Geology and Soils Report

3730 Francis Avenue
Battery Storage Project
San Bernardino County, California

June 22, 2023

Prepared for

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1.0 INTRODUCTION

Capacity Power Group, LLC (CPG), and ENGIE Distributed Storage Development LLC (ENGIE) propose to build a battery energy storage project at 3730 Francis Avenue (Project), Chino, California (see Figure 1). The proposed facility would be a standalone, utility scale project located adjacent to the Francis Substation, which is owned and operated by Southern California Edison (SCE). The project site is currently used for a private residence with multiple separate buildings.

2.0 PROJECT DESCRIPTION

CPG and ENGIE are proposing to construct and operate the 3730 Francis Avenue Battery Storage Project (Project) in San Bernardino County, California. The proposed facility would be a 40-megawatt, 160 megawatt-hour, standalone energy storage facility with a footprint of 18,160 square feet. The purpose of the facility is to provide reliable and flexible power to the local electrical system. The Project would support the California renewable energy standards and substantially increase local energy storage capacity.

The parcel on which the Project would be located includes approximately 1.5 acres of land that is immediately adjacent to the SCE Francis Substation. This location is approximately 1 mile north of State Highway 60 at the corner of S. East End Avenue and Francis Avenue.

The Project would connect to the substation via a 66-kilovolt transmission line. The Project site and the substation are each within the sphere of influence of the City of Chino, but are actually located in unincorporated San Bernardino County.

Construction is anticipated to start later this year, be completed in 2024, and come online in the last quarter of 2024. Work will require demolition and clearing of the existing structures and vegetation, grading, installation of foundations, placement of battery housing structures, trenching, and connecting the new facility to the existing SCE substation.

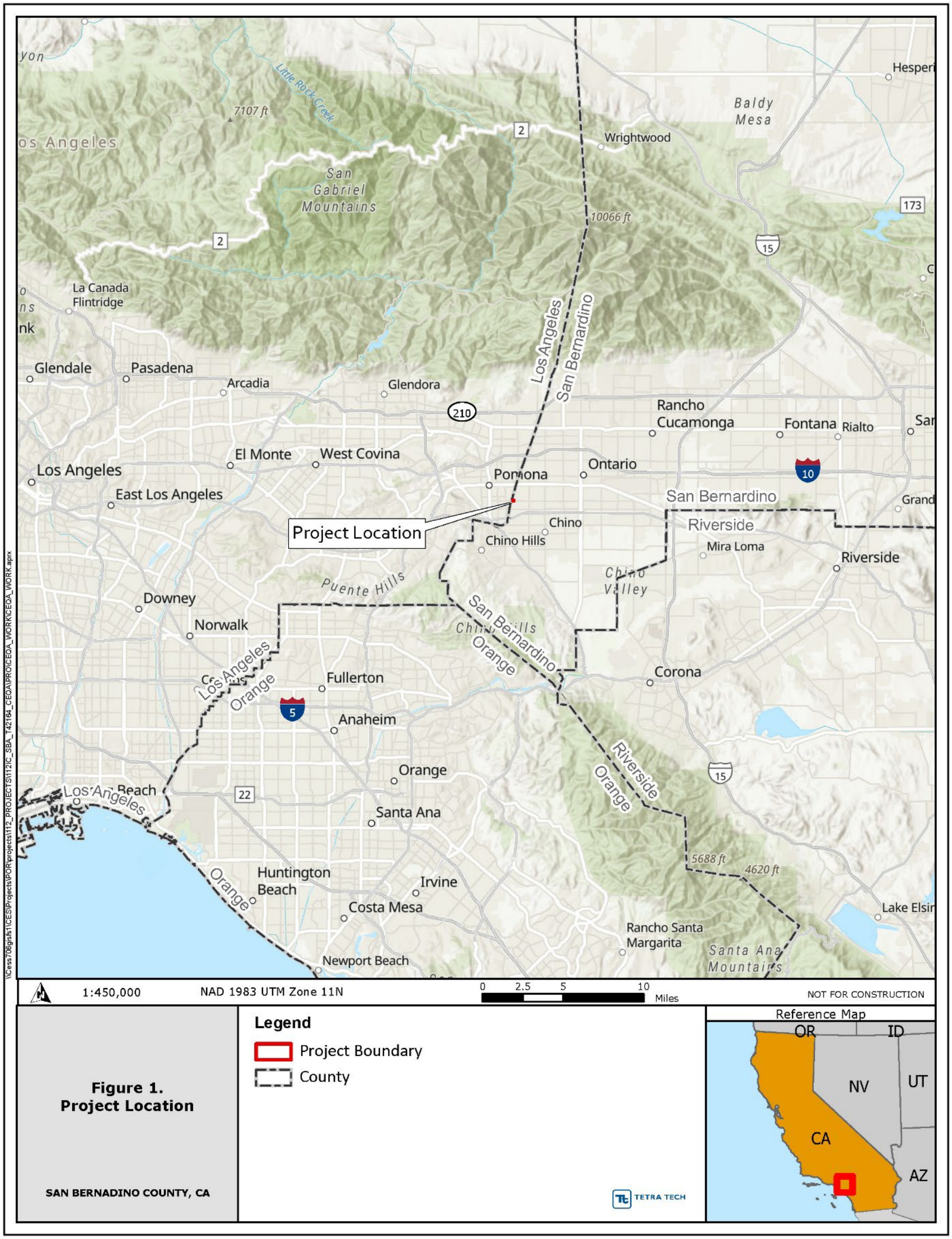
3.0 PROJECT SETTING

The Project is located in the greater Los Angeles Basin, which is bounded by the San Gabriel Mountains to the north, San Bernardino Mountains to the northeast, and the Santa Ana Mountains to the south and southeast. The site is further located south of Interstate Freeway 5, west of State Route 83, north of State Highway 60, and east of State Highway 71.

3.1 Regional Geomorphology

The proposed site falls within the Peninsular Ranges Geomorphic Province, which includes multiple mountain ranges (of which the Santa Ana Mountains is one) and numerous valleys (particularly the Los Angeles Basin at the northern end of this province). As shown in Figure 2, this province is bounded on the north by the Transverse Ranges Geomorphic Province, comprised in part by the San Gabriel and San Bernardino Mountains (CGS 2002). The landform that characterizes the general area of the site is a bajada surface, a nearly flat, sloping surface formed by coalescing alluvial fans originating from the San Gabriel Mountains and sloping generally toward the south. The U. S. Geological Survey

(USGS) 7.5-minute topographic quadrangle for this location shows that the property itself is very flat, with less than 5 feet of relief between the north end and the south end (USGS 1981).


Project Location
San Gabriel Mountains
Wrightwood
Baldy Mesa
La Canada Flintridge
Glendale
Pasadena
Arcadia
Glendora
Rancho Cucamonga
Fontana
Rialto
Los Angeles
El Monte
West Covina
Pomona
Ontario
East Los Angeles
San Bernardino
Riverside
Chino
Chino Hills
Mira Loma
Puente Hills
Chino Valley
Downey
Norwalk
Fullerton
Anaheim
Corona
Orange
Santa Ana
Huntington Beach
Irvine
Costa Mesa
Newport Beach
Rancho Santa Margarita
Santa Ana Mountains
Lake Elsinore
1:450,000
NAD 1983 UTM Zone 11N
0 2.5 5 10 Miles
NOT FOR CONSTRUCTION
Figure 1.
Project Location
SAN BERNADINO COUNTY, CA
Legend
Project Boundary
County
TETRA TECH
Reference Map
OR
ID
NV
UT
CA
AZ

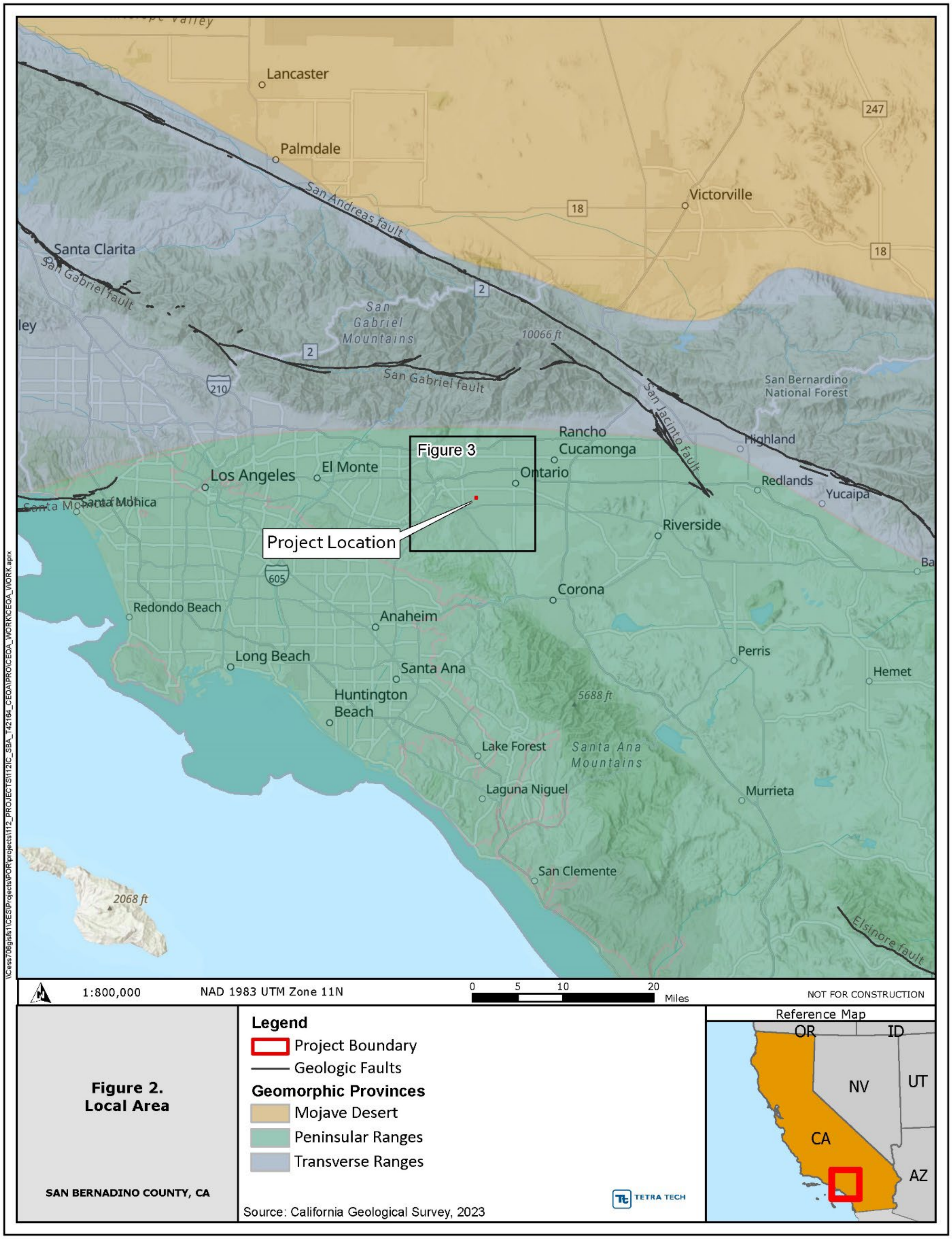


Figure 2. Local Area

3.2 Local Geology

The geology of the Los Angeles Basin is characterized by significant faulting, uplift of the surrounding mountains, and both horizontal and vertical movement of large structural blocks within the basin. At various locations within the basin, discontinuous depositional sequences covering 70 million years and continuous records of subsidence and deposition occurring over the last 10 million years can be found. Four significant structural blocks have been identified in the basin (Figure 3). The "northeastern block" lies beneath the Project site, which is near the northern edge of the block and just south of the San Gabriel Mountains. The "basement" rocks that comprise the northeastern block are a combination of igneous intrusive rocks and metamorphic rocks (some of which are metamorphosed sedimentary rocks). The top of this block is covered by as much as 11,000 feet of sediments in places (note especially the San Gabriel Valley), but these overlying sediments taper to much thinner sequences at the base of the San Gabriel Mountains (Yerkes et al. 1965).

Underlying the Project site are thick sequences of unconsolidated non-marine deposits almost entirely derived from alluvial fan activity. The surficial sediments on the Project site are characterized as Young Alluvial-fan Deposits (Middle Holocene age, or less than 1 million years in place), while adjacent areas (i.e., one street-block in either direction) are characterized as Young Alluvial-fan Deposits (Late Holocene age, or even more recent placement; Morton and Miller 2003). While the Project site is very flat and gently sloping, tectonic activity and movement of the blocks have formed areas with much greater relief than the flat alluvial surfaces. The Puente Hills are an example of such activity, and some of their northern extremities are within 2 miles of the Project site (to the southwest).

3.3 Geologic Hazards

Faulting and Seismicity. The Los Angeles Basin contains numerous major fault zones, many of which correspond with the edges of the structural blocks; hence, the closest Alquist-Priolo "Zones of Required Investigation" are along the edges of the northeast block. Located along the northern edge are the Sierra Madre Fault (at its closest point, approximately 12 miles northwest of the Project site) and the Cucamonga Fault (approximately 8.6 miles north-northeast of the Project site). Located along the southern edge is the Whittier Fault zone (approximately 9.8 miles southwest of the Project site at its closest point). The closest to the Project site, the Chino Fault, is on the eastern edge of the northeast block. It is also at the northern end of the Elsinore Fault zone, which is located on the eastern side of the Santa Ana Mountains and extends well out of the Los Angeles Basin toward the southeast. At its nearest location to the Project site, it is approximately 4.7 miles to the south-southeast (CGS 2023).

While these faults are relatively distant from the Project site, they are close enough that they could cause ground shaking at the Project site in the event of a significant earthquake. They are not close enough, however, to cause a ground surface rupture at the site, and no other faults have been identified at or closer to the Project site than the faults noted above.

Landslide and Slope Failure. The topography at the site, flat with a very gentle slope to the south, does not create the potential for landslides to occur. The surrounding area, at least 1 or 2 miles in any direction, is also flat and gently sloped. The interactive map identifying earthquake zones of required investigation also provides information on areas of concern for landslide potential. The flat surface on which the Project site is located has no landslide zones identified. The nearest location mapped landslide potential is in the Puente Hills approximately 2 miles to the southwest of the Project site (CGS 2023).

Land Subsidence. Subsidence in an area of native soils and geology, with no significant alterations (such as large fills) is generally caused by some type of subsurface activity, such as groundwater pumping or oil and gas extraction. The Chino Groundwater Basin in the southwestern corner of San Bernardino County has had significant groundwater pumping starting in the early 1900s. The basin includes the cities of Chino, Chino Hills, Pomona, Ontario, and Upland, and encompasses the Project site. Water levels declined more than 131 feet through 1978, causing as much as 3.9 feet of subsidence from 1986 through 1993 (Stewart et al. 1998; Lofgren 1971). Significant earth fissures developed as early as 1973 and have been documented through 1995 in conjunction with 2.3 feet of subsidence. Earth fissures developed along a flexure zone or can be due to differential subsidence associated with a hidden fault-zone/groundwater barrier. The Chino fissure zone has an estimated depth of deformation of as much as 1,400 feet, a width up to 600 feet, and a length of almost 2 miles in a northwesterly direction across the basin (USGS 2023a).

The Chino fissure zone does not extend north of State Highway 60, and no specific documentation of measured subsidence in the vicinity of the Project site was found during this desktop review. However, additional investigation into subsidence at the site would be a valuable addition to the site-specific geotechnical investigation.

Liquefaction. Based on the geology of the site (i.e., coarse alluvial fan deposits) and the extractive groundwater pumping from the regional aquifer (i.e., the Chino Groundwater Basin), it is unlikely that conditions favoring the occurrence of liquefaction during an earthquake would be found at this location. Liquefaction requires very shallow groundwater levels and loosely compacted soil or sediments for the soil/sediment to exhibit liquid-like tendencies rather than remaining solid. Nevertheless, it would be prudent to evaluate such conditions during the site-specific geotechnical investigation by establishing groundwater levels at depth and gathering subsurface compaction data.

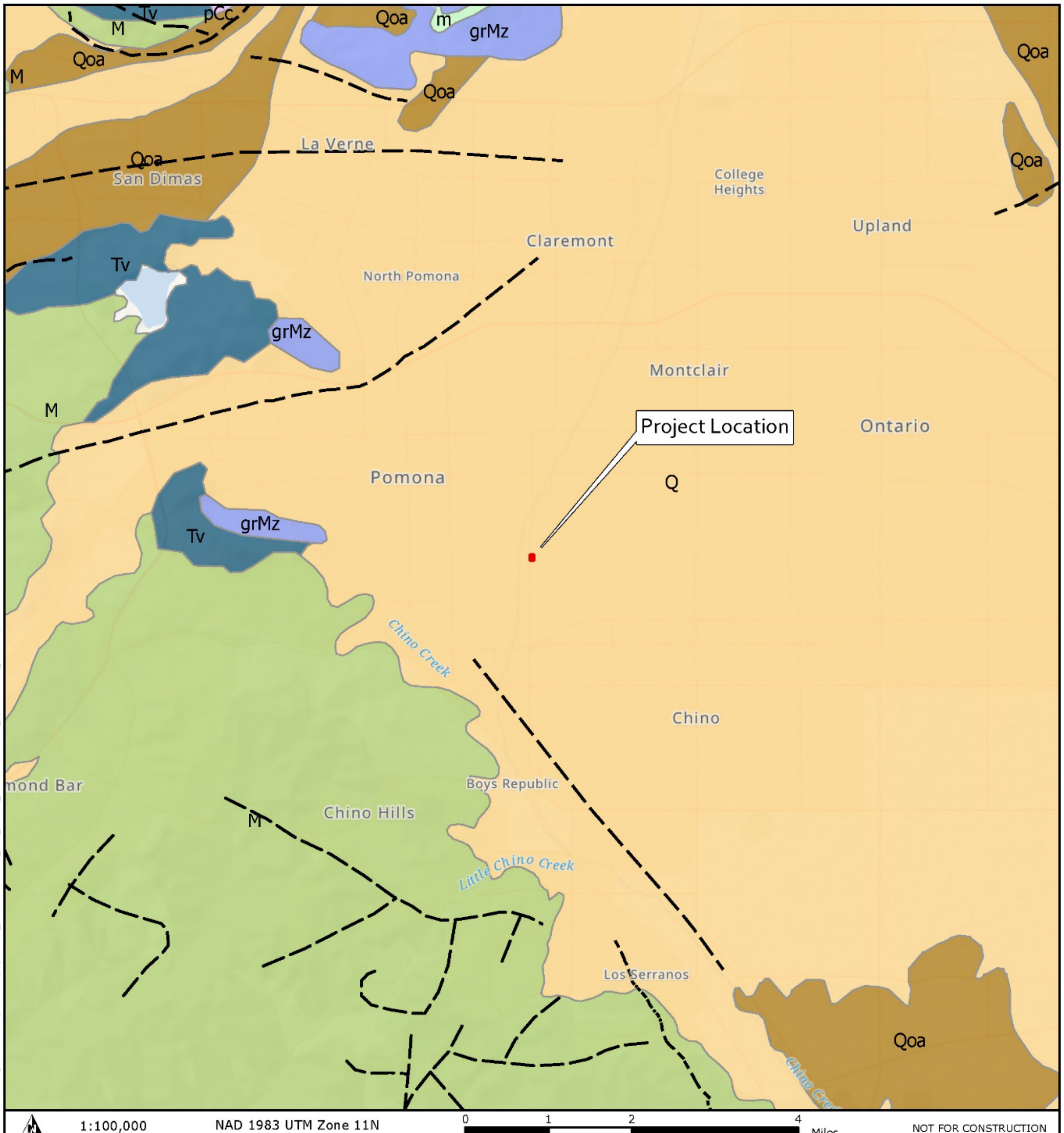


Figure 3.
Geology Map

SAN BERNADINO COUNTY, CA

Legend

Project Boundary

Fault

Generalized Rock Types

- Q-marine and nonmarine (continental) sedimentary rocks
- Qoa-marine and nonmarine (continental) sedimentary rocks
- M-marine sedimentary rocks
- Tv-volcanic rocks
- grMz-plutonic rocks
- m-mixed rocks
- pCc-mixed rocks

TETRA TECH

Source: California Geological Survey, 2023

3.4 Soils

Only one soil type was identified across the whole parcel containing the Project site by the Natural Resources Conservation Service (NRCS). Tujunga loamy sand, 0 to 5 percent slopes is the NRCS soil series identified on-site (Figure 4). Table 1 provides some basic information on the properties of this soil series.

This soil is characterized as nearly level to moderately sloping, somewhat excessively drained, and formed on a parent material of alluvial fan-deposited granitic alluvium. It generally forms a deep (60-inch) soil profile with a shallow A-horizon (6 to 10 inches), no B-horizon (transition), and the remainder containing C-horizons (slightly altered parent material).

Table 1. Soil Characteristics

Soil Unit	Slope	Percentage within Project Boundary	Drainage Class	Hydric	Wind Erodibility Group Rating	Water Erodibility K factor	Corrosion
Tujunga Loamy Sand	0 to 5% slopes	100.0	Somewhat excessively drained	No	2	0.15	Low

Partly because of the coarse texture of this soil, runoff is considered to be slow to very slow. The arid nature of the area (average annual precipitation of 12 to 16 inches) also contributes to the runoff speed.

Drainage Class. This property refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Seven classes of soil drainage are recognized:

1. Excessively drained,
2. Somewhat excessively drained,
3. Well drained,
4. Moderately well drained,
5. Somewhat poorly drained,
6. Poorly drained, and
7. Very poorly drained.

Hydric Rating. The hydric rating considers the percentage of map units meeting the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Tujunga loamy sand is not considered to be a hydric soil, confirming no wetland conditions on-site.

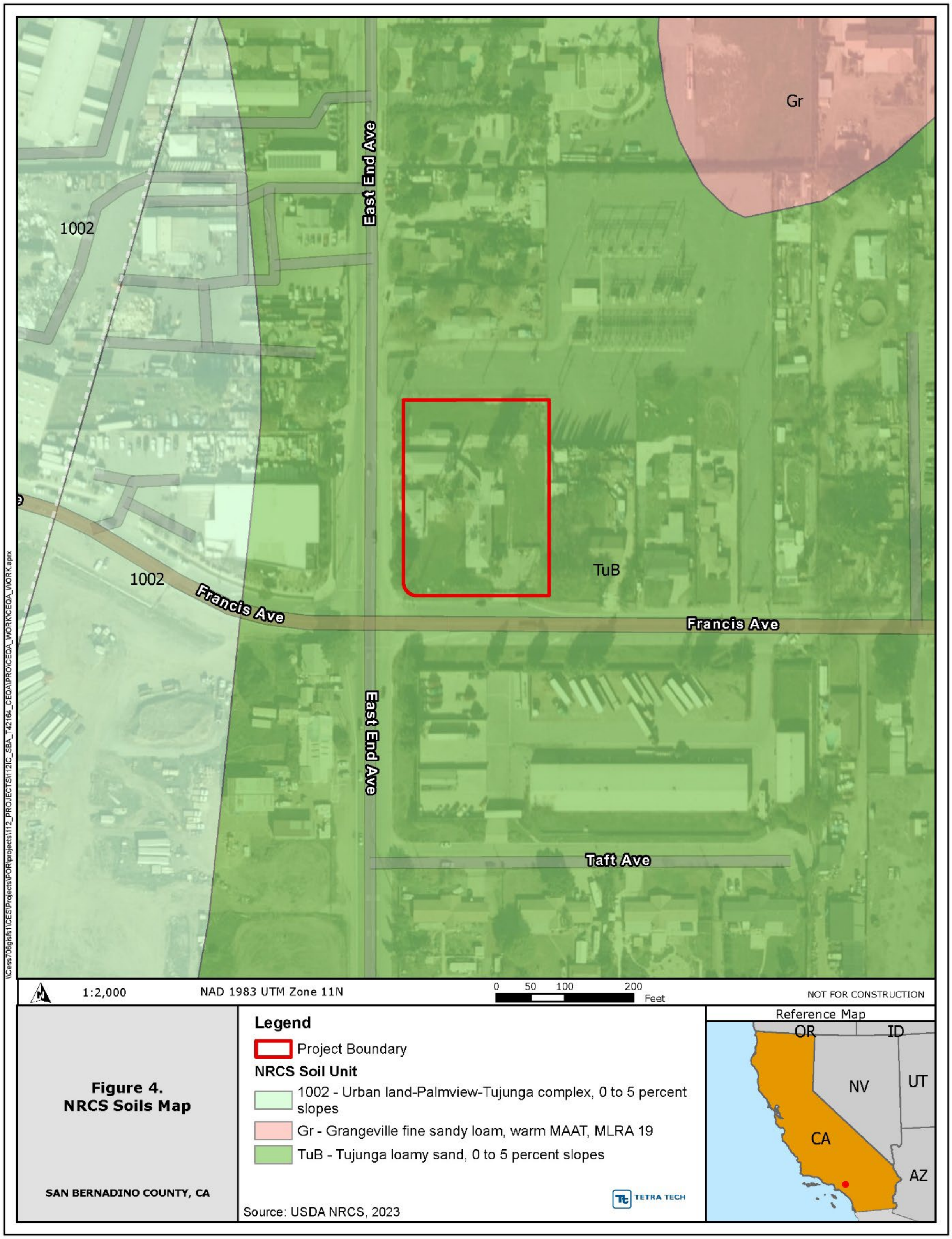


Figure 4.
NRCS Soils Map

Wind Erodibility. Considers soil properties affecting susceptibility to wind erosion in cultivated areas. Soils assigned to Group 1 are the most susceptible to wind erosion, and those assigned to Group 8 are the least susceptible. The low number of its wind rating indicates it is quite susceptible to wind erosion and that precautions will be necessary during construction especially, and also perhaps during operations, to limit erosion and control dust.

Water Erodibility. Erosion factor "K" denotes the susceptibility of a soil to sheet and rill erosion by water. It is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict soil loss by sheet and rill erosion in tons per acre per year. Estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity. Values of K range from 0.02 to 0.69, with higher values being more susceptible to sheet and rill erosion by water. The rating for Tujunga loamy sand is quite low, so erodibility would be limited.

Corrosion of Concrete. The corrosion of concrete pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens concrete. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the concrete in installations that are entirely within one kind of soil or within one soil layer. Corrosion ratings for Tujunga loamy sand were low for both concrete and steel.

Corrosion of Steel. The corrosion of steel pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel in installations that are entirely within one kind of soil or within one soil layer. Corrosion ratings for Tujunga loamy sand were low for both concrete and steel.

The general details provided here should be supplemented with a site-specific geotechnical investigation and report. This will provide the data necessary for additional site assessment and facility design.

4.0 SITE ASSESSMENT

For the Los Angeles Basin in general, potential geologic hazards can include seismic activity, ground rupture, and ground shaking. These in turn can affect the design of structures so they can withstand such hazards. A range of concerns related to seismic activity also must be considered, such as liquefaction, landslides, and slope failure.

4.1 Earthquake Activity

Would the project expose people or structures to potential substantial adverse effects, including the risk of loss, injury or death involving: (i) ground rupture, (ii) strong ground shaking, (iii) ground failure/ liquefaction, (iv) landslides

As discussed in Section 3, there are a number of Alquist-Priolo fault zones in the region, so the Project site is considered to be in a seismically active area. However, the site is not located within a State of California Alquist-Priolo Zone of Required Investigation. The nearest Zone of Required Investigation is the Elsinore Fault Zone (Chino Fault section) located approximately 4.7 miles south-southeast of the Project site. The next closest Zones of Required Investigation are the Cucamonga Fault (8.6 miles north-northeast of the Project site), the Whittier Fault Zone (9.8 miles southwest of the Project site), and the Sierra Madre Fault (12 miles northwest of the Project site). Table 2 lists principal known active faults that may affect the Project site, the 30-year probability of a maximum moment magnitude exceeding 6.7, and the fault type.

Table 2. Principal Active Faults in Region

Fault Name	Approximate Distance (Site to fault, miles)[1]	30-year Probability (%)[2]	Fault Type
Chino Alt. 2 (Subsection 0)	1.35 – SE	0.6	Unspecified
San Jose (Subsection 0)	3.0 – NNE	0.35	Left lateral
Cucamonga (Subsection 3)	5.8 – N	1.0	Thrust
Whittier Alt. 2 (Subsection 1)	10.0 – SW	1.11	Right lateral
Sierra Madre (Subsection 1)	11.4 – NW	1.05	Thrust
San Jacinto (San Bernardino) (Subsection 0)	20.4 – NE	4.12	Right lateral
San Andreas (San Bernardino, N) (Subsection 2)	22.3 – NE	19.22	Right lateral

Notes:
1/ Measured to the closest point of fault, not necessarily within the Alquist-Priolo Zone of Required Investigation.
2/ The probability of a magnitude 6.7 earthquake, or greater, occurring within the next 30 years (USGS 2023b: downloadable KMZ file with fault locations and earthquake probabilities).

To provide an alternate frame of reference, the USGS earthquake database includes only three earthquakes within the region (Latitude 33.75 N–34.25 N and Longitude 117.25 W–118.5 W) of magnitude 4.5 or greater over the last 20 years (USGS 2023a). These include:

- Magnitude 4.5 earthquake on September 19, 2020, in the vicinity of the East Montebello Fault, approximately 21 miles from the Project site;
- Magnitude 5.1 earthquake on March 29, 2019, in the vicinity of the West Coyote Hills Fault, approximately 14 miles from the Project site; and
- Magnitude 5.4 earthquake on July 29, 2008, in the vicinity of the Yorba Linda Fault, approximately 7 miles from the Project site.

In general, hazards associated with seismic activity include ground surface rupture, strong ground motion, liquefaction, and tsunami. These hazards are discussed below.

Ground Rupture. Lurching of the ground surface on the Project site caused by nearby seismic events is possible, and this could result in cracking of the ground surface on-site. However, actual rupture of the ground surface due to a fault is not considered likely on the Project site since there are no known active faults underlying the site.

Ground Shaking. With a high potential for seismic activity in the region, it is likely that strong ground shaking could occur at the Project site due to a nearby earthquake. The California Building Code (CBC) requires that building designs account for potential shaking from earthquakes, using a "risk-targeted" value for the Maximum Considered Earthquake (MCER) and an associated ground-motion response acceleration for the proposed location. These values help to establish the seismic loads that should be used for building design. The MCER response acceleration generally assumes some damping in the direction of maximum horizontal response and a specified chance of structural collapse in a given time period. Both the MCER and the corresponding horizontal peak ground acceleration needed for design purposes should be provided as part of the site-specific geotechnical investigation. Providing these parameters will allow the design of on-site structures to meet CBC requirements. This is included in the recommendations section of this report for the evaluation of seismic loads on buildings and other structures.

Ground Failure/Liquefaction. Liquefaction of cohesionless soils can occur when strong ground motion results from a relatively close earthquake, with favorable site conditions. Data show that such conditions occur when loose, granular soils and/or non-plastic silts are combined with a saturated subsurface resulting from shallow groundwater. Based on the overdraft conditions in the Chino Groundwater Basin, shallow groundwater is not anticipated in the Project area. Therefore, liquefaction is not anticipated to be a necessary design consideration. However, it is still recommended that the site-specific geotechnical investigation for the Project evaluate the potential for liquefaction and dynamic settlement and, if necessary. provide any appropriate design recommendations.

To comply with CBC requirements to consider the potential for ground failure due to liquefaction and or other loss of soil strength, where applicable, the peak ground acceleration for the Maximum Considered Earthquake Geometric Mean (MCEG) should be established for the Project site. This peak value is often adjusted for site class effects as specified in standard engineering procedures. Therefore, if deemed appropriate during the site-specific geotechnical investigation, the MCEG for the Project site should be established as well as the site "Class," and the associated peak ground acceleration determined using standard assumptions and procedures.

Landslides and Slope Failure. Geologic and geomorphic evidence strongly suggest very little likelihood of slope failure, especially landslides, occurring on the Project site under current conditions. The Project site, and the surrounding area, currently have very flat topography with minimal slope (less than 2 percent). Proposed development activities will not include any significant earthwork (cut and fill or materials); therefore, they will not alter conditions to create the potential for slope failure either on-site or off-site. As such, general slope stability considerations, even related to seismic activity, are not expected to be a design requirement for this Project site.

4.2 Soils and Soil Erosion

Would the project result in substantial soil erosion or the loss of topsoil?

The proposed site development process for the Project is not expected to be very intensive, with the greatest disturbance required for demolition and clearing of the existing on-site vegetation and structures. Grading and site preparation will be minimal, with no expected cut and fill of soils to achieve a buildable foundation. However, since the entire 1.5-acre parcel will be disturbed during site clearing and construction activities, the Project will be required to prepare a Stormwater Pollution Prevention Plan (SWPPP) under California's National Pollutant Discharge Elimination System (NPDES) Construction General Plan (issued by the U. S. Environmental Protection Agency [EPA] to the California Water Quality Control Board). With preparation of a SWPPP and compliance with specified use and monitoring of best management practices (BMP) for stormwater and erosion control, the potential for substantial soil erosion is expected to be low for the Project.

4.3 Unstable Substrate

Would the project 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?

As discussed earlier (see Section 4.1), both geology and soil conditions at the Project site are considered to be stable, even under the condition of regional seismic activity. In addition, there will be no earthwork required for site clearing or preparation. Therefore, no conditions affecting substrate stability will be changing due to facility installation. Hence, the Project site is not considered prone to future landslide or slope instability issues. The Project site is also not expected to become susceptible to spreading, liquefaction, or collapse with Project implementation.

In the larger Chino Groundwater Basin, there is evidence of and concern for regional land subsidence due to excessive groundwater pumping. However, no specific evidence for subsidence at this site was discovered in the research for this report, so no site-specific evaluation is given here. Recommendations are provided in Section 5 and include a field evaluation component for subsidence as part of a site-specific geotechnical investigation for the Project.

4.4 Expansive Soils

Would the project be located on expansive soil, as defined in Table18-1-B of the Uniform Building Code, creating substantial risks to life or property?

Expansive soils are usually the result of clay mineral content with the capacity to expand and contract, which is directly related to moisture content. Shrinking and swelling (i.e., expansion and contraction) of soils underlying foundations can lead to slab damage (e.g., tilting and cracking) or affect other engineered structures. The Tujunga loamy sand present at the Project site has a very low rating for shrink-swell potential. This is directly attributable to the very high sand content of these soils (80 percent) and the very low clay content (3 percent). The combination of no cut and fill for site preparation and the extremely limited potential for shrink-swell activity in the native soils results in no significant concern for mitigation. However, the recommended site-specific geotechnical investigation for the Project will provide definitive evidence for any final design considerations.

4.5 Septic System Support

Are site soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?

The proposed Project design does not include any on-site sanitary facilities and, therefore, will not need a septic system with a drain field. As a result, further consideration of the native soil's capacity to accommodate a septic system drain field will not be needed.

4.6 Paleontological Resources

Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

No database search for local paleontological resource sites was performed for this report, and no field survey attempts to evaluate such resource viability at the Project site were attempted. In general, the nature of the site geology (i.e., young alluvial fan deposits) and the age of these deposits (i.e., Middle Holocene) do not present a high likelihood for the presence of fossils. Two paleontological resource reviews for other sites within the region (both approximately 8.5 miles distant) having similar geological conditions were identified in the literature search. The first is located just north of Ontario International Airport and is east-northeast of the Project site, at a distance of 8.6 miles. The geology at this location is also young alluvial fan sediment, and is closer to the source of these sediments, therefore this location likely has a thinner deposit of these materials than is expected at the Project site. For this site, a database search was performed by the Natural History Museum of Los Angeles County. The database search did reveal two locations in the region containing vertebrate fossils, but these were found in older alluvium underlying the young alluvial fan deposits. The results presented were that the younger alluvial deposits are unlikely to contain fossils, while the older alluvial deposits underneath are very likely to contain fossils (Material Culture Consulting 2017).

The second location was close to the Chino Airport, at a distance of 8.4 miles to the southwest of the Project site. No paleontologic resource sites were identified for this location (or within a 1-mile radius) in the database search of the Western Science Center, the PaleoBiology Database (PBDB), and University of California Museum of Paleontology (UCMP) database. The second site is located farther from the sediment source (i.e., the mountains) than either the Project site or the first site, and the local geology there is characterized as Quaternary Older Alluvium. This is equivalent to the "older alluvium" noted at depth in the first site reviewed, and was characterized as having high potential for containing fossils (First Carbon Solutions 2018).

Although it is unlikely that any of the grading needed for site preparation at the Project site will go deep enough to encounter older alluvium, potential trenching to place underground lines might. Therefore, it is prudent to determine the depth of the young alluvial fan deposits at the Project site during the site-specific geotechnical investigation. If this cannot be accomplished prior to construction and trenching is planned for site construction, a sensible precautionary measure would be to engage a qualified paleontologic monitor during the subsurface work to evaluate in real time whether any fossils are unearthed.

5.0 SUMMARY AND RECOMMENDATIONS

This desktop evaluation of the geology and soils at the Project site at 3730 Francis Avenue in Chino, California, was performed without employing a site visit for field investigation or survey. A basic assessment was made using available resources of the geologic conditions at the site, the soils present, and the relevance of potential hazards for this location. Site conditions are summarized below followed by specific recommendations for future efforts.

5.1 Summary

Topography/Geomorphology: The Los Angeles Basin is bounded on a significant portion of its northern edge by the San Gabriel Mountains. These also provide the eroded materials deposited in multiple alluvial fans that form the broad, flat, sloping surface on which the Project site is located.

Geology: The surface/near-surface geology of the Project site is mapped as alluvium (Young Alluvial-fan Deposits; Middle Holocene age). The regional geologic history includes a considerable amount of tectonic activity and faulting that included the movement of several large structural blocks within the basin. Underlying the Project site is the northeastern block, which is covered by hundreds, if not thousands, of feet of alluvium at this location.

Faults: The Los Angeles Basin is known as an area of high potential for seismic activity, with much of this activity concentrated along the edges of the large structural blocks. The closest mapped Alquist-Priolo faults are the Chino Fault (1.35 miles), the Cucamonga Fault (5.8 miles), and the Sierra Madre Fault (11.4 miles). In general, the geotechnical constraints that should be considered as they relate to seismic activity (and their significance at this location) are as follows:

- Ground Shaking – The Project site has a moderate potential for strong ground motion should an earthquake occur on a nearby fault.
- Landslide – The potential for a landslide or other slope failure to occur in the vicinity such that it would affect the Project site is very low.
- Land Subsidence – The Chino groundwater basin, which includes the Project location, has experienced significant land subsidence in various places due to over-pumping of groundwater. Actual subsidence at the Project site has not been documented
- Liquefaction – The potential for liquefaction at the Project site is not a serious concern since shallow groundwater is not expected.

Soils: Based on the mapped NRCS soil series at the Project site (i.e., Tujunga loamy sands), this soil is very stable and exhibits good engineering qualities. The constraints commonly considered for soil qualities include:

- Drainage – Tujunga loamy sands are considered to be somewhat excessively drained, which means they do not retain water in the profile for long.
- Hydric Conditions – Tujunga loamy sands are not a hydric soil (not wetland related).

- Erosion – Water erosion is not considered to be an issue since the soil is so well drained and the rainfall amounts are low.
- Corrosion – Tujunga loamy sands are not expected to provide a corrosive environment for either steel or concrete when in contact with the soil.

5.2 Recommendations

Results of the geology and soils evaluation presented in this report help to assess conditions at the Project site with regard to hazards or potential impacts at an initial reconnaissance level. Based on these results, we provide recommendations for Project design considerations as well as additional investigation efforts. They are as follows:

1. This Project site will disturb more than 1 acre of ground and is therefore subject to the requirements of the NPDES Stormwater Construction General Permit. This means that a site-specific SWPPP will need to be prepared.
2. The most significant concerns arising from the on-site soil type (i.e., Tujunga loamy sand) are for wind erosion and blowing sand or dust. Preparation of a site-specific Dust Control Plan for the construction period is recommended.
3. Because the Project location is in a seismically active area, requirements and standards from the 2022 CBC should be followed in the design of on-site structures. The proposed facilities, including all structures, should be designed appropriately to mitigate strong ground shaking in the event of an earthquake on a nearby fault.
4. It is likely that a geotechnical investigation is already planned should this site be approved for the design-phase of the Project. Nevertheless, it is a recommendation of this report that a detailed, site-specific geotechnical evaluation, including subsurface sampling and laboratory testing, be conducted prior to finalizing Project plans and designs. As part of this evaluation, the following specific components should be included.
    - Determine site-specific MCER and provide applicable horizontal peak ground acceleration value for Project site to use in structure design.
    - Land Subsidence – Conduct investigations or additional research to determine whether specific evidence can be provided and quantified for land subsidence at the Project site. If additional subsidence at the Project site is anticipated, design accommodations will be needed to account for any vertical movement associated with long-term ground subsidence.
    - Groundwater – Determine whether shallow groundwater conditions exist at the Project site that could provide favorable conditions for liquefaction. Based on the information gathered for this report, such conditions are not expected at the Project site, but verification is recommended. If the evaluation finds conditions for liquefaction to be present, recommendations should be provided for mitigation measures in the Project design. It is also recommended to determine MCEG, site class, and peak ground acceleration values to aid in the design process and establish any necessary site preparation requirements.

- Clay Content in Soils – As part of the soil texture analysis, determine whether additional assessment of the type of clays present is needed to quantify the potential for expansive soils. If expansive soils are identified as a concern, recommendations should be provided for remedial actions during construction.

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