4.8 GEOLOGY AND SOILS

4.8.1 Introduction

This section provides a discussion of the existing geologic and soils environment and an analysis of potential impacts from implementation of the proposed project. This section also addresses the potential for structural damage due to the local geology underlying the proposed project site, as well as slope stability, ground settlement, soil conditions, grading, and regional seismic conditions. This section summarizes information provided in the *Limited Geotechnical Evaluation Del Mar Fairgrounds Master Plan, Del Mar, California,* prepared by Ninyo & Moore (September 2006), the *Limited Geotechnical Evaluation Hotel and Exhibit Hall at Del Mar Fairgrounds, Del Mar California,* prepared by Ninyo & Moore (May 2007), and the *Report of Preliminary Geotechnical Investigation Proposed Parking Lot and Event Area Del Mar Fairgrounds,* prepared by Christian Wheeler Engineering (March 2008). The Geotechnical Evaluations are included in Appendix G of this Environmental Impact Report (EIR).

4.8.2 Existing Environmental Setting

Geologic Setting. The project site is located in the San Diego County coastal section of the Peninsular Ranges Geomorphic Province, a 900-mile (mi) northwest-southeast-trending structural block that extends from the tip of Baja California to the Transverse Ranges and includes the Los Angeles Basin. The total width of the province is approximately 225 mi, with a maximum land-bound width of 65 mi. In general, the Peninsular Ranges consists of rugged mountains underlain by Jurassic metavolcanic and metasedimentary rocks and Cretaceous igneous rocks of the Southern California batholith. The portion of the province in San Diego County that includes the project area consists generally of Tertiary- and Quaternary-age sedimentary rock.

The Fairgrounds were built on extensive fill in the floodplain north of the San Dieguito River channel in the early 1930s. The Fairgrounds site was filled as part of the State of California's Swampland Reclamation Act, which was designed to develop swampland for "useful purposes." The initial 184-acre (ac) site was used as a golf course until 1936, when the golf course and 57 ac of additional land were purchased by the State Division of Fairs and Expositions for the development of a permanent Fairgrounds site. The 22nd District Agricultural Association (DAA) received a Works Progress Administration (WPA) grant to fund construction of the original facilities, including a main exhibit hall and auditorium, a grandstand and utility building, 10 livestock buildings, an equipment shed, a main entrance building, stables for 600 horses, and a mile-long Racetrack. Many facilities have been added to the Fairgrounds over the years, including additional exhibit halls, livestock and thoroughbred racing barns, a new horse arena, and a satellite wagering facility. The most recent major additions have been two new multipurpose livestock barns completed in 2006 and the addition of the roof over the arena completed in spring 2009. Today, facilities on the Fairgrounds include a Racetrack, stables, a Grandstand, a horse arena, barns, a multipurpose activity center, a satellite wagering facility (in two new buildings), and other structures associated with the Fair and Racetrack. The eastern edge of the Fairgrounds property, known as Surf and Turf, contains a driving range, a miniature golf course, a pro shop, a dirt parking lot, tennis courts, a recreational vehicle (RV) lot, a swimming pool, a volleyball tent, and some vacant land. The portion of the property east and south of Jimmy Durante Boulevard is largely used as unpaved parking areas.

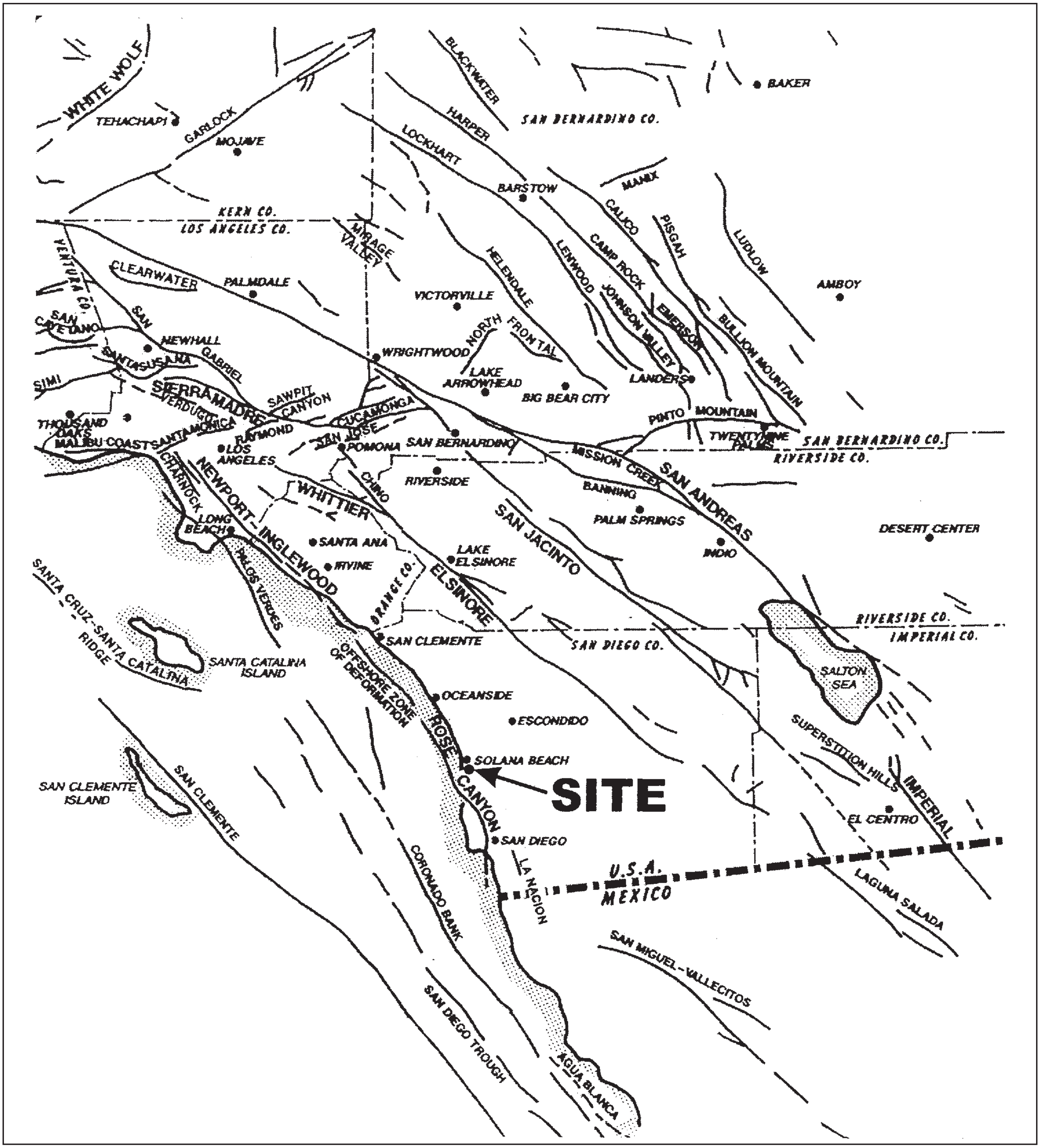
The site is underlain by shallow fill soils, alluvium, and materials of the Bay Point Formation, which consists of poorly consolidated lagoon and nonmarine sandstone. The fill and alluvium encountered during subsurface boring generally consisted of soft to stiff clay to silty clay and loose to dense silty sand to sandy silt. Interpretations of the Cone Penetrometer Testing (CPT) data suggest that materials in approximately the upper 20 feet (ft) generally consist of soft, fine-grained material. Dense to very dense, fine-grained sand and silty sand alluvium was encountered beneath the silt to the depths of approximately 55 to 66.5 ft.

Groundwater. Fluctuations in the groundwater level on site may occur due to variations in ground surface topography, tidal influence, subsurface geologic conditions and structure, rainfall, irrigation, and other factors. Based on the presence of surface water at an elevation of approximately 2 ft above mean sea level (amsl), groundwater on the project site is anticipated to be at a depth of approximately 5 ft below ground surface (bgs). Based on the proximity of the site to the San Dieguito River, groundwater elevation is expected to be influenced by seasonal rainfall amounts and could rise (to depths shallower than 5 ft bgs) during periods of high rainfall.

Seismicity and Faulting. As stated above, the project site is located within the Peninsular Range Geomorphic Province, which is dominated by en-enchelon, northwest-striking, right-lateral, strike-slip faults. A fault is described as the area where two tectonic or continental plates meet. An "active" fault is defined by the State of California as having had surface displacement within the Holocene time (i.e., within the last 11,000 years). A "potentially active" fault is defined as showing evidence of surface displacement during the Quaternary time (i.e., during the last 1.6 million years). These terms are, however, used by the State primarily in evaluating the potential for surface rupture along faults and are not intended to describe possible seismic activity associated with displacement along a fault. These definitions are not applicable to blind thrust faults that have only limited, if any, surface exposures. A blind thrust fault is a thrust fault that does not rupture the surface, so there is no evidence of it on the ground.

The project site would potentially be affected by seismically active faults in the region. Several active and potentially active faults have been mapped within several miles of the property. There are, however, no known active or potentially active faults or fault traces crossing the site. Therefore, the project site is not located within a currently designated Alquist-Priolo Earthquake Fault Zone. The approximate locations of the major faults in the region and their geographic relationship to the site are shown on Figure 4.8.1, Fault Location Map. Faults in the vicinity of the project site include the San Clemente, Agua Blanca-Coronado Bank, Newport Inglewood, and Rose Canyon Faults, located to the west of the site.

Regional geologic mapping by the State of California shows that the closest active fault is the Rose Canyon Fault, located approximately 2.5 mi west of the site. The Rose Canyon Fault is considered to be capable of generating an earthquake magnitude of 7.2.



LSA

FIGURE 4.8.1

N

0 15 30
MILES

SOURCE: Ninyo & Moore

Del Mar Fairgrounds Master Plan EIR

Fault Location Map

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Properties in Southern California are subject to seismic hazards of varying degrees, depending on the proximity, degree of activity, and capability of nearby active faults. These hazards can be primary (i.e., directly related to the energy release of an earthquake such as surface rupture and ground shaking) or secondary (i.e., related to the effect of earthquake energy on the physical world, which can cause phenomena such as liquefaction or ground lurching).

Potential Primary Seismic Effects.

Ground Shaking and Surface Fault Rupture. The primary seismic effects associated with earthquakes are ground shaking and surface fault rupture. Ground or seismic shaking would typically be considered to be the greatest potential for damage associated with earthquakes. Seismic shaking is characterized by the physical movement of the land surface during and subsequent to an earthquake. Seismic shaking has the potential to cause destruction and damage to buildings and property, including damage resulting from damaged or destroyed gas or electrical utility lines; disruption of surface drainage; blockage of surface seepage and groundwater flow; changes in groundwater flow; dislocation of street alignments; displacement of drainage channels and drains; and possible loss of life. In addition, groundshaking can induce several kinds of secondary seismic effects, including liquefaction, differential settlement, and landslides, all of which are described below.

The intensity of seismic shaking during an earthquake depends largely on geologic foundation conditions of the materials comprising the upper several hundred feet of the earth's surface. The greatest amplitudes and longest durations of ground shaking occur on thick, water-saturated, unconsolidated alluvial sediments that may lead to liquefaction (further described below). Ground shaking can also cause ground failure or deformation due to lurching and liquefaction.

Surface fault rupture refers to the displacement of the ground surface along a fault, which can occur during strong earthquakes. The potential for seismic hazards at the project site are a consequence of ground shaking caused by events on nearby active faults. As previously stated, the project site is not located within a currently designated Alquist-Priolo Earthquake Fault Zone, so the possibility for surface fault rupture is low. The primary seismic hazard for the proposed project site is ground shaking, due to the proximity of major active faults, including the Rose Canyon Fault.

Based on a site-specific probabilistic evaluation that was performed, the peak ground accelerations (PGA) for the alluvial sediments on the project site were calculated to be 0.36 g (36 percent of the acceleration of gravity), with a 10 percent probability in 50 years (design-basis earthquake [DBE]). These accelerations are consistent with other sites located within this region of Southern California. Based upon the results of these analyses, the parameters generated by the probabilistic evaluation should form the basis of the design of structures at the project site.

Potential Secondary Seismic Effects.

Liquefaction and Lateral Spreading. Lateral spreading typically occurs as a form of horizontal displacement of relatively flat-lying alluvial material toward an open or "free" face such as an open body of water, channel, or excavation. In soils, this movement is generally due to failure along a weak plane and may often be associated with liquefaction. Liquefaction is caused by sudden temporary increases in pore water pressure due to seismic densification or other displacement of submerged granular soils. Intervals of loose sand may, therefore, be subject to liquefaction if these materials are or were to become submerged and are also exposed to strong seismic ground shaking. Seismic ground shaking of relatively loose granular soils that are saturated or submerged can cause the soils to liquefy and temporarily behave as a dense fluid. This loss of support can produce local ground failure such as settlement or lateral spreading that may damage overlying improvements. Based on the relatively shallow groundwater table and the loose nature of the alluvial materials underlying the site, the potential for liquefaction at the project site is medium to high.

Seismically Induced Ground Settlement. This type of secondary seismic effect can result in damage to property when an area settles to different degrees over a relatively short distance. The sinking or settlement of a structure, fill prism, or other imposed load is usually the result of compaction or consolidation of the underlying soil. Soils susceptible to seismically induced settlement typically include loose granular materials. Based on the compressibility of the underlying soils and the presence of shallow groundwater, the site could be subject to dynamic settlement and seismically induced ground settlement.

Slope Instability. The downslope movement of loose rock or soil is also a potential secondary seismic effect that can occur during strong ground shaking. There are no existing landslides or evidence of deep-seated landsliding on the project site. Planned excavations (from the ground surface to the subgrade depth) and temporary slopes would follow soil specific trench sloping and shoring design parameters.

Nonseismic Geologic Constraints.

Erosion. Erosion typically occurs from concentrated runoff or unprotected slopes or along unlined channels that are underlain by relatively erosion-prone earth materials (e.g., topsoil, soft alluvium, uncemented sandstone). Proposed fills and exposed cut surfaces would typically consist of mixtures of silt and sand and would tend to be easily eroded under conditions of uncontrolled, concentrated surface runoff.

Expansive Soils. Expansive soils contain types of clay minerals that occupy considerably more volume when they are wet or hydrated than when they are dry or dehydrated. Volume changes associated with changes in the moisture content of near-surface expansive soils can cause uplift or heave of the ground when they become wet or, less commonly, cause settlement when they dry out. Soils on-site are anticipated to have a low to medium potential for expansion.

Subsidence. The phenomenon of widespread land sinking, or subsidence, is generally related to substantial overpumping of groundwater or petroleum reserves from deep underground reservoirs or associated with areas of uncompacted fill, such as landfills. The project does not have an oil or water pump on site and has not been used for the extraction of either resource. Dewatering associated with construction activities for the near-term projects would not be of a magnitude that would affect ground surfaces. Subsidence is therefore not considered a potential constraint or a potentially significant impact of the project.

Corrosive Soils. Corrosive soils contain chemical constituents that may cause damage to construction materials such as concrete and ferrous (iron-containing) metals. One such constituent is water-soluble sulfate, which, if high enough in concentration, can react with and damage concrete. Electrical resistivity, chloride content, and pH level are indicators of the soil's tendency to corrode ferrous metals. Due to the proximity of the project site to the marine environment, the on-site soils may be classified as corrosive.

4.8.3 Regulatory Setting

State building standards are imposed on every project within California to reduce potential seismic/ geologic hazards associated with new development. Construction practices are regulated by the California Building Code (CBC), which is a modification of the Uniform Building Code (UBC). The CBC regulates the design and construction of excavations, foundations, building frames, retaining walls, and other building elements to control the effects of seismic ground shaking and adverse soil conditions, such as liquefaction and dynamic settlement. The procedures and limitation for the design of structure are based on characteristics, occupancy type, configuration, structural design, height, and seismic zone. Seismic zones are mapped areas that are based on proximity to known active faults and the potential for future earthquakes and intensity of seismic shaking. The CBC delineates seismic zones, wherein each site is assigned a zone factor that recommends the incorporation of minimum design criteria. All grading operations and construction on the project site would be conducted in conformance with the most recent version of the CBC for Seismic Zone 4. In addition, trenches and excavations would be designed and constructed in accordance with Occupational Safety and Health Administration (OSHA) regulations, and fill soils would be compacted to 90 percent relative compaction as evaluated in accordance with the American Society for Testing and Materials Test Method D 1667. As described in Section 4.1, the City of Del Building Code (Title 23) may be applied to the condominium component of the Master Plan and the proposed fire station. The City's Code is based on the California Building Code (CBC) (Title 24 of the California Code of Regulations, in the California State Health and Safety Code, Section 18902 et seq.) and the International Building Code, 2006 Edition, for those provisions not included in the California Building Code.

The Alquist-Priolo Earthquake Fault Zoning Act of 1972 regulates development near active faults to mitigate the hazards associated with surface fault rupture. Under the Act, the State Geologist (Chief of the Division of Mines and Geology) is required to delineate Earthquake Fault Zones along known active faults in California. Cities and counties affected by the zones must regulate development within the zones.

4.8.4 Methodology

This section addresses the potential for structural damage due to the local geology underlying the proposed project site, as well as slope instability, ground settlement, unstable soil conditions, and regional seismic conditions. Geologic/geotechnical conditions affecting the site are summarized from compiled information and analyses, including referenced documents/publications and a site-specific program of geotechnical exploration, sampling, and laboratory testing. The two *Limited Geotechnical Evaluations* prepared for the project site (Ninyo & Moore; Christian Wheeler Associates) are included in Appendix G of this EIR.

4.8.5 Impact Significance Criteria

For this project, the following thresholds of significance are used. The effects of the project to geology and soils may be considered to be significant if the proposed project would:

Threshold 4.8.1 **Expose people or structure to potential substantial adverse effect, including the risk of loss, injury, or death involving:**

a) **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,**

b) **Strong seismic ground shaking,**

c) **Seismic-related ground failure, including liquefaction, or**

d) **Landslides.**

Threshold 4.8.2 **Result in substantial soil erosion or loss of topsoil.**

Threshold 4.8.3 **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 4.8.4 **Be located on expansive soil, as defined by Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property.**

Threshold 4.8.5 **Have 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.**

4.8.6 Project Impacts

Threshold 4.8.1 Expose people or structure to potential substantial adverse effect, including the risk of loss, injury, or death involving:

a) 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.

Near-Term Project Impact Analysis. As with all of Southern California, the project site is subject to strong ground motion resulting from earthquakes on nearby faults. There are, however, no known active or potentially active faults or fault traces crossing the site. Therefore, the project site is not located within a currently designated Alquist-Priolo Earthquake Fault Zone. The proposed near-term projects would not result in a significant environmental impact related to rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map, and no mitigation is required. Construction of the proposed near-term projects in phases as described in Chapter 3.0, Project Description, of this EIR would not alter this conclusion.

Long-Term Project Impact Analysis. The proposed long-term projects affect the same project site as the near-term projects. As stated above there are no known active or potentially active faults or fault traces crossing the site. The project site is not located within a currently designated Alquist-Priolo Earthquake Fault Zone. Therefore, the proposed long-term projects included in the Master Plan would not result in significant impacts related to ground surface rupture. No mitigation is required.

Threshold 4.8.1 Expose people or structure to potential substantial adverse effect, including the risk of loss, injury, or death involving:

b) Strong seismic ground shaking.

Near-Term Project Impact Analysis. As previously stated, the PGA is a commonly-used parameter to represent the level of observed and/or estimated ground shaking at a particular site. The PGA that might be generated at the project site by the DBE has been estimated to be 0.36g, with a 10 percent probability of exceedance in 50 years (475-year statistical return period), which would be generated by the Rose Canyon Fault.

Ground shaking generated by the fault movement is considered a potentially significant impact that may potentially affect the structures and other improvements associated with the proposed project. All applicable guidelines, including compliance with the CBC, accepted industry standards, and other regional and local regulations that address seismic hazards, will be incorporated into project design and would reduce potentially significant seismic-related hazards to less-than-significant levels. Compliance with standard State and City building requirements, Mitigation Measure 4.8.1, and Mitigation Measure 4.8.4, pertaining to seismic design standards and the recommendations of the project geotechnical reports (including site preparation, processing of fill areas, method of compaction, and pavement), would reduce these impacts to levels considered less than significant.

Construction of the proposed near-term projects in phases as described in Chapter 3.0, Project Description, of this EIR would not modify this conclusion.

Long-Term Project Impact Analysis. The project site is the same for both the long-term and near-term projects; therefore, the exposure to seismic ground shaking is the same for both sets of projects. Mitigation Strategy 4.8.1 requires project-specific geotechnical investigations as warranted for the long-term projects, including implementation of report recommendations. The proposed long-term projects would result in a significant impact related to seismic ground shaking, but compliance with State and City building codes and implementation of Mitigation Strategy 4.8.1, would reduce this impact below a level of significance. Refer to the discussion above for additional information.

Threshold 4.8.1 **Expose people or structure to potential substantial adverse effect, including the risk of loss, injury, or death involving:**

c) Seismic-related ground failure, including liquefaction.

Near-Term Project Impact Analysis. Liquefaction commonly occurs when three conditions are present simultaneously: (1) high groundwater; (2) relatively loose, cohesionless (sandy) soil; and (3) earthquake-generated seismic waves. The presence of these conditions may cause a loss of shear strength and, in many cases, ground settlement. Based on the relatively shallow groundwater table and the loose nature of the alluvial materials underlying the site, the potential for liquefaction at the project site is medium to high.

Mitigation Measure 4.8.2 requires remedial treatment for any of the existing fills and/or underlying alluvium that are composed of loose sandy soils that may become saturated in the future and are also intended for support of planned structures, slopes, and associated improvements. In general, foundation soils that are within a 1:1 (45-degree) downward projection from the perimeter of proposed structures, slopes, and associated improvements shall be considered as supporting these improvements. Remedial treatment of highly compressible soil and/or undocumented/unengineered fill that are intended for the support of planned improvements shall be performed. Removal and replacement of these unsuitable soils as compacted fill is considered the most straightforward method of remedial treatment. Alternative remediation measures, such as in-situ densification and/or installation of deep foundations, may be used in areas of the site where existing constraints make removal and compaction cost-prohibitive or difficult due to property line constraints. Site-specific final design evaluation and grading plan review shall be performed by the project geotechnical consultant, including assessment of possible remedial alternatives prior to the start of grading or construction for any of the near-term projects, including but not limited to the relocation of the fire station, realignment of the Solana Gate, and construction of a Health Club/Sports Training Facility. Therefore, implementation of Mitigation Measure 4.8.2, which requires remedial treatment of existing fills and/or alluvium, would reduce the potential for liquefaction to a less than significant level. Construction of the proposed near-term projects in phases as described in Chapter 3.0, Project Description, of this EIR would not modify this conclusion.

Long-Term Project Impact Analysis. The proposed long-term projects affect the same project site as the near-term projects and would experience the same exposure to seismic related ground failure including liquefaction. As with the near-term projects discussed above, the proposed long-term projects, including the construction of a multilevel parking structure, would result in a significant impact related to liquefaction. Site-specific final design evaluation and grading plan review shall be performed by the project geotechnical consultant, including assessment of possible remedial alternatives prior to the start of grading or construction for any of the long-term projects, including the Backstretch Area improvements and Horseman's Village, the seasonal train platform, multilevel parking structure, vehicle wash rack, and truck tunnel under the existing Racetrack. Therefore, implementation of Mitigation Strategy 4.8.1, which requires impact avoidance through the preparation of a project-specific geotechnical report, and Mitigation Strategy 4.8.2, which requires implementation of recommended measures to reduce geotechnical and seismic impacts including remedial treatment of existing fills and/or alluvium, would reduce the potential for liquefaction to a less than significant level. Construction of the proposed near-term projects in phases as described in Chapter 3.0, Project Description, of this EIR would not modify this conclusion.

Threshold 4.8.1 **Expose people or structure to potential substantial adverse effect, including the risk of loss, injury, or death involving:**

d) Landslides.

Near-Term Project Impact Analysis. As stated above, no existing landslides or indications of deep-seated landslides are present on the property. Therefore, the potential for future slope instability would be limited to proposed cut-and-fill slopes that would be manufactured as part of the proposed grading process and areas of slope near the Solana Gate Entrance that would be affected during project construction. Remedial grading required for removal and recompaction of existing fills and potentially compressible soils would produce temporary construction slopes in some areas. The potential impacts associated with slope instability can be reduced to a level considered less than significant with implementation of Mitigation Measure 4.8.3. Mitigation Measure 4.8.3 requires evaluation of the rough grading plans by a Registered Civil Engineer specializing in geotechnical engineering and a Certified Engineering Geologist. The resulting report would provide soil engineering design conditions and provide site-specific recommendations to mitigate any potential impacts related to slope stability and landslides. Construction of the proposed near-term projects in phases as described in Chapter 3.0, Project Description, of this EIR would not modify this conclusion.

Long-Term Project Impact Analysis. The proposed long-term projects affect the same project site as the near-term projects and, as stated above, there are no existing landslides or indications of deep-seated landslides on the property. As with the proposed near-term projects, the long-term projects could result in a potentially significant impact related to future slope stability and landslides during the construction process when temporary cut-and-fill slopes are manufactured. Implementation of Mitigation Strategies 4.8.1 and 4.8.2 would reduce this potential impact to below a level of significance. Refer to the discussion above for additional information.

Threshold 4.8.2 Result in substantial soil erosion or loss of topsoil.

Near-Term Project Impact Analysis. During construction activities of the near-term projects, soil would be exposed, and there would be an increased potential for soil erosion compared to existing conditions. Additionally, during a storm event, soil erosion could occur at an accelerated rate. The increased erosion potential could result in short-term water quality impacts, as identified in Section 4.11, Hydrology and Water Quality. These water-related impacts would be reduced to a level considered less than significant through implementation of Mitigation Measure 4.11.1 as described in Section 4.11, Hydrology and Water Quality, which include best management practices (BMPs). Mitigation Measure 4.11.1 requires preparation of a Storm Water Pollution Prevention Program (SWPPP) for each project site to identify Construction BMPs to be implemented as part of the proposed project to reduce impacts to water quality during construction, including those impacts associated with soil erosion. With implementation of Mitigation Measure 4.11.1, erosion impacts during construction would be reduced to below a level of significance

The 2008 Master Plan projects would result in a slight alteration of existing on-site drainage patterns due to changes in permeability and new area drainage systems that would connect to the existing storm drain lines. However, the larger drainage areas would remain essentially the same for the entire project site, and runoff would continue to drain generally from northeast to southwest for the Fairgrounds west of Jimmy Durante Boulevard and north to south for the area east of Jimmy Durante Boulevard, discharging at the existing major discharge points. The proposed projects would generally be replacing existing buildings with new buildings, with the exception of the East Parking Lot, which would change a dirt lot to paved (with BMPs). The project site is comprised of 16 subdrainage basins at the Fairgrounds and one subdrainage basin at the proposed fire station site (refer to Figure 4.11.2). The 2-year, 10-year, and 100-year storm event hydrology analysis included in Appendix I of this EIR (Hydrology Report, Fuscoe Engineering, Inc., 2009) found that the proposed project would either result in a decrease in on-site flow within the basins or a minor increase in on-site flow (Basins 9 and 16). Although the flow from Basin 9 would increase, this Basin is currently impervious, would remain impervious, and would therefore not be susceptible to erosion. The sheet flow runoff under the existing condition within the East Parking Lot (Basin 16) would be replaced by conveyed flows through storm drain piping and treated on site by a proposed bioretention cell. Because the parking lot would be paved, it would not be subject to erosion. The bioretention cell would slow the rate of flow from Basin 16 and would be maintained to prevent erosion. The proposed fire station site will be fully developed and paved, with the exception of on-site landscaping, and is therefore not susceptible to erosion. Therefore, on-site erosion impacts would be less than significant, and no additional mitigation is required. Construction of the proposed near-term projects in phases as described in Chapter 3.0, Project Description, of this EIR would not alter this conclusion.

Potential erosion impacts are considered less than significant through implementation of the erosion control BMPs described in Section 4.11, Hydrology and Water Quality, and Mitigation Measure 4.11.1.

Long-Term Project Impact Analysis. The proposed long-term projects affect the same project site as the near-term projects and the proposed long-term projects would result in comparable potential impacts related to soil erosion and loss of topsoil. Proposed long-term projects, including construction of a multilevel parking structure, Backstretch Area improvements and Horseman's Village, a new truck tunnel under the Racetrack, vehicle wash rack, and a seasonal train platform, would result in a less than significant impact related to erosion and loss of topsoil. Long-term projects would be required to comply with the erosion control measures described in Section 4.11, Hydrology and Water Quality.

Threshold 4.8.3 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.

Near-Term Project Impact Analysis.

Slope Stability. As stated above, no existing landslides or indications of deep-seated landslides are present on the property. Therefore, the potential for future slope instability would be limited to proposed cut-and-fill slopes that would be manufactured as part of the proposed grading. Remedial grading required for removal and recompaction of existing fills and potentially compressible soils would produce temporary construction slopes in some areas. The potential impacts associated with slope instability can be reduced to a level considered less than significant with implementation of Mitigation Measure 4.8.3. Mitigation Measure 4.8.3 requires evaluation of the rough grading plans by a Registered Civil Engineer specializing in geotechnical engineering and a Certified Engineering Geologist. The resulting report would provide soil engineering design conditions and provide site-specific recommendations consistent with the CBC to mitigate any potential impacts related to slope stability and landslides.

Unsuitable Soils.

Corrosive Soil. Corrosive soils contain constituents or physical characteristics that attack concrete (water-soluble sulfates) and/or ferrous metals (chlorides, ammonia, nitrates, low pH levels, and low electrical resistivity). Corrosive soils could potentially create a significant hazard to the project by weakening the structural integrity of the concrete and metal used to construct the building and could potentially lead to structural instability. Structural damage and foundation instability caused by corrosive soils is a potentially significant impact.

Due to the proximity of the project site to the marine environment, the on-site soils may be classified as corrosive. Potential methods of combating corrosive soils include the use of corrosion-resistant materials, materials treated with a protective coating, or placing utilities in sandy fill materials or appropriately treated clayey fill materials. Treatment of soils could include using lime, lime-cement, or other mixtures. Mitigation Measure 4.8.5 requires additional site testing and implementation of final design recommendation regarding corrosive soils. Adherence to Mitigation Measures 4.8.5 would reduce project impacts related to soils that are corrosive to a less than significant level.

Settlement Potential. The amount of settlement for a site is dependent on the thickness of design fills, the loading conditions, and the nature of the native materials underlying the fill.

Potential ground settlement may be separated into three types: (1) hydroconsolidation of alluvium left in place above the water table, (2) consolidation settlement of compressible alluvium left in place below the water table, and (3) liquefaction-induced settlement of a few loose, granular layers below the water table.

As stated above, the project site is underlain by alluvial fill. Due to the relatively shallow groundwater table and the loose nature of the alluvial materials underlying the site, the potential for settlement at the project site is medium to high.

The Limited Geotechnical Investigations contained in Appendix G of this EIR contain specific construction recommendations to reduce project impacts associated with settlement to a less than significant level, including the use of mat-type foundation and pile foundations, and the removal of unsuitable soils. Therefore, adherence to Mitigation Measure 4.8.4 would reduce project impacts related to dynamic settlement to a less than significant level.

Subsidence. The phenomenon of widespread land sinking, or subsidence, is generally related to substantial overpumping of groundwater or petroleum reserves from deep underground reservoirs. The project does not have an oil or water pump on site and has not been used for the extraction of either resource. Dewatering associated with construction of the near-term projects would not be of a magnitude that would affect ground surfaces. Subsidence is therefore not considered a potential constraint or a potentially significant impact of the project, and no mitigation is required.

Long-Term Project Impact Analysis. The proposed long-term projects affect the same project site as the near-term projects and would experience the same potential exposure to unstable geologic conditions. As with the near-term projects, the proposed long-term projects would result in a potentially significant impact related to slope stability, corrosive soils, and settlement. Implementation of Mitigation Strategies 4.8.1 and 4.8.2 would reduce these potential impacts to below a level of significance. The proposed project would result in a less than significant impact related to subsidence. Refer to the discussion above for additional information.

Threshold 4.8.4 Be located on expansive soil, as defined by Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property.

Near-Term Project Impact Analysis. Expansive soils contain types of clay minerals that occupy considerably more volume when they are wet or hydrated than when they are dry or dehydrated. Volume changes associated with changes in the moisture content of near-surface expansive soils can cause uplift or heave of the ground when they become wet or, less commonly, cause settlement when they dry out.

The site is underlain by shallow fill soils, alluvium, and materials of the Bay Point Formation, which consists of poorly consolidated lagoon and nonmarine sandstone. The fill and alluvium encountered during subsurface borings generally consisted of soft to stiff clay to silty clay and loose to dense silty sand to sandy silt. Interpretations of the CPT data suggest that materials in approximately the upper

20 ft generally consist of soft, fine-grained material. Dense to very dense, fine-grained sand and silty sand alluvium was encountered beneath the silt to the depths of approximately 55 to 66.5 ft.

The possibility of foundation instability associated with expansive soils on the project site cannot be ruled out on the basis of the available test data, and is, therefore, considered a potentially significant impact. Construction techniques that are employed to address potential adverse effects of expansive soils include (but are not limited to) deepened foundations, post-tension foundations, and moisture conditioning. Implementation of Mitigation Measures 4.8.3 and 4.8.4 would provide engineered soil conditions below project structures so as to reduce the potential impact from expansive soils to a less than significant level. Construction of the proposed near-term projects in phases as described in Chapter 3.0, Project Description, of this EIR would not alter this conclusion.

Long-Term Project Impact Analysis. The proposed long-term projects affect the same project site as the near-term projects and would experience the same potential exposure to expansive soil. As with the proposed near-term projects, the proposed long-term projects would result in a potentially significant impact related to expansive soils. Implementation of Mitigation Strategies 4.8.1 and 4.8.2 would reduce this potential impact to below a level of significance. Refer to the discussion above for additional information.

Threshold 4.8.5 **The project site would have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of waste water.**

Near-Term Project Impact Analysis. The proposed near-term projects would utilize the existing sewer system, and no on-site sewage disposal systems or septic tanks are planned. The 22nd DAA will implement on-site infrastructure to ensure compliance with the sewer MOU, as required in Mitigation Measure 4.12.4. Septic tanks are not a consideration. A self-contained holding tank may be constructed in conjunction with the hotel. There is, therefore, no significant impact with regard to utilization of on-site sewage disposal systems with implementation of Mitigation Measure 4.12.4, and no additional mitigation is required. Construction of the proposed near-term projects in phases as described in Chapter 3.0, Project Description, of this EIR would not alter this conclusion. For additional information about potential impacts related to the sewer system, refer to Section 4.12, Public Services and Utilities, of this EIR.

Long-Term Project Impact Analysis. The proposed long-term projects would utilize the existing sewer system, and no on-site sewage disposal systems or septic tanks are planned. There is, therefore, no impact with regard to utilization of on-site sewage disposal systems, and no mitigation is required. For additional information about potential impacts related to the sewer system, refer to Section 4.12, Public Services and Utilities, of this EIR.

4.8.7 Cumulative Impacts

For geology and soils, the study area considered for the cumulative impact of other projects consisted of: (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. The analysis above indicated no rare or special geological features or soil types on the project site that would cause project activities to have an effect on other sites. The analysis also indicated that there are no other known projects or activities caused by other projects that would affect the geology and soils of this site.

In addition, the proposed project would be required to comply with the applicable State requirements, and all other foreseeable projects would be required to comply with the applicable State and local requirements designed to protect inhabitants of new construction from seismic and soils hazards, including, but not limited to, the CBC. Therefore, the project-specific impacts, together with the impacts associated with other projects, would be reduced to a less than significant level. Seismic impacts are a regional issue and are also addressed through compliance with applicable codes and design standards. For these reasons, the project's incremental contribution to cumulative geotechnical and soil impacts is less than significant.

4.8.8 Level of Significance prior to Mitigation

Potential impacts related to surface fault rupture, subsidence, and alternative wastewater disposal systems are less than significant, and no mitigation is required. Potential impacts related to erosion would not be significant with implementation of BMPs and mitigation measures described in Section 4.11, Hydrology and Water Quality. Potential impacts related to seismic ground shaking, liquefaction, landslides and slope stability, corrosive soil, ground settlement, and expansive soil are considered potentially significant prior to implementation of mitigation measures.

4.8.9 Mitigation Measures

Mitigation Measure 4.8.1 Appropriate seismic design provisions shall be implemented with project design and construction in accordance with governing building codes. Unless superseded by other regulatory provisions or standards, seismic design criteria shall be developed on the basis of the requirements of the current California Building Code (CBC) and reviewed and approved by the California Construction Authority (CCA) prior to issuance of any notice to proceed for construction activities. The following CBC design parameters are based on the 2001 edition of the CBC (Table 16 I-U). These parameters are considered applicable for the seismic design evaluation of proposed structures pending any more recent updates of the CBC, or unless more site-specific design values are required by the project structural engineer (e.g., response spectra or site period).

Project Site Seismic Design Parameters

Seismic Zone Factor Z:	0.4
Soil Profile Type:	S_D
Design Fault:	Rose Canyon
Fault Distance:	2.5 mi

Prior to issuance of a notice to proceed for any construction activities, the 22nd District Agricultural Association (DAA) will confirm that the CCA Official (or designee) reviews and approves final design plans to ensure that all structures are designed to resist earthquake forces as defined by the CBC for a Seismic Zone 4.

Mitigation Measure 4.8.2 The 22nd District Agricultural Association (DAA) shall ensure that remedial treatment is provided for any of the existing fills and/or underlying alluvium that are comprised of loose sandy soils that may become saturated in the future and are also intended for support of planned structures, slopes, and associated improvements. In general, foundation soils that are within a 1:1 (45-degree) downward projection from the perimeter of proposed structures, slopes, and associated improvements shall be considered as supporting these improvements. Remedial treatment of highly compressible soil and/or undocumented/unengineered fill that is intended for the support of planned improvements shall be performed, as required by the Project Geotechnical Consultant. Removal of these unsuitable soils and replacement with granular compacted fill is considered the most straightforward method of remedial treatment. Alternative remediation measures, such as in-situ densification and/or installation of deep foundations, may be used in areas of the site where existing constraints make removal and compaction cost-prohibitive or difficult due to property line constraints. Site-specific final design evaluation and grading plan review shall be performed by the project geotechnical consultant, including assessment of possible remedial alternatives prior to the start of grading construction. Design and grading construction shall be performed in accordance with the requirements of the California Building Code (CBC) applicable at the time of grading and the recommendations of the project geotechnical consultant as summarized in a final written report, subject to review and approval by the California Construction Authority (CCA) prior to issuance of any notice to proceed.

Mitigation Measure 4.8.3 The 22nd District Agricultural Association (DAA) shall provide detailed geotechnical investigation reports for the Rough Grading Plan to the California Construction Authority (CCA) with engineered grading plans to further evaluate faults, subsidence, slope stability, landslides, surficial failures, settlement, foundations, grading constraints, liquefaction potential, issues related to shallow groundwater, and other soil engineering design conditions, and to provide site-specific recommendations to mitigate these issues/hazards. The geotechnical reports shall be prepared and signed/stamped by a Registered Civil Engineer specializing in geotechnical engineering and a Certified Engineering Geologist. Geotechnical rough-grading plan review reports shall be prepared in accordance with the requirements of the California Building Code

(CBC) applicable at the time of grading and the recommendations of the project geotechnical consultant as summarized in a final written report, subject to review by the CCA prior to issuance of any notice to proceed.

Mitigation Measure 4.8.4 The construction manager for the California Construction Authority (CCA) shall ensure and confirm to the 22nd District Agricultural Association (DAA) that all grading operations and construction are conducted in conformance with the recommendations included in the geotechnical reports for the proposed project site titled *Limited Geotechnical Evaluation Del Mar Fairgrounds Master Plan, Del Mar, California* (Ninyo & Moore, September 2006) *Limited Geotechnical Evaluation Hotel and Exhibit Hall at Del Mar Fairgrounds, Del Mar California* (Ninyo & Moore, May 2007) and the *Report of Preliminary Geotechnical Investigation Proposed Parking Lot and Event Area Del Mar Fairgrounds,* prepared by Christian Wheeler Engineering, March 2008), (included in Appendix G of this Environmental Impact Report [EIR]).

Mitigation Measure 4.8.5 The 22nd District Agricultural Association (DAA) shall ensure that additional site testing and final design evaluation regarding the possible presence of significant volumes of corrosive soils on site is performed by the project geotechnical consultant to refine and enhance the preliminary recommendations. Grading plan review shall also be performed by the project geotechnical consultant prior to the start of grading to verify that the recommendations developed during the geotechnical design evaluation have been appropriately incorporated into the project plans. Final design and recommendations regarding corrosive soils shall be based on testing and analyses of the near-surface soils following completion of grading. Design and grading construction shall be performed in accordance with the requirements of the California Building Code (CBC) applicable at the time of grading, appropriate local grading regulations, and recommendations of the project geotechnical consultant as summarized in a final report, subject to review and verification by the California Construction Authority (CCA) prior to commencement of any grading activity. On-site inspection during grading shall be conducted by the project geotechnical consultant to ensure compliance with geotechnical specifications as incorporated into project plans.

4.8.10 Programmatic Impact Avoidance And Mitigation Strategies

The mitigation measures described above are based on the existing geotechnical and seismic conditions of the site and on the findings of the project's site-specific Geotechnical Report. Since the report is site specific, its recommendations are applicable to both the near-term and long-term projects. Application of the mitigation measures listed above will reduce potentially significant impacts for near-term and long-term projects to below a level of significance; however, additional project-specific geotechnical investigations may be required at the time construction plans are prepared. Therefore, programmatic impact avoidance and mitigation strategies 4.8.1 and 4.8.2 are also included.

Strategy 4.8.1 The 22nd District Agricultural Association (DAA) shall prepare and implement the recommendations of project-specific geotechnical investigations when the California Construction Authority (CCA), the project engineer and/or the project geologist determine additional information is needed for the preparation of project-specific construction drawings.

Strategy 4.8.2 The 22nd District Agricultural Association (DAA) shall ensure implementation of measures to reduce geotechnical and seismic impacts, including but not limited to implementation of Mitigation Measures 4.8.1 through 4.8.5, described above.

4.8.11 Level of Significance after Mitigation

The mitigation measures identified above would reduce potentially significant impacts related to soils and geology for both long-term and near-term projects to a less than significant level.

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