

## Section 4.7: Geology and Soils

### 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.

#### Topography

Ground elevations on the site are relatively flat, ranging between approximately 971.5 feet above mean sea level (msl) along the northeastern site boundary at Turner Avenue and New Guasti Road; sloping gently to the south and southwest to approximately 963.2 feet above msl at Turner Avenue and the railroad tracks (southeast corner) and to 959.5 feet above msl at the railroad tracks (southwest corner of the site). Figure 4.7-1, *Site Elevation*, shows the topography and ground elevations at the site.

The Specific Plan area itself has elevations of 980 feet above msl at Turner Avenue and I-10 Freeway at the northeast corner of the Specific Plan area and 951.9 feet above msl at the UPRR tracks and Archibald Avenue at the southwest corner of the Specific Plan area.

#### Geologic Setting

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.

#### Soils

The United States Department of Agriculture's (USDA) Soil Survey of San Bernardino County, Southwestern Part identifies on-site soils as Delhi fine sands (Db), with Tujunga loamy sand (TuB) to the west and Hanford coarse sandy loam (HaC) to the southwest. Figure 4.7-2, *Soil Associations*, shows soils in the project area.

Delhi fine sands (Db) are pale brown and light yellowish-brown fine sand, with depths of more than 60 inches. These soils are rapidly permeable and runoff is very slow. Hazard of soil blowing is generally moderate, but high in unprotected areas. These soils are used mainly for grapes, pasture plants, alfalfa and some citrus. Delhi sands 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 cover material and topsoil, but good sources of sand and road fill.

Tujunga soils (TuB) 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.



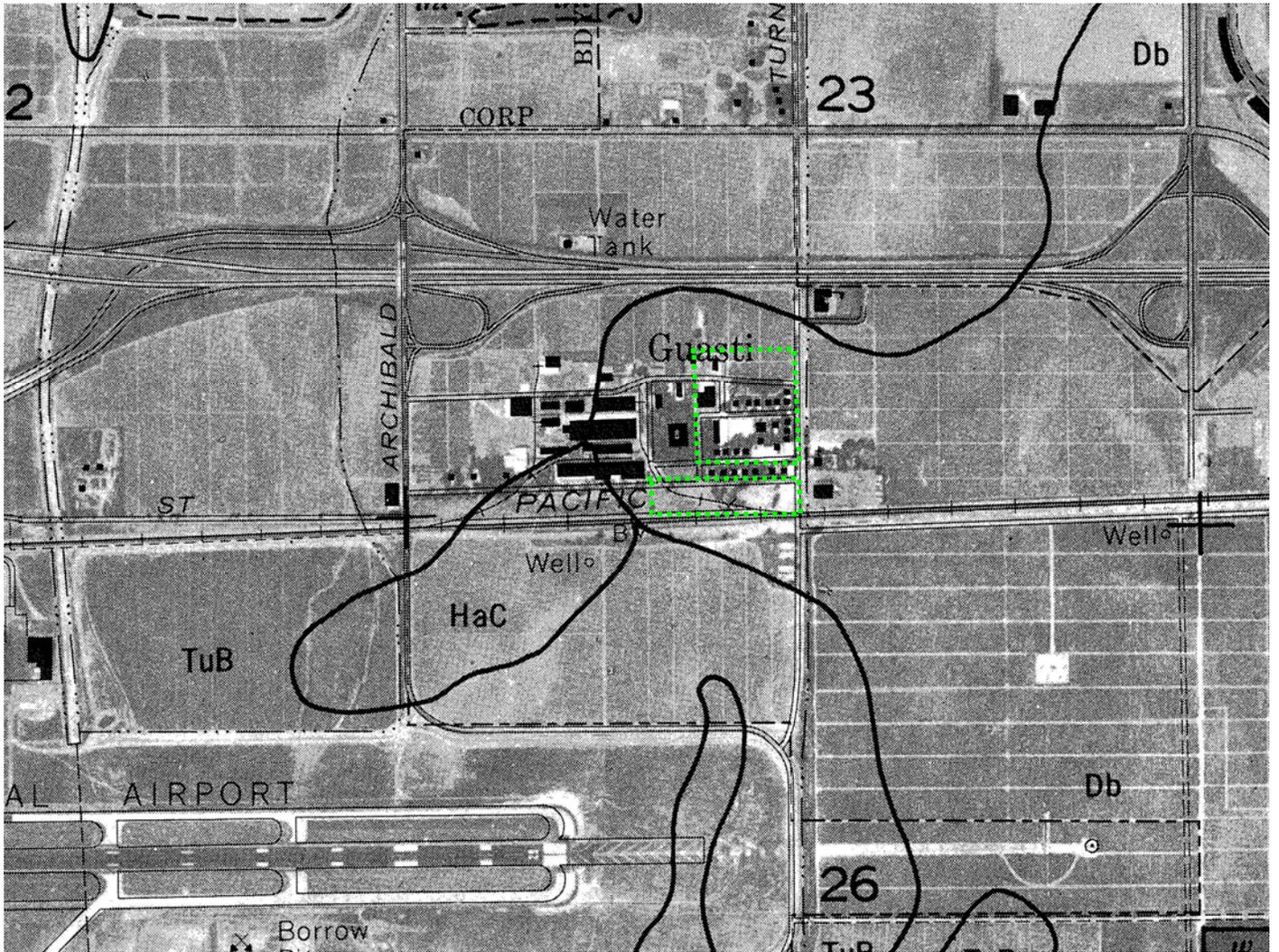
**Proposed Residential  
Overlay Zone**



**Elevation contour**



**Figure 4.7-1  
Site Elevation**  
**Guasti Plaza Specific Plan Amendment  
Supplemental EIR**



**Proposed Residential  
Overlay Zone**

Source: USDA Soil Survey of San Bernardino County, 1980



**Figure 4.7-2  
Soil Associations  
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Hanford soils (HaC) are characterized by a surface layer of light brownish-gray coarse sandy loam about 10 inches thick. These soils have slow to medium runoff potential and slight to moderate erosion hazard when left unprotected. They are slightly acid or neutral throughout and moderately rapidly permeable. These soils are used for irrigated crops like citrus and alfalfa. Hanford soils have low shrink-swell potential and are considered non-plastic. They have slight limitations for dwellings without basements, septic tank absorption fields, and shallow excavations, with severe limitations for sanitary landfills due to moderately rapid permeability. These soils are poor sources of sand and gravel but good sources of cover material, topsoil, and road fill.

### 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.

The City of Ontario is located in a seismically active region, and the region has experienced several earthquakes with a magnitude of 6.0 or greater during the last 100 years. However, no earthquake faults are known to cross the site or the Specific Plan area. Active earthquake faults near the City of Ontario include the San Andreas, San Jacinto, San Jose, Sierra Madre, Indian Hill, Chino, and Whittier-Elsinore faults.

#### 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 Earthquake Hazard Fault 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.

#### 4.7.3 Environmental Impacts

Future residential development under the proposed Amendment would be exposed to geologic and seismic hazards present on the site.

**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*

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*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 on the site, near the site or that extend into the site. The seismic conditions at the site have remained the same over time and the proposed Amendment would not expose future residential development to fault rupture hazards. No impacts are expected.

However, future residential development under the proposed Amendment would be subject to groundshaking hazards due to regional earthquake events, which could lead to the damage of buildings, parking lots, and utility lines, and resulting fires, falling objects, and other structural hazards that could cause property damage and personal injuries. Residents, employees, construction workers, 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. Depending on the magnitude of the earthquake, distance to the site, underlying soil conditions, and structural strength on structures and infrastructure, groundshaking hazards may be significant. Existing structures were built at the turn of the 20<sup>th</sup> century and do not meet current seismic design criteria. Thus, they would be exposed to groundshaking hazards that may affect their structural integrity and could pose undue hazards to future users. This is considered a significant adverse impact.

*Impact 4.7.1: Existing structures to be rehabilitated and reused would be subject to groundshaking hazards.*

Future residential development would be designed and built in accordance with applicable standards in the California Building Code, including pertinent seismic design criteria. Existing buildings to be reused should also be rehabilitated in accordance with the current California Building Code, the State Historic Building Code, and local building regulations. This will allow the rehabilitated structures to withstand groundshaking and maintain hazards at acceptable levels.

The project site and surrounding areas are identified as areas with very low to low liquefaction susceptibility by the USGS. The San Bernardino County General Plan and TOP also show that the site is not located in areas with liquefaction susceptibility. In addition, groundwater is found at approximately 330 feet below the ground surface, indicating the absence of perched water, which can make soils susceptible to liquefaction during an earthquake event. Thus, future residential development would not be exposed to liquefaction hazards.

The project site and the surrounding area have a relatively flat topography. Thus, future residential development under the proposed Amendment would also not be exposed to landslide hazards.

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

The project site is underlain by soils that have moderate to high erosion hazard and soil blowing hazards. Future residential development under the proposed Specific Plan Amendment would lead to soil disturbance and potential erosion hazards. Localized erosion is expected with construction activities on the site, as wind and water carry loose soils off-site. Excavation and grading activities could lead to the erosion of soils into nearby areas. Santa Ana winds would also result in blowsand hazards from exposed ground. Soil movement from water erosion

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would likely be towards the areas southwest of the site and south to southwest from wind erosion.

*Impact 4.7.2: Future residential development would lead to soil erosion and soil blowing hazards.*

The construction of future residential development 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 would minimize sediments and loose soils from entering the City's storm drain system. Fugitive dust control measures outlined in Section 4.4, *Air Quality*, would also reduce soil blowing from the site. Upon completion of construction, all areas on the site are expected to be paved or landscaped, and the nearby roadways repaved. This will limit soil erosion and soil blowing in the long-term.

**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?*)

There are no known geologic hazards, such as unstable soils that may lead to landslide, lateral spreading, liquefaction or collapse, in the project area. However, subsidence of less than 5 feet has occurred within the project area and the site from 1992 to 2001, based on groundwater studies for the Chino Groundwater Basin (Figure 4.7-3, *Subsidence Hazards*). Future residential development under the proposed Amendment would be exposed to subsidence hazards. This is a significant adverse impact.

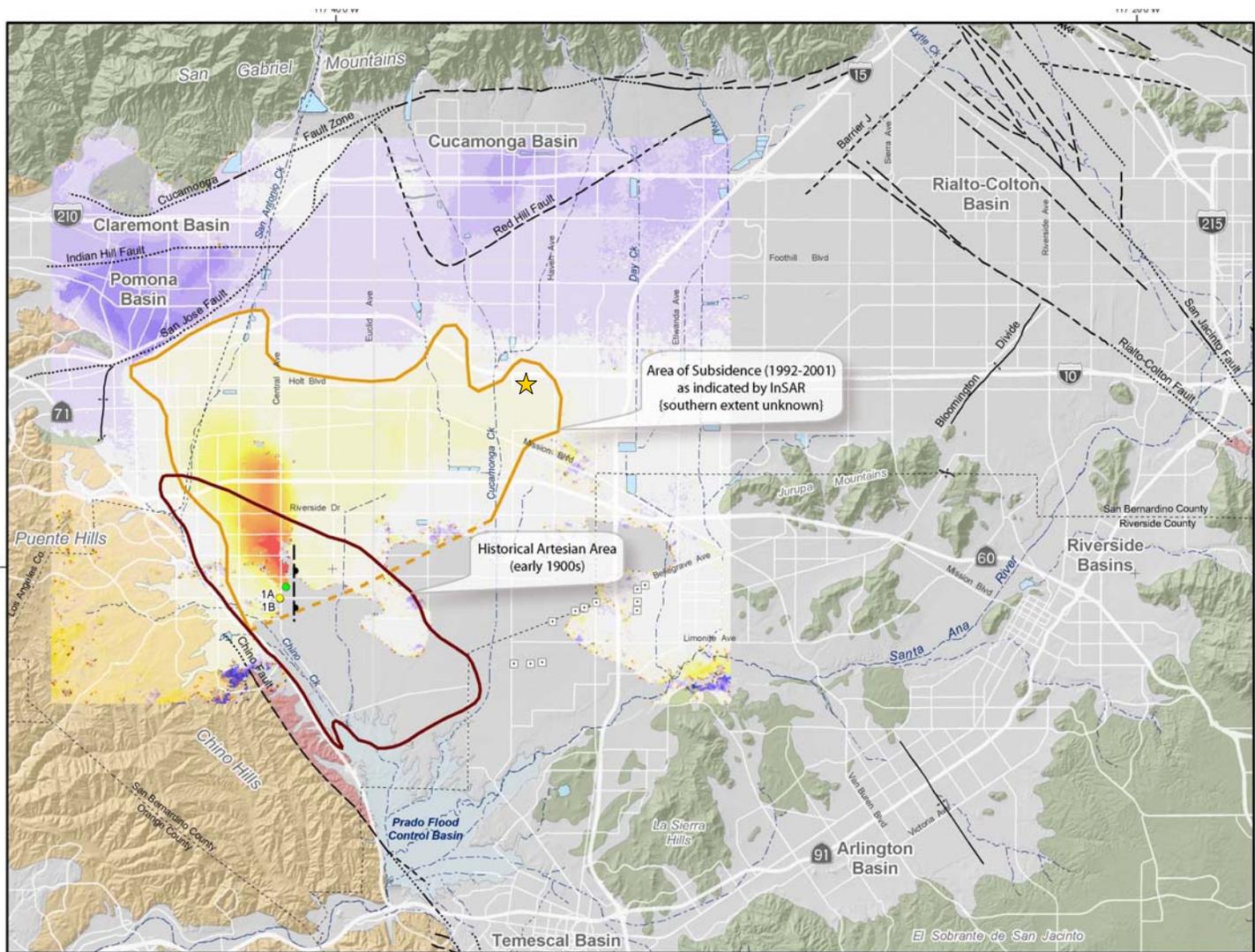
*Impact 4.7.3: Future residential development would be exposed to subsidence hazards.*

Site-specific geologic conditions have to be evaluated based on soil borings and geotechnical investigations that are required for every development. The geotechnical investigation would identify structural design criteria and construction recommendations to ensure the stability and integrity of structures and infrastructure that would be built on site. Impacts would be less than significant.

**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?*)

Delhi, Tujunga, and Hanford soils that are found on and near the site have low shrink-swell potential. Thus, future residential development is not expected to be exposed to expansive soil hazards. All structures and infrastructures would have to be designed and built in accordance with soil expansion index of on-site soils, as provided in the geotechnical investigation for each development. No soil expansion hazards would be created by the proposed Amendment. Impacts would be less than significant.

**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?*)



★ Project Site

Source: Chino Basin Optimum Basin Management Program, 2006



**Figure 4.7-3**  
**Historic Subsidence**  
 Guasti Plaza Specific Plan Amendment  
 Supplemental EIR

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There are existing sewer lines near the site that would connect future residential development to the public sewer system. No septic tanks are proposed as part of future residential development or the proposed Amendment. No impacts related to septic tank limitations are expected.

### 4.7.4 Previous Analysis

To the extent applicable, this Supplemental EIR tiers off previous environmental documents relating to the development of the project site, which include the EIR for the Guasti Plaza Specific Plan and the EIR for the Guasti Redevelopment Plan. The following discussion summarizes the similarities/differences in potential impacts between the previous documents and this Supplemental 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.

#### Guasti Plaza Specific Plan EIR

The EIR for the Guasti Plaza Specific Plan indicated that there are earthquake faults near the City but none of these run through the City or the Specific Plan area. However, future development in the Specific Plan area would be exposed to groundshaking hazards associated with nearby earthquake events. Mitigation measures were outlined to reduce groundshaking hazards to less than significant levels.

The EIR did not identify liquefaction hazards in the Specific Plan area. It also indicated that the Specific Plan area is relatively flat and no landslide or mudslide hazards, septic tank limitations, or expansive soils are present. No major cut and fill would be required for future development. It indicated that impacts associated with geology and seismicity would be mitigated through compliance with the recommendations of geotechnical investigations and evaluations for individual projects, the Uniform Code, the State Historic Building Code, and the Ontario Municipal Code.

*The geologic conditions at the site remain the same and the proposed Amendment would also not expose future residential development to fault rupture or liquefaction hazards, landslide or mudslide hazards, septic tank limitations, or expansive soils. Groundshaking hazards to future residential development would be the same as discussed in the previous EIR.*

*However, future residential development would be exposed to erosion and subsidence hazards. Future residential development would have to implement erosion control measures and comply with the recommendations of the geotechnical investigation for the site, the California Building Code, the State Historic Building Code, and the Ontario Municipal Code. This would ensure the structural stability of the proposed buildings and improvements.*

A number of mitigation measures were provided in the EIR for Guasti Plaza Specific Plan:

1. Prior to the submission of any building permit application, the applicant shall provide for the City's review and consent, comprehensive geotechnical investigations to explore and evaluate soil, groundwater, geological and seismic conditions; to provide soil engineering criteria, and document the potential for seismically induced ground shaking on the building site. Such investigations shall be conducted by a licensed civil engineer

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specializing in the practice of soil mechanics, and by a certified engineering geologist. Construction shall be in compliance with the findings and recommendations of the required investigations.

2. Prior to the submission of any building permit application in portions of the Project Area that lie near suspected faults identified in future studies, the applicant shall provide geotechnical evaluations acceptable to the City to establish the presence and location of the suspected faults, and to establish whether or not they are potentially active.
3. No structure intended for human occupancy or use shall be placed directly on or within 50 feet of any active or potentially active fault. Nor shall any structure intended for human occupancy be placed within 150 feet of an inferred fault whose exact location is unknown. Additionally, no sensitive land use, including hospitals and schools should be placed within any seismic study zone, or within 200 feet of any inferred fault.
4. All construction of new buildings or rehabilitation of existing buildings shall be in conformance with latest adopted edition of the Uniform Building Code. All rehabilitation and seismic retrofit of existing historic structures shall be in conformance with the latest edition of the State Historic Building Code.
5. Existing historic structures to be rehabilitated shall be brought up to applicable code standards at the time. Structures of unreinforced masonry shall be brought up to existing State and local building standards at the time of application for a change in use or for major additions or alterations.
6. All grading in the Project Area shall be in conformance with the City of Ontario Municipal Code.

*These mitigation measures remain applicable to future residential development under the proposed Specific Plan Amendment.*

### **Guasti Redevelopment Plan EIR**

The EIR for the Guasti Redevelopment Plan stated that no earthquake faults pass through the City. Thus, no fault rupture hazards to future development and rehabilitation are expected. The EIR stated that people and structures would be exposed to severe groundshaking events and mitigation measures in the Specific Plan EIR were reiterated. The EIR also indicated that the likelihood of ground failure, including liquefaction, is low due to the lack of known faults near the surface in the City and the depth of groundwater at more than 50 feet below the surface. The Project Area is relatively level and ground failure and landslides (mass movement of rocks and soils) are unlikely.

The EIR stated that the Project Area has a soil blowing hazard and ground disturbance would lead to erosion and loss of topsoil. Implementation of the City's soil erosion control policies and dust control measures would reduce impacts to less than significant levels. The EIR indicated that no unstable soil conditions are expected but mitigation is provided to ensure that adverse conditions are avoided.

*The impacts related to groundshaking, liquefaction, ground failure, and landslides remain the same. Erosion hazards are also expected with future residential development under*

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*the proposed Amendment. Mitigation would be needed for site-specific seismic and geologic hazards, including erosion and subsidence.*

A number of mitigation measures were provided in the EIR for Guasti Redevelopment Plan, which included mitigation measures in the EIR for the Guasti Plaza Specific Plan:

### 1. Seismic Hazard

The following mitigation measures would reduce the impacts of exposure to geological hazards to a level of less than significant.

- Prior to the submission of any building permit application, the applicant shall provide for the City's review and approval, comprehensive geotechnical investigations to explore and evaluate soil, groundwater, geological and seismic conditions; to provide soil engineering criteria, and document the potential for seismically induced ground shaking on the building site. Such investigations shall be conducted by a licensed civil engineer specializing in the practice of soil mechanics, and by a certified engineering geologist. Construction shall be in compliance with the findings and recommendations of the required investigations.
- Prior to the submission of any building permit application in portions of the project area that lie near suspected faults identified in future studies, the applicant shall provide geotechnical evaluations acceptable to the City to establish the presence and location of the suspected faults, and to establish whether or not they are potentially active.
- No structure intended for human occupancy or use shall be placed directly on or within 50 feet of any active or potentially active fault. Nor shall any structure intended for human occupancy be placed 150 feet of an inferred fault whose exact location is unknown. Additionally, no sensitive land use, including hospitals and school should be placed within any seismic study zone, or within 200 feet of any inferred fault.
- All construction of new buildings or rehabilitation of existing buildings shall be in conformance with latest adopted edition of the Uniform Building Code.
- Prior to the submission of any use application or building permit application for an existing unreinforced masonry structure, that structure shall be brought up to existing State and local building standards.
- All grading in the Project Area shall be in conformance with the City of Ontario Municipal Code.

*This mitigation is similar to those in the Specific Plan EIR and remains applicable to future residential development under the proposed Specific Plan Amendment.*

### 2. Soil Erosion

- In coordination with the City of Ontario, project design will incorporate landscaping and other features to reduce possible soil erosion.
- All grading in the Project Area shall be in conformance with the City of Ontario Municipal Code.
- Mitigation measures identified in Section 3.3, Air Quality.

*This mitigation remains applicable to future residential development under the proposed Specific Plan Amendment.*

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### 3. Soil Hazard Impact 3.4-3

While the potential for adverse impacts are considered less than significant, the following measures would ensure that adverse conditions are avoided:

- Prior to the submission of any building permit application, the applicant shall provide for the City's review and consent, comprehensive geotechnical investigations to explore and evaluate soil, groundwater, geological and seismic conditions; to provide soil engineering criteria, and document the potential for seismically induced ground shaking on the building site. Such investigations shall be conducted by a licensed civil engineer specializing in the practice of soil mechanics, and by a certified engineering geologist.
- All grading in the Project Areas shall be in conformance with the City of Ontario Municipal Code.

*This mitigation is similar to those in the Specific Plan EIR and remains applicable to future residential development under the proposed Specific Plan Amendment.*

### **4.7.5 Standard Conditions and Mitigation Measures**

#### **Standard Conditions**

The implementation of the following standard conditions would prevent adverse impacts related to the site's geologic and seismic characteristics:

*Standard Condition 4.7.1: Future residential development 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: Future residential development shall implement erosion control measures during rehabilitation and construction activities at the site, as required by the City.*

#### **Mitigation Measures**

Consistent with the mitigation measures in the EIR for the Guasti Plaza Specific Plan and the EIR for the Guasti Redevelopment Plan, the following mitigation measures shall be implemented as part of future residential development:

*Mitigation Measure 4.7.1: To ensure that structural stability of structures and infrastructure on the site, the following shall be implemented by future residential development:*

- *Prior to the submission of any building permit application, the applicant shall provide for the City's review and consent, comprehensive geotechnical investigations to explore and evaluate soil, groundwater, geological and seismic conditions; to provide soil engineering criteria, and document the potential for seismically induced ground shaking on the building site. Such investigations shall be conducted by a licensed civil engineer specializing in the practice of soil mechanics, and by a certified engineering geologist. Construction shall be in compliance with the findings and recommendations of the required investigations.*

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- *Prior to the submission of any building permit application in portions of the Project Area that lie near suspected faults identified in future studies, the applicant shall provide geotechnical evaluations acceptable to the City to establish the presence and location of the suspected faults, and to establish whether or not they are potentially active.*
- *No structure intended for human occupancy or use shall be placed directly on or within 50 feet of any active or potentially active fault. Nor shall any structure intended for human occupancy be placed within 150 feet of an inferred fault whose exact location is unknown. Additionally, no sensitive land use, including hospitals and schools should be placed within any seismic study zone, or within 200 feet of any inferred fault.*
- *All construction of new buildings or rehabilitation of existing buildings shall be in conformance with latest adopted edition of the California Building Code. All rehabilitation and seismic retrofit of existing historic structures shall be in conformance with the latest edition of the State Historic Building Code.*
- *Existing historic structures to be rehabilitated shall be brought up to applicable code standards at the time. Structures of unreinforced masonry shall be brought up to existing State and local building standards at the time of application for a change in use or for major additions or alterations.*

*Mitigation Measure 4.7.2: To prevent soil erosion and soil blowing hazards, the following shall be implemented by future residential development:*

- *All grading shall be in conformance with the City of Ontario Municipal Code.*
- *In coordination with the City of Ontario, project design will incorporate landscaping and other features to reduce possible soil erosion.*

*Mitigation Measure 4.7.3: Measures to avoid subsidence hazards to future residential development shall be implemented as part of design and construction, based on the recommendations of the geotechnical investigation for the project.*

### **4.7.6 Unavoidable Significant Adverse Impacts**

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 the recommended mitigation measures. No unavoidable significant adverse impacts are expected after mitigation.