4.8 GEOLOGY AND SOILS

4.8.1 INTRODUCTION

Appendix G of the California Environmental Quality Act (CEQA) Guidelines requires that geology and soils issues be evaluated as part of the environmental documentation process for a proposed project. The geotechnical impacts of the proposed Sunset Ridge Park Project on the existing Project site are analyzed below. Information within this section is based upon the Draft Geotechnical Study for the Proposed Sunset Ridge Park Project (Leighton 2009), the City of Newport Beach General Plan and Environmental Impact Report (CNB 2006), and the California Division of Mines and Geology Seismic Hazards Mapping (1998, 2009).

4.8.2 REGULATORY SETTING

Federal

International Building Code

The International Building Code (IBC) is the national model building code. The 2006 IBC is the most recent edition of the International Building Code, which was incorporated into the 2007 California Building Code, and currently applies to all structures being constructed in California (ICC 2008). The national model codes are incorporated by reference into the building codes of local municipalities, such as the California Building Code discussed below.

State

California Building Code

The California Building Code is promulgated under the *California Code of Regulations* (CCR), Title 24, Parts 1 through 12 (also known as the "California Building Standards Code" or CBC) and is administered by the California Building Standards Commission (BSC) (BSC 2009). The national model code standards adopted into Title 24 apply to all occupancies in California except for modifications adopted by State agencies and local governing bodies. The BSC published the 2007 triennial edition in July 2007, which incorporates the 2006 IBC, discussed above, and became effective January 1, 2008. The California Building Code may be adopted wholly or with revisions by local municipalities.

Alquist-Priolo Act of 1972

The Alquist-Priolo Earthquake Fault Zoning Act (Alquist-Priolo Act) was adopted by the State of California in 1972 in order to mitigate the hazard of surface fault rupture along known active faults (*Public Resources Code* [PRC], Section 2621 et. seq.). The purpose of the Alquist-Priolo Act is to reduce the threat to life and property, specifically from surface fault rupture, by preventing the construction of buildings used for human occupancy on the surface trace of active faults. Under this Act, the State has defined an "active" fault as having had surface displacement during the past 11,000 years (Holocene time). This law directs the State Geologist to establish Earthquake Fault Zones (known as "Special Studies Zones" prior to January 1, 1994) to regulate development within designated hazard areas. City and County jurisdictions must require a geologic investigation to demonstrate that a proposed development project, which includes structures for human occupancy, is adequately set back (usually at least 50 feet) from an active fault prior to permitting. In accordance with the Alquist-Priolo Act, the State has delineated "Earthquake Fault Zones" along identified active faults throughout the state.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act (Act) was passed in 1990 and directs the State Department of Conservation to identify and map areas subject to earthquake hazards, such as liquefaction, earthquake-induced landslides, and amplified ground shaking (PRC 2690–2699.6). Passed by the State legislature after the 1989 Loma Prieta Earthquake, the Act is aimed at reducing the threat to public safety and minimizing potential loss of life and property in the event of a damaging earthquake event. Seismic Hazard Zone Maps are a product of the resultant Seismic Hazards Mapping Program and are produced to identify Zones of Required Investigation; most developments designed for human occupancy within these zones must conduct site-specific geotechnical investigations to identify the hazard and to develop appropriate mitigation measures prior to permitting by local jurisdictions.

City of Newport Beach

General Plan Safety Element

The primary goal of the Safety Element of the *City of Newport Beach General Plan* is to reduce the potential risk of death, injuries, property damage, and economic and social dislocation resulting from natural and human-induced hazards. The Safety Element specifically addresses coastal hazards, geologic hazards, seismic hazards, flood hazards, wildland and urban fire hazards, hazardous materials, aviation hazards, and disaster planning. These goals and policies are provided in Table 4.1-2 in Section 4.1, Land Use and Related Planning Programs, with a Project consistency analysis. The Project's consistency with the City's Coastal Land Use Plan and the California Coastal Act is evaluated in Tables 4.1-3 and 4.1-4, respectively, in Section 4.1.

4.8.3 EXISTING CONDITIONS

Site Topography

The Project site is located within the Newport Mesa geomorphic area, a broad flat-topped mesa situated at an average of 50 to 75 feet above mean sea level (msl). The southwestern two-thirds of the Sunset Ridge Park Project site is at an elevation of about 25 to 30 feet above msl (Exhibit 4.8-1); the northeastern one-third of the property is at a higher elevation of approximately 70–75 feet above msl. The higher portion of the Project site sits atop a low bluff, the face of which has been eroded by gullies created by drainage from this upper "pad" area. Prior use of the site as a borrow area has resulted in heavy topographic modification of the site from its original condition. In its current topographic form, the site provides coastal views.

The Park's proposed access road would be located on a portion of the adjacent Newport Banning Ranch property, which currently consists of open terrain with features associated with oil drilling activities. Slopes along this access road area range from near vertical and flatter.

Geology

The Newport Mesa is characterized by nearly horizontal terrace and alluvial deposits (ancient near shore marine and terrestrial deposits) over bedrock. These terrace and alluvial deposits are underlain by sediments of the Quaternary-aged San Pedro Formation and the Tertiary-aged Monterey Formation.

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Site Topography

Exhibit 4.8-1

Sunset Ridge Park EIR

N
W E
S

150 75 0 150

Feet

Bonterra CONSULTING

R:/Projects/Newport/J016/Graphics/EIR/ex4.8-1_site_topo.pdf

Seismic Environment

Southern California is a geologically active area. Major earthquake faults in the region include the San Andreas Fault and its large branch, the San Jacinto Fault; the Elsinore-Whittier Fault; and the Newport-Inglewood Fault. The Project site is approximately 52 miles from the San Andreas Fault and ½ mile from the Newport-Inglewood Fault. The Newport-Inglewood Fault is a northwest-southeast trending feature that poses the closest seismic source of activity for the Project site. This fault system enters the region from the Los Angeles basin and passes offshore at Newport Beach. The Project site is located within the Newport-Inglewood Zone of deformation (Exhibit 4.8-2). The North Branch splay fault, which forms the northern boundary of this deformation zone, is inferred to lie under the Project site, but is not considered to be active[1] (Leighton 2009).

An analysis was conducted to determine the Peak Horizontal Ground Acceleration (PHGA) that could be expected at the site (please refer to Section 4.8.5 for the methodology used for this analysis). The results of this analysis indicate that the PHGA with a 2 percent probability of exceedance in 50 years is approximately 0.71g[2] (recurrence interval of 2,500 years), which is classified as a relatively high level of seismic shaking. This level of ground motion is considered the Maximum Considered Earthquake (MCE) in accordance with the 2007 California Building Code (Leighton 2009).

Soil Conditions

The Project site is comprised of native soils (marine terrace deposits) over bedrock. The elevated upper pad portion of the Project site is comprised of sandy clay, clay, and silty sand. The lower pad is comprised of a layer of silty sand that appears to extend across the entire site at a consistent elevation (at depth below the upper pad area). Below this layer of silty sand is a continuous layer of sandy clay and clay, which is underlain by claystone (Exhibit 4.8-3). Visual observations along the proposed access road's alignment would imply the soils along the road are consistent with those of the Project site, although borings were not taken in that area (Leighton 2009).

Groundwater/Seepage

Groundwater elevations below the Project site are at approximately 0 to -10 feet msl. Seepage was observed in numerous slope faces and at the toe of slopes on the property. Much of this seepage is believed to originate from infiltration occurring within the Newport Crest condominium development to the north of the site, daylighting at the Project site from subsurface flow at higher elevations under the development. Site-specific infiltration is also a potential source for seepage flows.

Mineral Resources

Oil drilling in Newport Beach began as early as 1904 when oil production became the primary mineral extraction activity in and around the City of Newport Beach. Two separate production and reserve areas exist within the City's Sphere of Influence: Newport Oil Field, which lies under the Pacific Ocean but has land-based tanks and extraction pumps just outside the municipal

[1] The California Geological Survey (CGS) generally considers a fault "active" if it has had surface displacement within Holocene time (about the last 11,000 years) (CGS 2009).

[2] Site acceleration during a seismic event is measured as a percent of gravity, or g. For instance, 0.76g is 76 percent of the force of gravity.

boundary in West Newport; and West Newport Oil Field, which is located in the Newport Banning Ranch area.

The proposed park would be accessed via the Newport Banning Ranch property to the west. There are active oil operations on the Newport Banning Ranch property. Within that portion of Newport Banning Ranch property proposed for use as a part of the Sunset Ridge Park Project for the park access road, there are two abandoned oil well sites and oil field roads that are located on the western portion of the Project site in the vicinity of the proposed park access road. There are also two abandoned well sites located within the area of the proposed haul road and export soil sites on the Newport Banning Ranch property. The oil wells have been abandoned as part of the abandonment and remediation program known as the Environmental Restoration Plan (ERP), which began during the 1990s in order to abandon the least productive wells on the Newport Banning Ranch property.

4.8.4 PROJECT DESIGN FEATURES AND STANDARD CONDITIONS

Project Design Features

PDF 4.8-1 Landscape and irrigation plans have been designed to minimize irrigation near natural areas/slopes.

PDF 4.8-2 Geotechnical design recommendations contained within the Geotechnical Study for the Sunset Ridge Park Project (Leighton 2009) shall be incorporated into the final Project design, unless supplemental geotechnical investigations provide information requiring revision of these recommendations.

Standard Conditions and Requirements

SC 4.8-1 A qualified Geotechnical Engineer shall review the final grading plans, foundation plans and specifications when available to verify that all Project Design Features have been appropriately considered and incorporated into final plan development.

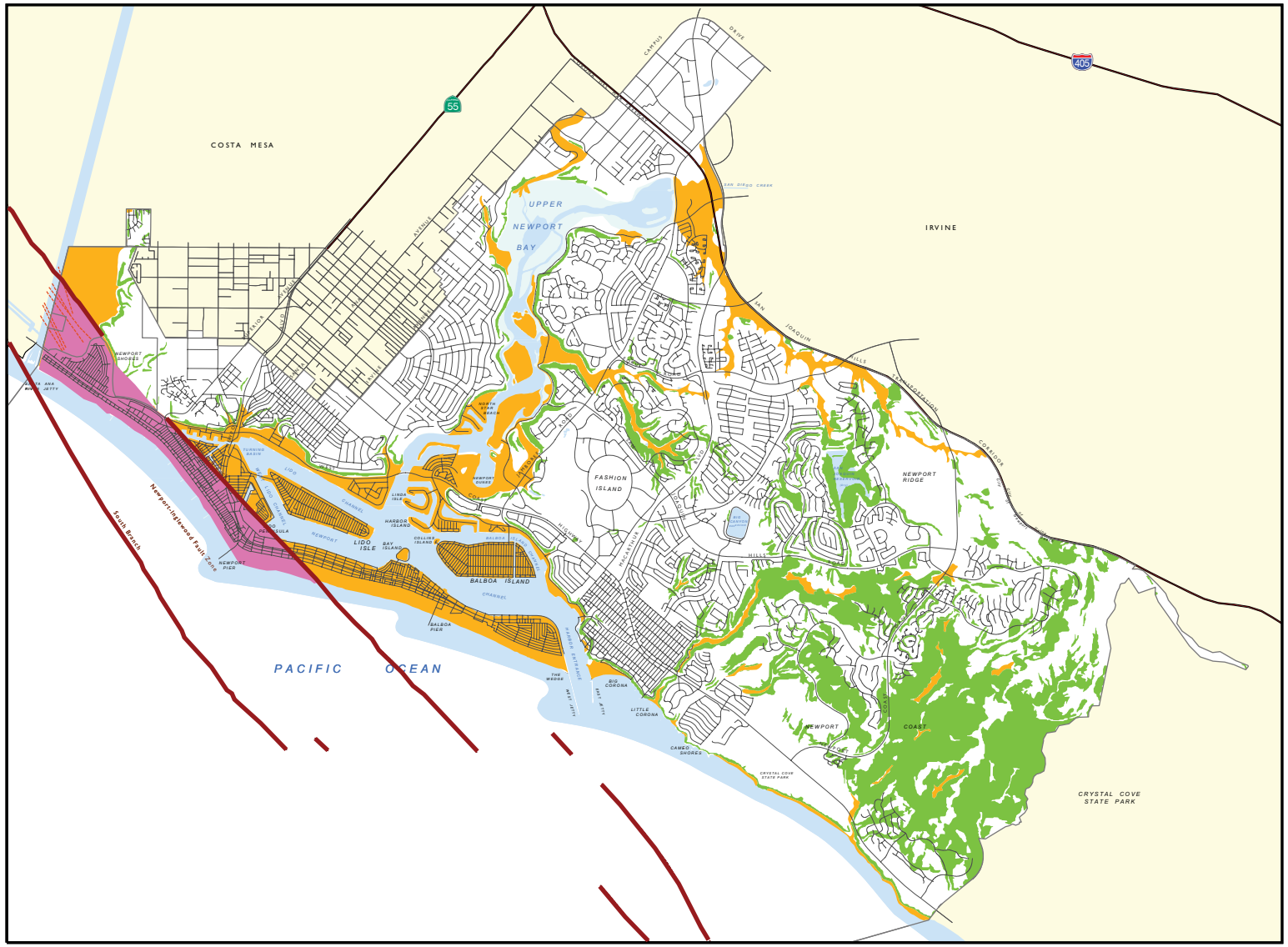
4.8.5 METHODOLOGY

The magnitude of ground shaking associated with earthquake activity is generally characterized by using the PHGA calculations. A probabilistic seismic hazard analysis was performed using the computer program FRISKSP to estimate the PHGA that could occur at the site. This analysis took into consideration the effect of site proximity to regional active faults.

Laboratory tests were performed on selected soil samples from the Project site. These tests evaluated the physical and engineering characteristics of the soils on the site and included in situ moisture content and dry density, grain size analysis, Atterberg Limits, direct shear, R-value, water-soluble sulfate concentration, resistivity, chloride content, and pH. Test results were used to determine the expansiveness potential for on-site soils, as well as appropriate applications and methods for excavation and use as fill material, stability characteristics, and construction materials assessment.

4.8.6 THRESHOLDS OF SIGNIFICANCE

The following significance criteria are derived from Appendix G of the State CEQA Guidelines. The Project would result in a significant impact related to geology and soils if it would:



Legend

- City Boundary
- Areas with liquefaction potential
- Areas with landslide potential
- Fault Disclosure Zone for real-estate disclosure purposes

Fault Line

- Major fault traces as mapped by Morton, 1999. Presumed active, except where shown otherwise based on geological studies
- Southward projection of active fault traces based on a subsurface study on the west bank of the Santa Ana River
- Highway
- Local Road
- County

Source: EIP Associates

Seismic Hazards, City of Newport Beach

Exhibit 4.8-2

Sunset Ridge Park EIR

N W E S

BonTerra CONSULTING

(Rev:JFG 09-10-09)R:/projec Newport/J016/EIR/ex4.8-2_seismic.pdf

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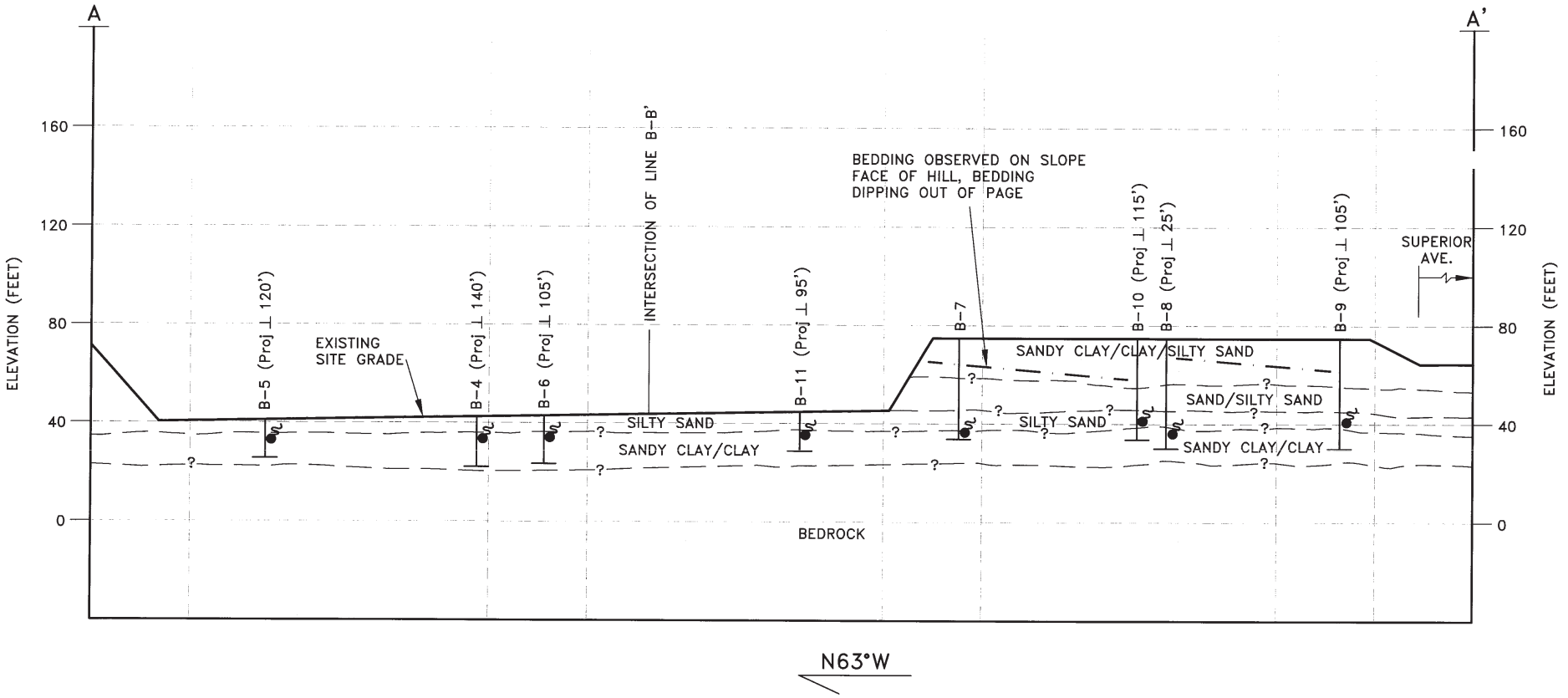

LEGEND

SEEPAGE

OBSERVED BEDDING (QUERIED WHERE UNCERTAIN)

SOIL UNIT/GEOLOGIC CONTACT (QUERIED WHERE UNCERTAIN)

Source: Leighton Consulting, Inc.

Soil Units

Exhibit 4.8-3

Sunset Ridge Park EIR

BonTerra CONSULTING

(Rev:JFG 09-10-09)R:/projec Newport/J016/EIR/ex4.8-3_soil_units.pdf

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Threshold 4.8-1 Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking.

Threshold 4.8-2 Expose people or structures to potential substantial adverse effects including the risk of loss, injury, or death from seismic-related ground failure, including liquefaction.

Threshold 4.8-3 Expose people or structures to potential substantial adverse effects including the risk of loss, injury, or death from landslides.

Threshold 4.8-4 Result in substantial soil erosion or the loss of topsoil.

Threshold 4.8-5 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.

Threshold 4.8-6 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.

4.8.7 ENVIRONMENTAL IMPACTS

The Project proposes to develop the Project site with active and passive recreational uses, restroom facilities, a parking lot, and an access road. Supporting Project infrastructure would include retaining walls, a storm water routing system, and site drainage features/Best Management Practices (BMPs). Please refer to Section 4.10, Hydrology and Water Quality, of this EIR for details on BMPs incorporated into the Project design.

Exhibit 4.8-4 illustrates the proposed Project site's grading plan. Fill would be added to the northern edge of the site adjacent to the existing development in order to support site drainage plans and to provide a foundation for a sound wall. The central portion of the site would be subject to minor grading to improve site drainage consistent with overall existing drainage patterns. The most extensive topographic alteration would occur to the existing slope face that separates the upper and lower portions of the site where the existing 1.5:1 (horizontal: vertical) slope would be flattened to a 2:1 slope (for a topographic elevation change of -20 to -30 feet).

Threshold 4.8-1 Would the project expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking?

The Project site is located near the Newport-Inglewood Fault and within the fault's zone of deformation. The North Branch Splay Fault, part of this fault system, is believed to lie under the Project site, which is considered 'not active' according to the criteria set by the State of California for Alquist-Priolo Special Studies Zones for evaluating surface faulting potential (Leighton 2009). The site itself is not located within an Alquist-Priolo Earthquake Fault Zone. However, the *City of Newport Beach General Plan EIR* indicates that the Newport Beach area has a 10 percent chance of experiencing ground acceleration in the high to very high range for southern California. These levels of shaking can be expected to cause damage particularly to older and poorly constructed buildings (CNB 2006a).

The California Geological Survey and U.S. Geological Survey have placed Newport Beach in an area designated to have a moderate to high potential for ground shaking associated with

regional earthquake activity (CGS and USGS 2008). A site-specific analysis of the Project site's potential to experience significant seismic ground motion was recently conducted (Leighton 2009). This analysis concludes that, although the Project site is not located within a designated Alquist-Priolo Earthquake Fault Zone, strong ground shaking due to regional seismic activity is anticipated.

The only structure proposed as part of the Project is 1,300-square-foot (sf) building with restrooms and storage for park maintenance equipment and sports equipment. The structure would be located in the north-central portion of the site. Other Project features include open recreational and natural areas.

Given these site conditions, PDF 4.8-2 provides for incorporation of geotechnical recommendations contained within Leighton's 2009 Project Geotechnical Report into final Project design and approvals. Recommendations include the use of design parameters listed in Table 4.8-1 (California Building Code 2007 Seismic Design Parameters). These parameters would be applied as appropriate to the restroom structure and site grading design.

SC 4.8-1 provides for a qualified Geotechnical Engineer to review the final grading plan, foundation plans, and specifications to confirm that all PDFs and seismic design considerations have been appropriately considered and incorporated into final plan development. A design-level geotechnical exploration would also be conducted to ensure that the Geotechnical Engineer reviewing the final Project plans and specifications has all the data needed for design approval.

Therefore, risk of loss, injury or death to people from seismic ground shaking associated with the one structure would be minimal. Users of open-air park recreational facilities would not experience significant additional risk from ground shaking over existing conditions. Impacts are determined to be less than significant. MM 4.8-1 provides for a final design-level; geotechnical investigation to confirm design parameters and recommendations. With this mitigation measure impacts would be further reduced.

TABLE 4.8-1
CALIFORNIA BUILDING CODE 2007 SEISMIC DESIGN PARAMETERS

Seismic Design Parameters	Recommended Minimum Value*
Soil Site Class	D
Mapped Acceleration for Short (0.2 Second) Period, S_s	1.829
Mapped Acceleration for 1 Second Period, S_1	0.687
Site Coefficient, F_a	1.0
Site Coefficient, F_v	1.5
Spectral Response Acceleration for Short Period, S_{MS}	1.829
Spectral Response Acceleration for 1 Second Period, S_{M1}	1.030
Design Spectral Response Acceleration for Short Period, S_{DS}	1.220
Design Spectral Response Acceleration for 1 Second Period, S_{D1}	0.687
* recommendation contained within the Geotechnical Study for the Proposed Sunset Ridge Park Project, Leighton 2009	
Source: Leighton 2009.	

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Proposed Project Grading Plan (Option B)

Exhibit 4.8-4

Sunset Ridge Park EIR

N
W E
S

150 75 0 150
Feet

Bonterra CONSULTING

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Impact Summary: ***Less Than Significant with Mitigation.*** Although the Project site is not located within a designated AP Earthquake Fault Zone, strong seismic ground shaking at the site can be expected associated with regional earthquake activity. With the incorporation of PDF 4.8-2, SC 4.8-1 and MM 4.8-1, this impact would be less than significant.

Threshold 4.8-2 ***Would the project expose people or structures to potential substantial adverse effects including the risk of loss, injury, or death from seismic-related ground failure, including liquefaction?***

Threshold 4.8-5 ***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?***

There are no known active or potentially active faults that cross or underlie the Project site; therefore there would be no risk of ground failure associated with surface fault expression. Liquefaction is the loss of soil strength or stiffness due to a build up of pore-water pressure during severe ground shaking. This condition is associated primarily with loose (low density), saturated, fine- to medium-grained, cohesionless soils. The *City of Newport Beach General Plan* (CNB 2006) and the Seismic Hazard Zone Map for the Newport Beach Quadrangle (CDMG 1998) indicates the Project site is not in an area susceptible to liquefaction. Leighton (2009) concurs with this determination, as the materials on the proposed Project site consist of medium dense to dense soils and bedrock, for which the liquefaction potential is considered low.

Subsidence consists of a lowering or settlement of the ground surface through collapse of subsurface void space. This condition can occur in areas where oil or groundwater has moved out of an area and created a void space unable to sustain the materials above it; or in areas where subsurface materials are dissolved, leaving little or no support for surface soils or features. Subsidence can be a dangerous condition for structures and facilities if not accounted for in project planning and design. There are active oil operations on the Newport Banning Ranch property; two abandoned oil well sites are located on the western portion of the Project site (within the Newport Banning Ranch property) in the vicinity of the proposed access road and two abandoned oil well sites are proximate the proposed haul road and export soils sites. No active oil operations are conducted or proposed within the boundaries of the Project site. Groundwater table levels are below grading contours, and perched groundwater as well as local seepage will be dewatered if encountered during construction; project sub-drain facilities will minimize the effects of seepage once construction is complete. There is a very low potential for the Project site to experience post-construction subsidence or settlement (Cheng, pers. comm. September 21, 2009).

Lateral spreading is the finite, horizontal movement of material associated with pore pressure build-up or liquefaction. This process can that occur in a shallow underlying deposit during an earthquake. Lateral spreading requires the existence of a continuous and laterally unconstrained liquefiable zone to occur. As this condition does not occur on the Project site, there would be no effect from lateral spreading either on site or off site.

The slope face separating the upper northeastern portion of the Project site from the lower southwestern portion of the Project site is identified as an area potentially susceptible to earthquake-induced landsliding in the City of Newport Beach General Plan (CNB 2006a). This specific portion of the site is proposed for grading that would flatten out the existing slope and reduce the topographic elevation of the bluff by about 20 to 30 feet. This will reduce any risk of

landslide occurrence on site to a less than significant level. Please refer to the impact analysis for Threshold 4.1.3 below for additional discussion on landslide potential at the site.

The risk associated with landsliding, seismic-related ground failure and associated liquefaction, lateral spreading or subsidence is less than significant.

Impact Summary: ***Less Than Significant.*** Conditions on the Project site indicate that the potential for liquefaction and associated lateral spreading is low. The site is not underlain by active or potentially active faults; accordingly there would be no potential for ground failure on the site associated with surface fault expression. Therefore, impacts from the Project associated with seismic related ground failure or other geologic instability are less than significant.

Threshold 4.8-3 ***Would the project expose people or structures to potential substantial adverse effects including the risk of loss, injury, or death from landslides?***

Slope stability is expressed in engineering design analyses through the calculation of 'safety factors', for which a safety factor of 1.5 or higher is needed to ensure slope stability (E. Burrows, pers. com). However, analyses conducted for Project site conditions indicate that existing slopes do have a safety factor of 1.5 or higher under static conditions, and a factor of safety between 1.0 and 1.2 under seismic conditions. Although the existing bluff face on the property is considered an area subject to potential instability during a seismic event (CNB 2006a), site grading would flatten this slope and increase existing safety factors in the post-project condition. The final grading plans would ensure all slopes on the Project site would have appropriate safety factors required for plan approval. MM 4.8-2 provides for a slope stability analysis to be performed once the final slope configuration is available. Final slope configurations would be adjusted as necessary to ensure that the potential risk from the Project associated with on-site landslide potential is less than significant.

Impact Summary: ***Less Than Significant with Mitigation.*** The *City of Newport Beach General Plan* and the CDMG (1998) indicate that there is some on-site potential for landsliding under seismic conditions. Post-Project slopes on site would be flatter and be in compliance with required factors of safety. With the incorporation of MM 4.8-2 providing for additional slope stability analysis and grading plan revision if needed to maintain Project slope stability under seismic conditions, impacts would be less than significant.

Threshold 4.8-4 ***Would the project result in substantial soil erosion or the loss of topsoil?***

The Project site is fairly denuded;[3] and existing conditions are conducive to rill and gully erosion as storm waters flow toward existing V-ditch conduits on site. Impervious surface areas on site would increase with the proposed Project by approximately 14.4 percent. Analysis of the existing and proposed Project conditions indicate that an increase in peak flows would result at the location where flows exit the site; these flows have been calculated at approximately 10.84 cubic feet per second (cfs) and 13.27 cfs, for the 10-year and 25-year storm events, respectively (please refer to Section 4.10, Hydrology and Water Quality, for additional detail on site hydrology). Storm water flows moving throughout the site would follow similar flow paths as

[3] Denudation: the exposing or laying bare of rock by erosive processes (www.dictionary.com).

in the existing condition, but would be diverted into BMPs and PDFs (such as a vegetated dry creek, on-site swales, or polyvinyl chloride [PVC] drainage piping) that would either reduce flow velocities, or transfer flows to a facility that is not susceptible to erosion or sedimentation (see Exhibits 4.10-10 and 4.10-11 of Section 4.10, Hydrology and Water Quality).

To ensure that existing flow peak flow velocities remain unchanged from the existing condition, an underground corrugated metal pipe (CMP) Detention System would be used to temporarily retain flows and to release them at a rate equal to the existing condition. Therefore, management of site hydrology and flow velocities through the on-site storm water routing features, PDFs and BMPs discussed in Section 4.10, Hydrology and Water Quality, would reduce the loss of topsoil on the Project site from erosion. PDF 4.8-1 would also ensure that irrigation and landscaping plans would minimize irrigation near natural drainage or slopes, further reducing the potential for Project-induced erosion over existing conditions. Impacts are considered less than significant.

Impact Summary: ***Less Than Significant.*** Existing site conditions are conducive to rill and gully erosion based upon the lack of vegetation and amount of exposed soil surface. With the PDFs and BMPs incorporated into the proposed Project, the loss of topsoil associated with Project-induced erosion would be reduced over existing conditions. Project impacts on soil erosion and/or the loss of topsoil would be less than significant.

Threshold 4.8-6 ***Would the project 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?***

Based on the result of the laboratory testing of soils at the Project site (please refer to Section 4.8.5, Methodology) the on-site near surface soils are expected to have a low expansion potential. Therefore, impacts associated with expansive soils are expected to be less than significant.

Impact Summary: ***Less Than Significant.*** As on-site soils have a low expansion potential, impacts associated with expansive soils are less than significant.

4.8.8 CUMULATIVE IMPACTS

For geology and soils, the study area considered for the cumulative impact includes (1) the area that could be affected by proposed Project activities and (2) the areas affected by other projects whose activities could directly or indirectly affect the geology and soils of the proposed project site. Geology and soils impacts are generally site-specific and there is typically little, if any, cumulative relationship between the development of the proposed Project and development within a larger cumulative area, such as the citywide development. For example, development at the Project site as a park would not alter geologic events or soil features/characteristics (such as groundshaking, seismic intensity, or soil expansion); therefore, the Project would not affect the level of intensity at which a seismic event on an adjacent site is experienced. However, Project development and future development in the area may expose more persons to seismic hazards. However, the proposed Project, as well as the foreseeable projects, would be required to comply with the applicable State and local requirements, such as the California Building Code. As such, potential impacts would be reduced to a less than significant level and to the maximum extent practicable under current engineering practices. Seismic impacts are a regional issue and are also addressed through compliance with applicable codes and design

standards. For these reasons, the Project's contribution to cumulative geotechnical and soils impacts would be less than significant.

4.8.9 MITIGATION PROGRAM

Project Design Features

PDF 4.8-1 Landscape and irrigation plans have been designed to minimize irrigation near natural areas/slopes.

PDF 4.8-2 Geotechnical design recommendations contained within the Geotechnical Study for the Sunset Ridge Park Project (Leighton 2009) shall be incorporated into the final Project design, unless supplemental geotechnical investigations provide information requiring revision of these recommendations.

Standard Conditions and Requirements

SC 4.8-1 A qualified Geotechnical Engineer shall review the final grading plans, foundation plans and specifications when available to verify that all Project Design Features have been appropriately considered and incorporated into final plan development.

Mitigation Measures

MM 4.8-1 A final design-level geotechnical exploration shall be performed after the final grading plans are made available to confirm that the data and assumptions applied in the development of final Project plans and specifications remain appropriate.

MM 4.8-2 Additional slope stability analyses shall be performed when the final slope configuration is available to confirm that Project slopes would be seismically stable. Final slope configuration would be adjusted if needed to ensure impacts are less than significant.

4.8.10 LEVEL OF SIGNIFICANCE AFTER MITIGATION

With the incorporation of the Mitigation Program, impacts to geotechnical resources would be less than significant.