4. ENVIRONMENTAL IMPACT ANALYSIS
4. GEOLOGY/SOILS

1. INTRODUCTION

The following section of the Draft EIR evaluates potential impacts related to geology, including seismicity and soils associated with development of the Proposed Project. The majority of the analysis is based on the *Preliminary Geotechnical Investigation, Proposed Malibu Campus, City of Malibu, California* (the "Geotechnical Report") prepared by Geolabs –Westlake Village on June 20, 2012 and was later revised on December 18, 2013. The Geotechnical Report is included as Appendix F of this Draft EIR. In addition, Geolabs-Westlake Village's *Responses to Second Geotechnical Review Sheet*, dated July 22, 2014 is included in Appendix F of this Draft EIR.

2. ENVIRONMENTAL SETTING

As discussed in Section 2.0, Project Description, there are several improvements on-site including a one-story building with a basement, appurtenant parking areas, a temporary trailer that houses a day-laborer office, and a transmission tower. There are several retaining walls ranging from five to eight feet in height. The new SMC Malibu Campus building will replace an old Sheriff's Station that was decommissioned in the 1990s. The northeast corner of the Project Site contains underground seepage pits. The total relief across the Project Site is approximately six feet from the low point near Civic Center Way and the high point at the northern boundary of the parcel.

a. Regional Geologic Conditions

The City of Malibu is located on the western section of Los Angeles County. The Project Site is located in the south-western portion of the Transverse Ranges geomorphic province of Southern California. The Transverse Ranges are essentially east-west trending elongate mountain ranges and valleys that are geologically complex. Structurally, the province reflects the north-south compressional forces that are the result of a bend in the San Andreas Fault. As the Pacific Plate (westerly side of the fault) and the North American Plate (easterly side) move past one another along the fault, the bend creates a deflection, which allows for large accumulations of compressional energy. Some of these forces are spent in deforming the crust into roughly east-west trending folds and secondary faults. Faults in this area are typically reverse or thrust faults, which allow for the crustal shortening that takes place regionally.

The City of Malibu sits atop of relatively flat-lying, near-shore sediments between the Pacific Coast (to the south) and the Santa Monica Mountains (to the north). These sediments are mapped as Quaternary-age alluvial fan deposits and floodplain deposits and are associated with Malibu Creek. The Project Site is within the onshore portion of the Malibu Coast Fault Zone, which involves a broad zone of faulting and shearing as much as one mile in width. The Malibu Coast Fault is only one fault splay within this broad deformation zone, but it is the most prominent feature within the zone. It juxtaposes two crustal blocks of extremely different character on either side of its length. To the north, a basement terrain of granite and related igneous rocks intruded into older (probably Jurassic-age) metasedimentary-rocks termed the Santa Monica Slate, which is overlain by a thick sequence of sedimentary rocks ranging in age from Late Cretaceous to Recent; while on the south of this "main trace," a basement complex of mid-Cretaceous-age

high-pressure tectonometamorphic rocks termed the Catalina Schist is overlain unconformably by a 5,000-foot thick sequence of sedimentary rocks no older than Miocene, including the Monterey Formation.

The Malibu Coast Fault purportedly passes beneath the floodplain deposits. The assumed location of the fault, at the top of the buried bedrock, is based on poorly constrained, fairly linear, projections from observed exposures of the fault in bedrock outcrops that are on the order of one-half mile to the west and east of the Project Site. Its indicated surface trace runs approximately 20 feet south of the Proposed SMC Malibu Campus building. Geolabs-Westlake Village favors an interpretation where the north-dipping Malibu Coast fault would intersect the top of the bedrock at progressively more northerly locations as it traverses the more deeply incised portions of the Malibu Creek drainage.

b. Soil Conditions

As seen in Figure 4.4.1, Regional Geologic Map, the Project Site is located on an area of alluvium floodplain deposits, which may include mudflow deposits. The Project Site is underlain by a thin layer of artificial fill over alluvium. Geolabs-Westlake Village encountered artificial fill at all three exploratory borings. The artificial fill from each boring ranged in thickness from three feet in Boring 1 (B1) to seven feet in Boring 3 (B3). South and west of the current Sheriff's Station building, the artificial fill consists of silty to clayey sand in a medium dense and moist condition. North of the Sheriff's Station, the artificial fill consists of orangish brown clayey gravel in a dense and wet condition.

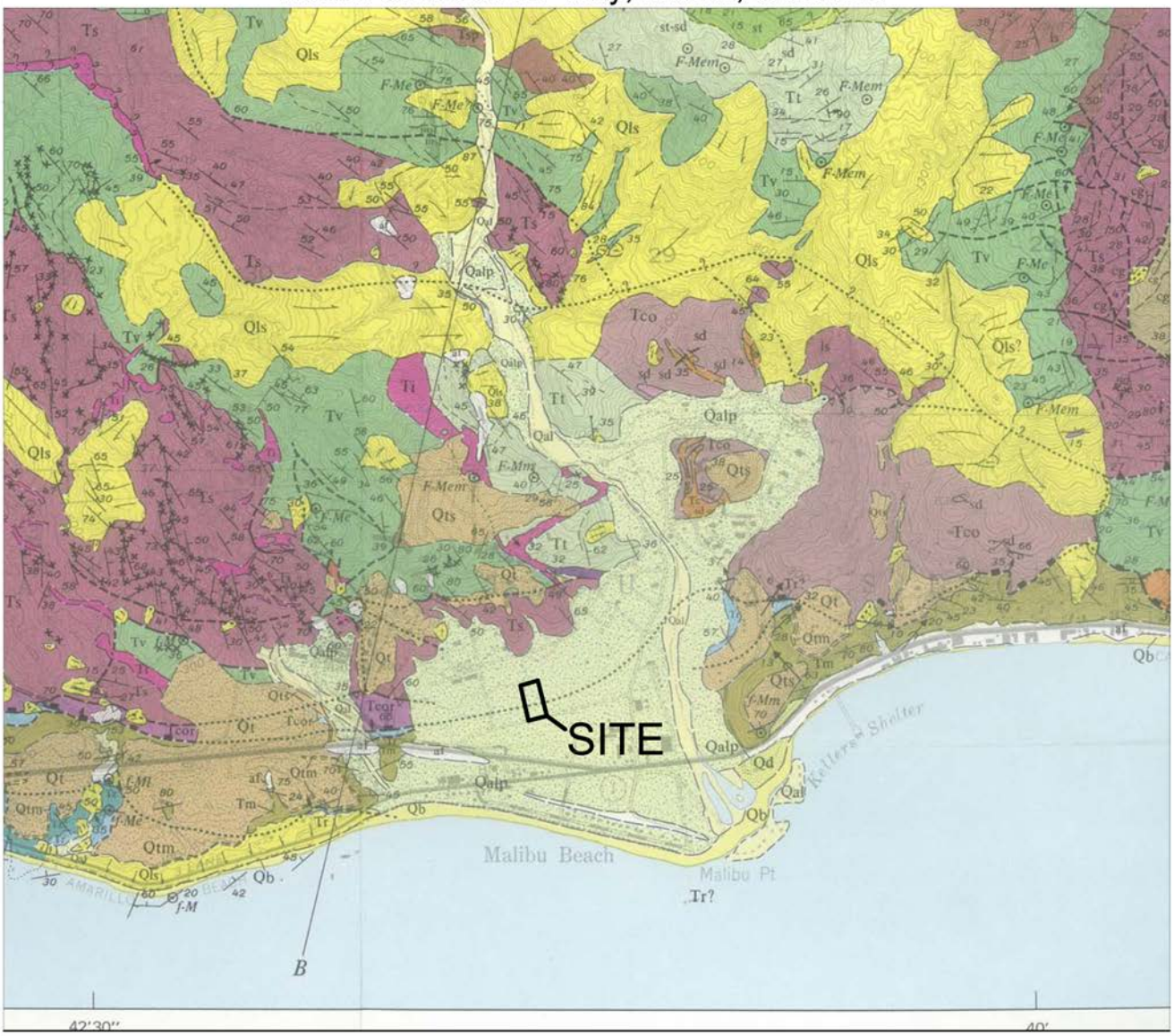
Alluvium (of Quaternary-age) was encountered underlying the fill in each of the three exploratory borings. The alluvium extended to the maximum tested depth explored of 50 feet. The alluvium consists of dark gray thinly interlayered silty fine sands, clayey sand, and sandy lean clay with sparse, laterally continuous interlayers of relatively clean, fine to course sand. The coarse material was found to be in a loose to dense condition, while the fine material was found to be medium stiff to hard. The materials were wet. Very sparse decayed root filaments and no pores were observed. The organic were decayed root filaments.

Bedrock was not encountered on-site, and bedding was not observed in the alluvium.

c. Groundwater

Groundwater was encountered in each of the three exploratory borings and cone penetrometer test (CPT) soundings at depths ranging from six feet to twenty-three feet. In the CPT soundings, the continuous push on the rods was temporarily halted in deeper sand zones to allow for monitoring of pore pressure dissipations. The groundwater reading for the CPT soundings are based on the dissipation data. The groundwater from six feet was likely perched atop the clayey alluvium in that area. However, as shown in Figure 4.4.2 Groundwater Map, the Seismic Hazard Zone Report for the Malibu Beach Quadrangle shows historic high groundwater at five feet below the surface in the vicinity of the Project Site.

REGIONAL GEOLOGIC MAP
23555 Civic Center Way, Malibu, California



EXPLANATION

Qalp	Alluvium as flood plain deposits, may include some mudflow deposits
65	Malibu Coast fault - Boxes on upper plate of reverse fault, dotted where buried

Geolabs – Westlake Village
GEOLOGY AND SOIL ENGINEERING

DATE 6/20/2012 BY RMP
SCALE ~1"=2000' W.O. 9279

Source: GeoLabs - Westlake Village, Preliminary Geotechnical Investigation, Proposed Malibu Campus, Plate 1.3, December 13, 2013

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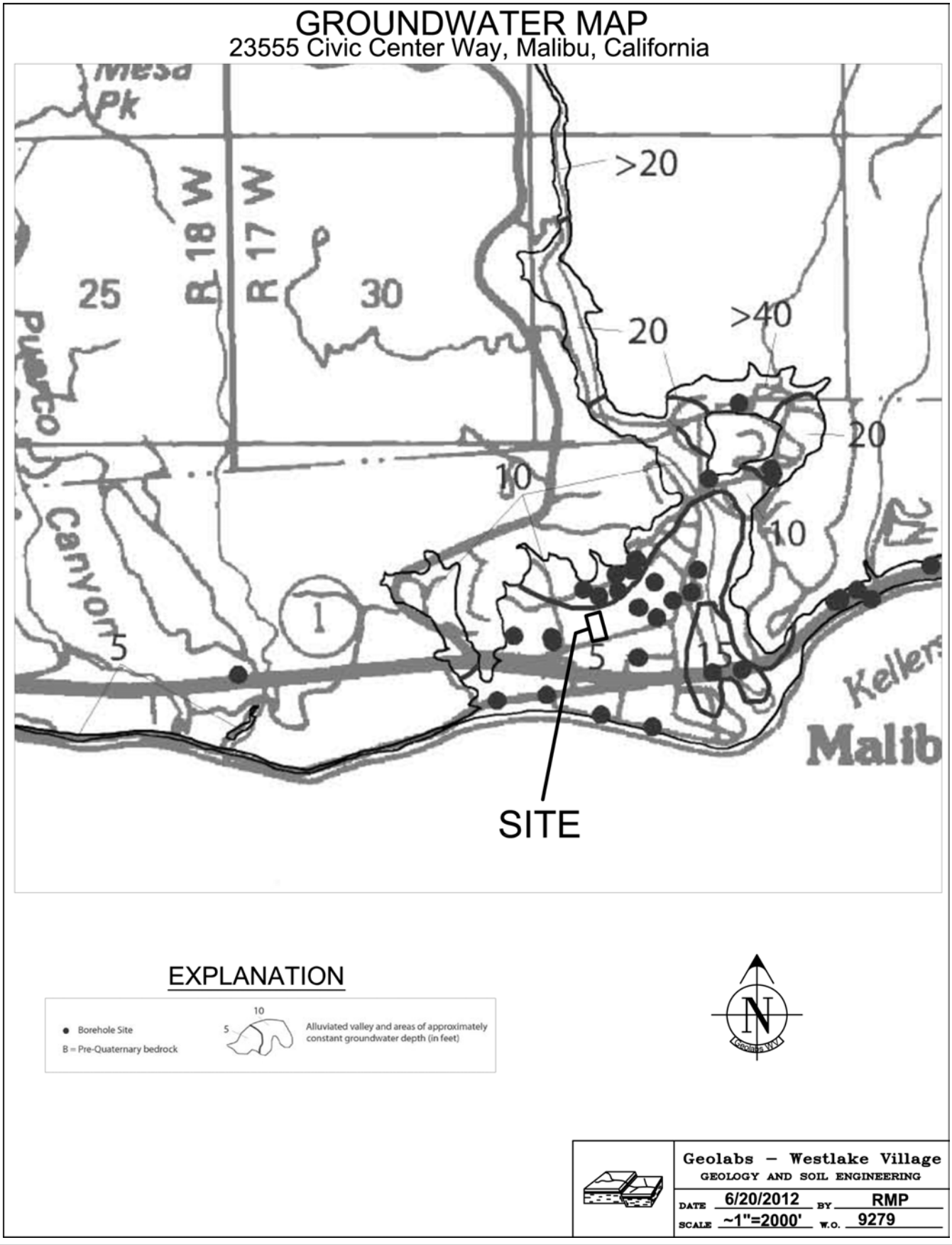
Figure 4.4.1
Regional Geologic Map



Source: GeoLabs - Westlake Village, Preliminary Geotechnical Investigation, Proposed Malibu Campus, Plate 1.4, December 13, 2013

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Figure 4.4.2
Groundwater Map

d. Seismic Conditions

The entire Southern California area is considered to be a seismically active region. A significant active fault is defined by a fault's capability of generating a magnitude 7.0 or greater earthquake and has a slip rate exceeding 5mm/year. Although significant earthquakes may occur on faults, the San Andreas and Cucamonga faults (Sierra Madre Fault Zone) are most likely to cause damage to the Project Site. Figure 4.4.3, Alquist-Priolo Map, and Figure 4.4.4, Regional Fault Map, show the active faults around the Project Site.

(1) The San Andreas Fault

The last major earthquake in Southern California originating from the San Andreas Fault was the 1857 Fort Tejon quake (magnitude 7.5-8.5). This event generated intensities of X-XI (Modified Mercalli scale). Intensities of X-XI indicated masonry and wooden structures destroyed, extensive ground rupture, and multiple landslides. The United States Geologic Survey (USGS) has determined that the San Andreas Fault is capable of generating a maximum credible Richter magnitude event of 8.0. A maximum probable earthquake is the largest earthquake that is likely to occur in a 100-year period.

The segment of the San Andreas Fault closest to the Project Site, 46 miles to the northeast, is considered capable of generating the largest earthquake (maximum credible earthquake). Because this segment has not moved in 118 years, (since the Fort Tejon earthquake), there is probably enough energy stored in this segment to generate a major earthquake at any time. The energy stored is estimated to be sufficient to generate an earthquake of magnitude 8.0. An event of this magnitude appears certain to occur sometime within the next 100 years.

(2) The Cucamonga Fault

The latest rupture of the Cucamonga Fault occurred in very recent Holocene. The Cucamonga Fault zone is part of the same fault system as the Sierra Madre Fault Zone. The Cucamonga Fault Zone marks the southern boundary of the eastern portion of the San Gabriel Mountains.[1] It is unknown if the faults that form the fault system may rupture both in single-segments or multiple-segment breaks. Nonetheless, the Cucamonga Fault Zone is more active than the Sierra Madre Fault Zone, due to its higher slip rate.[2] The segment of the Cucamonga Fault closest to the Project Site, 56 miles to the east, is considered capable of generating an earthquake with a magnitude of 6.0-7.0.

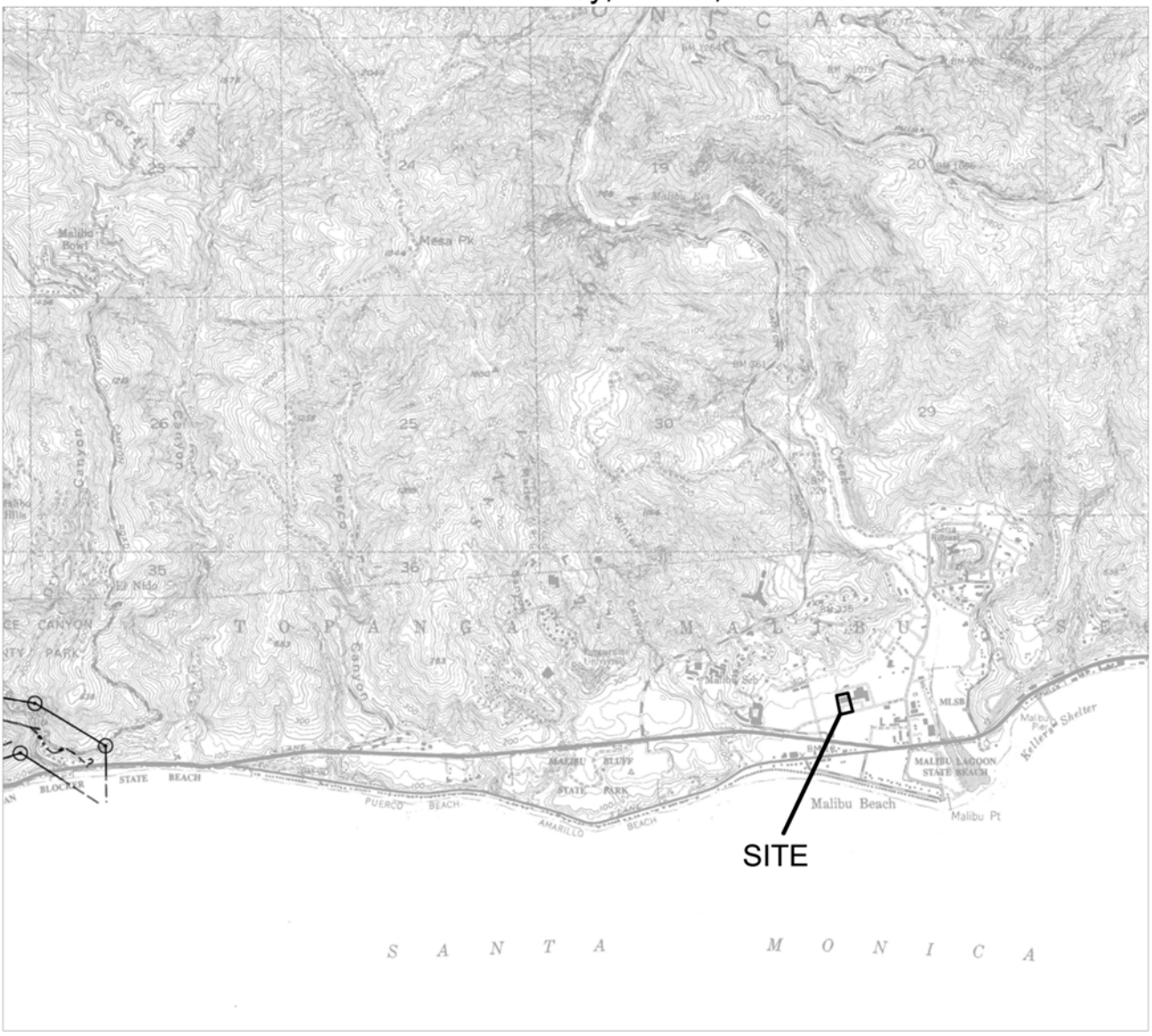
(3) Other Faults in the Project Site Vicinity

The Project Site is within the Civic Center area south of the Santa Monica Mountains, between Malibu Canyon Road and the Pacific Coast Highway. The Project Site is within the Malibu Coast Fault Zone,

[1] *Southern California Earthquake Data Center, California Institute of Technology, "Cucamonga Fault Zone." 31 Jan 2013, http://www.data.scec.org/significant/cucamonga.html, retrieved November 2013.*

[2] *Southern California Earthquake Data Center, California Institute of Technology, "Sierra Madre Fault Zone." 31 Jan 2013, http://www.data.scec.org/significant/sierramadre.html, retrieved November 2013.*

ALQUIST-PRIOLO MAP
23555 Civic Center Way, Malibu, California



MAP EXPLANATION

Active Faults

Faults considered to have been active during Holocene time and to have potential for surface rupture; solid line where accurately located, long dash where approximately located, short dash where inferred, dotted where concealed; query (?) indicates additional uncertainty. Evidence of historic offset indicated by year of earthquake-associated event or C for displacement caused by fault creep.

Earthquake Fault Zone Boundaries

These are delineated as straight-line segments that connect encircled turning points so as to define Earthquake Fault Zone segments.

Seaward projection of zone boundary.

Base Map: Earthquake Fault Zones Map, Malibu Beach 7.5-min Quadrangle by California Geological Survey, 2007

Geolabs – Westlake Village
GEOLOGY AND SOIL ENGINEERING

DATE 6/20/2012 BY RMP
SCALE ~1"=3000' W.O. 9279

Source: GeoLabs - Westlake Village, Preliminary Geotechnical Investigation, Proposed Malibu Campus, Plate 1.5, December 13, 2013

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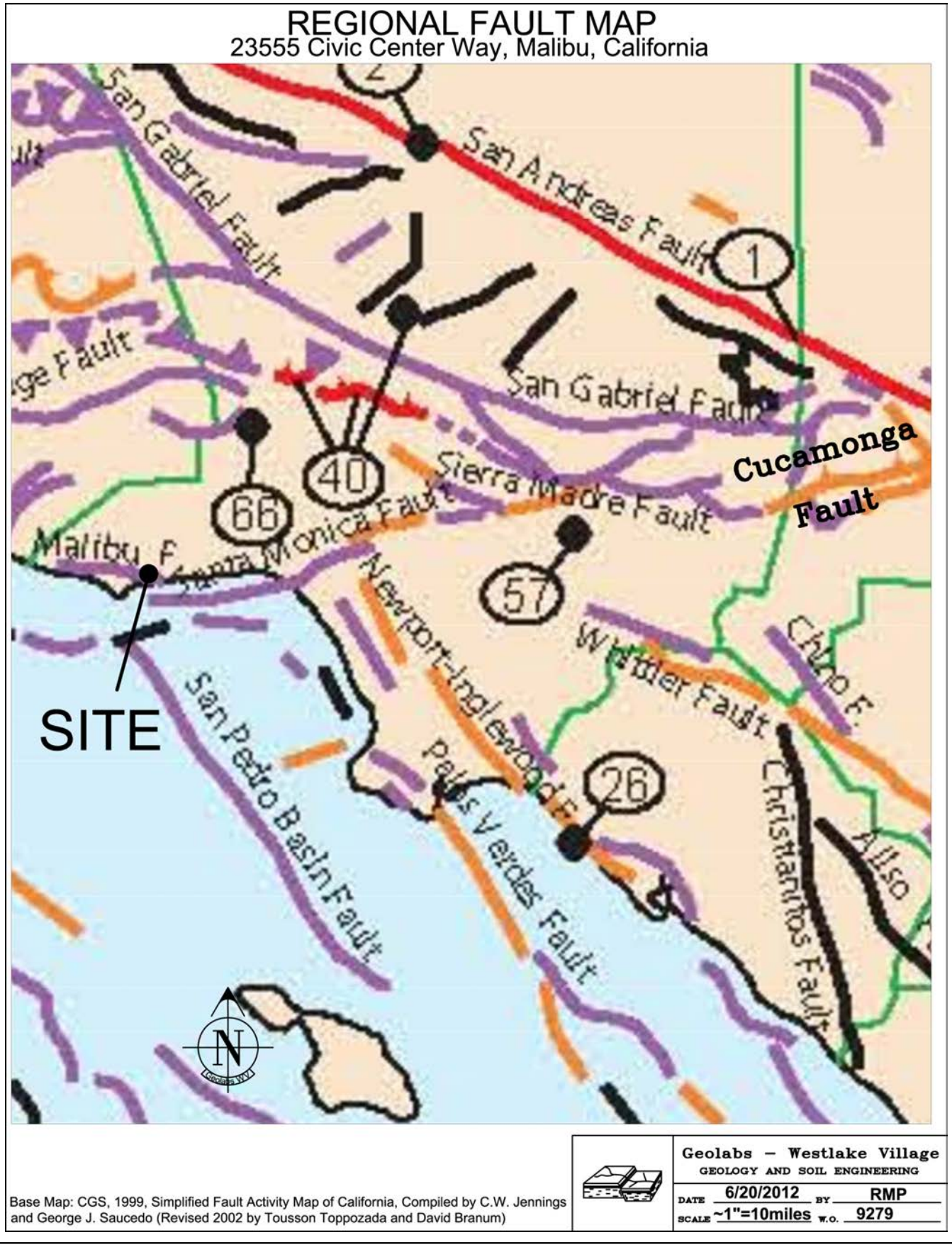
Figure 4.4.3
Alquist-Priolo Map



Source: GeoLabs - Westlake Village, Preliminary Geotechnical Investigation, Proposed Malibu Campus, Plate 1.6, December 13, 2013

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Figure 4.4.4
Regional Fault Map

although the Malibu Coast Fault does not cross the proposed building, and the section of the Malibu Coast Fault closest to the proposed building is not considered active by Alquist-Priolo definitions. There are other faults closer to the Project Site than the San Andreas and Cucamonga Faults, but the faults closer to the Project Site are projected to produce earthquakes of lower magnitudes and have slip rates less than 5mm per year, such as the Malibu Coast Fault that runs through the Civic Center area, but the faults are not active based on Alquist-Priolo definitions. The faults within the immediate Project vicinity are not expected to expose people or structures to significant seismic impacts that is not typical of the Southern California region.

The Project Site might be underlain by the projection of the Malibu Coast Fault. Active faulting has been recognized west of the Malibu Creek drainage, specifically at a location that is approximately three miles from the Project Site. Furthermore, west of the location where the fault was found to be active, the fault is considered sufficiently well defined to warrant establishment of an Alquist-Priolo Fault Rupture Hazard Zone. Active faulting has not been recognized within or east of the Malibu Creek drainage; the Project Site is located within the Malibu Creek drainage area. Consequently, the Project Site is not located within the boundaries of an "Earthquake Fault Zone" as defined by the State of California in the Alquist-Priolo Earthquake Fault Zoning Act.[3]

Additionally, a detailed study by Leighton and Associates (1994) for the Civic Center Planning Area, which includes the Project Site, found the Malibu Coast Fault that runs through the Civic Center area is not considered active by Alquist-Priolo definitions. Their conclusion was based on their observation of a pre-Holocene-age gravel unit underlying the study area that was penetrated by an array of CPT soundings and trenches. It was found to be continuous and unbroken across the Project Site. Therefore, the potential for fault rupture at the ground surface of the Project Site is relatively low.

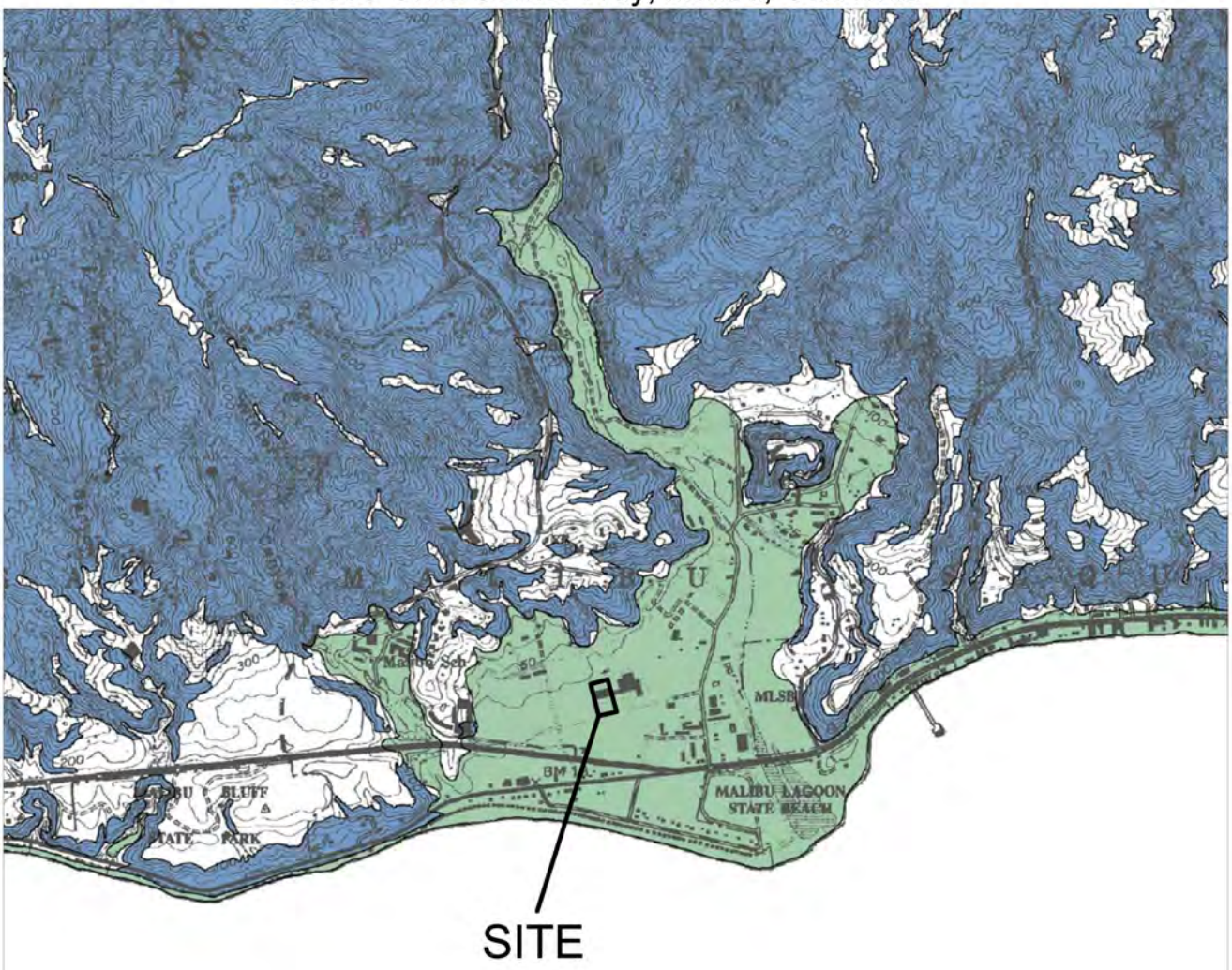
e. Landslides

Landslides may be triggered by earthquakes, rainstorms, or construction-related activities (e.g., improper grading, structural design, landscaping, etc.). The Project Site is not immediately adjacent to any mountains or steep slopes, and the topography of the Project Site is relatively flat. The Project Site is not located in the City of Malibu designated areas of high susceptibility for landslides.[4] In addition, the Project Site is not located within a Seismic Hazard Zone for earthquake-induced landsliding, as shown in Figure 4.4.5, Seismic Hazard Zones Map.

[3] *Special Publication 42, Interim Revision 2007, Fault-Rupture Hazard Zones, In California Alquist-Priolo Earthquake Fault Zoning Act.*

[4] *City of Malibu, Planning Department, Chapter 5.0 Safety and Health Element of the General Plan, Figure S-6: General Landslide Map of Malibu, November 1995, website: http://qcode.us/codes/malibu-general-plan/. Accessed November 2013*

SEISMIC HAZARD ZONES MAP
23555 Civic Center Way, Malibu, California



MAP EXPLANATION

Zones of Required Investigation:

Liquefaction

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

Earthquake-Induced Landslides

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

Base Map: Seismic Hazard Zones Map, Malibu Beach 7.5-min Quadrangle by California Geological Survey, 2001

Geolabs – Westlake Village
GEOLOGY AND SOIL ENGINEERING

DATE 6/20/2012 BY RMP
SCALE ~1"=2000' W.O. 9279

Source: GeoLabs - Westlake Village, Preliminary Geotechnical Investigation, Proposed Malibu Campus, Plate 1.7, December 13, 2013

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Figure 4.4.5
Seismic Hazard Zones Map

f. Liquefaction

Liquefaction is a condition where the soil undergoes continued deformation at a constant low residual stress due to the build-up of high porewater pressures. The possibility of liquefaction occurring at a given site is dependent upon the occurrence of a significant earthquake in the vicinity; sufficient groundwater to cause high pore pressures; and on the grain size, relative density, and confining pressures of the soil at the site. The Project Site, like other sites in Southern California, is expected to be subjected to significant shaking from earthquakes. The Project Site is located in an area with low to high liquefaction risk. The Project Site is underlain by layers and lenses of coarse-grained soils that have a potential to liquefy during a design-level earthquake, and groundwater was found in all boring holes between the depths of six to twenty-three feet. Analyses of these fine-grained soils using procedures proposed by Bray and Sancio (2006) indicate these fine-grained materials are not considered susceptible to liquefaction (see Laboratory Appendix B of the Geotechnical Report in Appendix F). The Project Site is within a Seismic Hazard Zone delineated as having potential for liquefaction as mapped by the California Geological Survey (formerly CDMG) for the Malibu Beach 7.5 Minute Quadrangle, as shown in Figure 4.4.5. These conditions render the potential for liquefaction to be low to high, and potential impacts of liquefaction will be considered in the design; thus, reducing the impact to a less-than-significant level.

g. Subsidence, Expansive Soils and Settlement

Subsidence is the downward settling of the earth's surface as a result of fluid withdrawal from deep geologic formations. Unless these voids are refilled, they may collapse causing subsidence in the shallower earth layers between the ground surface and the pumped geologic units. Review of the available literature indicates that the Project Site has not been subject to historical subsidence. Expansion test results indicate that the on-site materials are considered to have a low expansion potential or are considered non-expansive.

During seismic groundshaking, seismically induced settlement can occur. The potential for liquefaction-induced settlement has been evaluated using the procedures proposed by Zhang (2002). The analysis indicates the potential liquefaction-induced settlement due to a design earthquake motions would be on the order of ⅔ to 1-⅔ inches. Differential settlement can be assumed to be half of the total settlement. Due to the relatively shallow groundwater at the Project Site, it was found that there is no potential seismic settlement of the unsaturated near surface soils. Structural design is anticipated to be capable of accommodating the hazard of seismic settlement.

h. Regulatory Framework

(1) Alquist-Priolo Earthquake Fault Zoning Act

California's Alquist-Priolo Act (Public Resources Code § 2621 et seq.), originally enacted in 1972 as the Alquist-Priolo Special Studies Zone Act and renamed in 1994, is intended to reduce the risk of life and property from surface fault rupture during earthquakes. As discussed above, the Alquist-Priolo Act prohibits the location of most types of structures intended for human occupancy across the traces of active faults and strictly regulates construction in the corridors along active faults (Earthquake Fault Zone). It

also defines criteria for identifying active faults, giving legal weight to terms such as "active," and establishes a process for reviewing building proposals in and adjacent to Earthquake Fault Zones.

Under the Alquist-Priolo Act, fault zones are defined, and construction along or across them is strictly regulated if they are "sufficiently active" and "well-defined." A fault is considered sufficiently active if one or more of its segments or strands shows evidence of surface displacement during Holocene time (defined for the purposes of the Act as within the last 11,000 years). A fault is considered well-defined if its trace can be clearly identified by a trained geologist at the ground surface or in the shallow subsurface, using standard professional techniques, criteria, and judgment.

2. Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act of 1990 (Public Resources Code §§ 2690-2699.6) is intended to reduce the damage resulting from earthquakes. While the Alquist-Priolo Act addresses surface fault rupture, the Seismic Hazards Mapping Act addresses other earthquake-related hazards, including strong ground shaking, liquefaction, and seismically induced landslides. Its provisions are similar in concept to those of the Alquist-Priolo Act; the State is charged with identifying and mapping areas at risk of strong ground shaking, liquefaction, landslides, and other corollary hazards; and cities and counties are required to regulate development within mapped Seismic Hazard Zones.

Under the Seismic Hazards Mapping Act, permit review is the primary mechanism for local regulation of development. Specifically cities and counties are prohibited from issuing development permits for sites in Seismic Hazard Zones until appropriate site-specific geologic or geotechnical investigations have been carried out, and measures to reduce potential damage have been incorporated into the development plans.

3. California Building Standards Code

The State of California's minimum standards for structural design and construction are given in the California Building Standards Code (CBSC) (California Code of Regulations Title 24). The CBSC is based on the IBC (International Code Council, 1997), which is used widely throughout the United States (generally adopted on a state-by-state or district-by-district basis) and has been modified for California conditions with numerous, more detailed or more stringent regulations. The CBSC requires that "classification of the soil at each building site will be determined when required by the building official" and that "the classification will be based on observation and any necessary test of the materials disclosed by borings or excavations." In addition, the CBSC states that "the soil classification and design-bearing capacity will be shown in the building plans, unless the foundation conforms to specified requirements." The CBSC provides standards for various aspects of construction, including but not limited to: excavation, grading, and earthwork construction; fills and embankments; expansive soils; foundation investigations; and liquefaction potential and soil strength loss. In accordance with California law, the Project would be required to comply with all provisions of the CBSC.

4. Applicable City of Malibu Regulations/Policies

(a) General Plan Safety and Health Element

Safety and Health Goal 1 of the General Plan is to promote a community that is free from all avoidable risks to safety, health, and welfare from natural and man-made hazards. Safety and Health Objective 1.2 is to minimize the risks to residents and businesses from development in hazardous areas. To achieve this goal and objective, the City of Malibu requires that development needs to provide analyses of site safety related to potential hazards of fault rupture, earthquake ground shaking, liquefaction, rockfalls, landsliding, debris flows, expansive soils, collapsible soils, erosion/sedimentation, and groundwater effects; development needs to provide for safety from coastal storm flooding, coastal erosion, surfacing septic effluent, and tsunami; and development needs to be consistent with minimum Federal Emergency Management Agency guidelines for floodplain management. Safety Implementation Measure 41 states that the City shall require new construction to be designed to be earthquake resistant to maximum probable earthquakes. Safety Implementation Measure 42 states that the City shall apply restrictions and investigation requirements mandated by the State under the Alquist-Priolo Special Studies Zones Act for faults classified as "active" to development on properties crossed by or adjacent to the Malibu Coast Fault. Implementation Measure 51 states that the proposed development shall be evaluated for its impact on, and from, geologic hazards, flood and mud flow hazards, and fire hazards.

(b) Local Coastal Program Land Use Plan

Chapter 4, Hazards and Shoreline/Bluff Development, of the Local Coast Program Land Use Plan for the City of Malibu and the Santa Monica Mountains coastal zone contains policies aiming to minimize the risks associated with many geological hazards. The Land Use Policies address geologic, flood, and fire hazards; remediation and stabilization of landslides; development on steep slopes; areas that are floodprone; and drainage and erosion control.

3. ENVIRONMENTAL IMPACTS

a. Thresholds of Significance

In accordance with guidance provided in the Environmental Checklist Form contained in Appendix G to the *State CEQA Guidelines*, lead agencies are encouraged to address the questions from the Checklist that are relevant to the Project's environmental effects. With respect to Geology and Soils, the following Checklist Questions are addressed under the Project Impacts/Environmental Consequences subheading below. Would the Project:

(a) Expose people or structures to 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 (Refer to Division of Mines and Geology Special Publication 42);

ii) Strong seismic ground shaking;

iii) Seismic-related ground failure, including liquefaction; or

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 soil, as defined in Table 18-1-B of the Uniform Building Code (1994) creating substantial risks to life or property; or

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

As discussed in the Initial Study, the Proposed Project would have a potentially significant impact on Geology and Soils Checklist questions (a)-(d) and less than significant impact on Checklist question (e), reproduced above.

b. Project Impacts

(1) Seismic Hazards

(a) Rupture of a known Earthquake Fault

As previously discussed, the Project Site might be underlain by the projection of the Malibu Coast Fault, yet the Malibu Coast Fault is not thought to underlie the proposed building. Active faulting has been recognized west of the Malibu Creek drainage, specifically at a location that is approximately three miles from the Project Site. Furthermore, west of the location where the fault was found to be active, the fault is considered sufficiently well defined to warrant establishment of an Alquist-Priolo Fault Rupture Hazard Zone. Active faulting has not been recognized within or east of the Malibu Creek drainage. Consequently, the Project Site is not located within the boundaries of an "Earthquake Fault Zone" as defined by the State of California in the Alquist-Priolo Earthquake Fault Zoning Act.[5] A detailed study by Leighton and Associates (1994) for the Civic Center Planning Area, which includes the Project Site, found the Malibu Coast Fault that runs through the Civic Center area is not considered active by Alquist-Priolo definitions. Additionally, as shown in Figure 4.4.6 and Figure 4.4.7, the Malibu Coast Fault does not cross the proposed building. For this reason, the Malibu Coast Fault is not expected to pose any planning or design

[5] *Special Publication 42, Interim Revision 2007, Fault-Rupture Hazard Zones, In California Alquist-Priolo Earthquake Fault Zoning Act.*

constraints. Their conclusion was based on their observation of a pre-Holocene-age gravel unit underlying the study area that was penetrated by an array of CPT soundings and trenches. It was found to be continuous and unbroken across the Project Site.

Additionally, the two faults within the vicinity of the Project Site that are most likely to cause damage to the Project Site are the San Andreas and Cucamonga Faults. The San Andreas Fault and the Cucamonga Fault are located 46 miles to the northeast and 56 miles to the east, respectively. Both faults have little probability of producing a rupture on the Project Site during a large earthquake given their location in relation to the Project Site. Therefore, the potential for fault rupture at the Project Site is considered low. Mitigation Measure GEO-1 is recommended to ensure impacts are reduced to a less than significant level.

(b) Ground Shaking

As previously discussed, the Project Site might be underlain by the projection of the Malibu Coast Fault. The Malibu Coast Fault has the potential of producing relatively low magnitude earthquakes due to the low slip rate (roughly 0.3mm/year[6]). Therefore, the probability of exposing people or structures to potential substantial adverse effects from earthquakes on the Malibu Coast Fault is considered low.

Additionally, the two faults that are most likely to cause damage to the Project Site are the San Andreas and the Cucamonga Faults. The San Andreas Fault and the Cucamonga Fault are located 46 miles to the northeast and 56 miles to the east, respectively. The San Andreas Fault is capable of generating a maximum credible Richter magnitude event of 8.0. It is anticipated that an earthquake of an 8.0 magnitude will occur sometime within the next 100 years along the San Andreas Fault. Additionally, the Cucamonga Fault has a probable magnitude of 6.0 to 7.0.[7] Significant ground shaking events from earthquakes are a commonality within California. Specifically, the Southern California area is considered a seismically active region. For this reason, all development within Southern California is subject to ground shaking and risks damage due to earthquakes. With the proper building construction and site preparation, risks are reduced. For this reason, Mitigation Measure GEO-1 would ensure that the Proposed Project would be constructed in accordance with the final geotechnical recommendations and the City of Malibu's General Plan (Safety and Health Element), and Local Coastal Program Land Use Plan. Therefore, with implementation of the site development recommendations and policies, development of the Proposed Project would not expose people to significant ground shaking that is not typical of Southern California.

(c) Ground Failure, Including Liquefaction

The Project Site, like other sites in Southern California, is expected to be subject to significant shaking from earthquakes. The Project Site is within a Seismic Hazard Zone delineated as having potential for liquefaction as mapped by the California Geological Survey (formerly CDMG) for the Malibu Beach 7.5 Minute Quadrangle, as shown in Figure 4.4.5, above. Additionally, according to the Geotechnical Report,

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[6] *Southern California Earthquake Data Center, California Institute of Technology, "Malibu Coast Fault." 31 Jan 2013, http://www.data.scec.org/significant/malibucoast.html, retrieved November 2013.*

[7] *Southern California Earthquake Data Center, California Institute of Technology, "Cucamonga Fault Zone." 31 Jan 2013, http://www.data.scec.org/significant/cucamonga.html, retrieved November 2013.*

the Project Site is underlain by silty fine sands, clayey sand, and sandy lean clay to the maximum depth studied of 50 feet, and groundwater was encountered at depths ranging from six feet to twenty-three feet. The soils below the Project Site have a low to high risk of liquefaction based on their Liquefaction Potential Index. Based on the analysis of the data from the CPT soundings and exploratory borings, the Geotechnical Report concluded that layers and lenses of coarse-grained soils have a potential to liquefy during a design-level earthquake. Analyses of these fine-grained soils using procedures proposed by Bray and Sancio (2006) indicate these fine-grained materials are not considered susceptible to liquefaction (see Laboratory Appendix B of the Geotechnical Report in Appendix F). These conditions render the potential for liquefaction at the Project Site to be low to high. The Proposed Project would be constructed in accordance with the City and State Building Codes and would adhere to all modern earthquake standards, including those relating to soil characteristics. Construction of the Proposed Project would also comply with the requirements of the Division of the State Architect, which would assure safe construction, including building foundation requirements appropriate to site conditions. Implementation of Mitigation Measure GEO-1 would also ensure the Proposed Project would be constructed in accordance with the final geotechnical recommendations, Malibu's General Plan (Safety and Health Element), and Local Coastal Program Land Use Plan. Therefore, with implementation of the site development recommendations, development of the Proposed Project would not expose people to significant seismic-related ground failure, including liquefaction, and these impacts would be considered less than significant.

(d) Landslides

A significant impact may occur if a project is build immediately adjacent to any steep slopes, or if the project site has steep topography. The Project Site is not immediately adjacent to any mountains or steep slopes, and the topography of the Project Site is relatively flat. The Project Site is not located in the City of Malibu designated areas of high susceptibility for landslides.[8] In addition, the Project Site is not located within a Seismic Hazard Zone for earthquake-induced landsliding, as shown in Figure 4.4.5, Seismic Hazard Zones Map, above. Therefore, potential hazards associated with landslides would be less than significant.

(e) Sedimentation, Soil Erosion, and Loss of Topsoil

A significant impact may occur if a project is built on a site that has exposed soils that would be susceptible to weathering and erosion contributing to topsoil loss and sedimentation of local waters. SMC Malibu Campus Project's proposed site is currently improved by a former Sheriff's Station, parking lot, and a small interior courtyard with landscaping; therefore, there is little exposed soil that would be susceptible to weathering and erosion. Nevertheless, soils could be exposed to the elements during construction. The Project would be designed to comply with the Construction General Permit Water Quality Order 2009-0009-DWQ as amended by Order No. 2010-0014-DWQ to prevent short-term construction-induced water quality impacts resulting from erosion and sedimentation issues. Similarly, as a regulatory requirement, the Project requires the preparation of a Stormwater Pollution and Prevention

[8] *City of Malibu, Planning Department, Chapter 5.0 Safety and Health Element of the General Plan, Figure S-6: General Landslide Map of Malibu, November 1995, website: http://qcode.us/codes/malibu-general-plan/. Accessed November 2013*

Plan (SWPPP) because construction activities would disturb more than one acre of land. The SWPPP would address construction impacts, especially during soil disturbing activities when soils are exposed to wind, rain and concentrated flows that could cause erosion. Mitigation Measure WQ-1 in Section 4.7, Hydrology and Water Quality, would minimize soil erosion and the transmission of sediment into the City's separate storm sewer system. Therefore, Project impacts related to sedimentation, erosion and loss of topsoil would be less than significant.

(f) Soil Stability

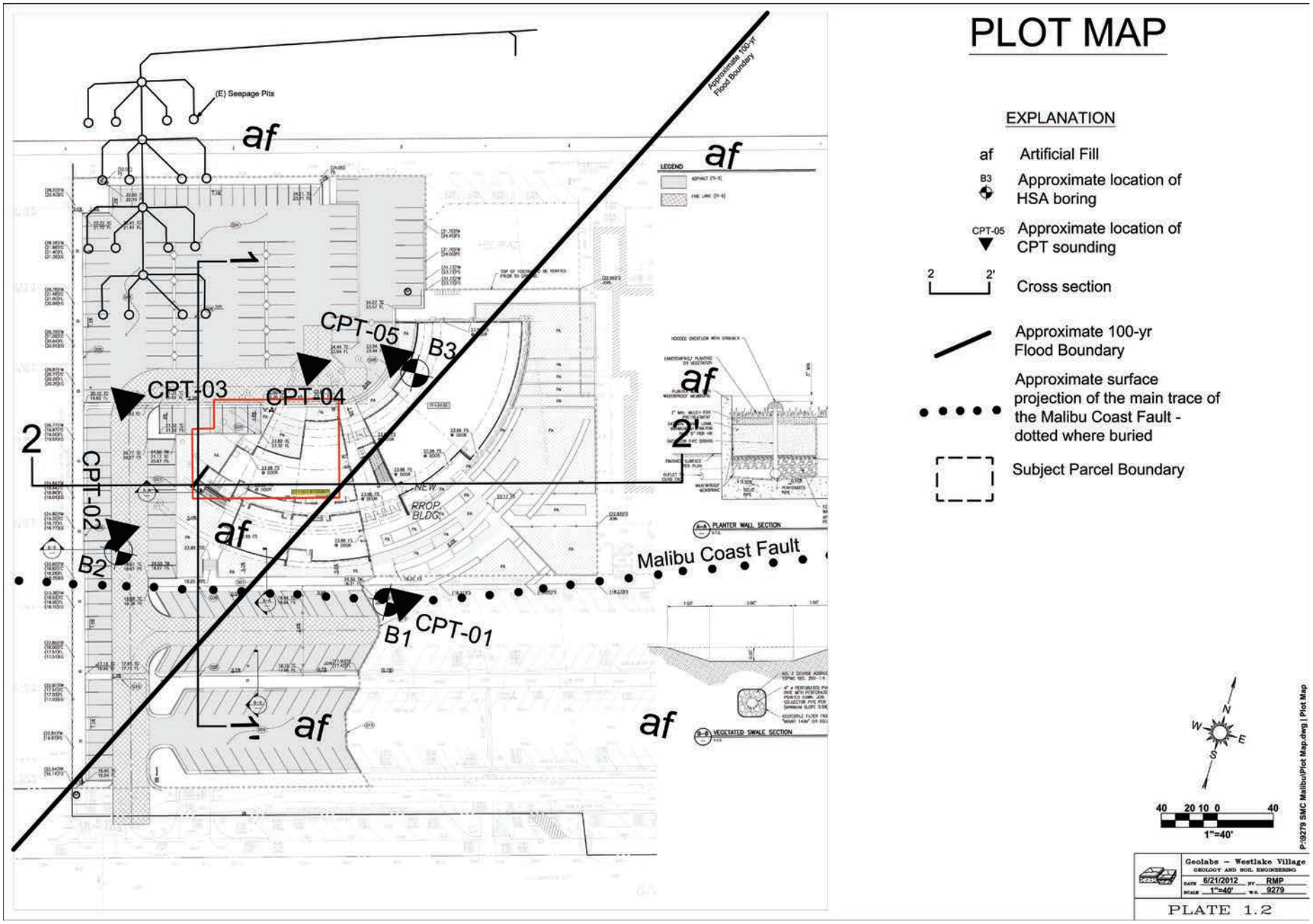
A significant impact may occur if there is significant depletion in the groundwater level that causes the ground level to subside or collapse. A review of the available literature indicates that the Project Site has not been subject to historical subsidence. The Preliminary Geotechnical Study indicates the Project Site is considered to be suitable for the proposed construction from a geotechnical engineering standpoint, provided that the geotechnical recommendations are incorporated into the final construction plans. The proposed building is two-stories high, and may be supported by continuous or pad footings. As discussed previously, a final design geotechnical and seismic study, including additional subsurface investigations and evaluation, would be performed at the Project Site once final structures and loads are determined, prior to final foundation design. The combination of these mandatory code-compliance measures would ensure project impacts would be less than significant (see Mitigation Measure GEO-1, below).

(g) Expansive Soil

A significant impact may occur if a project is built on expansive soils without proper site preparation or design features to provide adequate foundations for project buildings, thus posing a hazard to life and property. Expansive soils are clay-based soils that tend to expand as they absorb water and shirk when water is drawn away. As previously discussed, expansion test results indicate that the on-site materials are considered to have a low expansion potential or be non-expansive. The Proposed Project is not expected to withdraw or disrupt any groundwater, nor does the surrounding development. Proper construction would be further assured through the compliance with the Division of the State Architect, which includes building foundation requirements appropriate to site conditions. Mitigation Measure GEO-1, below, would ensure the Proposed Project would be constructed in accordance with the final geotechnical recommendations, City of Malibu's General Plan (Safety and Health Element), and Local Coastal Program Land Use Plan, and Division of the State Architect. Therefore, with implementation of the site development recommendations, development of the Proposed Project would have less than significant impacts related to soil stability.

(h) Flooding and Inundation

The Project Site lies on the floodplain of Malibu Creek. As shown in Figure 4.4.6, Plot Map, Figure 4.4.7, Cross Section 1, and Figure 4.4.8, Cross Section 2, the approximate eastern half of the Project Site is exposed to flooding during the 100-year-flood. Figure 4.7.1, Flood Hazard Map, in Section 4.7, Hydrology and Water Quality, indicates



Source: GeoLabs - Westlake Village, Preliminary Geotechnical Investigation, Proposed Malibu Campus, Plate 1.2, December 13, 2013

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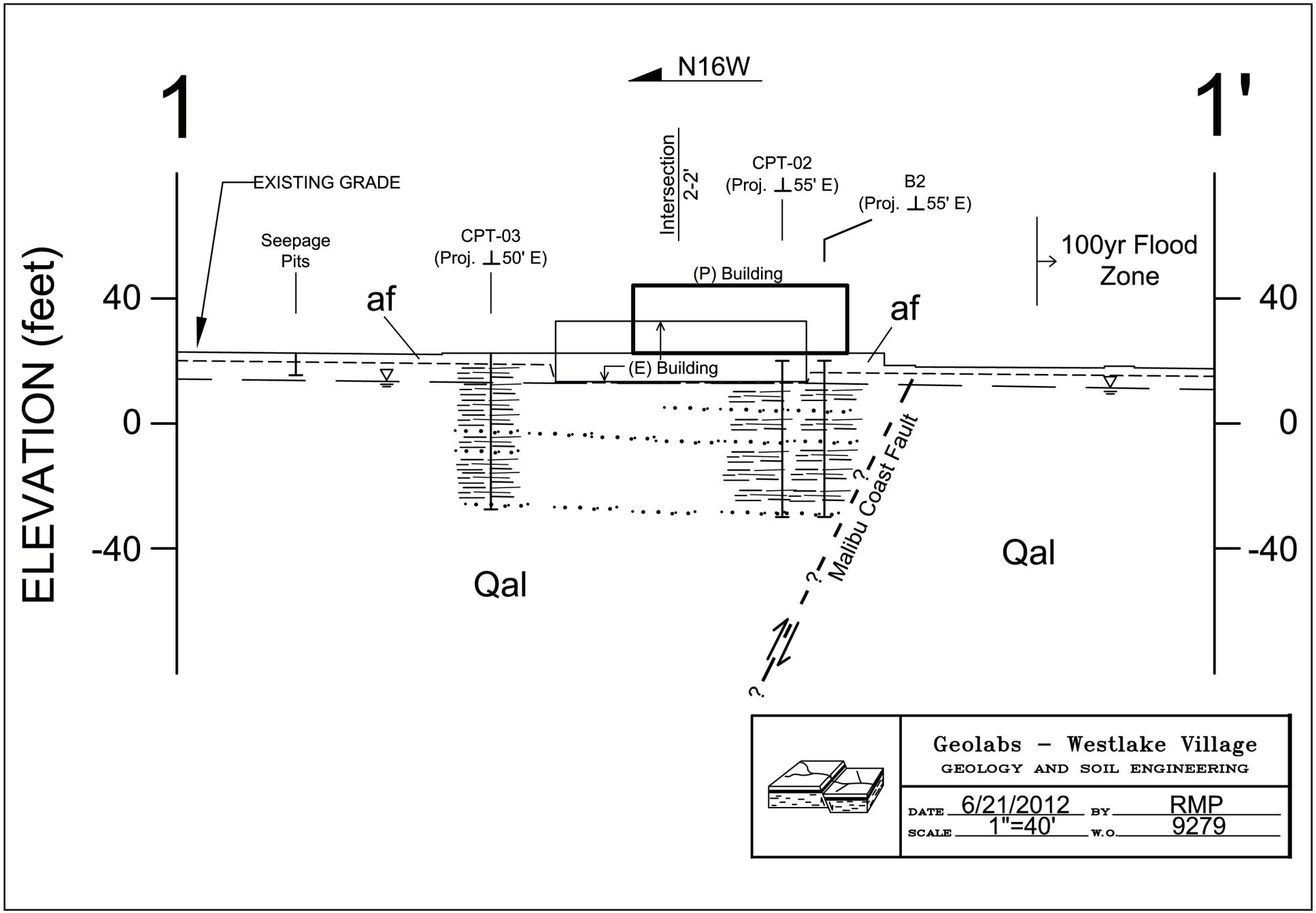
Figure 4.4.6
Plot Map



Source: GeoLabs - Westlake Village, Preliminary Geotechnical Investigation, Proposed Malibu Campus, Plate 2.1, December 13, 2013

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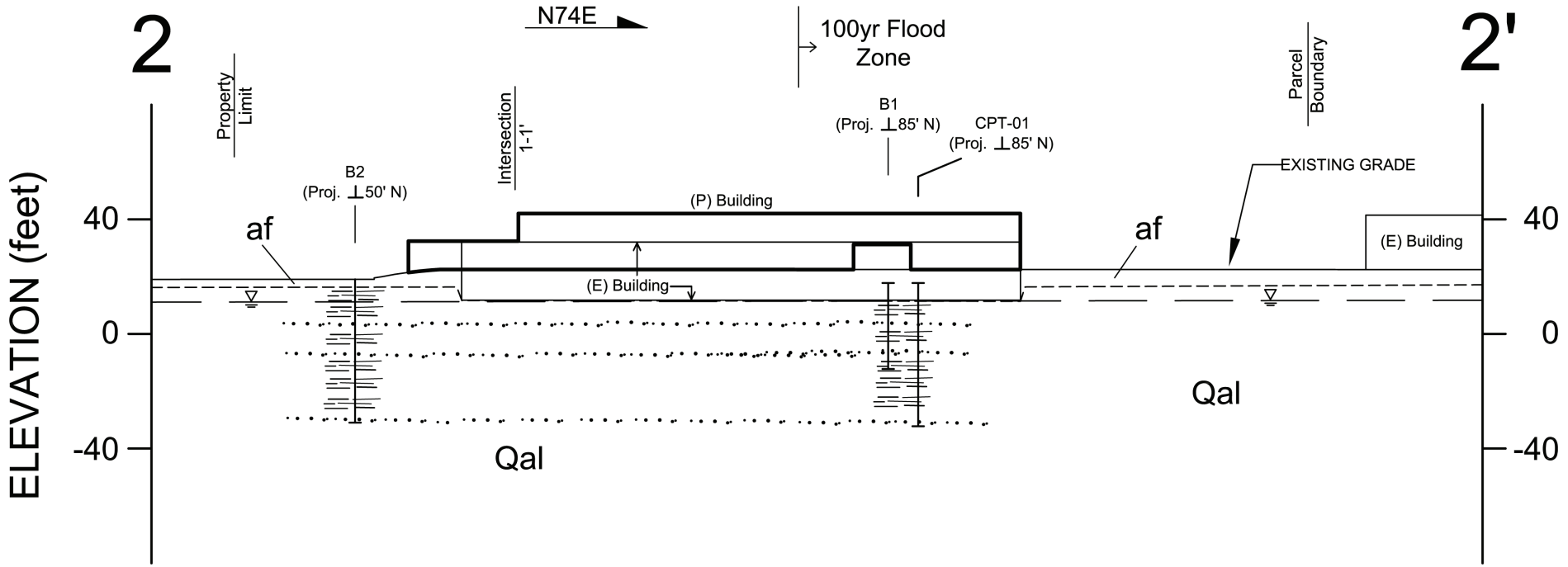
Figure 4.4.7
Cross Section 1



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GEOLOGY AND SOIL ENGINEERING

DATE 6/21/2012 BY RMP
SCALE 1"=40' W.O. 9279

Source: GeoLabs - Westlake Village, Preliminary Geotechnical Investigation, Proposed Malibu Campus, Plate 2.2, December 13, 2013

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Figure 4.4.8
Cross Section 2

that the eastern half of the Project Site is located in a Special Flood Hazard Area (SFHA) Zone of "AO." This corresponds to average flood depths (usually sheet flow on sloping terrain of up to two feet during a 100-year flood event). Figure 4.7.2, Dam Inundation Map, indicates several dammed reservoirs up-canyon from the Project Site. From northwest to southwest these reservoirs include Lake Sherwood (LSW), Westlake Lake (PW), the Las Virgenes Reservoir (WLR), Malibu Lake (MBL), and Century River (CTR). The Project Site lies within an inundation area for one or more of these reservoirs. With the implementation of acceptable design and building practices, the impact of a 100-year-flood and an inundation of up to two feet on the Proposed Project would be considered less than significant.

(i) Wastewater Disposal Systems

The existing buildings within the Civic Center complex are currently served by an existing septic system. The septic system's underground seepage pits are located on the northwest corner of the Project Site, in an area that is currently overlain by a surface parking lot (as seen in Figure 4.4.6 Plot Map).

Consistent with the City's Policy For Environmental Health Review Of Development Projects within the Civic Center Prohibition Area, the approval of the Proposed Project will be conditioned to connect to the City of Malibu's planned Wastewater Treatment Facility Project for the Civic Center Area when it becomes operational. The City's wastewater treatment facility is currently in the planning stages and will be undergoing a separate environmental review process. As discussed in further detail in Section 4.12, Utilities, the proposed City of Malibu Civic Center Wastewater Treatment Facility Project has accounted for future development within the Civic Center and will be able to accommodate the wastewater flows of the Proposed Project. Therefore, impacts will be reduced to a less than significant level.

4. CUMULATIVE IMPACTS

Geotechnical impacts related to future development in the City of Malibu would involve hazards related to site-specific soil conditions, erosion, and ground shaking during earthquakes. Such conditions are site-specific and would not be common to (nor shared with, in an additive sense) the impacts on other sites that are not physically connected. Cumulative development in the Civic Center area would increase the overall population that is exposed to seismic hazards by increasing the number of people living, working, and spending their leisure time in an area prone to earthquake hazards, including ground shaking, ground rupture, liquefaction, subsidence, and landslides. Although there are secondary earthquake hazards present within the Project vicinity, no secondary earthquake hazards are expected to cause a significant impact to the future SMC Malibu Campus building and site, assuming that the Project is constructed with the following mitigation measure. With adherence to applicable Federal, State, and local regulations, geological hazards and soil impacts can be reduced to a less than significant level. With the implementation of the mitigation measure below, no adverse cumulative impacts in relation to geology and soils is expected to occur.

5. MITIGATION MEASURES

GEO-1 The Proposed Project shall be designed and constructed in accordance with the City and State Building Codes and shall adhere to all modern earthquake standards, including the recommendations provided in the Project's Final Geotechnical Report, which shall be reviewed by the Division of the State Architect prior to construction.

6. LEVEL OF SIGNIFICANCE AFTER MITIGATION

With the implementation of mitigation measure listed above, impacts related to geology and soils would be less than significant.