3.6 SOILS AND GEOLOGY

3.6.1 AFFECTED ENVIRONMENT

The geology of the San Gabriel Basin is dominated by unconsolidated to semi-consolidated alluvium deposited by streams flowing out of the San Gabriel Mountains. These deposits include Pleistocene and Holocene (10,000 years ago to the present) alluvium and the lower Pleistocene San Pedro Formation. The Upper Pleistocene alluvium deposits form alluvial fans along the San Gabriel Mountains. The San Pedro Formation is characterized by its interbedded marine sand, gravel, and silt. The primary native soil types in the San Gabriel Basin area are sandy loam, silt loam, and clay loam (LACDPW 2005).

The sublease boundary sits on the alluvial soils of the San Gabriel River floodplain and erosion from the San Gabriel Mountains. Younger alluvium (Qal) is underlying geologic unit. This is an unconsolidated, poor to well graded mass consisting of sand, gravel, and cobbles. Surface soils are well drained, with moderately rapid permeability, slow runoff, and slight erosion hazard (USACE 1996).

The San Gabriel Valley is a structural basin lying between the Sierra Madre fault to the north and the Whittier-Elsinore fault zone in the Puente Hills to the southeast. There are five major faults within a 35-mile radius of the Recreation Area. The San Andreas Fault lies approximately 35 miles to the north, and the Newport-Inglewood Fault lies approximately 19 miles to the southwest. The Sierra Madre Fault is located approximately 10 miles to the northeast, and the Raymond Hill Fault is located approximately three miles to the north. The Whittier-Elsinore Fault lies approximately seven miles to the southeast. The strongest known fault occurred on October 1, 1987 and registered at 6.1 (Richter scale) on a hidden underground fault in the vicinity of the Whittier-Elsinore Fault (USACE 1996). The project site is not located within a fault rupture zone or within a currently established Alquist-Priolo Earthquake Fault Zone. Although the potential for surface rupture at the site is low, the site could be subject to strong ground shaking in the event of an earthquake (LACDPW 2005).

According to the Los Angeles County Seismic Safety Element, the sublease boundary is not located within an area identified by the California Geological Survey as having the potential for earthquake-induced landslides (LACDRP 1990; California Geological Survey 1999). In addition, the sublease boundary is not within an area identified as having a potential for seismic slope instability (LACDRP 1990; California Geological Survey 1999). There are no known landslide areas near the sublease boundary, nor is the sublease boundary in the path of any known potential landslides. The sublease boundary has a relatively flat topography, which precludes both landslide problems and lurching.

Liquefaction is the process in which sediments below the water table temporarily lose strength and behave as a liquid rather than a solid. Liquefaction generally occurs in sand and silts in areas with high groundwater levels. Due to the presence of loose alluvium materials deposited by the San Gabriel River, the sublease boudnary falls within a liquefaction hazard zone (California Geological Survey 1999).

Expansive soils are soils that swell when they absorb water and shrink as they dry. Pure clay soils and claystone are good examples of expansive soils. The hazard associated with expansive soils is that structural damage may occur when buildings are placed on these soils. Expansive soils are often present in liquefaction zones due to the high level of groundwater typically associated with liquefiable soils. Land subsidence is the loss of surface elevation due to the removal of subsurface support. Land subsidence is caused by activities that contribute to the loss of support materials within the underlying soils, such as agricultural practices or the overdraft of an aquifer. The sublease boundary is currently used as the WNNC. No agricultural practices currently occur on-site nor has the site historically been used for agricultural purposes. Water to the project site is currently supplied by an existing water main located in Durfee Avenue. Groundwater is not pumped within the sublease boundary. Thus, the potential for land subsidence within the sublease boundary is considered low (LACDPW 2005).

3.6.2 Criteria for Significance of Effects

Significant effects associated with geologic conditions and soils hazards are generally those that have the potential to:

- Expose people or structures to potential substantial adverse effects, including the risk of loss, injury or death;
- Rupture a known earthquake fault as delineated on the most recent zoning map or based on other substantial evidence of a known fault, strong seismic ground shaking, seismic-related ground failure, including liquefaction or landslides;
- Be located on a geologic unit or soil that is unstable, or would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse; or
- Be located on expansive soil creating substantial risks to life or property.

3.6.3 Project Effects on Soils and Geology

3.6.3.1 No Action Alternative

As part of the No Action Alternative, no new structures would be constructed. The risk of loss, injury, or death associated with seismic ground shaking or unstable soils would not change from existing conditions. No direct, indirect, or cumulative effects would occur.

3.6.3.2 18,230 SF Alternative

Potentially active/active (earthquake) faults within the project area are capable of moderate to large earthquakes that could generate ground shaking within the sublease boundary. The potential for strong

ground shaking during earthquakes is a general hazard encountered throughout Southern California. The performance of the 18,230 sf Alternative during earthquake shaking is addressed, and the acceptable level of risk is inherently defined, by the County of Los Angeles and California Building Code requirements. As discussed above, the sublease boundary is located in a liquefaction hazard zone. The required geotechnical/foundation reports for the 18,230 sf Alternative would provide area-specific data on soils and bedrock properties. The foundation design would be reviewed and approved by the U.S. Army Corps of Engineers (USACE) and County of Los Angeles Department of Public Works (LACDPW) prior to the issuance of building permits. Compliance with existing regulations would ensure a less than significant effect to liquefaction and expansion. There are no known landslide areas near the sublease boundary, nor is the sublease boundary in the path of any known potential landslides. The 18,230 sf Alternative would not remove groundwater or otherwise contribute to possible causes of subsidence in the area. Compliance with the California Building Code seismic safety requirements would ensure that no direct, indirect, or cumulative adverse effect would occur.

3.6.3.3 14,000 SF ALTERNATIVE (PROPOSED ACTION)

See Section 3.6.3.2 above.

3.6.3.4 10,000 SF ALTERNATIVE

See Section 3.6.3.2 above.

3.6.3.5 2,800 SF ALTERNATIVE

See Section 3.6.3.2 above.

3.6.4 MITIGATION MEASURES

No mitigation measures are required.

3.6.5 SIGNIFICANCE SUMMARY

3.6.5.1 NO ACTION ALTERNATIVE

No direct, indirect, or cumulative effects would occur related to soils and geology.

3.6.5.2 18,230 SF ALTERNATIVE

See Section 3.6.5.5 below.

3.6.5.3 14,000 SF ALTERNATIVE (PROPOSED ACTION)

See Section 3.6.5.5 below.

3.6.5.4 10,000 SF ALTERNATIVE

See Section 3.6.5.5 below.

3.6.5.5 2,800 SF ALTERNATIVE

Compliance with the California Building Code seismic safety requirements would ensure that no direct, indirect, or cumulative adverse effects related to soils and geology would occur.