*:** Take into account the need to protect archeological and paleontological resources in any environmental enhancement activities involving creek restoration and flood control.

The Health and Safety (HS) chapter of the plan contains strategies and policies relevant to geological hazards:

Strategy #4: Design, Locate, and Regulate Development to Avoid or Withstand Hazards

***Policy SCP-HS* 6:** Avoid significant geologic hazard areas, such as unstable slopes, in locating new development. For projects proposed within areas of concern, provide geologic reports of investigations which quantify the risks and recommend mitigation measures. Such reports must be reviewed and approved by the County Geologist.

***Policy SCP-HS 7*:** Through the development review process, ensure compliance with all applicable County ordinances and other laws, regulations, and codes for seismic evaluation and the design of new and existing buildings and campus infrastructure.

***Policy SCP-HS 8*:** Designate such lands with significant geologic hazards Special Conservation Areas in the Community Plan Land Use map.

Strategy #8: Protect Heritage Resources Through Avoidance, Adaptive Reuse, and Sensitive Planning and Design

***Policy SPC-RC 25*:** Take into account the need to protect archeological and paleontological resources in any environmental enhancement activities involving creek restoration and flood control.

4.6.3 Environmental Impacts and Mitigation Measures

Significance Thresholds

The thresholds used to determine the significance of impacts related to geology, paleontological resources, and mineral resources are based on Appendix G of the *CEQA Guidelines*. Implementation of the proposed project would have a significant impact on the environment if it would:

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

   i. 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;

   ii. Strong seismic ground shaking;

   iii. Seismic-related ground failure, including liquefaction;

   iv. Landslides.

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

c) 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;

d) Be located on expansive[6] soil creating substantial direct or indirect risks to life or property;

e) 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 waste water;

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

g) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state.

h) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan.

Issues Not Discussed in Impacts

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

Criterion a(iv): ***Landslides***. There are no active or historic landslides within any of the housing opportunity sites. Because of the relatively flat topography, impacts related to landslides are not expected to affect any of the housing opportunity sites, nor would the housing opportunity sites directly or indirectly cause substantial adverse effects related to landslides, whether seismically induced or gravity-induced. Therefore, relative to landslides, **no impact** would occur.

Criteria e: ***Septic Systems*****.** All development that could occur as a result of the proposed project's implementation would connect to exiting sanitary sewer systems. Use of septic systems would not be required. Therefore, relative to septic systems and soil suitability, **no impact** would occur.

[6] Appendix G cites Table 18-1-B of the 1994 Uniform Building Code. However, in California, expansive soils are currently defined in California Building Code (2019) Section 1803.5.3.

Criteria g and h: ***Mineral Resources***. MRZ-2 areas are zones where significant mineral deposits are known to be present. None of the housing opportunity sites would be located within in an established MRZ-2. Neither the County of Santa Clara General Plan nor the SCP include any data that suggest any housing opportunity sites are within an established MRZ-2. Additionally, the proposed project does not propose any activities that would result in the loss of availability of a known mineral resource. As such, there would be **no impact** in relation to the loss of availability of a known mineral resource.

Methodology and Assumptions

Information for this assessment of impacts related to geology and paleontological resources is based on a review of information gathered from geologic maps, scientific literature, museum records, and data from the U.S. Geological Survey (USGS), CGS, and NRCS.

Development activities associated with the proposed project would be regulated by the various laws, regulations, and policies summarized in the Regulatory Setting. Compliance with applicable federal, state, and local laws and regulations is assumed in this analysis, and local and state agencies would be expected to continue to enforce applicable requirements to the extent that they do so now. It should be noted that compliance with many of the regulations is a condition of permit approval.

A significant impact would occur if development activities associated with the project could not be mitigated for after consideration of applicable regulatory requirements. For those impacts considered to be significant, mitigation measures are proposed to reduce the identified impacts.

Impacts and Mitigation Measures

Impacts

Impact GEO-1: Implementation of the proposed project would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault. (*Less than Significant Impact*)

The injection of water or the extraction of groundwater, crude oil, or natural gas has the potential to trigger movement along a fault. The proposed project does not include the injection or extraction of fluids or gas and therefore could not directly cause an earthquake or movement along a fault.

Housing Element Update

All but one of the housing opportunity sites would not be developed within an established EFZ. One of the housing opportunity sites at Alum Rock would be located within an EFZ and a County of Santa Clara fault rupture zone, due to the proximity to the Evergreen Fault, which is part of the Hayward Fault Zone (see Figure 4.6-1b).

However, as required by California law and the County of Santa Clara Geologic Hazard Ordinance, any new developments would be subject to the design criteria of the CBC and the

County's ordinance, which requires that all improvements be constructed to withstand anticipated impacts from regional fault sources. Each new development would be required to obtain a site-specific geotechnical report prior to the issuance of individual grading permits and each new development would be required to retain a licensed geotechnical engineer to design new structures. The CBC standards and the County's ordinance require all new developments to be designed consistent with a site-specific, design-level geotechnical report, which would be fully compliant with the seismic recommendations of a California-registered professional geotechnical engineer. Adherence to the applicable CBC and County requirements would ensure that development facilitated by the project would not directly or indirectly cause substantial adverse effects, including the risk of loss, injury, or death involving surface fault rupture. Therefore, impacts would be **less than significant**.

Stanford Community Plan

The housing sites and potential future school location on the Stanford campus are not located within an established EFZ. However, one of the Stanford sites is within a County of Santa Clara fault rupture zone (see Figure 4.9-1a). As required by California law and the County of Santa Clara Geologic Hazard Ordinance, any new developments would be subject to the design criteria of the CBC and County of Santa Clara ordinance, which requires that all improvements be constructed to withstand anticipated impacts from regional fault sources. Each new development would be required to obtain a site-specific geotechnical report prior to the issuance of individual grading permits and each new development would be required to retain a licensed geotechnical engineer to design new structures. The CBC standards and County of Santa Clara ordinance require all new developments to be designed consistent with a site-specific, design-level geotechnical report, which would be fully compliant with the seismic recommendations of a California-registered professional geotechnical engineer. Adherence to the applicable CBC and County requirements would ensure that development facilitated by the proposed project would not directly or indirectly cause substantial adverse effects, including the risk of loss, injury, or death involving surface fault rupture. Therefore, impacts would be **less than significant**.

Mitigation Measure: None required.

Impact GEO-2: Implementation of the proposed project would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking. (*Less than Significant Impact*)

The injection of water or the extraction of groundwater, crude oil, or natural gas has the potential to trigger movement along a fault. The project does not include the injection or extraction of fluids or gas and therefore could not directly cause an earthquake or movement along a fault.

HEU and Stanford Community Plan

Due to the proximity to the active fault zones depicted in Figures 4.6-1a, b, and c, new developments allowable under the proposed project would be subject to strong seismic ground shaking in the event of an earthquake originating from one of the previously mentioned fault

zones. Strong seismic ground shaking could potentially cause damage to new developments, resulting in loss, injury, or death.

As required by California law and the County of Santa Clara Geologic Hazard Ordinance, any new developments would be subject to the seismic design criteria of the CBC and the County Ordinance, which requires that all improvements be constructed to withstand anticipated ground shaking from regional fault sources. Each new development would be required to obtain a site-specific geotechnical report prior to the issuance of individual grading permits; each new development would be required to retain a licensed geotechnical engineer to design new structures to withstand probable seismically induced ground shaking. The CBC standards and the County Ordinance require all new developments to be designed consistent with a site-specific, design-level geotechnical report, which would be fully compliant with the seismic recommendations of a California-registered professional geotechnical engineer. Adherence to the applicable CBC and the County Ordinance requirements would ensure that development facilitated by the project would not directly or indirectly cause substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking. Therefore, impacts would be **less than significant**.

Mitigation Measure: None required.

Impact GEO-3: Implementation of the proposed project would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving seismic related ground failure, including liquefaction. (*Less than Significant Impact*)

HEU and Stanford Community Plan

Based on the available data (i.e., geologic mapping, liquefaction susceptibility mapping, and groundwater data), any new development facilitated by the proposed project would be subject to—at the very least—moderate soil liquefaction. New developments facilitated by the project would be subjected to the damaging effects of liquefaction in the event of an earthquake in the region.

As required by California law, any new developments would be subject to the seismic design criteria of the CBC and the County of Santa Clara Geologic Hazard Ordinance, which requires that all improvements be constructed to withstand any anticipated seismic-related ground failures, including liquefaction, due to ground shaking from regional fault sources. Each new development would be required to obtain a site-specific geotechnical report prior to the issuance of individual grading permits; each new development would be required to retain a licensed geotechnical engineer to investigate and evaluate each new development site and design new structures to withstand probable seismic-related ground failures, such as liquefaction. The CBC and County ordinance standards require all new developments to be designed consistent with a site-specific, design-level geotechnical report, which would be fully compliant with the seismic recommendations of a California-registered professional geotechnical engineer. Liquefaction hazards can generally be addressed through site preparation measures or foundation design

measures such as removal and replacement of liquefiable soils, densification of these soils, or specific foundation design recommendations. Implementation of these measures in accordance with building code requirements can effectively reduce the hazard to minimize any potential for substantive damage.

Compliance with all applicable CBC and County ordinance requirements would ensure that development facilitated by the proposed project would not directly or indirectly cause substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking. Therefore, impacts would be **less than significant**.

Mitigation Measure: None required.

Impact GEO-4: Implementation of the proposed project would not result in substantial soil erosion or the loss of topsoil. (*Less than Significant Impact*)

HEU and Stanford Community Plan

Construction

New developments facilitated by the proposed project would include ground disturbance activities, such as grading, grubbing, or mass excavation. These ground disturbing activities are some examples of activities that could contribute to substantial soil erosion or the loss of topsoil. Any new development that would require the disturbance of one or more acres during construction would be subject to the requirements of the NPDES Construction General Permit. The NPDES Construction General Permit requires the preparation and implementation of a SWPPP, which would include BMPs designed to control and reduce soil erosion. The BMPs may include dewatering procedures, storm water runoff quality control measures, watering for dust control, and the construction of silt fences, as needed. Compliance with this independently enforceable existing requirement, and implementation of these soil and erosion control measures would ensure that impacts related to erosion and soil loss would be **less than significant**.

Operation

Once constructed, development facilitated by the proposed project would be subject to Municipal Regional Stormwater Permit for the San Francisco Bay Region which regulate stormwater discharges in lands under the water quality jurisdiction of the San Francisco Bay Region in Santa Clara County. These permits require that the housing opportunity sites be developed to collect, infiltrate, and treat stormwater falling on the sites such that erosion does not occur and the runoff does not exceed the capacity of the existing municipal stormwater collection systems. With compliance with the permits, stormwater on the development sites would be controlled to prevent erosion and loss of topsoil, resulting in impacts that would be **less than significant**.

Mitigation Measure: None required.

Impact GEO-5: Implementation of 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 Impact*)

HEU and Stanford Community Plan

As discussed above, areas associated with the proposed project would be subject to the potential effects of unstable soils. Any new developments that are proposed in areas determined to be susceptible to geotechnical hazards (e.g., liquefaction or landslide) would be subject to the damaging effects of these hazards. Also discussed above is the requirement that subjects all new developments to the building standards of the CBC. Included in this requirement is the obligation to retain a geotechnical engineer to analyze the conditions at each specific new development site. Geotechnical investigations include the analysis of potential unstable soil conditions at a site. If unstable soil conditions are determined to be present at a given site, the geotechnical report specific to that site would include site-specific design requirements to implement to reduce or avoid adverse effects associated with unstable soils.

Compliance with CBC and County requirements, including implementation of recommendations provided in site-specific geotechnical reports would reduce or avoid impacts related to unstable soils. The proposed project would not directly or indirectly result in adverse effects related to unstable soils, and the impact would be **less than significant**.

Mitigation Measure: None required.

Impact GEO-6: Implementation of the proposed project would not be located on expansive soil creating substantial direct or indirect risks to life or property. (*Less than Significant Impact*)

Housing Element Update

The HEU would not include new developments within areas of very high soil expansion potential. The Alum Rock, Fruitdale, and Pleasant Hill Golf Course sites would be constructed on soils with low to no soil expansion potential. While current data suggests that the soils underlying these sites demonstrate low expansion potential, analysis of expansive soils is a standard requirement of geotechnical investigations, as the CBC outlines specific soil engineering parameters to identify and mitigate for expansive soils. If expansive soils are detected during the geotechnical investigation, the geotechnical would be required to provide recommendations to address expansive soils, which may include removal and/or treatment.

Compliance with the CBC requirement to determine the potential for expansive soils for each housing opportunity site under the HEU would ensure that any problematic soils are identified and soil engineering requirements are implemented. Soil engineering is used to adjust the existing problematic properties of certain soils so that they are suitable for new developments. Adherence to the requirements of the CBC and geotechnical investigation would avoid impacts resulting from potentially expansive soils. Therefore, the proposed project would not create substantial

direct or indirect risks to life or property related to expansive soils, and impacts would be **less than significant.**

Stanford Community Plan

The Stanford housing opportunity sites and the potential future school location would be constructed on soil with low to no soil expansion potential. As discussed above, a geotechnical investigation would be required prior to construction. While there is a low—or no—soil expansion potential, the geotechnical investigation will identify any potentially problematic soils. Adherence to the requirements of the CBC and geotechnical investigation would avoid impacts resulting from potentially expansive soils. The project would not result in substantial direct or indirect risks to life or property related to expansive soils, and impacts would be **less than significant.**

Mitigation Measure: None required.

Impact GEO-7: Implementation of the proposed project would not directly or indirectly destroy a unique paleontological resource or site or unique geologic feature. (*Less than Significant Impact, with Mitigation*)

HEU and Stanford Community Plan

Geologic mapping indicates that the surficial deposits within the project area are composed of alluvium of both Holocene and Pleistocene-age alluvium.

A review of geologic maps of the area, the UCMP online fossil localities database, and available scientific literature indicates that the Holocene-age alluvium has a low potential to contain significant paleontological resources near the surface, but the potential increases in the deeper, older layers of these deposits. The Pleistocene-age alluvium is considered to have a high potential to contain significant paleontological resources, due to the numerous previous fossil discoveries within the formation from Santa Clara County.

The addition of new developments in the project area would require grading and excavation during the construction phases of future projects. Paleontological resources may be encountered in deep excavations (generally, approximately 6 or more feet, depending on site-specific information) into previously undisturbed Holocene-age alluvium where Pleistocene-age sediments are present. Excavations at any depth in previously undisturbed deposits of the Pleistocene-age alluvium have the potential to encounter significant paleontological resources. If significant paleontological resources are encountered and inadvertently destroyed during construction of new developments, that would constitute a **potentially significant impact**.

To ensure potential impacts to significant paleontological resources are less than significant **Mitigation Measure GEO-1: Determination of Paleontological Potential** would be required to ensure that each new development that includes excavation to depths of greater than 6 feet below grade will undergo individual CEQA analyses and be assigned paleontological sensitivity specific

to each site based on site-specific project information (i.e., the extent of ground disturbance and potential geologic units that would be encountered). Based on the project-specific details, individual paleontological resource assessment reports will be prepared and would include appropriate mitigation to be implemented to reduce potential impacts to significant paleontological resources.

Mitigation Measure GEO-1: Determination of Paleontological Potential.

Prior to issuance of a grading permit for any project that requires ground disturbance (i.e., excavation, grading, trenching, etc.) in previously undisturbed deposits of Holocene-age alluvium and Pleistocene-age alluvium below a depth of six feet, the project will undergo a CEQA-level analysis to determine the potential for a project to encounter significant paleontological resources, based on a review of site-specific geology and the extent of ground disturbance associated with each project. The analysis shall include but would not be limited to: 1) a paleontological records search, 2) geologic map review, and 3) peer-reviewed scientific literature review. If it is determined that a site has the potential to disturb or destroy significant paleontological resources, a professional paleontologist (meeting the Society of Vertebrate Paleontology [SVP] standards), will be retained to recommend appropriate mitigation to reduce or avoid significant impacts to paleontological resources, based on project-specific information. Such measures could include but would not be limited to: 1) preconstruction worker awareness training, 2) paleontological resource monitoring, and 3) salvage of significant paleontological resources.

Significance After Mitigation: Implementation of Mitigation Measure GEO-1 would ensure that a thorough analysis of the potential to encounter significant paleontological resources would be performed in accordance with SVP standard guidelines. If it is determined that the potential exists for a project to encounter and destroy significant paleontological resources, the appropriate steps will be followed to ensure that a professional paleontologist is retained to prepare a paleontological resource management plan (or similar), which will include appropriate mitigation recommendations to avoid a potentially significant impact. Compliance with Mitigation Measure GEO-1 would reduce impacts to **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 that could cause cumulatively considerable impacts. Significant cumulative impacts related to geology, paleontological resources, and mineral resources could occur if the incremental impacts of the project combined with the incremental impacts of one or more of the cumulative projects or cumulative development projections included in the project description and described in Section 4.0.3, *Cumulative Impacts*.

Impact GEO-C: Implementation of the proposed project, when combined with other past, present, or reasonably foreseeable projects, would not result in a substantial adverse effect related to geology, paleontological resources, and mineral resources. (*Less than Significant Impact, with Mitigation)*

As discussed above, the proposed project would have no impact related to landslides or mineral resources. Therefore, the project would neither cause or contribute to any potential significant cumulative impact regarding these considerations, and impacts related to landslides and mineral resources are not considered further. The potential for the proposed project to cause or contribute to a potential significant cumulative impact with respect to the remaining geology, soils, or paleontological resources considerations is evaluated below.

Impacts related to geology and paleontological resources tend to be site-specific and depend on the local geology and soil conditions. For these reasons, the geographic scope for potential cumulative impacts consists of the project sites and adjacent areas.

The area would be subject to potential strong, seismically-induced ground shaking and seismic-induced ground failures (e.g., landslides, liquefaction). However, as discussed in the preceding impact analyses, development facilitated by the project would be designed and constructed in accordance with the most current building code requirements, and the potential for the project to exacerbate seismic hazards would be less than significant. State and local building regulations and standards have been established to address and reduce the potential for projects to cause or exacerbate seismic hazard impacts. Any cumulative projects that are occurring in proximity to the project sites would be required to comply with the same applicable provisions of these laws and regulations. Compliance with these requirements would limit the potential for impacts to a less than significant level. The purpose of the CBC (and related local ordinances such as the County of Santa Clara Geologic Hazard Ordinance) is to regulate and control the design, construction, quality of materials, use/occupancy, location, and maintenance of all buildings and structures within its jurisdiction. 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 seismic hazards.

If site drainage is not managed properly, drainage from the housing opportunity sites in combination with drainage from other cumulative project sites could cause soil erosion or loss of topsoil at a local and regional level. As with the proposed project, all other cumulative projects would be required to comply with the same existing codes, standards, and permitting requirements (e.g., preparation of a SWPPP under the state construction general permit and compliance with the Regional Stormwater Permit) to reduce erosion impacts. Potential impacts to soil erosion and loss of topsoil would be reduced through the implementation of the BMPs identified in the SWPPP. Requirements in the state construction general permit are designed to reduce adverse cumulative effects of erosion and sedimentation. Compliance with stormwater control requirements would reduce the overall cumulative impact to a less than significant level.

The geographic scope of cumulative impacts to paleontological resources includes the project sites and adjacent areas where deposits with a high potential to contain paleontological resources could be disturbed. If there were paleontological resources that extended across areas of ground

disturbance of the project sites and cumulative projects, the projects could result in the loss of paleontological resources, a potentially significant impact.

However, cumulative projects would be required to protect paleontological resources with mitigation similar to Mitigation Measure GEO-1: Determination of Paleontological Potential. Implementation of the mitigation measure would effectively avoid the potential loss of paleontological resources in the event of inadvertent discovery during construction and the impacts form the construction of the project sites and cumulative projects would be less than significant.

Mitigation Measure GEO-1: Determination of Paleontological Potential.

Prior to issuance of a grading permit for any project that requires ground disturbance (i.e., excavation, grading, trenching, etc.) in previously undisturbed deposits of Holocene-age alluvium and Pleistocene-age alluvium below a depth of six feet, the project will undergo a CEQA-level analysis to determine the potential for a project to encounter significant paleontological resources, based on a review of site-specific geology and the extent of ground disturbance associated with each project. The analysis shall include but would not be limited to: 1) a paleontological records search, 2) geologic map review, and 3) peer-reviewed scientific literature review. If it is determined that a site has the potential to disturb or destroy significant paleontological resources, a professional paleontologist (meeting the Society of Vertebrate Paleontology [SVP] standards), will be retained to recommend appropriate mitigation to reduce or avoid significant impacts to paleontological resources, based on project-specific information. Such measures could include but would not be limited to: 1) preconstruction worker awareness training, 2) paleontological resource monitoring, and 3) salvage of significant paleontological resources.

Significance After Mitigation: Implementation of Mitigation Measure GEO-1 would ensure that a thorough analysis of the potential to encounter significant paleontological resources would be performed in accordance with SVP standard guidelines. If it is determined that the potential exists for a project to encounter and destroy significant paleontological resources, the appropriate steps will be followed to ensure that a professional paleontologist is retained to prepare a paleontological resource management plan (or similar), which will include appropriate mitigation recommendations to avoid a potentially significant impact. Compliance with Mitigation Measure GEO-1 will reduce impacts to **less than significant**.

4.6.4 References

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