4.7 GEOLOGY AND SOILS

A Geotechnical Investigation was prepared by Geotechnical Professionals in July 2004, to identify the geologic and soil characteristics at the project site and to identify potential geologic and seismic constraints. The findings of the report are summarized below, and the report is provided in Appendix G of this EIR.

4.7.1 Environmental Setting

The City of Ontario is located in the western section of the San Bernardino Valley, south of the San Gabriel Mountains. The San Bernardino Valley is underlain by alluvial soils resulting from the erosion of soils from the San Gabriel Mountains to the north. The alluvial soils are underlain by igneous-metamorphic rocks, seen as rock outcrops in the Chino Hills and the San Jose Hills (EIR for Amendment No. 1, 1994 p. 3-14).

Topography

The project site is located at the central western section of the Valley and has a slight slope to the south. On-site elevations range from 1,111.8 feet above mean sea level (msl) at the southwestern corner to 1,128.5 feet above msl at the northeastern edge of the site, with the parcel to the north up to 3 feet higher in elevation (ALTA/ACSM Land Title Survey, 2004). Figure 4.7-1, *Existing Topography*, shows on-site elevations.

Soils

The majority of the site is covered with asphalt pavement or building foundations. The asphalt ranges in thickness from 0 to 9 inches, with an average of 4 to 5 inches. Soil borings at the site disclosed natural soils beneath the asphalt; consisting of dry to moist, loose to dense silty sands, sands with silts, and sands. Gravel and cobbles up to 4 inches in diameter were encountered with dense materials underlain by loose soils. Testing of the soils indicate low compressibility and moderate to high strength, as well as very low expansion potential and low to moderate hydro-collapse potential. Groundwater was not encountered to a depth of 20 feet. Caving was not observed but may occur in the dry loose sands that are present on the site (Geotechnical Investigation, 2004 p. 4).

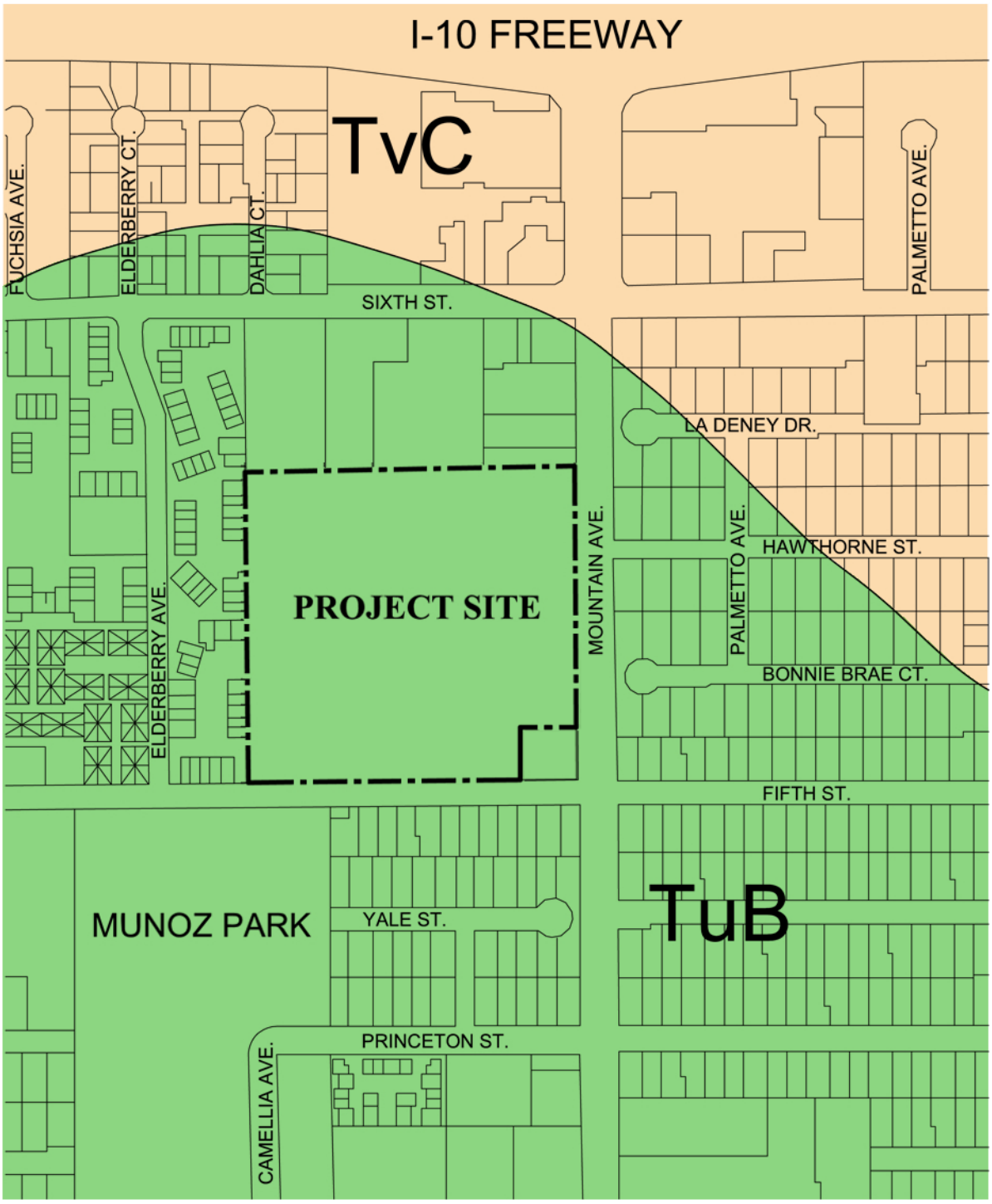
The United States Department of Agriculture's (USDA) Soil Survey of San Bernardino County, Southwestern Part identifies on-site soils as Tujunga loamy sand (TuB). Figure 4.7-2, *Soil Associations*, shows soils in the project area. Tujunga soils are somewhat excessively drained, nearly level to moderately sloping soils that formed on alluvial fans in granitic alluvium. Their surface layer consists of brown loamy sand and pale-brown coarse sand, about 60 inches thick. The Tujunga soils are slightly acid and rapidly permeable. Runoff is slow to very slow. Water erosion hazard is slight and wind erosion hazard is moderate to high on bare soils. These soils are used mainly for irrigated crops such as citrus, grapes, small grains, and pasture plants. Tujunga soils have low shrink-swell potential and are considered non-plastic. They have slight limitations for dwellings without basements and septic tank absorption fields, with severe limitations for shallow excavations and sanitary landfills due to side wall stability and rapid permeability, respectively. These soils are poor sources of topsoil, sand, and gravel, but are suitable as road fill (Soil Survey of San Bernardino County, Southwestern Part, 1980 pp. 26, 42-43, 50-51).

Ontario Wal-Mart Supercenter

Source: ALTA/ ACSM Land Title Survey, 2004

Figure 4.7-1 **Topography**

Ontario Wal-Mart Supercenter



NORTH

TuB = Tujunga Loamy Sand

TvC = Tujunga Gravelly Foamy Sand

Source: Soil Survey of San Bernardino County, Southwestern Part, 1980

Figure 4.7-2 **Soil Associations**

Seismicity

Southern California is a seismically active region that is subject to seismic hazards of varying degrees, depending on the proximity and earthquake potential of nearby active faults, and the local geologic and topographic conditions, which can either amplify or attenuate seismic waves. Seismic hazards in the project area include primary hazards due to surface rupturing of rock and soil materials along active fault traces, and secondary hazards resulting from strong groundshaking (Evaluating Earthquake Hazards in the Los Angeles Region, 1985 pp. 43, 44, and 60).

An active earthquake fault is defined as a fault that has had surface displacement within Holocene time (about the last 11,000 years). Several active or potentially active faults have been mapped in the region and are believed to accommodate the compression forces associated with the collision of the Peninsular and Transverse Range Provinces (EIR for Amendment No. 1, 1994 p. 3-15).

The City is located in a seismically active region, and the region has experienced several earthquakes with magnitudes of 6.0 or greater within the last 100 years. No earthquake faults are known to cross the City or the project site. However, there are several known active earthquake faults near the City of Ontario. These include the San Andreas, San Jacinto, San Jose, Sierra Madre, Indian Hill, Chino, and Whittier-Elsinore faults (EIR for Amendment No. 1, 1994 p. 3-15).

San Andreas Fault. The San Andreas Fault is widely recognized as the longest and most active earthquake fault in the State of California. The San Andreas fault has been mapped from Cape Mendocino in northern California to the Gulf of California near the Mexican border, a distance of about 750 miles. Earthquakes on this fault include the 1906 Magnitude 8.0 earthquake in San Francisco and the 1857 Magnitude 7.9 earthquake between Cholame and San Bernardino. Recent work indicates that large earthquakes have occurred along the San Andreas Faults at intervals averaging about 160 years, and that during these major earthquakes, the fault breaks along distinct segments. The closest segment of the San Andreas Fault to the project site is the Southern Segment, located approximately 30 miles north and northeast of the site. This segment is thought to be capable of producing a maximum credible earthquake of Magnitude 7.4 (EIR for Amendment No. 1, 1994 p 3-15 and Evaluating Earthquake Hazards in the Los Angeles Region, 1985 p. 48).

San Jacinto Fault. The San Jacinto Fault extends approximately 130 miles from its intersection with the San Andreas Fault near the Lytle Creek area, southeast to form the southwestern boundary of the San Jacinto Mountains and the San Timoteo Badlands, toward El Centro in Imperial County. West of the San Jacinto fault is the Lytle Creek Fault, which forms the western side of Lytle Creek Canyon, approximately 25 miles northeast of the site (EIR for Amendment No. 1, 1994 p. 3-16 and Evaluating Earthquake Hazards in the Los Angeles Region, 1985 pp. 48-49).

Sierra Madre-Cucamonga Fault. The Sierra Madre-Cucamonga Fault is located along the southern margin of the San Gabriel Mountains, approximately 5 miles northwest of the site. This fault has been responsible for the uplift of the mountains as a result of north-south compression. The Sierra Madre Fault Zone runs along the base of the central San Gabriel Mountains and the Cucamonga Fault Zone runs along the base of the eastern San Gabriel Mountains. The Cucamonga Fault is considered to be one of the most active segments, based on the presence of several scarps along its 40.4-mile trace (EIR for Amendment No. 1, 1994 p. 3-16 and Evaluating Earthquake Hazards in the Los Angeles Region, 1985 p. 57).

Red Hill Fault. The Red Hill Fault is defined by fault scarps at the extreme southern extent of the fault near Foothill Boulevard. The fault serves as a barrier to groundwater between the Chino Basin to the

south and the Cucamonga Basin to the north, with groundwater elevation differences of several hundred feet on opposite sides of the fault. The site is located approximately 3.5 miles southwest of this fault (EIR for Amendment No. 1, 1994 p. 3-17 and Chino Basin Optimum Basin Management Program, 2004 p. 2-4).

San Jose Fault. The San Jose Fault is located along the southern base of the San Jose Hills, northwest of the City. This fault is approximately 13 kilometers (8.1 miles) long and runs northeast to southwest. It was the source of the Upland earthquakes in 1988 and 1990. The site is located approximately 2.5 miles southeast of this fault (EIR for Amendment No. 1, 1994 p. 3-16).

Indian Hill Fault. The Indian Hill Fault is located north of the San Jose Fault, northeast of the project area. This fault runs east to west for approximately 9 kilometers (5.6 miles) and serves as a barrier to groundwater movement. The site is located approximately 4.0 miles southeast of this fault (EIR for Amendment No. 1, 1994 p. 3-16).

Whittier-Elsinore Fault. The Whittier-Elsinore Fault is located along the base of the Puente Hills, approximately 24 miles southwest of the site. This fault runs from the Whittier Narrows area, southeast across the Santa Ana River, past Lake Elsinore into western Imperial County and into Mexico (EIR for Amendment No. 1, 1994 p. 3-16).

Chino Fault. The Chino Fault is part of the Whittier-Elsinore Fault system and is located northeast of Chino Hills. The fault is approximately 28 kilometers (17.4 miles) long and extends from the Santa Ana Mountains northwest to the City of Pomona, as it joins the San Jose Fault. The site is located approximately 8.0 miles north of this fault (EIR for Amendment No. 1, 1994 p. 3-16).

4.7.2 Threshold of Significance

According to Appendix G of the CEQA Guidelines, a project could have a significant adverse impact in terms of geology and soils, if its implementation results in any of the following:

- Exposes people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving: 1) 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, 2) strong seismic ground shaking, 3) seismic-related ground failure, including liquefaction, or 4) landslides;
- Results in substantial soil erosion or the loss of topsoil;
- Is 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;
- Is located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property; or,
- If it has 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.

Environmental Impacts

The existing Hollywood Video store would be retained in place and would not be exposed to new geologic or seismic hazards nor would it create geologic or seismic hazards to the project. No change to

the geologic conditions at the northeastern corner of the site would occur. The proposed building and infrastructure for the Wal-Mart Supercenter would be exposed to geologic and seismic conditions present on the site. The project would retain the relative southerly slope of the site and no major changes to the topography would occur. Future ground elevations at the site would be approximately 1,131.3 feet above msl at the northwestern corner of Main Street to 1,112.2 feet above msl at the southeastern corner of the site (Design Review – Conceptual Grading Plan, November 2005).

Surface Rupture, Groundshaking, and Seismic Hazards *(Would the project expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving: 1) 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, 2) strong seismic ground shaking, 3) seismic-related ground failure, including liquefaction, or 4) landslides?)*

There are no earthquake faults crossing or projecting toward the site or found in the City. Thus, no ground rupture hazards are expected to affect the proposed project. No impacts relating to surface rupture are expected (EIR for Amendment No. 1, 1994 pp. 3-15 to 2-17).

The City of Ontario, including the project site, would be exposed to groundshaking hazards associated with earthquake events in the region. The San Jose and Cucamonga faults are located nearest the project site, and earthquake events on these faults could lead to peak ground acceleration at the site of 0.62 gravity (g). This acceleration has a 10 percent chance of being exceeded in 50 years (Geotechnical Investigation, 2004 pp. 5-6).

The proposed building and on-site improvements that would be constructed as part of the project would be subject to these groundshaking hazards, which could lead to the damage of the structure, parking lot, and utility lines, and resulting fires, falling objects, and other structural hazards that could cause property damage and personal injuries. Employees, construction workers, patrons, and visitors at the site would be exposed to groundshaking hazards during an earthquake event. These groundshaking hazards are not unlike the potential hazard in other areas of the region (Evaluating Earthquake Hazards in the Los Angeles Region, 1985 Figure 75).

The proposed structures on-site would be designed and built in accordance with applicable standards in the California Building Code, including pertinent seismic design criteria. Thus, the proposed structure is expected to withstand groundshaking and maintain groundshaking hazards at acceptable levels (California Building Code, 2002). Potential impacts associated with strong seismic groundshaking are expected to be less than significant.

No liquefaction hazards are expected on the site, and the proposed project would not be exposed to liquefaction. No impacts relating to liquefaction are expected (Geotechnical Investigation, 2004 p. 6).

The project site is located at the central western section of the San Bernardino Valley and has a slight slope to the south. There are no steep slopes on or near the site, which may pose landslide hazards (ALTA/ACSM Land Title Survey, 2004).

Erosion Hazards *(Would the project result in substantial soil erosion or the loss of topsoil?)*

The on-site soils have slight water erosion hazard and moderate to high wind erosion hazard on bare soils (Soil Survey of San Bernardino County, Southwestern Part, 1980 p. 26). While the Ontario General Plan

does not include the project site in designated Soil Erosion Control Areas (Ontario General Plan, 1992, page 3-11), grading and excavation activities may lead to localized erosion, as wind and water carry loose soils off-site. Excavation and grading activities could lead to the erosion of soils into nearby areas. With southerly slopes and walls along the northern and western site boundaries, soil movement would likely be towards Mountain Avenue and Fifth Street. Excavation and trenching for the proposed power line undergrounding, proposed storm drain line on Mountain Avenue, roadway widening and the raised median on Mountain Avenue, and utility connections on Fifth Street and Hollowell Street could also result in the erosion of bare soils.

The project would be required to implement erosion control measures per standard engineering practices and City requirements. Implementation of erosion control measures would prevent eroded soils from entering adjacent properties and minimize sediments and loose soils from entering the City's storm drain system. Upon completion of construction, all areas on the site would be paved or landscaped, and the nearby roadways repaved. Thus, limited erosion is expected during project operations. The project would not result in significant adverse impacts associated with substantial soil erosion or loss of topsoil. Impacts relating to erosion would be temporary and less than significant.

Geologic Hazards *(Is the project 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?)*

The Chino Basin Optimum Basin Management Program does not identify the site in an area subject to historic subsidence (Chino Basin Optimum Basin Management Program, 2004 Figure 5-1). The Geotechnical Investigation states seismic subsidence is not expected at the site (Geotechnical Investigation, 2004 p. 6). Building design with consideration to the recommendations of the Geotechnical Investigation would account for soil shrinkage and subsidence, avoiding hazards associated with soil settlement (Geotechnical Investigation, 2004 p. 10).

While no surface rupture hazards are present in the City of Ontario or on the site, the project site is located within Seismic Zone No. 4 and would be subject to moderate to strong groundshaking due to earthquake events on nearby faults (Geotechnical Investigation, 2004 p. 5).

Liquefaction is characterized by saturated cohesionless soils that undergo a temporary loss of strength during severe groundshaking and leads to soil movement and ground deformation. Soils particles may become suspended in water, resulting in soil deposits becoming mobile and fluid-like. Liquefaction generally occurs in loose to medium density deposits of saturated soils (Geotechnical Investigation, 2004 p. 6).

The project area is not identified to have liquefaction susceptibility (Geotechnical Investigation, 2004 p. 6). In 2003, groundwater levels near the site were estimated at approximately 630 feet above msl or approximately 482 feet or more below the ground surface (Chino Basin Optimum Basin Management Program, 2004 Figure 3-6). Thus, soil liquefaction is not likely to occur due to the depth of groundwater and the granular nature of soils below 10 feet, which are predominantly dense to very dense (Geotechnical Investigation, 2004 p. 6).

Seismic ground subsidence occurs when loose, sandy soils are densified during strong groundshaking. The Chino Basin Optimum Basin Management Plan does not include the project site in the area subject to historic subsidence. Also, the Geotechnical Investigation states that subsidence is not expected because the on-site sandy soils are predominantly dense to very dense (Geotechnical Investigation, 2004 p. 6).

There are no steep slopes on the project site, which may be subject to landslides (USGS Ontario Quadrangle, 1978). The site is not located near the ocean and is not subject to tsunami hazards. Also, no enclosed bodies of water that can experience seiche during an earthquake event are present in the project area (Thomas Guide 2005, pp. 571, 572, 601, 602). Flooding due to failure of the San Antonio Dam, which is located approximately 4.5 miles north of the City, may occur on the site (Flood Emergency Plan, 1986 Inundation Maps). This is discussed in Section 4.8, *Hydrology and Water Quality*.

The site is not known to have been subject to landslide, lateral spreading, subsidence, liquefaction, or collapse. Thus, the proposed project is not expected to be exposed to nor create off-site landslide, lateral spreading, subsidence, liquefaction, or collapse. No impacts are expected.

The soils within the upper 10 feet of the surface were found to be variable in moisture and consistency. Loose in-place soils have moderate potential for hydro-collapse. The placement of the proposed building or parking lot pavement on these soils may lead to settlement of the soils with the introduction of water, resulting in foundation or pavement cracks and utility line damage (Geotechnical Investigation, 2004 p. 5).

Impact 4.7.1: Loose in-place soils at the site have moderate potential for hydro-collapse.

The Geotechnical Investigation recommends that a portion of these materials be removed and replaced as properly compacted fill. The exposed subgrade should then be densified in place using vibratory compaction equipment. Partial removals in the proposed pavement areas are also recommended (Geotechnical Investigation, 2004 p. 5).

In addition, there are dry, granular soils at the site which are susceptible to caving. Relatively shallow vertical cuts into the dry, loose sandy deposits will lead to caving. Thus, excavation and utility trenching may encounter trench-wall instability, due to the caving potential of the on-site soils (Geotechnical Investigation, 2004 p. 5).

Impact 4.7.2: Dry, granular soils at the site are susceptible to caving.

The Geotechnical Investigation recommends significant moisture conditioning (wetting) to achieve the required degree of compaction and facilitate excavations (Geotechnical Investigation, 2004 p. 5). These recommendations shall be implemented during project construction.

Soil Expansion *(Is the project located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?)*

Testing of the soils on-site indicate very low expansion potential (Geotechnical Investigation, 2004 p. 4). Thus, the existing Hollywood Video Store and the proposed Wal-Mart Supercenter would not be exposed to hazards associated with expansive soils. No impacts related to soil expansion hazards are expected.

Septic Tank Limitations *(Does the site 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?)*

The project site is served by the public sewer system, with an existing sewer line running north-south through the site (ALTA/ACSM Land Title Survey, 2004). The proposed project would be connected to the public sewer system and limitations posed by on-site soils for septic tank systems would not affect the

project (Design Review Plans, November 2005). No impacts posed by soils with septic tank limitations are expected.

4.7.4 Previous Analysis

To the extent applicable, this Subsequent EIR tiers off previous environmental documents relating to the development of the project site. As outlined in Section 1.2.1, *Previous Environmental Review*, previous analyses include a Supplemental EIR considering the environmental impacts associated with future development within the Mountain Village Specific Plan area (which included the project site) and the EIR analyzing the environmental impacts of new development and redevelopment within the Added Area, which was part of Amendment No. 1 to the Ontario Redevelopment Project No. 2.

While baseline conditions in this Subsequent EIR reflect the present situation, the linkages between the three documents remain pertinent to the environmental review of the Wal-Mart Supercenter proposal. The following discussion summarizes the salient points of similarity/difference between the previous documents and the Subsequent EIR and, where similar impacts are present, applicable policies, standard conditions or mitigation measures in the previous documents are identified for incorporation or implementation by the current project, where appropriate.

Supplemental EIR for Mountain Village Specific Plan

The Supplemental EIR for the Mountain Village Specific Plan indicated that new development in the Specific Plan area would be exposed to earthquake hazards that are no different than those present in the region. Redevelopment would reduce these hazards and the reduction in overall development density under the Specific Plan would reduce the number of persons exposed to on-site groundshaking hazards.

The proposed project would be exposed to groundshaking hazards, which would be no different than those throughout the region. As required, compliance with the seismic design criteria in the California Building Code, the City's building standards, and other pertinent building regulations would keep hazards at acceptable levels.

The Supplemental EIR for the Mountain Village Specific Plan also indicated that liquefaction and subsidence hazards are not known to be present in the Specific Plan area. The proposed project would not be exposed to liquefaction or subsidence hazards.

The Supplemental EIR for the Mountain Village Specific Plan indicated that the Specific Plan area is relatively level, with no hillsides. No landslides or mudslides are expected in the area. The proposed project would not be exposed to landslide hazards.

The Initial Study for the Mountain Village Specific Plan indicated that the Specific Plan area is not located in the Soil Erosion Conservation Area, where blowsand hazards are present. Development under the proposed Specific Plan would not lead to erosion or expose people to erosion hazards. No major erosion hazards are expected on-site but erosion control measures would be implemented as standard City practice.

The Initial Study for the Mountain Village Specific Plan also did not identify hazards associated with expansive soils in the Specific Plan area. The proposed project is not expected to be exposed to expansive soil hazards and the proposed building and improvements would be designed and built in accordance with soil expansion index of on-site soils.

The Supplemental EIR for the Mountain Village Specific Plan also indicated that there are existing sewer lines that provide sewer services to the Specific Plan area. The proposed project would be connected to the public sewer system, as were the previous land uses on the site. Thus, no hazards associated with soils incapable for supporting leach fields for septic tank systems would occur.

As analyzed in the previous EIR, no adverse impacts on soils and geology are expected with the project. No mitigation measures for soils and geology are provided in the Supplemental EIR for the Mountain Village Specific Plan but the EIR called for development to comply with the Uniform Building Code, Ontario Zoning Ordinance, seismic design criteria, and the Ontario General Plan.

EIR for Amendment No. 1

The EIR for Amendment No. 1 indicated that future development and redevelopment in the Added Area, including the site, would not result in significant changes in topography or soil resources. However, development would be exposed to groundshaking hazards associated with earthquake events in the region and new development and redevelopment would have to comply with the Uniform Building Code, Ontario General Plan and Zoning Ordinance, and seismic design criteria to reduce groundshaking hazards to insignificant levels.

To reduce groundshaking hazards, the proposed structures on-site would be designed and built in accordance with applicable standards in the California Building Code, including pertinent seismic design criteria.

The EIR for Amendment No. 1 indicated that no liquefaction or subsidence hazards are present in the Added Area. The proposed project would not be exposed to liquefaction or subsidence hazards.

The Initial Study for Amendment No. 1 indicated that no landslide hazards are present in the Added Area. No landslides or mudslides are expected in the area. The proposed project would not be exposed to landslide hazards.

The EIR for Amendment No. 1 indicated that a Soil Erosion Control Area has been designated at the eastern section of the City but not in the Added Area. No major erosion hazards are expected on-site but erosion control measures would be implemented as standard City practice.

The EIR did not indicate the presence of expansive soils in the Added Area. The proposed project is not expected to be exposed to expansive soil hazards and the proposed building and improvements would be designed and built in accordance with the soil expansion index of on-site soils.

The EIR indicated that the Added area is served by a public sewer system. The proposed project would be connected to the public sewer system, as were the previous land uses on the site. Thus, no hazards associated with soils incapable for supporting leach fields for septic tank systems would occur.

As analyzed in the previous EIR, no adverse impacts on soils and geology are expected with the project. No mitigation measures for soils and geology are provided in the EIR for Amendment No. 1 but the EIR called for development to comply with the Uniform Building Code, Ontario Zoning Ordinance, seismic design criteria, and the Ontario General Plan. Also, policies in the Ontario General Plan, which would reduce and eliminate potential geologic impacts, were outlined in the EIR for Amendment No. 1. The policy is provided below, along with the project's compliance.

General Plan Policy in EIR	Project Compliance
1. Promote earthquake preparedness within the community by participation in periodic quake awareness programs, such as Earthquake Awareness Month.	The City celebrates National Earthquake and Disaster Preparedness Month each September, and has speakers, presentations, educational brochures, and articles in the City newsletter to promote earthquake preparedness (Jacob Greene, pers. comm. 12/18/2006).

The project would not be involved in ensuring compliance with this policy but would participate in City-wide programs, as appropriate. The proposed Wal-Mart Supercenter would be built in accordance with the California Building Code, the City's building standards, and other pertinent building regulations.

Based on the comparative discussion above, the project's impacts are no different than those analyzed in the previous EIRs. However, specific on-site geologic conditions and impacts on the proposed Wal-Mart Supercenter site are discussed above.

4.7.5 Standard Conditions and Mitigation Measures

Standard Conditions

In addition to other project-specific conditions which may be imposed by the City, the City will impose the following standard conditions on the project as part of any future approval:

Standard Condition 4.7.1: The project shall comply with seismic design criteria in the California Building Code, the City's building standards, and other pertinent building regulations.

Standard Condition 4.7.2: The project shall implement erosion control measures during demolition and construction activities at the site, as required by the City.

Standard Condition 4.7.3: Recommendations of the Geotechnical Investigation for the project site, as they pertain to structural design and construction recommendations for earthwork (clearing and grubbing, excavation, subgrade preparation, material for fill, placement and compaction of fill, shrinkage and subsidence, trench/wall backfill, observation and testing), foundation design (foundation type, allowable bearing pressure, footing widths and embedments, estimated settlement, lateral load resistance, foundation concrete, footing excavation observation) building floor labs, lateral earth pressures, corrosivity, drainage, exterior concrete and masonry flatwork, slopes, and paved areas shall be implemented for building construction.

Mitigation Measures

Mitigation measures that would reduce the potentially significant adverse impacts of the project and/or that have been identified in the Supplemental EIR for the MVSP and the EIR for Amendment No. 1 and found to be applicable to the project include the following:

Mitigation Measure 4.7.1: Loose in-place soils shall be removed and replaced as properly compacted fill. The exposed subgrade shall be densified in place using vibratory compaction equipment, as recommended by the Geotechnical Investigation.

Mitigation Measure 4.7.2: Significant moisture conditioning (wetting) shall be made to dry, loose sandy soils to achieve the required degree of compaction and facilitate excavations, as recommended by the Geotechnical Investigation.

4.7.6 Unavoidable Significant Adverse Impacts

Preliminary analysis in the Initial Study (IS) for the project indicated that no significant impacts are expected as they relate to surface rupture, liquefaction, landslides, unstable soils, expansive soils, and soils incapable of supporting septic systems. Less than significant impacts relating to strong seismic groundshaking were expected, assuming proposed structures would be designed and built in accordance with applicable City standards and the Uniform Building Code, including pertinent seismic design. Soil erosion was also expected to be less than significant.

The analysis in this Subsequent EIR, as provided above, reflects the same conclusions relating to surface rupture, liquefaction, landslides, unstable soils, expansive soils, and soils incapable of supporting septic systems. Detailed analysis of on-site soils and seismic hazards shows that impacts relating to seismic groundshaking and soil erosion would be less than significant with the project's compliance with standard conditions. However, on-site soils could expose the proposed project and users of the site to geologic hazards, based on the findings of the Geotechnical Investigation for the site.

As stated in this section, geologic and seismic hazards on the site can be prevented or reduced to less than significant levels by the implementation of the standard conditions and mitigation measures outlined above. No unavoidable significant adverse impacts are expected after mitigation.