Safety Element Appendix

SAFETY ELEMENT APPENDIX

Tables

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1.0 Potential Seismic and Soils Hazards

Groundshaking
The most serious direct earthquake hazard is the damage or collapse of buildings caused by groundshaking, which, in addition to property damage, can cause injury or death.

Groundshaking is the vibration that radiates from the epicenter of an earthquake. The severity of groundshaking and its potential to cause damage to buildings is determined by several factors, including: the nature of the underlying soil and geology, the location of the epicenter of the earthquake, the duration and character of the ground motion, the structural characteristics of a building, and the quality of workmanship and materials used in buildings.

Groundshaking is the primary seismic concern for Paso Robles. Portions of Paso Robles, especially those areas within or immediately adjacent to the Salinas River and Huerhuero Creek floodplains, are located on alluvial deposits, which can increase the potential for groundshaking damage. Ground motion lasts longer on loose, water-saturated materials than on solid rock. As a result, structures located on these types of materials may suffer greater damage. "Poor ground" can be a greater hazard for structures than close proximity to the fault or the earthquake's epicenter.

Older buildings constructed before building codes were in effect are most likely to suffer damage in an earthquake. Many of Paso Robles' buildings are one or two stories high, and of wood frame construction, which is considered relatively resistant to earthquake damage. However, the City also includes buildings made of unreinforced masonry, which are highly susceptible to damage from severe groundshaking. The downtown area in particular includes a high percentage of buildings with brick facades, indicating that this portion of the community is at relatively higher risk. Some buildings of this type have recently been retrofitted.

Liquefaction
Liquefaction in soils and sediments can occur during earthquake events, when material is temporarily transformed from a solid to a liquid (gelatinous) by increases in interpore pressure. Earthquake-induced liquefaction most often occurs in low-lying areas with soils composed of unconsolidated, saturated, clay-free sands and silts, but can also occur in dry, granular soils or saturated soils with some clay content. Liquefaction also occurs in areas overlain by unconsolidated fill, particularly artificial fill.

The potential for liquefaction is greatest in unconsolidated sedimentary deposits with a high water table. In the Paso Robles area, hazards from liquefaction are greatest in active river channels such as the Salinas River and Huerhuero Creek. The terrace deposits on which the major portion of the City is located can be considered as having a low to moderate liquefaction potential in the presence of shallow groundwater (less than

30 feet). Consolidated rock areas of the City are characterized by low to non-existent liquefaction potential.

Lurch Cracking and Lateral Spreading

Lurch cracking refers to fractures, cracks and fissures produced by groundshaking, and may occur far from an earthquake's epicenter. Lateral spreading is the horizontal movement of soil toward an open face of a stream bank or the side of a levee. Steep-sided artificial fill embankments are most susceptible to damage. The potential for these hazards is greatest on steep-sided alluvial soils where the groundwater table is high. In Paso Robles, this includes areas adjacent to the Salinas River and Huerhuero Creek.

Landslides

Geologic, topographic, and climatic factors generally determine the occurrence of landslides. Landslides can be traced to the nature of the parent rock and the natural processes affecting it. In general, young sedimentary and poorly consolidated rocks of Pleistocene and Pliocene age in upslope areas are more susceptible to erosion and landsliding than older igneous and sedimentary rocks. Accordingly, the low hills east and west of the Salinas River which are underlain by Pliocene and Pleistocene sands and gravels of the Paso Robles Formation are susceptible to potential landslides. The weak sandstones and shale of the Monterey Formation, which outcrop in the steep elevations west of the City are subject to the greatest landslide potential.

Erosion

Soil erosion can be caused by natural occurrences such as wildfires, landslides, and stormwater runoff. In addition, vegetation removal, grading for construction, improper agricultural or grazing practices, and off-roam vehicle traffic area major sources of erosion. Soils in Paso Robles are classified as having high to moderate susceptibility to erosion (San Luis Obispo County 1980). In the low-lying areas surrounding the Salinas River, erodability is attributed to river scouring and potential flooding. In the steep upland areas of the City, soils are subject to erosion from wind, rain, grazing, and human disturbance or soil and vegetation. Soil types in the City that are characterized by erosion hazard potential are listed in Table S-1. The effects of erosion range from nuisance problems, such as increased siltation in storm drains, to extreme cases where watercourses are downcut and gullies develop that can eventually undermine adjacent structures or vegetation.

Table S-1 Soil Characteristics and Hazards by Type

Soil Name and Number	Shrink-Swell Potential	Rate of Runoff	Erosion Hazard	Permeability
Linne-Calodo Complex (152, 153, 154)	Moderate	Rapid	High	Moderately slow
Lockwood Shaley Loam (158)	Moderate	Medium	Moderate	Moderately slow
Hanford and Greenfield Gravelly Sandy Loam (150)	Low	Medium	Moderate	Moderately rapid
Metz-Tujunga Complex (167)	Low	Slow	Slight	Moderately rapid
Xerofluvents (Riverwash) (212)	ND	ND	ND	ND
Metz Loamy Sand (166)	Low	Slow	Slight	Moderately rapid

Arbuckle Fine Sandy Loam (100)	Low to Moderate	ND	None	ND
Cropley Clay (132)	High	Slow	Slight	Slow

Source: NRCS, Soil Survey of San Luis Obispo County, California, Paso Robles Area (1983).

Expansive Soils
Expansive soils expand when wet and are easily recognized by large surface cracks that form when they are dry and contracted. Paso Robles is an area of moderately expansive soils (San Luis Obispo County, 1980). Construction in areas of expansive soils may require major sub-excavation and replacement of existing materials with more stable soils.

2.0 Wildland and Urban Fires

Paso Robles faces two types of fire hazards that threaten lives and property: urban and wildland fires. Wildland fires may also result in the loss of natural vegetation, loss of agricultural crops, and soil erosion. The threat posed by each type of fire hazard is described below.

Wildland Fires
The outbreak and spread of wildland fires within the planning area is a potential danger, particularly during the dry summer and fall months. The buildup of understory brush, which under natural conditions would be periodically burned off, provides fuel to result in larger more intensive fires.
Various factors contribute to the intensity and spread of wildland fires: humidity, wind speed and direction, vegetation type, the amount of vegetation (fuel), and topography. Most wildland fires are the result of arson or simple carelessness.

The topography, climate, and vegetation of much of the Paso Robles PIA are conducive to the spread of wildland fires. According to the California Department of Forestry and Fire Protection San Luis Obispo County Fire Hazard Map, almost all of the PIA, the hillsides south of Highway 46 East, and the areas of the City north of Highway 46 East are located within "Wildland Areas that may contain substantial fire hazards and risks" (GIS Solutions Group, January 6, 2000).

Urban Fires
Urban fires are primarily those associated with structures and the activities in and around them. Most urban fires are caused by human activity. Over the years, development standards have become more stringent to reduce the frequency and severity of such events.

Urban fire hazards are greatest in areas containing older buildings that do not meet current building codes. Paso Robles contains many such structures, even though the City requires that such buildings be brought up to code when made aware of such buildings.

Utility facilities also present a potential urban fire hazard. Earthquakes or floods may rupture buried gas lines, while high winds or accidents could cause overhead electric lines to break. Either condition could result in a fire. Catastrophic earthquakes could cause widespread urban fires, as multiple gas and electrical lines could be broken or disrupted.

While Paso Robles has had urban fires, most have been relatively small and easily contained. No catastrophic fires have been recorded in recent history, particularly since emergency response and building codes have been improved.

3.0 Flooding Hazards

Effects of Flooding
Flooding can cause widespread damage to affected areas. Buildings and vehicles can be damaged or destroyed, while smaller objects can be buried in flood-deposited sediments. Floods can also cause drowning or isolation of people or animals. In addition, floodwaters can break utility lines, interrupting services and potentially affecting health and safety, particularly in the case of broken sewer or gas lines.

The secondary effects of flooding are due to standing water, which can result in crop damage, septic tank failure, and water well contamination. Standing water can also damage roads, foundations, and electrical circuits.

Inadequately sized culverts and bridges can create impediments to the passage of high water flow in streams and gullies. Undersized infrastructure typically results in short-term back-ups behind the culvert or bridge, with pooling water in such areas, in effect, an unintended detention basin.

100-Year Flood Hazard
The City is prone to flooding when storm flows exceed the transport capacity of creek and river channels, especially since the central portion of the City surrounds the Salinas River and encompasses its floodplain. The Federal Emergency Management Agency (FEMA) has prepared Flood Insurance Rate Maps (FIRM) for areas within the current City limits of Paso Robles. These maps indicate that several areas within the current City limits are located within a 100-year floodplain. The 100-year flood, or "base flood", refers to the flood resulting from a storm event which has a probability of occurring once every 100 years, or a one percent chance of occurring in any given year. Areas mapped in the 100-year floodplain area are subject to inundation during a 100-year storm event. These areas are depicted on Figure LU-5 in the Land Use Element.

Areas designated as lying in the P I A were not included in the FEMA study of flood hazard areas. However, the San Luis Obispo County Planning Department has prepared maps delineating areas of known flood hazard. The study areas mapped by the County as "flood hazard" areas include:

Subarea A: The southeast portion of this area is subject to flooding from Huerhuero Creek, which flows approximately to the southeast. The western border is also subject to flooding from the Salinas River.

Subarea B: The area south of the airport is subject to flooding from Dry Creek, a tributary to Huerhuero Creek.

Subarea C: The northwest and central portion of this Subarea may be flooded due to overtopping of Huerhuero Creek and Dry Creek,

Subarea D: The northern boundary along Linne Road is subject to flooding from Huerhuero Creek.

Subarea E: The eastern boundary of this subarea may be flooded from high flows in an unnamed tributary of Huerhuero Creek.

Subarea F: Flooding may occur in this subarea in the vicinity of Marquita Road, east of Highway 101.

Subarea G: The area bounded by Herdsman Way to the south, West Bethel Road to the west, and Highway 46 West to the north, is subject to flooding.

Subarea H: Flooding may occur in an area north of Highway 46 West, west of Arbor Road, and south of Live Oak Road.

Flood hazards in Subareas I and J were not mapped.

4.0 Hazardous Materials

Hazardous materials are defined as those that are a potential threat to human health, having the capacity to cause serious illness or death. This section discusses the types of hazardous materials typically found in the planning area.

Household Products
By far the most common hazardous materials are those found or used in the home. Waste oil is a common hazardous material that is often improperly disposed of and can contaminate surface water through runoff. Other household hazardous wastes (used paint, pesticides, cleaning products and other chemicals) are common and often improperly stored in garages and homes throughout the community. Because of their prevalence and proximity to residents, household products constitute the most pervasive health hazard facing residents of the community.

Agricultural Pesticide Use
Paso Robles contains agricultural operations, concentrated in the north-central portion of the City, north of Highway 46 East. Orchards in particular are often sprayed with various pesticides, which can contaminate the soils. Denuded vegetation can suggest evidence for soil contamination. Potential contaminants can include DDT, lead and

arsenic. In such areas, it is prudent to conduct soil testing (and conduct soil remediation, if necessary) before allowing more intensive development.

Asbestos

Asbestos is a highly crumbly material naturally occurring in certain soil and rock formations and often found in older buildings, typically used as insulation in walls or ceilings. It was formerly popular as an insulating material because it had the desirable characteristic of being fire resistant. However, it can pose a health risk when very small particles become airborne. These dust-like particles can be easily inhaled, where their microscopically sharp structures can puncture tiny air sacs in the lungs, resulting in long-term health problems.

Paso Robles contains many older structures with the potential to contain asbestos. Pre-1979 construction often included asbestos and it should be assumed that the demolition of older structures in the City may present this hazard. Proper asbestos abatement and disposal procedures are required to be undertaken whenever the demolition of older structures is considered. In addition, the County Air Pollution Control District has published procedures for dealing with naturally occurring asbestos.

Hazardous Materials Transport

The Union Pacific Railroad and Highway 101 are major interstate transportation routes that pass through Paso Robles. In addition Highway 46 East and West support relatively high traffic volumes. Trains and trucks commonly carry a variety of hazardous materials, including gasoline and various crude oil derivatives, and other chemicals known to cause human health problems. When properly contained, these materials present no hazard to the community. But in the event of an accident or derailment, such materials may be released, either in liquid or gas form. In the case of some chemicals (such as chlorine), highly toxic fumes may be carried far from the accident site. Although standard accident and hazardous materials recovery procedures are enforced by the state and followed by private transportation companies, the Town of Paso Robles is at relatively high risk because of its location along interstate rail and highway corridors.

Hazardous Waste Management Plan

Counties are required by state law to prepare hazardous waste management plans. San Luis Obispo County's Hazardous Waste Management Plan (HWMP) addresses the treatment, storage and disposal of such materials. The primary goal of the plan is to protect public health by promoting the safe use and disposal of hazardous waste. To accomplish this, the plan provides for the reduction of hazardous waste through source reduction, recycling, and on-site handling and treatment methods. The HWMP is based on an analysis of the current and projected hazardous waste generation rates within the County and the facilities available for hazardous waste storage, treatment, or disposal. Using this information, the projected volume of hazardous waste that will be generated in the County is estimated and the need for additional hazardous waste treatment facilities is determined. Review of the HWMP indicates that in 1986, 6118.32 tons of hazardous wastes were generated in the County. Nearly all of this was transported outside of the County for treatment or disposal since the County's one permitted

hazardous waste treatment, storage or disposal (TSD) facility, the cold Canyon Landfill, accepts only asbestos-containing hazardous waste. The 1988 HWMP projected that up to 10,910 tons of hazardous waste could be generated in the County by the year 2000.

5.0 Other Hazards

Paso Robles Airport
The Paso Robles Municipal Airport is a basic transport airport and is used extensively for recreational and business purposes by both single and multi-engine aircraft, including helicopters and occasional jets. The airport currently accommodates about 30,000 aircraft operations (take-offs and landings) annually. Of this total, about 15,000 take-offs are south of the airport. Additionally, the airport accommodates an average of 500 California Department of Forestry (CDF) air tanker flights per year, as well as occasional C-130 military aircraft flights serving Camp Roberts and Camp San Luis Obispo military operations. Air tanker departures are restricted by the FAA to a flight pattern that turns to the southeast, following Huerhuero Creek. The Paso Robles Municipal Airport has designated clear zones and approach and "climbout" extensions from the ends of the active runway. Hazards associated with the airport are primarily related to the risk of aircraft accident and to the aircraft noise levels along primary flight paths. The Paso Robles Airport Land Use Plan (1977) addresses these hazards by limiting the types of land uses and development that can be located within the airport planning area and further establishes implementation measures and development standards to minimize or avoid hazards. The airport land use planning area extends 10,000 feet (about 1.9 miles) from each end of the airport runway.

Electric and Magnetic Fields (EMFs)
The transmission of electricity and the use of electrical appliances results in the creation of electromagnetic fields. The strength of the field is a function of the electrical line voltage, distance between the line and the point of measurement, the design of the line, and the electrical phasing characteristics. Neither California nor the Federal Government has established exposure criteria for electric or magnetic fields. Thus, there are no recognized jurisdictional standards with which to evaluate the expected levels of magnetic or electric fields below high voltage lines. To date, experimental and field data are inconclusive regarding adverse health effects from electrical or magnetic fields. However, impacts can be qualitatively estimated based on existing studies and standards established by the California Department of Health Services regarding radio emissions from high voltage antenna towers. Setback guidelines adopted by the California Department of Health Services are 100 feet from 100-110 kV lines; 150 feet from 220-230 kV lines; and 250 feet from 345 kV lines (California Department of Health Services 1992).

Radon Hazards
Radon is a naturally occurring gas produced by the breakdown of uranium in soil, rock, and water. Accumulations of this gas inside structures can become a health hazard because radon is known to cause lung cancer. The threat of radon is very low in well-ventilated structures. Basements, which are rare in the region, are common problem areas.

High-Voltage Transmission Lines

Pacific Gas and Electric Company (PG&E) provides the City of Paso Robles with electricity through a series of electrical lines. One set of high-voltage transmission lines is located just east of the City, and runs in a northeast-southwest direction.