

Appendix C

GEOLOGY AND SOILS TECHNICAL REPORT



August 29, 2024

File No.: LA-02152-01
Project No.: 303836-001

Aspen Environmental Group
5020 Chesebro Road, Suite 200
Agora Hills, California 91301

Attention: Fritts Golden, Project Manager

Subject: **Geology and Soils Discussion**
Parkway Village Master Plan
10th Street West, Sierra Hwy, Avenue K and Avenue L
Lancaster, California

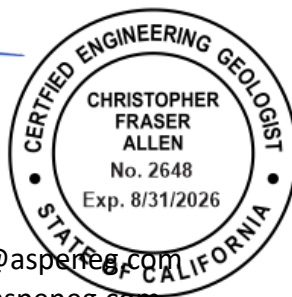
Presented herewith is the Geology and Soil discussion prepared, as authorized, for the Parkway Village Master Plan EIR. The discussion and conclusions contained in this report are based upon Earth Systems' understanding of data available at the time this report was prepared.

The submittal of this report marks the completion of the Geology and soils section of the scope of services described in Earth Systems' proposal dated March 22, 2024, and authorized on July 2, 2024.

Respectfully submitted,

Earth Systems Pacific

Christopher F. Allen, E.G.
Engineering Geologist



Linda Pineda
Staff Geologist

Distribution:

Fritts Golden – fgolden@aspeneg.com
Amanda Wild – awild@aspeneg.com

**GEOLOGY AND SOILS
PARKWAY VILLAGE MASTER PLAN
CITY OF LANCASTER, CALIFORNIA**

SITE LOCATION

The project site is bordered by West Avenue K on the north (east of Fig Avenue); by Sierra Highway on the east; by West Avenue L on the south, and by 10th Street West on the west (only up to West Avenue K8). The project site primarily includes vacant land with approximately 70 acres of the total Plan area developed with a mix of different land uses.

REGIONAL GEOLOGY

The project site is located at the southwestern edge of the Mojave Desert Geomorphic Province, a broad interior region of isolated mountain ranges separated by desert plains and basins. The Western Mojave Desert is a wedge-shaped structural block bounded on the north by the Garlock fault and along the southwest by the San Andreas rift zone, see Plate I, State of California Geomorphic Map. North of the Garlock fault are the Sierra Nevada and Tehachapi Mountains. Southwest of the San Andreas fault are the Transverse Ranges and coastal basins. Regional features of the western Mojave Desert include the alluvial-filled Antelope Valley, San Gabriel and San Bernardino Mountains, the Rosamond Hills, Rosamond Lake, Little Rock Wash and Big Rock Creek. Lancaster is within the Antelope Valley portion of the Western Mojave Desert with the project site within the south-central portion of the Antelope Valley. Lithologic units exposed in this area consist predominantly of Quaternary sediments, including both lacustrine and alluvial deposits.

The regional geology of this area consists of crystalline rock of Pre-Tertiary age, volcanic and sedimentary rock of Tertiary age and alluvial sediments rock of Quaternary age. The crystalline rock of Pre-Tertiary age and volcanic and sedimentary rock of Tertiary age are generally found in the foothills and mountains surrounding Antelope Valley. The Quaternary age alluvial deposits are found in the lower foothills, stream channels and throughout much of the valley floor, see Plate II, Regional Geologic Map.

GEOLOGIC HAZARDS

Regional Faulting: No active faults have been mapped within the project limits based upon local and regional select published geologic maps by the California Geological Survey (2010) or United States Geological Survey fault database (2006). The site is not located within a currently designated Alquist-Priolo Earthquake fault zone. The nearest mapped fault is the Mojave segment of the San Andreas rift zone located approximately 7.2 miles southwest of the site, see Plate III, Regional Fault Map.

Geologic hazards that may affect the region include seismic hazards (ground shaking, surface fault rupture, soil liquefaction, and other secondary earthquake-related hazards), flooding, ground subsidence, and erosion. A discussion follows on the specific hazards to this site.

Seismic Sources: Approximately 38 active faults or seismic zones lie within 46 miles of the project site. The primary seismic hazard to the site is strong ground shaking from earthquakes along regional faults including the San Andreas fault, Garlock fault, Eastern California shear zone, and the many faults within the Los Angeles basin and Inland Empire. The Mojave segment of the San Andreas fault is located approximately 7.2 miles southwest of the site.

Surface Fault Rupture: The project site does not lie within a currently delineated State of California, Alquist-Priolo Earthquake Fault Zone (CGS, 2018). Well-delineated fault lines cross through this region as shown on California Geological Survey (CGS) maps (Jennings, 2010). Therefore, active fault rupture is unlikely to occur at the project site. While fault rupture would most likely occur along previously established fault traces, future fault rupture could occur at other locations.

Historic Seismicity: The site is located within an active seismic area in southern California where large numbers of earthquakes are recorded each year. Plate IV, Earthquake Epicenter Map, depicts epicenters of significant seismic events greater than magnitude 5.5 that occurred in southern California between 1812 and 1999. Magnitudes that are above 6 and prior to accurate instrumental measurements (after 1933) are based on moment magnitudes (M_W). Magnitudes that are below 6 or earthquakes prior to 1933 are based on local magnitudes (M_L).

Approximately 38 earthquakes of magnitude 5.5 or greater have occurred within 60 miles of the site. Significant regional earthquakes include the 1812 Wrightwood, 1857 Fort Tejon, 1872 Owens Valley, 1952 Arvin-Tehachapi, 1971 San Fernando, 1992 Landers, 1994 Northridge, and 1999 Hector Mine earthquakes. Strong ground motions were experienced with magnitudes ranging from approximately 5.9 to 7.8. Major historic earthquakes felt in the vicinity of Lancaster have usually originated from faults located outside the area. With the exception of the 1812 Wrightwood and 1857 Fort Tejon earthquakes, these include the 1872 Owens Valley, 1952 Kern County, 1971 San Fernando, 1987 Whittier Narrows, 1992 Landers, 1994 Northridge, and 1999 Hector Mine earthquakes (see Table 1). Of recent note, the July 6, 2019, 7.1 magnitude Ridgecrest earthquake was about 80 miles north-northeast of Lancaster.

Historically, the San Andreas fault is responsible for two of the three great earthquakes experienced in California. These are the 1857 Fort Tejon and 1906 San Francisco earthquakes. Each event is credited with approximately 200 miles of surface rupture and horizontal displacements as great as 30 feet. Ground shaking was very intense and damage to man-made structures widespread. The 1857 rupture extended along the San Andreas fault from Parkfield to Cajon Pass and was felt throughout most of California. No significant earthquakes or fault movements have been attributed to this segment of the San Andreas fault since 1857. Prior to 1857, a strong earthquake that occurred in 1812 near Wrightwood, a small community in the eastern San Gabriel Mountains, originated on the San Andreas fault.

On March 26, 1872, the greatest recorded earthquake in the western United States, excluding Alaska, occurred along the Owens Valley fault near Lone Pine. The earthquake is estimated to have had a Richter magnitude of about 8.3, and significantly shook most of California.

In 1952, the White Wolf fault, located approximately 52 miles northwest of Lancaster, was responsible for the Kern County earthquake. The earthquake registered 7.5 on the Richter Scale and did significant damage to the Bakersfield and Tehachapi areas. Considerable damage occurred to unreinforced masonry structures and to railroad tunnels located nearby.

The 1971 San Fernando earthquake resulted in extensive damage to structures in parts of San Fernando and the Santa Clarita Valley. The epicenter of the earthquake was located near Soledad Junction approximately 22 miles southwest of Lancaster. Strong motion accelerographs recorded ground accelerations as high as 1.25 g at Pacoima Dam near the epicenter of the earthquake. Some structures designed in accordance with the Building Code in effect at the time were extensively damaged. Freeways, hospitals, schools, electrical facilities, water projects, and some residential structures sustained light to major damage as a result of severe ground shaking.

The 1987 Whittier Narrows earthquake shook the Antelope Valley for several seconds. The epicenter of this 5.9 magnitude earthquake, located near Monterey Park, was approximately 44 miles south of Lancaster. This earthquake occurred on an unsuspected seismogenic feature known as a buried, or blind, thrust fault that underlies the Elysian Park-Montebello Hills area.

The major 1992 Landers/Big Bear earthquakes also shook the Lancaster area. Damage in the western Antelope Valley was minimal. This earthquake was generated by a system of strike-slip faults in the mountain and desert areas about 104 miles east of Lancaster. Structural damage and loss of life was limited primarily because of the remote area of occurrence.

The 1994 Northridge earthquake and related aftershocks significantly shook the Lancaster area for 10 to 20 seconds. Like the Whittier Narrows earthquake, this event was produced by a buried thrust fault that underlies portions of the San Fernando Valley and the Santa Susana Mountains. The epicenter of the Northridge earthquake was approximately 39 miles southwest of Lancaster.

Another major earthquake to affect the Lancaster area was the 1999 Hector Mine earthquake. The epicenter of this magnitude 7.1 earthquake was approximately 106 miles east of Lancaster. Approximately 26 miles of surface rupture occurred along the Lavic Lake fault and the central section of the Bullion fault.

The last major earthquake to affect the Lancaster area was the July 2019 Ridgecrest earthquake. The epicenter of this magnitude 7.1 earthquake was approximately 80 miles north-northeast of Lancaster. Surface rupture occurred near segments of the Little Lake fault zone near Ridgecrest. Geologic evaluation of this earthquake is underway.

Table 1 lists significant recorded earthquakes felt in the Lancaster area and the estimated intensity of ground shaking near the site based on the Modified Mercalli Scale. A description of damage based on the Modified Mercalli Scale is included as Table 2.

Table 1
Significant Historical Earthquakes

Earthquake	~ Distance to Epicenter Miles (km)	Earthquake Magnitude*	Estimated Intensity**	Date
Fort Tejon	102 (164)	7.8	VIII-IX	1857
Owens Valley	139 (224)	7.6	VI	1872
Kern County	53 (85)	7.5	VI	1952
Sylmar	23 (37)	6.5	VI-VII	1971
Whitter	43 (69)	5.9	IV	1987
Landers	104 (167)	7.3	V	1992
Big Bear	84 (135)	6.4	V	1992
Northridge	39 (63)	6.7	V	1994
Hector Mine	106 (171)	7.1	V	1999
Ridgecrest	80 (129)	7.1	IV-V	2019

* Moment Magnitude after 1933 or above 6, or Local Magnitude prior to 1933 or below 6 (S.C.E.C.)

** Modified Mercalli Scale

From this analysis, it appears that the past maximum intensity in the Lancaster area from historical earthquakes due to regional faults is on the order of VIII-IX on the Modified Mercalli Scale. Anticipated intensities from a local 7+ magnitude earthquake along the nearby San Andreas fault is VIII-IX.

Table 2**Modified Mercalli Intensity Scale of 1931¹, (1956 version)²**

Masonry A, B, C, D. To avoid ambiguity of language, the quality of masonry, brick or otherwise, is specified by the following lettering.

<i>Masonry A</i>	Good workmanship, mortar, and design; reinforced, especially laterally and bound together by using steel, concrete, etc.; designed to resist lateral forces.
<i>Masonry B</i>	Good workmanship and mortar; reinforced, but no designed in detail to resist lateral forces.
<i>Masonry C</i>	Ordinary workmanship and mortar; no extreme weaknesses like failing to tie in at corners, but neither reinforced nor designed against horizontal forces.
<i>Masonry D</i>	Weak materials, such as adobe; poor mortar; low standards of workmanship; weak horizontally.

I.	Not felt. Marginal and long-period effects of large earthquakes.
II.	Felt by persons at rest, on upper floors, or favorably placed.
III.	Felt indoors. Hanging objects swing. Vibration like passing of light trucks. Duration estimated. May not be recognized as an earthquake.
IV.	Hanging objects swing. Vibrations like passing of heavy trucks; or sensation of a jolt like a heavy ball striking the walls. Standing motor cars rock. Windows, dishes, doors rattle. Glasses clink. Crockery clashes. In the upper range of IV wooden walls and frame creak.
V	Felt outdoors; direction estimated. Sleepers wakened. Liquids disturbed, some spilled. Small unstable objects displaced or upset. Doors swing, close, open. Shutters, pictures move. Pendulum clocks stop, start, change rate.
VI.	Felt by all. Many frightened and run outdoors. Persons walk unsteadily. Windows, dishes, glassware broken. Knickknacks, books, etc., off shelves. Pictures off walls. Furniture moved or overturned. Weak plaster and masonry D cracked. Small bells ring (church, school). Trees, bushes shaken visibly, or heard to rustle.
VII.	Difficult to stand. Noticed by drivers of motor cars. Hanging objects quiver. Furniture broken. Damage to masonry D, including cracks. Weak chimneys broken at roof line. Fall of plaster, loose bricks, stones, tiles, cornices also unbraced parapets and architectural ornaments. Some cracks in masonry C. Waves on ponds; water turbid with mud. Small slides and caving in along sand or gravel banks. Large bells ring. Concrete irrigation ditches damaged.
VII.	Steering of motor cars affected. Damage to masonry C; partial collapse. Some damage to masonry B; none to masonry A. Fall of stucco and some masonry walls. Twisting, fall of chimneys, factory stacks, monuments, towers, elevated tanks. Frame houses moved on foundations if not bolted down; loose panel walls thrown out. Decayed piling broken off. Branches broken from trees. Changes in flow or temperature of springs and wells. Cracks in wet ground and on steep slopes.
IX.	General panic. Masonry D destroyed; masonry C heavily damaged, sometimes with complete collapse; masonry B seriously damaged. General damage to foundations. Frame structures, if not bolted, shifted off foundations. Frames racked. Serious damage to reservoirs. Underground pipes broken. Conspicuous cracks in ground. In alluviated areas sand and mud ejected, earthquake fountains, sand craters.
X.	Most masonry and frame structures destroyed with their foundations. Some well-built wooden structures and bridges destroyed. Serious damage to dams, dikes, embankments. Large landslides. Water thrown on banks of canals, rivers, lakes, etc. Sand and mud shifted horizontally on beaches and flat land. Rails bent slightly.
XI.	Rails bent greatly. Underground pipelines completely out of service.
XII.	Damage nearly total. Large rock masses displaced. Lines of sight and level distorted. Objects thrown into the air.

¹Original 1931 version in Wood, H.O., and Neumann, F., 1931, Modified Mercalli intensity scale of 1931: Seismological Society of America Bulletin, v. 53, no. 5, p. 979-987.

²1956 version prepared by Charles F. Richter, in Elementary Seismology, 1958, p. 137-138, W. H. Freeman & Co.

Soil Liquefaction and Lateral Spreading: Liquefaction is the loss of soil strength from sudden shock (usually earthquake shaking), causing the soil to become a fluid mass. Liquefaction describes a phenomenon in which saturated soil loses shear strength and deforms as a result of increased pore water pressure induced by strong ground shaking during an earthquake. Dissipation of the excess pore pressures will produce volume changes within the liquefied soil layer, which can cause settlement. Shear strength reduction combined with inertial forces from the ground motion may also result in lateral migration (lateral spreading). Factors known to influence liquefaction include soil type, structure, grain size, relative density, confining pressure, depth to groundwater, and the intensity and duration of ground shaking. Soils most susceptible to liquefaction are saturated, loose sandy soils and low plasticity clay and silt.

The anticipated soils within this project site generally range from non-plastic silts, sands, and clays with low plasticity. In general, for the effects of liquefaction to be manifested, groundwater levels typically must be within 50 feet of the ground surface and the soils within the saturated zone must also be susceptible to liquefaction. We consider the potential for liquefaction to occur throughout most of this site as low based on historic groundwater depths greater than 100 feet bgs. However, the Amargosa Creek zone which crosses the site diagonally in the southwestern portion is considered a “Liquefaction Zone” which is defined by the California Geologic Survey (CGS) as “*Areas where historical occurrence of liquefaction, or local geological, geotechnical and ground water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required*”, see Plate V, Seismic Hazard Zones Map.

The areas outside the Amargosa Creek zone are not in a CGS mapped liquefaction hazard zone and the potential for perched water to develop on an aerial basis is very low. The potential for lateral spreading is considered low due to non-liquefiable conditions and lack of descending slopes in the proximity of the site.

Fissuring and Ground Subsidence: Subsidence is the gradual settling or sudden sinking of the Earth’s surface due to subsurface movement of earth materials. It can result in the loss of aquifer storage, increased flooding, cracks and fissures at the land surface, damage to man-made structures, and associated economic costs. According to the Scientific Investigations Report 2014-5166 “Groundwater-Flow and Land-Subsidence Model of Antelope Valley, California” (Siade et al. 2014) the project site lies south of an area of measurable land subsidence, see Plate VI, Regional Subsidence Map. Significant dewatering of the Antelope Valley groundwater basin has resulted in groundwater level declines of more than 270 feet in some areas of the basin and by at least 100 ft in most of the Antelope Valley between 1915 and 1996. As a result, as much as 6.6 ft of subsidence has occurred in the Antelope Valley between 1930 and 1992. Based on the referenced 2014 study, Earth Systems estimates a total of approximately 1 foot of subsidence has occurred just north of the site between 1930 and 1992.

Fissures typically are minor ground cracks that are readily expressed and enlarged by water erosion and flow. Since the site will be developed with structures and paving, the erosion potential of water on any ground cracking is considered low.

In areas of fairly uniform thickness of alluvium, fissures are thought to be the result of tensional stress near the ground surface and generally occur near the margins of the areas of maximum subsidence. Surface runoff and erosion of the incipient fissures augment the appearance and size of the fissures. No obvious evidence of fissuring was observed during our review of the referenced historical aerial photographs.

Other Geologic Hazards: Other seismic hazards related to ground shaking include ground lurching, landslides, tsunamis, seiches, and flooding. Ground lurching is generally associated with fault rupture and liquefaction. As these two hazards are considered unlikely, it is Earth Systems opinion that the potential for ground lurching is also low. Due to the inland location of the site, hazards from tsunamis are considered nonexistent.

Landslides and Slope Instability: The site is relatively flat and proposed new slopes are anticipated to be less than 5 feet high. The site is not within any of the Earthquake Induced Landslide Hazard Zones designated by the Seismic Hazard Zone Map for the Lancaster West Quadrangle (CGS, 2005). Therefore, potential hazards from slope instability, landslides, or debris flows are considered very low.

Flooding: The majority of the project site lies in an area designated as Zone X: *Areas of 0.2% annual chance floodplain; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.* The Amargosa Creek zone is designated as Zone A: *Areas subject to inundation by the 1-percent-annual chance flood event generally determined using approximate methodologies. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFE's) or flood depths are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply.* This project area is identified on FEMA Map No.: 06037C0420F, Map Revised September 26, 2008, see Plate VII, FEMA Flood Map. Appropriate project civil design, construction, and maintenance can minimize the site sheet flooding potential.

Seiches: Seiching is defined as a periodic oscillation of liquid within a container or reservoir. Its period is determined by the resonant characteristics of the container, as controlled by its physical dimensions. One large water storage tank is located within or directly adjacent to the central portion of the site, approximately 470 feet east of the east end of W Avenue K-8. Three large water storage facilities are currently located just east of the central part of the site, approximately 250 feet east of the eastern property line. If these tanks were to release water, it is anticipated that existing or planned storm water control facilities and paving and diversion improvements (curbs, gutters, etc.) would minimize the impact on this project site. No other significant water storage facilities are currently located up gradient of the property and the site is not within a dam inundation zone for the Palmdale, Littlerock and Harold Reservoirs. Therefore, it is Earth Systems' opinion that significant hazards due to local reservoir failure (seiches) are considered low.

SOILS

Local Soil Conditions: Lancaster is located upon the generally flat alluvial and playa surface of the middle portion of the valley south of the Rosamond Hills and north of the Sierra Pelona and San Gabriel Mountains. Locally, thick sequences of interbedded alluvium and playa lake deposits underlie the site. Nearby referenced explorations and literature review indicate that the native soils within the project site are alluvial deposits, typically consisting of interbedded layers of silty sand, sand with varying amounts of silt, sandy silt, and silt (SM, SP, and ML soil types based upon the Unified Soil Classification System) with lesser interbedded silty clay and clay (CL) lenses. The site was used for agricultural purposes from prior to 1948 to around 1974, so it is anticipated that some of the upper site soils will consist of artificial fill associated with this farming. It is anticipated that the upper four to five feet will be loose, becoming medium dense to dense below five feet.

The United States Department of Agriculture (USDA) has mapped five different soil types within the project site, which consist of Cajon Loamy Sand (CaA), Hesperia Loamy Fine Sand (HgA), Hesperia Fine Sandy Loam (HkA), Rosamond Fine Sandy Loam (Ro), and Rosamond Loam (Rp). The surface exposure of these soil types has been mapped by the USDA, see Plate VIII, Soil Survey Map for a copy of this map. In general, these soils have a low expansion potential.

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PLATES

PLATE I – State of California Geomorphic Map

PLATE II - Regional Geologic Map

PLATE III - Regional Fault Map

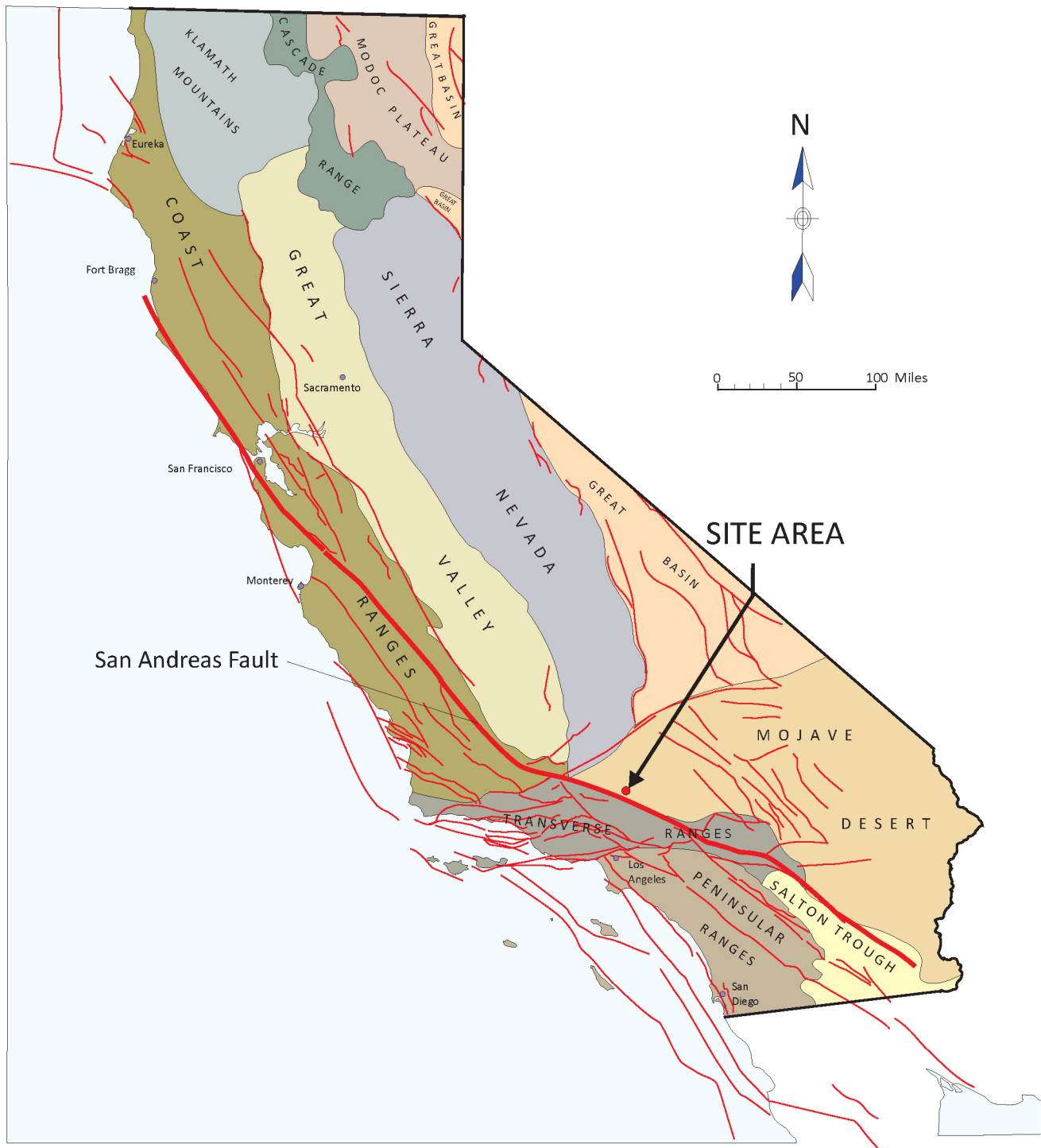
PLATE IV – Earthquake Epicenter Map

PLATE V - Seismic Hazard Zones Map

PLATE VI - Regional Subsidence Map

PLATE VII – FEMA Flood Control Map

PLATE VIII – Soil Survey Map



Map showing geomorphic provinces of California and major active and potentially active faults. Fault locations are based on Jennings (1994) and Blake (2000).

Plate I
State of California Geomorphic Map

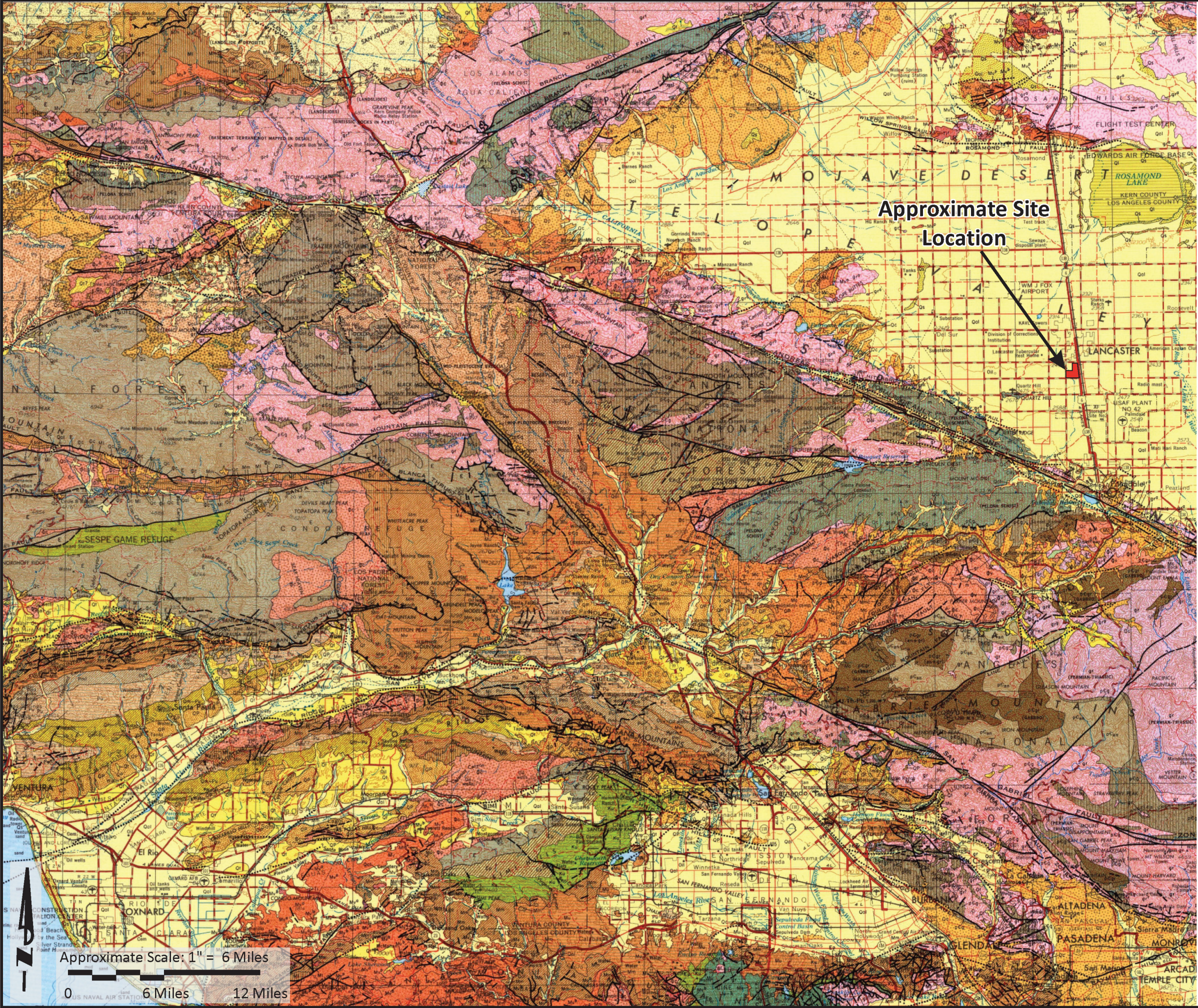
Parkway Village Project
Bordered by 10th Street West, Sierra Highway, Avenue K & Avenue L
Lancaster, Los Angeles County, California



EARTH SYSTEMS

AUGUST 2024

303836-002



LEGEND

	Dune sand		Oligocene nonmarine
	Alluvium		Eocene nonmarine
	Lake deposits		Eocene marine
	Glacial deposits		Paleocene marine
	River terrace deposits		Tertiary nonmarine
	Pleistocene marine and marine terrace deposits		Tertiary marine
	Pleistocene volcanic rocks Qpv ^r -rhyolite Qpv ^a -andesite Qpv ^b -basalt Qpv ^p -pyroclastic rocks		Tertiary intrusive (hypabyssal) rocks Ti ^r -rhyolite Ti ^a -andesite Ti ^b -basalt
	Pleistocene nonmarine		Tertiary lake deposits
	Plio-Pleistocene nonmarine		Tertiary volcanic rocks Tv ^r -rhyolite Tv ^a -andesite Tv ^b -basalt Tv ^p -pyroclastic rocks
	Quaternary and/or Pliocene cinder cones		Upper Cretaceous marine
	Undivided Pliocene nonmarine		Upper Jurassic marine
	Upper Pliocene marine		Mesozoic granitic rocks
	Middle and/or lower Pliocene nonmarine		Mesozoic basic intrusive rocks
	Middle and/or lower Pliocene marine		Mesozoic ultrabasic intrusive rocks
	Pliocene volcanic rocks Pv ^r -rhyolite Pv ^a -andesite Pv ^b -basalt Pv ^p -pyroclastic rocks		Jurassic-Triassic metavolcanic rocks
	Undivided Miocene nonmarine		Pre-Cretaceous metamorphic rocks (ls=limestone)
	Upper Miocene nonmarine		Pre-Cretaceous metasedimentary rocks
	Upper Miocene marine		Pre-Cretaceous metavolcanic rocks
	Middle Miocene marine		Pre-Cenozoic granitic and metamorphic rocks
	Lower Miocene marine		Precambrian igneous and metamorphic rock complex
	Miocene volcanic rocks Mv ^r -rhyolite Mv ^a -andesite Mv ^b -basalt Mv ^p -pyroclastic rocks		Undivided Precambrian metamorphic rocks pCg=gneiss pCs=schist pCl=limestone and/or dolomite
			Undivided Precambrian granitic rocks

- Fault: Dashed where approximate, dotted where concealed

Source: USGS Geologic Map of California, Los Angeles sheet, dated 1969

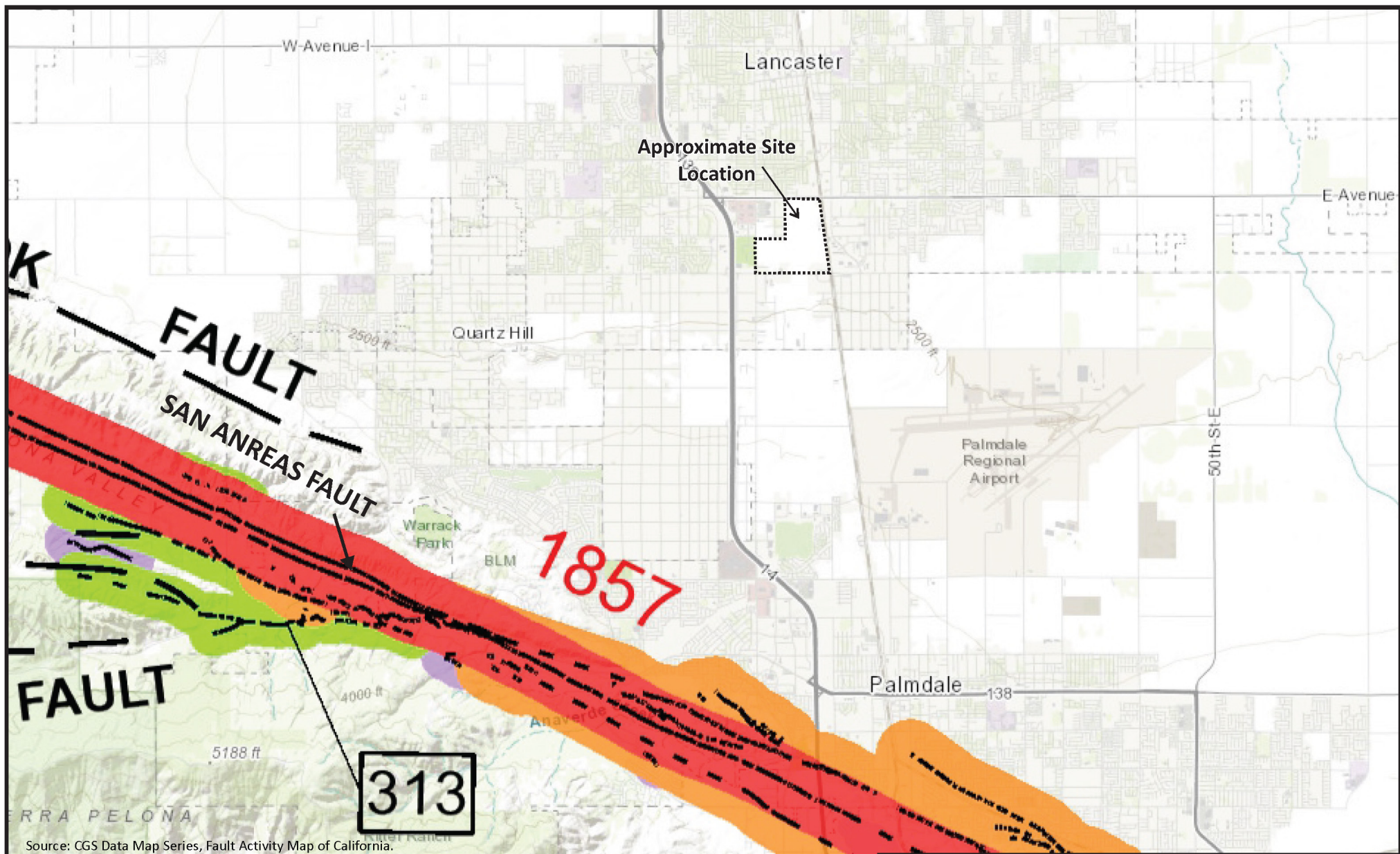
Plate II
Regional Geologic Map

Parkway Village Project
Bordered by 10th Street West, Sierra Highway, Avenue K & Avenue L
Lancaster, Los Angeles County, California



AUGUST 2024

303836-002



LEGEND

- Fault along which historic (last 200 years) displacement has occurred.
- Fault along which Holocene (last 11,700 years) displacement, has occurred.
- Fault along which Late Quaternary (past 700,000 years) displacement has occurred.
- Fault along which Quaternary (past 1.6 million years) displacement has occurred.



Plate III Regional Fault Map

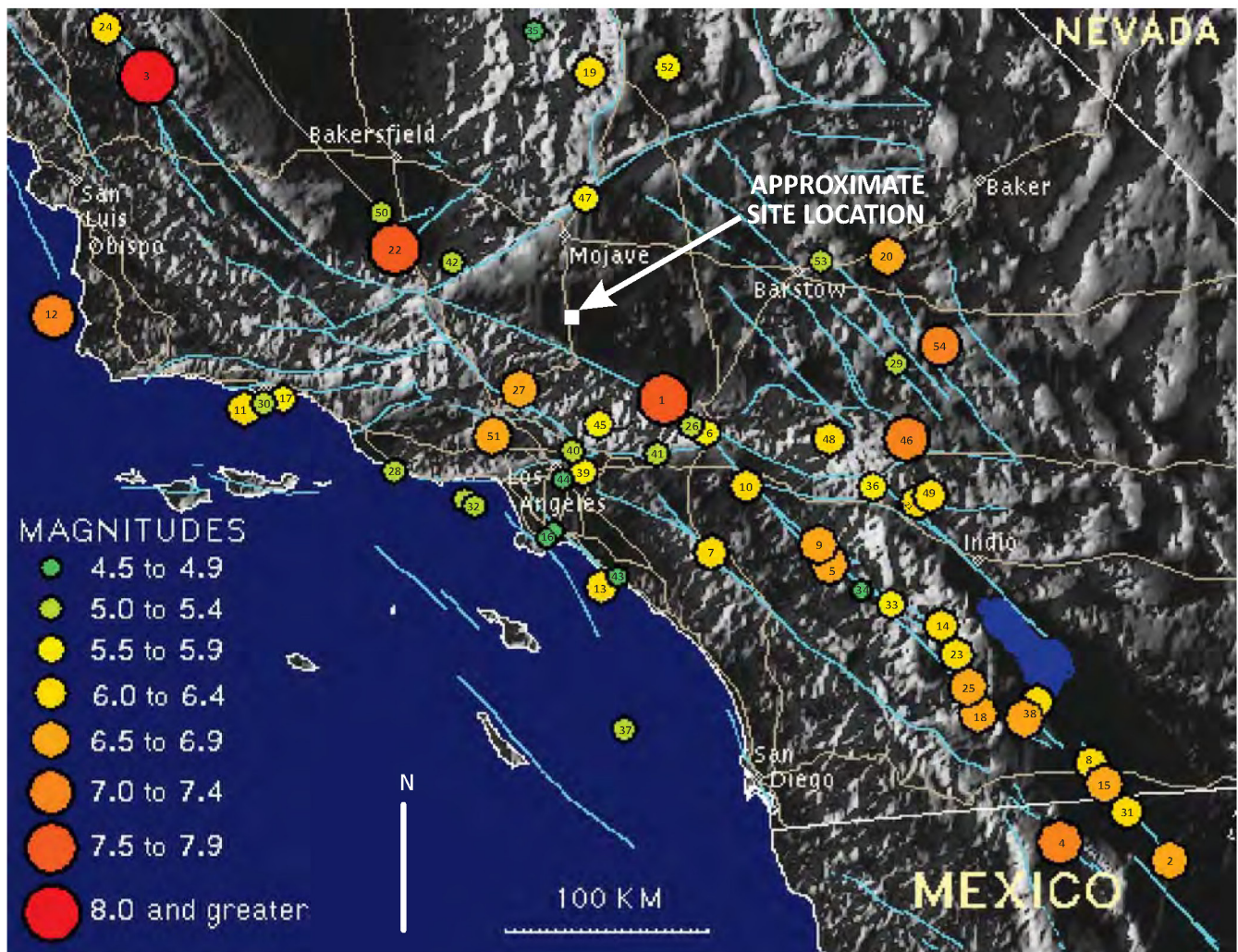
Parkway Village Project
Bordered by 10th Street West, Sierra Highway, Avenue K & Avenue L
Lancaster, Los Angeles County, California



EARTH SYSTEMS

AUGUST 2024

303836-002



HISTORIC EARTHQUAKES AND EPICENTERS

- | | | |
|--------------------------------|----------------------------------|---|
| 1. 1812, WRIGHTWOOD | 19. 1946, WALKER PASS | 37. 1986, OCEANSIDE |
| 2. 1852, VOLCANO LAKE | 20. 1947, MANIX | 38. 1987, ELMORE RANCH & SUPERSTITION HILLS |
| 3. 1857, FORT TEJON | 21. 1948, DESERT HOT SPRINGS | 39. 1987, WHITTIER NARROWS |
| 4. 1892, LAGUNA SALADA | 22. 1952, KERN COUNTY | 40. 1988, PASADENA |
| 5. 1899, SAN JACINTO | 23. 1954, SAN JACINTO | 41. 1988, UPLAND |
| 6. 1899, CAJON PASS | 24. 1966, PARKFIELD | 42. 1988, TEJON RANCH |
| 7. 1910, ELSINORE | 25. 1968, BORREGO MOUNTAINS | 43. 1989, NEWPORT BEACH |
| 8. 1915, IMPERIAL VALLEY | 26. 1970, LYTLE CREEK | 44. 1989, MONTEBELLO |
| 9. 1918, SAN JACINTO | 27. 1971, SAN FERNANDO | 45. 1991, SIERRA MADRE |
| 10. 1923, NORTH SAN JACINTO | 28. 1973, POINT MAGU | 46. 1992, LANDERS |
| 11. 1925, SANTA BARBARA | 29. 1975, GALWAY LAKE | 47. 1992, MOJAVE |
| 12. 1927, LOMPOC | 30. 1978, SANTA BARBARA | 48. 1992, BIG BEAR |
| 13. 1933, LONG BEACH | 31. 1979, IMPERIAL VALLEY | 49. 1992, JOSHUA TREE |
| 14. 1937, SAN JACINTO | 32. 1979, MALIBU | 50. 1993, WHEELER RIDGE |
| 15. 1940, IMPERIAL VALLEY | 33. 1980, WHITE WASH | 51. 1994, NORTHRIDGE |
| 16. 1941, TORRANCE-GARDENA | 34. 1982, ANZA GAP | 52. 1995, RIDGECREST |
| 17. 1941, SANTA BARBARA | 35. 1983, DURRWOOD MEADOWS SWARM | 53. 1997, CALICO |
| 18. 1942, FISH CREEK MOUNTAINS | 36. 1986, NORTH PALM SPRINGS | 54. 1999, HECTOR MINE |

MAP SHOWING LOCATIONS OF SIGNIFICANT HISTORICAL EARTHQUAKES IN SOUTHERN CALIFORNIA FROM 1812 TO 2000

SOURCE: SOUTHERN CALIFORNIA EARTHQUAKE CENTER, WEB PAGE, 2000

Plate IV Earthquake Epicenter Map

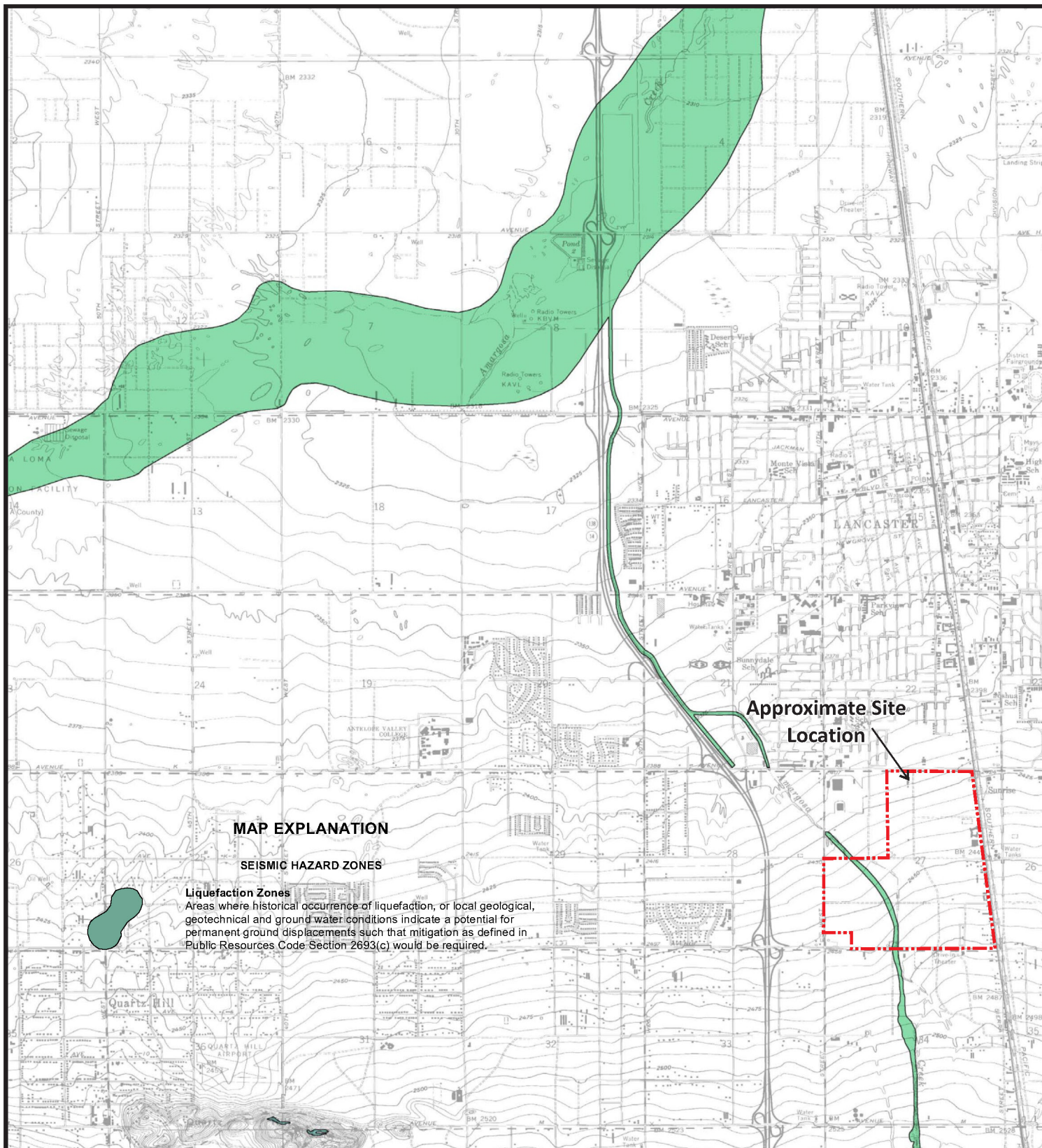
Parkway Village Project
Bordered by 10th Street West, Sierra Highway, Avenue K & Avenue L
Lancaster, Los Angeles County, California



EARTH SYSTEMS

AUGUST 2024

303836-002



MAP EXPLANATION

SEISMIC HAZARD ZONES

Liquefaction Zones

Areas where historical occurrence of liquefaction, or local geological, geotechnical and ground water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

Source: Seismic Hazard Zones, Lancaster West Quadrangle (CGS, 2/11/2005)

Approximate Scale: 1" = 4,000 feet

0 ft. ~ 2,000 ft. ~ 4,000 ft.



Plate V Seismic Hazard Zones

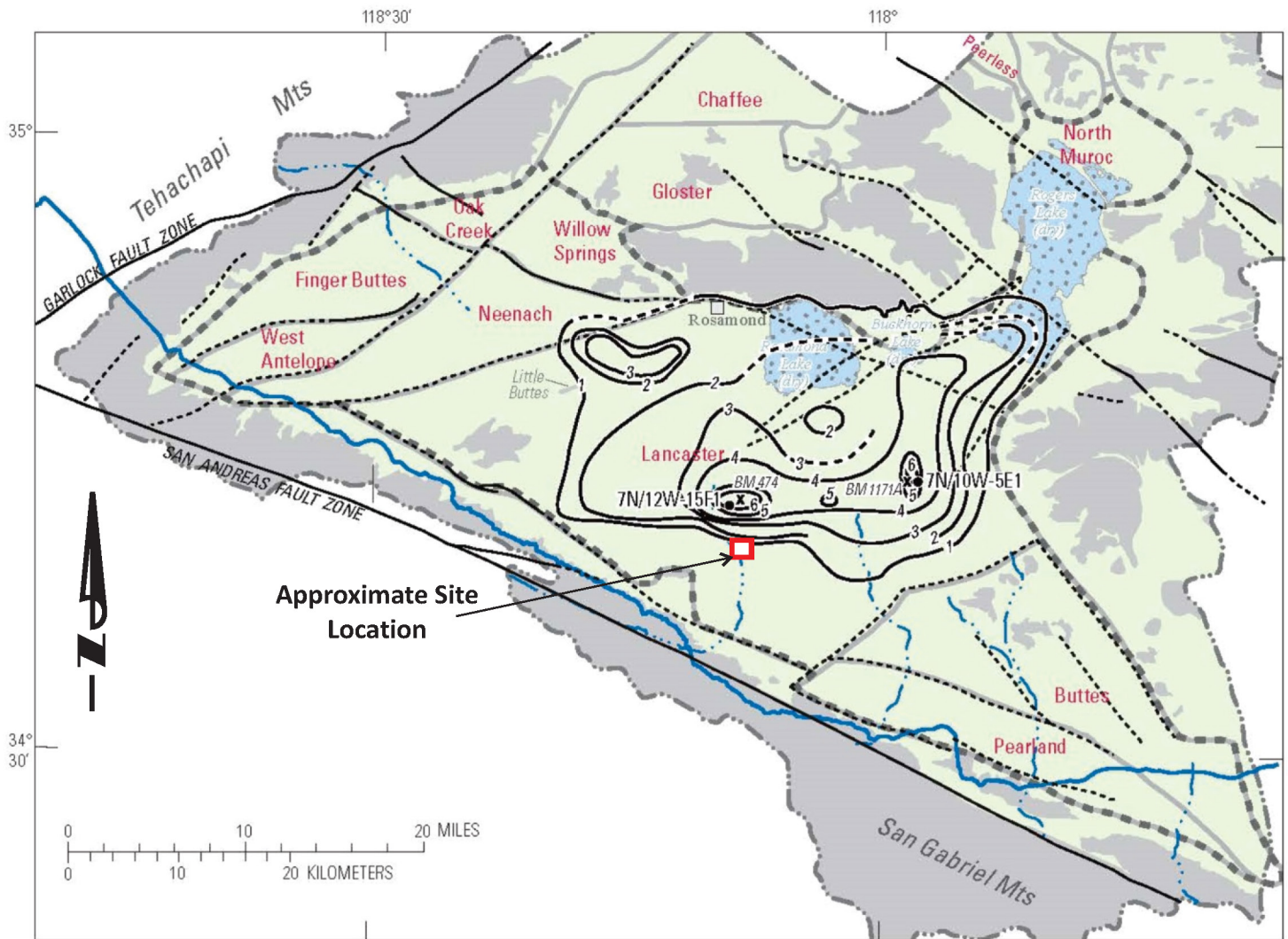
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EARTH SYSTEMS

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Modified from Leighton and Phillips, 2003.

EXPLANATION

Geologic type

- Alluvial deposits
- Bedrock
- Playa surface

- 2 ——— Line of equal measured subsidence, in feet—
Dashed where approximately located.
Interval 1 foot (modified from Ikehara
and Phillips, 1994)

- Fault—Dashed where inferred
(modified from Dibblee, 1963;
Ward and others, 1993;
Nishikawa and others, 2001)

- Antelope Valley drainage basin

- Antelope Valley groundwater
basin

- Groundwater subbasin

- California Aqueduct

- Stream channel

7N/12W-15F1

● Well and State well number

BM 474 x Bench mark and number

Plate VI Regional Subsidence Map

Parkway Village Project
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Lancaster, Los Angeles County, California



EARTH SYSTEMS

Source: USGS, 2014

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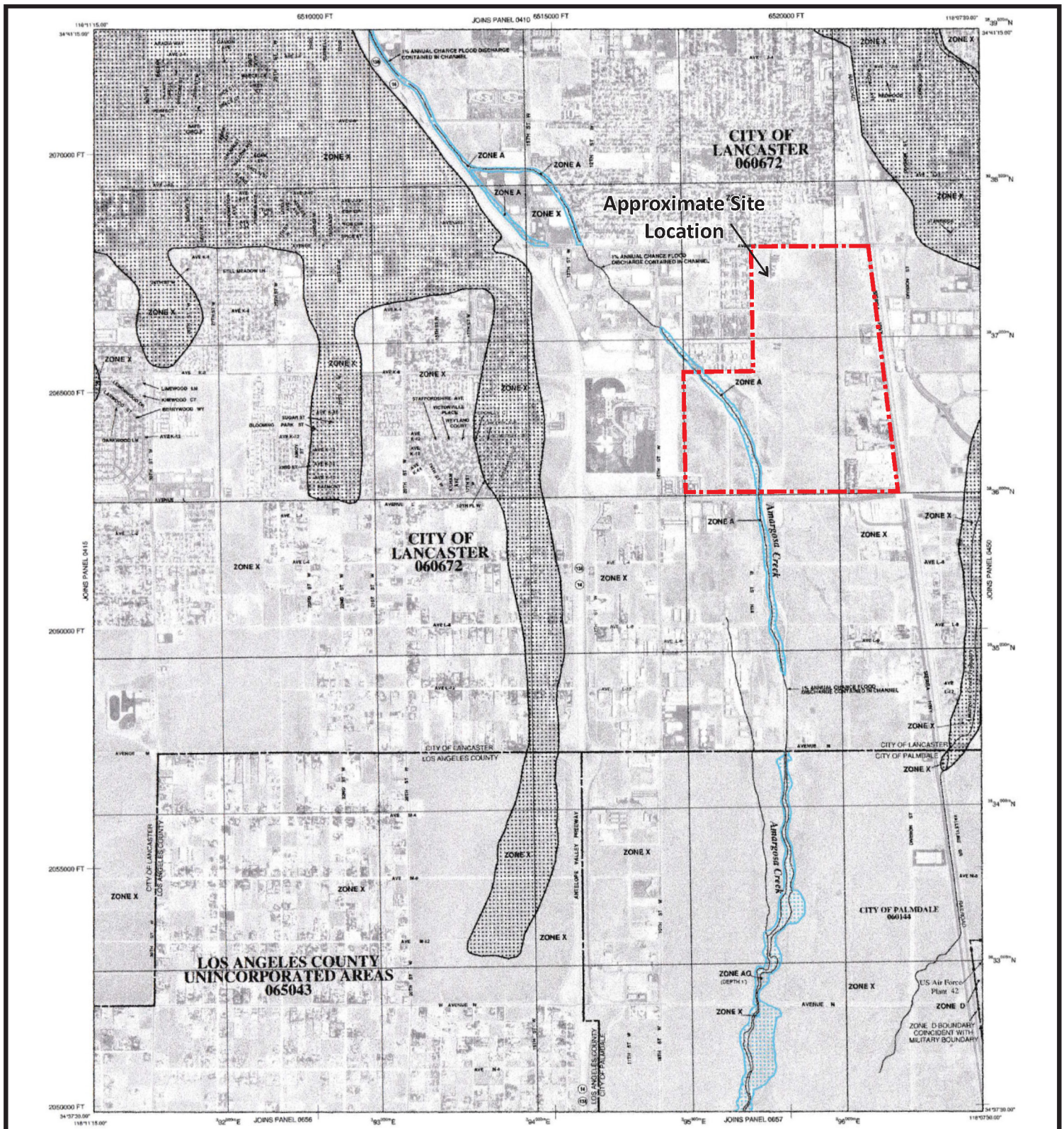


Plate VII
FEMA Flood Control Map

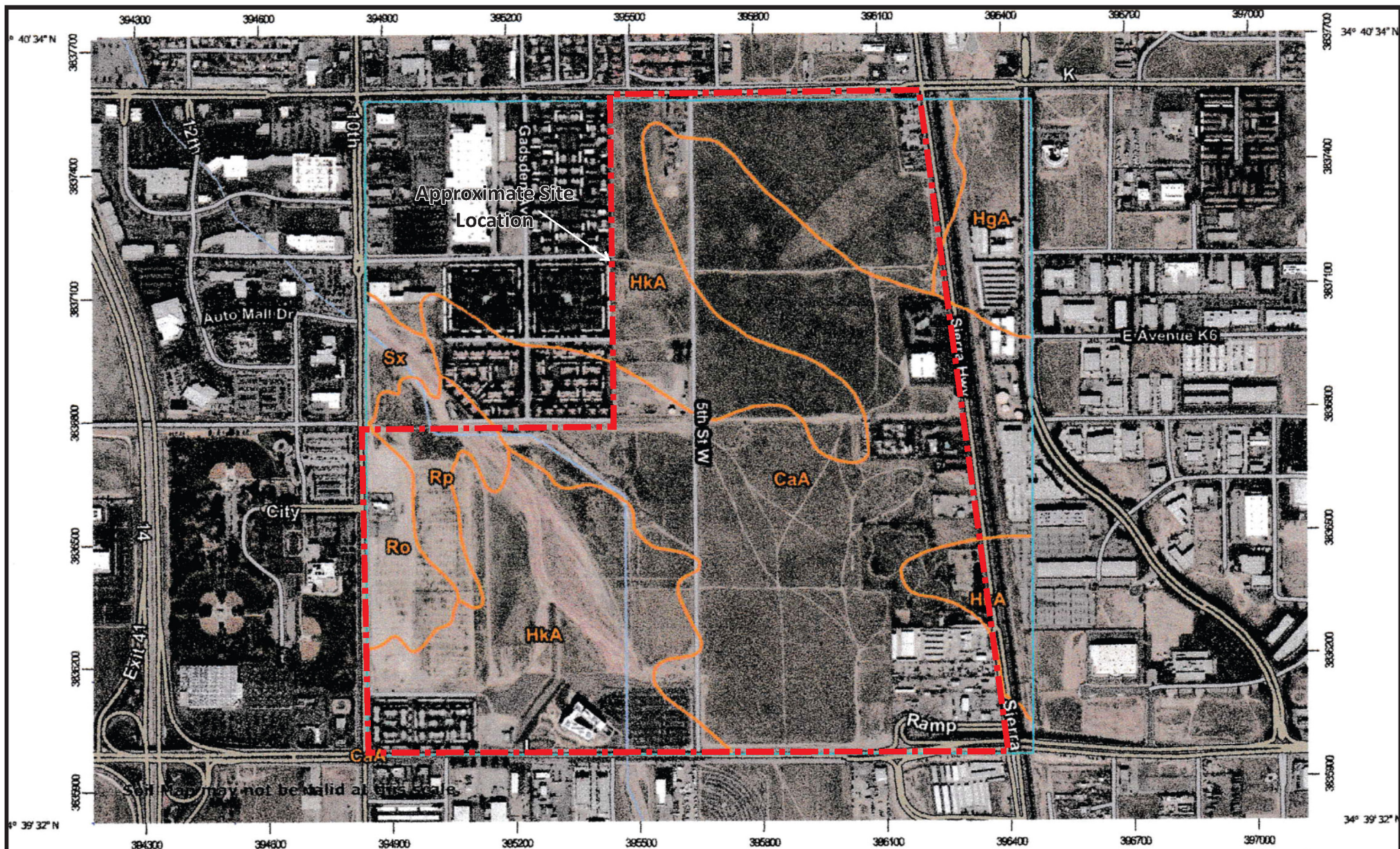
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Source: Flood Insurance Rate Map, Los Angeles, California

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LEGEND

CaA- Cajon Loamy Sand
 HgA- Hesperia Loamy Fine Sand
 HkA- Hesperia Fine Sandy Loam
 Ro- Rosa Fine Sandy Loam
 Rp- Rosa Loam
 Sx- Sunrise Loam.



Plate VIII Soil Survey Map

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EARTH SYSTEMS

AUGUST 2024

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