
V. ENVIRONMENTAL IMPACT ANALYSIS

E. GEOLOGY AND SOILS

INTRODUCTION

The following section is a summary of the geotechnical investigations and analyses conducted for the proposed project. This section summarizes and incorporates by reference the following reports prepared by MACTEC Engineering and Consulting:

- Report of Geotechnical Evaluation for Environmental Impact Report, Proposed MDR Tower Building Development, 4363 Lincoln Boulevard, Marina Del Rey, District, Los Angeles, California (September 13, 2006) (the “Geotechnical Report”)
- Report of Preliminary Geotechnical Investigation Proposed Building Development, 4363 Lincoln Boulevard, Marina Del Rey, District, Los Angeles, California (August 15, 2005)

Copies of these reports can be found as Technical Appendix E to this Draft EIR. The conclusions of these reports form the authority for the conclusions drawn by this EIR.

ENVIRONMENTAL SETTING

The project site encompasses approximately 1.09 acres and is located within the Venice Community Planning Area of the City of Los Angeles. The triangular-shaped project site is generally bounded by Lincoln Boulevard on the northeast, a surface (medical center) parking lot on the southwest, and Ralph’s grocery store on the northwest. The site is currently developed with a rental car facility with one fixed building and a paved exterior area containing a service area, a waste oil storage area, a carwash and areas for vehicle storage. The site is flat and no onsite geological features, including soils, are exposed for visual inspection.

Field exploration, conducted on July 26, 2005, included site reconnaissance and exploratory soil borings to assess the condition of shallow soil materials.

Regional Geology

The project site is located in the coastal area of Los Angeles in close proximity to the Marina del Rey Harbor. Prior to development, the project site vicinity was an inland tidal flat and marsh known as Del Rey Lagoon (United States Army Corps of Engineers, 2002). The Del Rey Lagoon was fed by Ballona and Centinela Creeks from the north. Because of this, the subsurface soils are mostly made up of young (Holocene) detrital sediment with regional mountain provenance and minor near shore deposits.

Regionally, the site is located on the western coastal edge of the Los Angeles basin (10 miles west of Los Angeles). The Los Angeles basin has a northwest trend with dimensions of about 50 miles by 20 miles wide. It is a structural depression now filled by alluvium.

The Los Angeles basin is located in the coastal portion of California's Peninsular Ranges geomorphic province. This province extends northwesterly from Baja California into the Los Angeles Basin and westerly into the offshore area, including Santa Catalina, Santa Barbara, San Clemente and San Nicolas islands. The northern boundary of the province is the Transverse Ranges along the Malibu, Santa Monica, Hollywood, Raymond, Sierra Madre and Cucamonga faults. The eastern boundary of the province is the Colorado Desert geomorphic province along the San Jacinto fault system. The Peninsular Range province is characterized by northwest/southeast trending alignments of mountains and hills and intervening basins, reflecting the influence of northwest trending major faults and folds controlling the general geologic structural fabric of the region. The Newport-Inglewood fault zone, a northwest-trending structural zone expressed at the surface by a series of discontinuous low hills, is located approximately four miles east of the site. The geology of the region is shown in Figure V.E-1A, Regional Geologic Map; while the legend for the Regional Geologic Map is shown in Figure V.E-1B

Project Site Geologic Conditions and Topography

The soil and ground-water conditions beneath the project site were explored by drilling two borings to depths of 40 and 60 feet below the existing grade at the locations shown on Figure V.E-2, Locations of the Exploratory Borings. The borings were drilled using five-inch diameter rotary wash-type drilling equipment with drilling mud to prevent caving. The mud was removed from the borings following completion of drilling to permit measurements of the ground water level. The mud and soil cutting from the borings were placed in barrels and left at the site pending the results of chemical analyses. Because of difficult drilling through large gravel and cobbles, Boring 2 was terminated at somewhat shallower depth than originally planned. A detailed discussion of the field investigation, including boring logs, are included in Appendix E to this Draft EIR.

In addition, MACTEC Engineering and Consulting ("MACTEC") previously drilled borings at nearby sites to a maximum depth of 101 feet. The borings drilled at these nearby sites were part of prior geotechnical investigations for the Regatta II (Law/ Crandall, 2001) and Regatta III (Law/Crandall, 2000) developments at 13650 and 13600 Marina Pointe Drive, respectively.

Based on the MACTEC explorations, the site is predominately underlain by Holocene age alluvial deposits (Poland et al., 1959). As encountered in the borings, the alluvial materials consist of alternating layers of silty sand, sandy silt, and poorly graded and well-graded sand with varying amounts of gravel and few cobbles (to the maximum depth explored). Local layers of silty and sandy clay were also encountered. The silts and clays were generally stiff, but were locally weak in the upper 10 to 17 feet. Dense to very dense sand and silty sand predominate below around 16 to 17 feet. The Holocene age

Figure V.E-1A Regional Geologic Map

Figure V.E-1B Legend Regional Geologic Map

Figure V.E-2 Locations of the Exploratory Borings

(approximately 11,000 years ago to the present) alluvial materials and the underlying Pleistocene age (approximately 1.8 million to 11,000 years before the present) materials are estimated to be 500-600 feet thick and are underlain by the Pliocene age (approximately 5.3 million to 1.8 million years before the present) Pico formation (Poland, 1959).

Artificial fill soils were encountered to a depth of five feet in the two borings drilled at the subject site. The fill soils consist of silty sand and are not uniformly well compacted. Deeper fill soils could occur between the boring locations. In addition, artificial fill was locally encountered in borings on nearby sites, some of which was poor quality and had petroleum odors and staining. According to the Phase I Archaeological Survey Report (see Section V.D., Cultural Resources) some of the artificial fill appears to be midden deposit associated with archaeological site CA-LAN-47.

To supplement data obtained for the borings and to evaluate the liquefaction potential of the soils underlying the site, standard penetration tests (SPTs) were performed in the borings. The soils are classified in accordance with the Unified Soil Classification System

Groundwater

The site is located in the Coastal Plain of Los Angeles Groundwater Basin; and more specifically the Santa Monica sub basin (California Department of Water Resources, 2004). Historically, the geologic region west of the Newport-Inglewood Fault is called the Hawthorne-Long Beach Depression. It is this depression that contains the Gardena syncline, the major structural water bearing system. The Ballona and Silverado aquifers are the primary sources of productive ground water supply in the area.

Ground water was measured at a depth of about 14 feet below the existing grade in the two exploration borings and ground water was encountered within 12 and 25 feet of the ground surface where explored by the previous borings at nearby sites. However, based on the available data, the historic high ground water level in the vicinity of the site is between five and ten feet below the surface (California Division of Mines and Geology, 1998) due to its proximity to the ocean. Fluctuations in the level of groundwater may occur due to variations in rainfall, temperature and other factors. Fluctuations may also occur across the site.

Seismic Conditions

Based on criteria established by the California Geological Survey (CGS), faults may be categorized as active, potentially active or inactive. Active faults are those that show evidence of surface displacement within the last 11,000 years (Holocene age). Potentially active faults are those that show evidence of the last displacement within the last 1.6 million years (Quaternary age). Faults showing no evidence of displacement within the last 1.6 million years may be considered inactive for most purposes, except for some critical structures. Faults without known surface expression are known as buried thrust faults. They

are typically broadly defined based on the analysis of seismic wave recordings of several hundred small earthquakes in the area. The risk for surface rupture of these buried thrust faults is considered low, however recurrence and maximum potential magnitude is not well established.

In 1972 the Alquist-Priolo Special Studies Zone Act (now known as the Alquist-Priolo Earthquake Fault Zoning Act) was passed into law. The Act defines 'active' and 'potentially active' faults utilizing the same age criteria as that used by the CGS. However, the established policy is to zone active faults and only those potentially active faults that have a relatively high potential for ground rupture. Therefore, not all faults identified as 'potentially active' by the CGS are zoned under the Alquist-Priolo Act.

The nearest known faults to the project site are the potentially active Charnock Fault (approximately two miles east-northeast of the site) and Overland Fault (approximately three miles east-northeast of the site), and the active Santa Monica Fault (approximately three miles north of the site), the Newport Inglewood Fault Zone (approximately four miles east of the site), the Malibu Coast Fault Zone (approximately five miles west-northwest of the site) and the Palos Verdes Fault (approximately six miles southwest of the site). The closest Alquist-Priolo Earthquake Fault Zone to the site is located along the Newport-Inglewood fault zone. The closest active fault to the site with the potential for surface fault rupture is the Santa Monica fault. The closest known blind-thrust fault, the Puente Hills Blind Thrust Fault, is approximately eight miles to the east-northeast of the site. Figure V.E-3, Regional Fault Map, shows major faults and earthquake epicenters in Southern California with respect to the site. Table V.E-1 indicates the Major Named Faults Considered to be Active in Southern California, while Table V.E-2 indicates the Major Named Faults Considered to be Potentially Active in Southern California.

Based on the foregoing available geologic data, active or potentially active faults with the potential for surface fault rupture are not known to be located directly beneath or projecting toward the site, nor is the site located within an Alquist-Priolo Earthquake Fault Zone. Therefore, the potential for surface rupture due to fault plane displacement propagating to the surface at the site is considered low. However, because it is located in the seismically active southern California region, the project site could be subjected to moderate to strong ground shaking in the event of an earthquake on one of the many active southern California faults.

Liquefaction Potential

Liquefaction is the process in which loose granular soils below the ground-water table temporarily lose strength during strong ground shaking as a consequence of increased pore pressure and thereby, reduced effective stress. The vast majority of liquefaction hazards are associated with sandy soils and silty soils of low plasticity (California Division of Mines and Geology, 1997). Potentially liquefiable soils (based on composition) must be saturated or nearly saturated to be susceptible to liquefaction (California Division of Mines and Geology, 1997).

Figure V.E-3 Regional Fault Map

**Table V.E-1
Major Named Faults Considered to be Active
in Southern California**

Fault (In Increasing Distance)	Maximum Magnitude			Slip Rate (mm/yr)	Distance From Site (Miles)	Direction From Site
Santa Monica	6.6	(a)	RO	1.0	3	N
Newport-Inglewood Zone	7.1	(a)	SS	1.0	4	E
Malibu Coast	6.7	(a)	RO	0.3	5	WNW
Palos Verdes	7.3	(a)	SS	3.0	6	SW
Hollywood	6.4	(a)	RO	1.0	7.5	N
Puente Hills Blind Thrust	7.1	(a)	R	0.7	8	ENE
Upper Elysian Park Thrust	6.4	(a)	RO	1.3	8.5	NE
Northridge Thrust	7.0	(a)	RO	1.5	9	N
Anacapa-Dume	7.5	(a)	RO	3.0	14	W
Raymond	6.5	(a)	RO	1.5	15	NE
Verdugo	6.9	(a)	RO	0.5	17	NE
San Fernando (Sierra Madre Segment)	6.7	(a)	RO	2.0	21	N
Sierra Madre	7.2	(a)	RO	2.0	22	NE
Santa Susana	6.7	(a)	R	5.0	23	NNW
Whittier	6.8	(a)	SS	2.5	24	E
San Gabriel	7.2	(a)	SS	1.0	25	NNE
Simi-Santa Rosa	7.0	(a)	RO	1.0	27	NNW
Clamshell-Sawpit	6.5	(a)	RO	0.5	28	ENE
San Jose	6.4	(a)	RO	0.5	33	ENE
Holser	6.5	(a)	R	0.4	35	NNW
San Cayetano	7.0	(a)	R	6.0	36	NW
San Joaquin Hills Thrust	6.6	(a)	RO	0.5	37	SE
Oak Ridge	7.0	(a)	R	4.0	40	NW
Chino Central Avenue	6.7	(a)	RO	1.0	41	E
Cucamonga	6.9	(a)	RO	5.0	44	ENE
San Andreas (Mojave Segment)	7.4	(a)	SS	30.0	45	NE
San Jacinto (San Bernardino Segment)	6.7	(a)	SS	12.0	58	ENE
Elsinore (Glen Ivy Segment)	6.8	(a)	SS	5.0	59	ESE
Santa Ynez	7.1	(a)	SS	2.0	59	NW
(a)	CGS, 2003					
SS	Strike Slip		RO	Reverse Oblique		
NO	Normal Oblique		R	Reverse		

Table V.E-2
Major Named Faults Considered to be Potentially Active
in Southern California

Fault (In Increasing Distance)	Maximum Magnitude			Slip Rate (mm/yr)	Distance From Site (Miles)	Direction From Site
Charnock	6.5	(b)	SS	0.1	2	ENE
Overland	6.0	(b)	SS	0.1	3	ENE
MacArthur Park	5.7	(d)	RO	3.0	10.5	NE
Northridge Hills	6.6	(e)	SS	1.2	18	N
Los Alamitos	6.2	(c)	SS	0.1	21	SE
Norwalk	6.7	(b)	RO	0.1	21	SE
Duarte	6.7	(b)	RO	0.1	29	NE
El Modeno	6.5	(c)	NO	0.1	32	SE
Indian Hill	6.6	(c)	RO	0.1	35	ENE
Peralta Hills	6.5	(c)	RO	0.1	37	SE
Pelican Hill	6.3	(c)	SS	0.1	40	SE
(b) Slemmons, 1979 (c) Mark, 1977 (d) Hummon et al., 1994 (e) Wesnousky, 1986 SS Strike Slip NO Normal Oblique RO Reverse Oblique						

Significant factors that affect liquefaction include water level, soil type, particle size and gradation, relative density, confining pressure, intensity of shaking, and duration of shaking. Liquefaction potential has been found to be the greatest where the ground water level is shallow and submerged loose, fine sands occur within a depth of about 50 feet or less. Liquefaction potential decreases with increasing grain size and clay and gravel content, but increases as the ground acceleration and duration of shaking increase.

According to the County of Los Angeles Seismic Safety Element (1990), the City of Los Angeles Safety Element (1996), and the California Division of Mines and Geology (1998), the site is either within or at the margin of an area identified as having a potential for liquefaction. Figure V.E-4, Liquefaction Zone Map, shows the liquefaction zone in the vicinity of the site.

Based on liquefaction potential analysis performed for nearby sites (Law/Crandall, 2001), the soils below approximately 15 to 20 feet are not susceptible to liquefaction. Based on the results of the preliminary geotechnical investigation, the saturated granular soils above a depth of about 17 feet are susceptible to liquefaction.

Figure V.E-4 Liquefaction Zone Map

Seismic-induced settlement can be caused by loose to medium-dense granular soils densifying (becoming more consolidated) during ground shaking. Some of the granular, near surface soils above approximately 15 to 20 feet may be susceptible to seismic settlement.

ENVIRONMENTAL IMPACTS

Thresholds of Significance

In accordance with Appendix G to the State CEQA Guidelines, a Project could have a potentially significant geology and soils impact if it were to cause one or more of the following conditions:

- a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:
 - i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map or based on other substantial evidence of a known fault;
 - ii) Strong seismic ground shaking;
 - iii) Seismic-related ground failure, including liquefaction;
 - iv) Landslides;
- b) Result in substantial soil erosion or the loss of topsoil;
- c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse;
- d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property;
- e) 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 wastewater;

Based on the City of Los Angeles Draft L.A. CEQA Thresholds Guide, the proposed project would also result in a significant geotechnical impact if it exceeds the following threshold:

- (a) A Project would normally have a significant geologic hazard impact if it would cause or accelerate geologic hazards which would result in substantial damage to structures or infrastructure, or expose people to substantial risk of injury.

As the proposed project would tie into the City's existing wastewater system (refer to Section V.K, Utilities), the Proposed project would have no impact with respect to Threshold (e) listed above. As such, no further analysis of this topic is required.

Project Impacts

Seismic Hazards - Fault Rupture

The Project site is located in the seismically active region of Southern California. However, there are no active surface fault traces identified by the State, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map,¹ known to be present on the project site.² Therefore, the possibility of surface fault rupture affecting the project site would be considered remote, and the proposed project would not present a significant impact with respect to exposing people or property to hazardous conditions resulting from rupture of a known earthquake fault on the project site. Fault rupture impacts would be less than significant.

Seismic Hazards - Ground Shaking

The principal seismic hazard to the proposed project is strong ground shaking from earthquakes produced by local faults. Modern, well-constructed buildings are designed to resist ground shaking through the use of shear walls and reinforcements. The proposed construction would be required to conform to all applicable provisions of the City of Los Angeles Building Code, as well as the seismic design criteria contained within the Uniform Building Code. Although the project site is located near many faults on a regional level, the potential strong ground shaking hazard to the proposed project would not be higher than in most areas of the City of Los Angeles or elsewhere in the region. Therefore, the risks from seismic ground shaking are considered to be less than significant.

Liquefaction

The project site is within an area identified as having a potential for liquefaction. However, liquefaction analysis of the subject site and adjacent sites indicates that sediments deeper than about 15 to 20 feet are not susceptible to liquefaction. Sediments shallower than about 15 to 20 feet that are saturated and susceptible to liquefaction. In addition, based on the analysis in the Geotechnical Report, the estimated

¹ City of Los Angeles, *Safety Element of the Los Angeles City General Plan, Exhibit A, Alquist-Priolo Special Study Zones & Fault Rupture Study Areas, March 1994.*

² *Active faults are classified by the State Division of Mines and geology as faults showing evidence of surface displacement within the last 11,000 years.*

liquefaction-induced settlement would range from 1½ to 2½ inches with an average settlement of about two inches.

Because of the estimated liquefaction-induced settlement in the granular soils within the upper 15 to 20 feet, the onsite soils are not considered suitable for the support of the proposed building development on either shallow spread footings or a mat-type foundation. To provide good support for the proposed building development with minimum liquefaction-induced settlement and/or static settlement, the Geotechnical Report recommends the use of driven friction piling. The shallow ground-water level and the caving potential would preclude the use of conventional drilled cast-in-place piling. With the implementation of this recommendation, the risks from liquefaction-induced settlement and/or static settlement are considered to be less than significant.

Landslides

The topography at the proposed project site is relatively flat and the site is not located near any foothills or mountains, meaning that the possibility of landslides occurring on the project site minimal. Therefore, the potential impact associated with landslides would be less than significant.

Erosion and Topsoil

Although project development has the potential to result in the erosion of soil during site preparation and construction activities, erosion would be reduced by implementation of appropriate erosion controls during grading. Minor amounts of erosion and siltation could occur during project grading, which could be collected in a controlled manner. Additionally, the potential for soil erosion during the ongoing operation of the proposed project is low due to the generally level topography of the area and the fully developed aspects of the project site at the completion of build-out. All grading activities require grading permits from the Department of Building and Safety, which include requirements and standards designed to limit potential impacts to acceptable levels. In addition, all onsite grading and site preparation would be required to comply with applicable provisions of Chapter IX, Division 70 of the Los Angeles Municipal Code which addresses grading, excavations, and fills. With implementation of the applicable grading and building permit requirements and the application of Best Management Practices, the project would have a less-than-significant impact with respect to erosion or loss of topsoil.

Soil Stability

There are no known landslides at the site, nor is the site in the path of any known or potential landslides. The site is not within an area identified as having a potential for slope instability. Further, according to the Geotechnical Report, there are no substantial issues related to subsidence at the site. Therefore, the proposed project would neither be subject to nor would it have the potential to induce landslides and/or subsidence hazards; impacts would be less than significant.

However, the near surface soils on the project site are anticipated to be susceptible to settlement. Based on the results of the preliminary geotechnical investigation performed at the site, either the building and its floor slab are to be supported on driven piles or the building has to extend 20 feet below the existing grade and supported on a mat-type foundation. In conformance with City building code requirements, these types of foundations would be needed to reduce the potential effects of settlement to a less than significant level.

In addition, due to their relatively loose nature, the upper alluvial deposits and undocumented artificial fill may be susceptible to erosion, sloughing and failure if temporary cut slopes are constructed at angles steeper than approximately 2:1 (horizontal to vertical) or constructed below the ground water table. Temporary shoring should be designed to protect any temporary excavations and adjacent properties in order to reduce the potential adverse effects of temporary slope instability. With the implementation of these recommendations from the Geotechnical Report, impacts associated with settlement and/or soil stability would be less than significant.

Expansive Soils

Expansive soils are typically associated with fine-grained clayey soils that have the potential to shrink and swell with repeated changes in the moisture content. As previously stated, the near-surface soils consist primarily of fill, which would be excavated as part of project construction, while the remaining on-site soils are interbedded silty to clayey sand. With construction of the proposed project in accordance with the Los Angeles Building Code Chapter IX and the implementation of the recommendations in the Geotechnical Report, expansive soil impacts to the proposed project would be less than significant.

CUMULATIVE IMPACTS

Geotechnical impacts related to future development in the City would involve hazards related to site-specific soil conditions, erosion, and ground-shaking during earthquakes. These impacts would be site-specific and would not be common to (nor shared with, in an additive sense) the impacts on other sites. Furthermore, development of each of the related projects and the proposed project would be subject to uniform site development and construction standards that are designed to protect public safety. Therefore, cumulative geotechnical impacts would be less than significant.

MITIGATION MEASURES/PROJECT FEATURES

With project construction in accordance with the recommendations of the geotechnical reports prepared for the project site and the requirements of the Department of Building and Safety and the City Engineer, geology and soils related impacts would be less than significant. Therefore, under CEQA mitigation

measures are not required. Nevertheless, the following project features are identified for information purposes to indicate the City's standard requirements:

Permits/Plan Check

- E-1** Prior to the issuance of building or grading permits, the applicant shall submit a detailed geotechnical report prepared by a registered civil engineer or certified engineering geologist to the written satisfaction of the Department of Building and Safety.
- E-2** The project shall be designed in accordance with the requirements of the latest edition of the City of Los Angeles Uniform Building Code and the California Building Code.
- E-3** The project shall comply with the Uniform Building Code Chapter 18. Division 1, Section 1804.5, Liquefaction Potential and Soil Strength Loss which requires the preparation of a geotechnical report. The geotechnical report shall assess potential consequences of any liquefaction and soil strength loss, estimation of settlement, lateral movement or reduction in foundation soil-bearing capacity, and discuss mitigation measures that may include building design consideration.
- E-4** The design and construction of the project shall conform to the Uniform Building Code seismic standards as approved by the Department of Building and Safety.

Grading/Site Preparation

- E-5** All grading shall be conducted in accordance with Chapter IX, Division 70 of the Los Angeles Municipal Code, which addresses grading, excavations, and fills. All grading activities shall be conducted in accordance with the provisions of the required grading permits issued by from the Department of Building and Safety.
- E-6** Excavation and grading activities shall be scheduled during dry weather periods. If grading occurs during the rainy season (October 15 through April 1), diversion dikes shall be constructed to channel runoff around the site. Channels shall be lined with grass or roughened pavement to reduce runoff velocity.
- E-7** Appropriate erosion control and drainage devices shall be provided to the satisfaction of the Building and Safety Department. These measures include interceptor terraces, berms, vee-channels, and inlet and outlet structures, as specified by Section 91.7013 of the Building Code, including planting fast-growing annual and perennial grasses in areas where construction is not immediately planned.
- E-8** Stockpiles and excavated soil shall be covered with secured tarps or plastic sheeting.

- E-9** Building design considerations shall include, but are not limited to: ground stabilization, selection of appropriate foundation type and depths, selection of appropriate structural systems to accommodate anticipated displacements or any combination of these measures.

LEVEL OF SIGNIFICANCE AFTER MITIGATION

The Proposed project's impacts on geology and soils would be less than significant without mitigation. The implementation of the recommended mitigation measures above would further reduce the proposed project's impacts.