

## 4.7 GEOLOGY AND SEISMIC HAZARDS

This section describes the existing conditions related to the geologic and seismic characteristics within the City of Cerritos. Geologic and seismic impacts that could result from implementation of the proposed General Plan Update are identified and appropriate mitigation measures are provided.

### 4.7.1 ENVIRONMENTAL SETTING

#### GEOLOGY AND SOILS

Cerritos is located in the northeastern portion of the coastal plain. In this area sedimentary and volcanic rocks in the subsurface attain great thickness. Alluvial deposits about 1,000 feet in thickness, consisting predominantly of marine and non-marine sand and silt underlie this portion of the coastal plain. Newer alluvial deposits exist along the San Gabriel River.

#### SEISMIC HAZARDS

The following section describes the presence and characteristics of seismic hazards in Cerritos including earthquake faults, surface rupture, ground shaking, liquefaction, hazardous buildings and seismic response.

#### EARTHQUAKE FAULTS

Active faults and historically destructive earthquakes characterize Southern California. Although there are no identified Alquist-Priolo Earthquake Fault Zones within the City of Cerritos, there are several known faults within close proximity. These faults include: Newport-Inglewood Fault Zone, Whittier-Elsinore Fault, Norwalk Fault and Elysian Park Fault. The closest fault is the projected trace of the buried Norwalk Fault, approximately one mile to the north of Cerritos. The San Andreas Fault is located further from Cerritos than other faults, but has the potential for larger magnitude earthquakes. Exhibit 4.7-1, *Regional Fault Map*, depicts the location of the faults in Southern California.

#### Newport-Inglewood Fault Zone

The Newport-Inglewood Fault Zone is a series of northwesterly trending folded hills and echelon faults extending over 40 miles from the Santa Monica Mountains to the offshore area near Newport Beach. The fault segments are:

- ❑ Charnook Fault;
- ❑ Overland Avenue Fault;

- ❑ Inglewood Fault;
- ❑ Portrero Fault;
- ❑ Avalon-Compton Fault;
- ❑ Cherry Hill Fault; and
- ❑ Seal Beach Fault.

This zone is seismically active with numerous recorded earthquakes, including the historic Long Beach Earthquake of 1933 registering a 6.3 magnitude. This fault zone could generate a 7.6-plus magnitude maximum credible earthquake.

### **Whittier-Elsinore Fault**

The Whittier fault extends over 20 miles from the Whittier Narrows southeasterly to the Santa Ana River where it merges with the southeasterly trending Elsinore fault. These two faults combined with smaller faults, form the Whittier-Elsinore fault zone. While no major or moderate size earthquakes have occurred along the Whittier fault, micro seismic data has been seen, verifying its seismic activity.

### **Norwalk Fault**

The Norwalk fault is approximately 16 miles long and is located generally one mile to the north of Cerritos. Seismic activity has occurred along the fault.

### **Elysian Park Fault**

The Elysian Park Fault is located approximately 15 miles north of Cerritos, in the Montebello and Monterey Park areas. This fault produced the 5.9 magnitude Whittier Narrows earthquake.

### **San Andreas Fault**

The San Andreas Fault is 50 miles to the northeast of Cerritos. The fault extends more than 600 miles over the length of California. An earthquake along the San Andreas Fault zone could affect most of Southern California. Several earthquakes have been attributed to this fault. It is estimated by geologists that this fault may be capable of generating an earthquake of magnitude 8.5 on the Richter scale.

## **SURFACE RUPTURE AND GROUND SHAKING**

Surface rupture from earthquakes is unlikely to occur in Cerritos as no faults have been identified within the City boundaries. The nearest fault, the Norwalk fault, is located approximately one mile north of Cerritos. Other faults within the area include the Newport-Inglewood, Whittier-Elsinore and Elysian Park faults.

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C E R R I T O S   G E N E R A L   P L A N   E I R

Link to Exhibit 4.7-1  
Regional Fault Map  
11 x 8.5 – b&w

The impacts of earthquakes on Cerritos depend on the particular fault, fault location, distance from the City and magnitude of the earthquake. These factors determine the degree of shaking that would occur in the City. The City of Cerritos lies on the coastal plain. Soils consisting predominantly of marine and non-marine sand and silt underlie this portion of the coastal plain. Newer alluvial deposits exist along the San Gabriel River.

## LIQUEFACTION HAZARDS

According to the Seismic Hazard Evaluations of the Los Alamos 7.5 Minute Quadrangle (March 1999) prepared by the California Department of Conservation, Division of Mines and Geology, the entire City of Cerritos is in a liquefaction hazard zone (refer to Exhibit 4.7-2, *Potential Liquefaction Areas*). Liquefaction is associated with intense ground shaking, wherein the strength and stiffness of a soil is reduced. Liquefaction occurs in saturated soils, where the space between individual solid particles is completely filled with water. This water exerts a pressure on soil particles that influence how tightly the particles themselves are pressed together. Earthquake shaking can cause the water pressure to increase to the point where the soil particles can readily move with respect to each other. Its effects are most commonly observed in low-lying areas.

## HAZARDOUS BUILDINGS

A substantial amount of buildings in Cerritos have been built under recent building codes and design criteria, which were developed after the 1971 San Fernando earthquake. In general, complete collapse of buildings is not likely to occur and building damage is likely to be only moderate. However, partial to total collapse could occur among the very few pre-1933 buildings still existing as well as partial collapse of some tilt-up and concrete block buildings built prior to March 1972.

## SEISMIC RESPONSE

Complying with the Standardized Emergency Management System requirements of State law, the City of Cerritos has prepared a Multi-Hazard Functional Plan for emergency response within the City. Critical areas within the City are identified along with areas for meeting and staging, communication and evacuation routes in the event of an emergency. An Emergency Operation Center (EOC) is provided within the Sheriff Station adjacent to City Hall for seismic and other disaster situations. The EOC is fully equipped with emergency communication equipment and cooking, showering and sleeping facilities. A citywide operating system has been implemented should other communication systems fail. The City's emergency evacuation routes are shown in Exhibit 4.7-3, *Emergency Evacuation Routes*.

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C E R R I T O S   G E N E R A L   P L A N   E I R

Link to Exhibit 4.7-2  
Potential Liquefaction Areas  
11 x 17 – b&w

Link to Exhibit 4.7-3  
Emergency Evacuation Routes  
11 x 17 – b&w

## LANDSLIDES

According to the Department of Conservation, Division of Mines and Geology's report, Seismic Hazard Evaluations of the Los Alamos 7.5 Minute Quadrangle (March 1999), the City of Cerritos does not have the potential for landslides.

### 4.7.2 STANDARDS OF SIGNIFICANCE

#### SIGNIFICANCE CRITERIA

In accordance with CEQA, the effects of a project are evaluated to determine if they will result in a significant adverse impact on the environment. An EIR is required to focus on these effects and offer mitigation measures to reduce or avoid any significant impacts that are identified. The criteria, or standards, used to determine the significance of impacts may vary depending on the nature of the project. Geologic and seismic impacts resulting from the implementation of the proposed General Plan Update could be considered significant if they cause any of the following results:

- Expose people or structures to potential substantial adverse effects, including the risk of loss, injury or death involving;
- 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;
- Strong seismic ground shaking;
- Seismic-related ground failure, including liquefaction;
- Landslides;
- Result in substantial soil erosion or the loss of topsoil;
- 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- or off-site landslides, lateral spreading, subsidence, liquefaction or collapse;
- Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code, creating substantial risk to life or property; and/or
- 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 (refer to Section 7.0, *Effects Found Not To Be Significant*).

Based on these standards, the effects of the proposed project have been characterized as either a “less than significant impact” or a “potentially significant impact.” Mitigation measures are recommended for potentially significant impacts. If a potentially significant impact cannot be reduced to a less than significant impact level through the application of mitigation, it is categorized as a significant and unavoidable impact.

### 4.7.3 IMPACTS AND MITIGATION MEASURES

#### FAULT RUPTURE

- FUTURE DEVELOPMENT RESULTING FROM IMPLEMENTATION OF THE PROPOSED GENERAL PLAN UPDATE MAY RESULT IN GEOLOGIC OR SEISMIC HAZARDS WITH RESPECT TO RUPTURE OF A KNOWN EARTHQUAKE FAULT.

**Level of Significance Before Policies/Mitigation:** Less Than Significant Impact.

**Impact Analysis:** The Southern California area is characterized by its seismic activity. The City of Cerritos is not situated directly above any active or potentially active faults. However, there are several known faults within close proximity to the City. They include: the Charnook Fault, Overland Avenue Fault, Inglewood Fault, Portrero Fault, Avalon-Compton Fault, Cherry Hill Fault and Seal Beach Fault.

Buildout of the City according to the proposed General Plan Update would not result in any impacts related to fault rupture beyond those that may presently exist within the City. Additionally, Cerritos has identified the protection of its residents from potential harm due to a seismic event as one of its goals (SAF-2). Specific policies include ensuring building code standards are enforced and maintained to reduce the effects of a seismic event (SAF-2.2). Implementation of the proposed General Plan Update would result in less than significant impacts.

**Policies in the Proposed General Plan Update:**

- SAF-2.1 Provide instructional materials, classes and other education resources to ensure residents and the day-time population is knowledgeable of the risks and methods to reduce such risks, as well as involve the residents and community groups in the City’s annual emergency preparedness event.
- SAF-2.2 Ensure building code standards are enforced and maintained so that new development shall be located, designed and operated to reduce the effects of a seismic event.
- SAF-2.3 Identify and correct potential areas of deficiencies in the level of safety present in existing structures and facilities.

**Mitigation Measures:** No mitigation measures beyond the policies identified in the proposed General Plan Update are required.

**Level of Significance After Policies/Mitigation:** Less Than Significant Impact.

## LANDSLIDES

- THE PROPOSED GENERAL PLAN UPDATE MAY RESULT IN GEOLOGIC OR SEISMIC HAZARDS WITH RESPECT TO LANDSLIDES.

**Level of Significance Before Policies/Mitigation:** Less Than Significant Impact.

**Impact Analysis:** Cerritos is predominately built out, and any future development would occur on vacant and underutilized lands. In addition, the City of Cerritos has a relatively flat topography with no more than a five to ten foot change in elevation throughout the City. According to the Department of Conservation, Division of Mines and Geology's report, Seismic Hazard Evaluations of the Los Alamitos 7.5 Minute Quadrangle (March 1999), the City of Cerritos does not have the potential for landslides. As a result, no mitigation in compliance with Public Resources Code 2693 (c) would be required. Thus, any impacts would be less than significant in this regard.

**Policies in the Proposed General Plan Update:** No policies within the proposed General Plan Update pertain to potential impacts resulting from landslides.

**Mitigation Measures:** No mitigation measures are required.

**Level of Significance After Policies/Mitigation:** Less Than Significant Impact.

## SOIL EROSION

- FUTURE DEVELOPMENT RESULTING FROM IMPLEMENTATION OF THE PROPOSED GENERAL PLAN UPDATE MAY RESULT IN IMPACTS RELATED TO SOIL EROSION OR THE LOSS OF TOPSOIL.

**Level of Significance Before Policies/Mitigation:** Less Than Significant Impact.

**Impact Analysis:** Topographically, the City of Cerritos is predominately flat, resulting in a low potential for soil erosion. Future development resulting from implementation of the proposed General Plan Update would occur on vacant and underutilized land, with minimal soil erosion or loss of topsoil. The soils underlying Cerritos are younger alluvium comprised of sand and silt. Impacts resulting from soil erosion or loss of topsoil from implementation of the proposed General Plan Update would be less than significant.

**Policies in the Proposed General Plan Update:** No policies within the proposed General Plan Update pertain to potential impacts resulting from soil erosion or loss of topsoil.

**Mitigation Measures:** The following mitigation measure is recommended to further reduce any impacts.

MM-GEO-1 Grading plans for development projects shall include an approved drainage and erosion control plan to minimize the impacts from erosion and sedimentation during grading. Plans should conform to all standards adopted by the City and meet the requirements of Storm Water Pollution Prevention Plans (SWPPS) required by California State Water Resources Control Board.

**Level of Significance After Policies/Mitigation:** Less Than Significant Impact.

## SEISMIC GROUND SHAKING

- THE CITY OF CERRITOS MAY BE SUBJECT TO HIGH LEVELS OF GROUND SHAKING DURING A SEISMIC EVENT. THIS MAY RESULT IN SUBSTANTIAL DAMAGE TO SOME BUILDINGS WITHIN THE COMMUNITY.

**Level of Significance Before Policies/Mitigation:** Potentially Significant Impact.

**Impact Analysis:** Earthquakes are a common occurrence in Southern California. Development under the proposed General Plan Update may result in the addition of up to 179 residential units and approximately 2.5 million square feet of non-residential uses, thereby exposing more people (residents and employees) to the effects of ground shaking from regionally generated earthquakes.

Strong seismic ground shaking could result in substantial damage to some buildings within the City of Cerritos. Most structures and infrastructure within the City were built after the 1971 San Fernando earthquake, implementing modern building codes and design standards. However, there is the possibility of partial to total collapse of buildings built prior to 1933 and some tilt-up concrete block buildings built prior to March 1972. Additional hazards within the City exist as six-foot high concrete walls that border many sidewalks, which could collapse due to groundshaking.

The effects of seismically induced ground shaking are probably the most critical potential seismic hazards to the City of Cerritos. Seismic hazards include secondary effects of seismically induced ground failure including liquefaction and landslides. Property damage, personal injury, and loss of life may result from such events.

The City has identified protection of its residents from potential harm due to a seismic event as one of its goals (SAF-2). The policies incorporated into the proposed General Plan Update acknowledge the safety concerns due to seismic activity. They include educating residents of Cerritos regarding the risk of seismic events (SAF-2.1) and

ensuring building code standards are enforced (SAF-2.2). The policies proposed in the General Plan Update and mitigation measures listed below would minimize potential seismic hazards in the City to less than significant levels.

**Policies in the Proposed General Plan Update:**

- SAF-2.1 Provide instructional materials, classes and other education resources to ensure residents and the day-time population is knowledgeable of the risks and methods to reduce such risks, as well as involve the residents and community groups in the City's annual emergency preparedness event.
- SAF-2.2 Ensure building code standards are enforced and maintained so that new development shall be located, designed and operated to reduce the effects of a seismic event.
- SAF-2.3 Identify and correct potential areas of deficiencies in the level of safety present in existing structures and facilities.

**Mitigation Measures:** In addition to the policies listed above, the following mitigation measures are recommended to further reduce any impacts.

- MM-GEO-2 Due to the potential for ground shaking in a seismic event, individual development projects shall comply with the standards set forth in the Uniform Building Code (UBC) (most recent edition) to assure seismic safety to the satisfaction of the City's Community Development Department prior to issuance of a building permit, including compliance with California Division of Mines and Geology Special Publication 117 (Guidelines for Evaluation and Mitigating Seismic Hazards in California, adopted March 13, 1997).
- MM-GEO-3 Individual development projects shall comply with non-structural seismic mitigation measures, e.g. overhead glass treatments shall use safety glass or film; vending machines, ice machines (if used) and other types of machines and equipment shall be bolted or braced. Pictures and decorative items within common areas shall be secured for earthquake safety.
- MM-GEO-4 Ensure individual development projects compliance with current seismic mitigation codes.

**Level of Significance After Policies/Mitigation:** Less Than Significant Impact.

## LIQUEFACTION

- THE CITY OF CERRITOS IS UNDERLAIN BY SOILS THAT MAY BECOME UNSTABLE DURING INTENSE GROUND SHAKING, RESULTING IN POTENTIAL LIQUEFACTION.

**Level of Significance Before Policies/Mitigation:** Potentially Significant Impact.

**Impact Analysis:** Liquefaction occurs when the strength and stiffness of a soil is reduced by intense ground shaking. When intense ground shaking occurs, water in highly saturated soils mix with that soil, resulting in ground failure. According to the Seismic Hazard Evaluations of the Los Alamitos 7.5 Minute Quadrangle (March 1999) prepared by the California Department of Conservation, Division of Mines and Geology, the City of Cerritos is in a liquefaction hazard zone.

It is impossible to eliminate or avoid seismic hazards within Southern California. However, the City has acknowledged the necessity of addressing these hazards as an important safety concern. The City has identified the protection of its residents from potential harm due to a seismic event as one of the goals in the proposed General Plan Update (SAF-2). Policies incorporated into the proposed General Plan Update such as ensuring building code standards are enforced and maintained so that new development is located, designed and operated to reduce effects of a seismic event (SAF-2.2), as well as the mitigation measure listed below, would minimize potential seismic hazards, including liquefaction, within the City to a less than significant level.

### **Policies in the Proposed General Plan Update:**

- SAF-2.2      Ensure building code standards are enforced and maintained so that new development shall be located, designed and operated to reduce the effects of a seismic event.
- SAF-2.3      Identify and correct potential areas of deficiencies in the level of safety present in existing structures and facilities.

**Mitigation Measures:** In addition to the policies listed above, the following mitigation measure is recommended to further reduce any impacts.

- MM-GEO-5    Individual development projects shall comply with the standards set forth in the Uniform Building Code (UBC) (most recent edition) for structures on-site to assure safety of the occupants to the satisfaction of the City's Community Development Department prior to issuance of a building permit. These standards included compliance with California Division of Mines and Geology Special Publication 117 (Guidelines for Evaluating and Mitigating Seismic Hazards in California, adopted march 13, 1997) and "Recommended Procedures for Implementation of

CDMG Special Publication 117- Guidelines for analyzing and Mitigating Liquefaction in California” (Dr. Geoffrey R. Martin et al, May 1999).

**Level of Significance After Policies/Mitigation:** Less Than Significant Impact.

## EXPANSIVE SOIL AND STRENGTH

- THE PROPOSED GENERAL PLAN UPDATE MAY RESULT IN IMPACTS RELATED TO EXPANSIVE SOILS OR SOIL STRENGTH.

**Level of Significance Before Policies/Mitigation:** Potentially Significant Impact.

**Impact Analysis:** The soils underlying Cerritos are younger alluvium comprised of sand and silt. These soils may become unstable during intense ground shaking. Cerritos is mostly built out and the proposed General Plan Update does not contain any new or additional policies proposing large-scale development or expansion of the City. Adherence to building code standards, policies incorporated into the proposed General Plan Update and mitigation measures would reduce any impacts to less than significant levels.

### Policies in the Proposed General Plan Update:

- SAF-2.2      Ensure building code standards are enforced and maintained so that new development shall be located, designed and operated to reduce the effects of a seismic event.

**Mitigation Measures:** Although all soil type and strength impacts would be considered less than significant, the following mitigation measure is recommended to further reduce any impacts.

- MM-GEO-6    Development proposals within identified soil or seismic hazard areas shall include design features directed at mitigating such hazards, as confirmed during building design and plan checking stages of review. These mitigating features shall be confirmed during building design and plan checking stages of project review.

**Level of Significance After Policies/Mitigation:** Less Than Significant Impact.

## 4.7.4 UNAVOIDABLE SIGNIFICANT IMPACTS

All geologic and seismic impacts associated with implementation of the proposed General Plan Update would be less than significant by adherence to and/or compliance with policies in the proposed General Plan Update and with the imposition of mitigation measures. No unavoidable significant geologic impacts would occur as a result of buildout of the proposed General Plan Update.

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