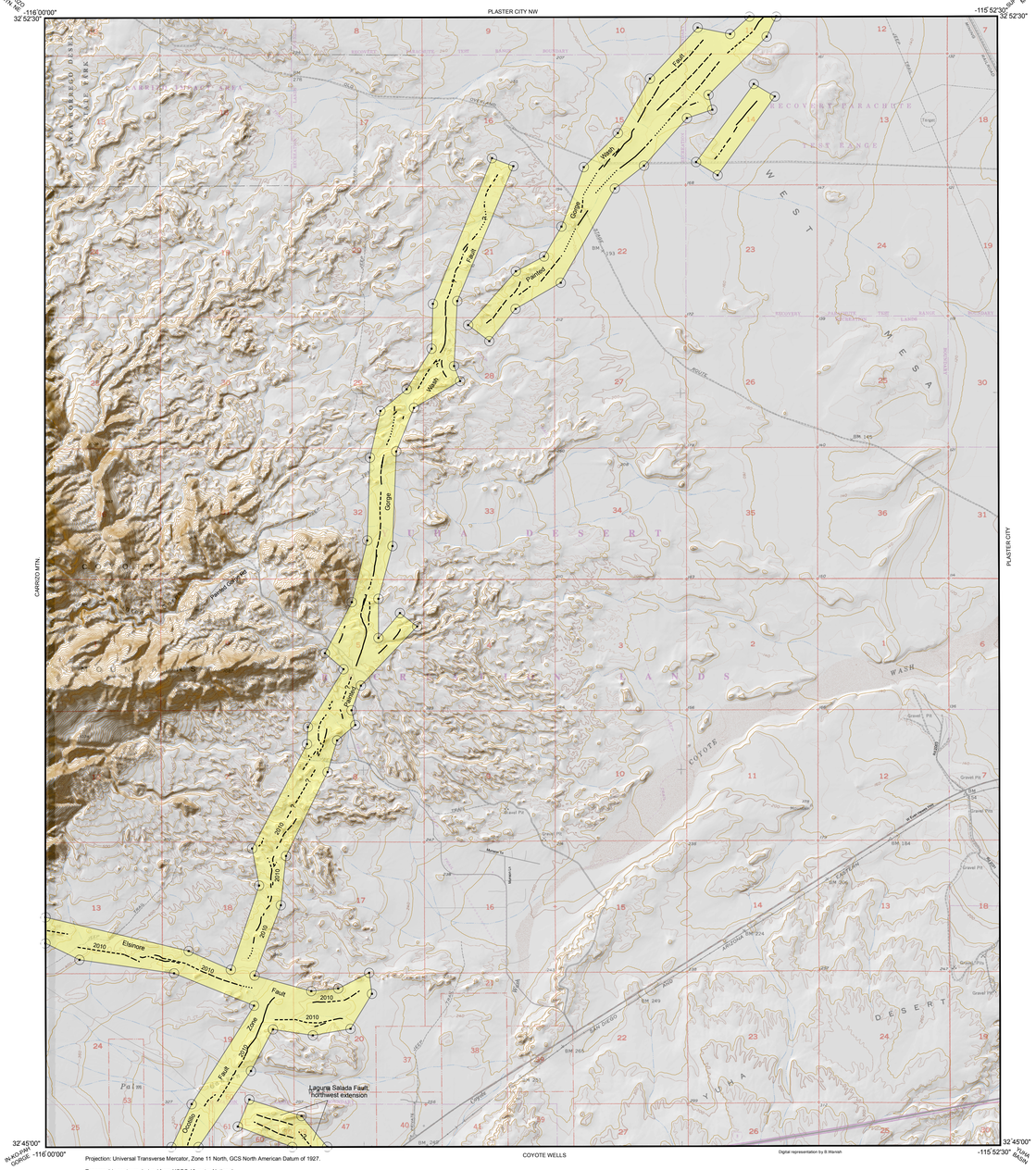

Projection: Universal Transverse Mercator, Zone 11 North, GCS North American Datum of 1927.

Topographic contours derived from USGS 10 meter National Elevation Dataset (NED). Shaded topographic relief derived from USGS 10 meter NED.

Scale 1:24,000

0 0.25 0.5 1 1.5 2 Miles

0 1,000 2,000 4,000 6,000 8,000 Feet

0 0.25 0.5 1 1.5 Kilometers

CONTOUR INTERVAL 20 FEET

MAP LOCATION

California Geological Survey
Geologic Information and Publications
801 K Street, MS 14-34
Sacramento, CA 95814-3532
(916) 415-5716
www.conservation.ca.gov/cgs

STATE OF CALIFORNIA
California Geological Survey

Earthquake Zones of Required Investigation
Painted Gorge Quadrangle
2012

PURPOSE OF MAP

THIS MAP SHOWS BOTH ALQUIST-PRIOLO EARTHQUAKE FAULT ZONES AND SEISMIC HAZARD ZONES, IF EVALUATED.

This map shows the location of Alquist-Priolo (AP) Earthquake Fault Zones and Seismic Hazard Zones, collectively referred to here as Earthquake Zones of Required Investigation. The Geographic Information System (GIS) digital files of these regulatory zones released by the California Geological Survey (CGS) are the "Official Maps". GIS files are available at the CGS website www.conservation.ca.gov/cgs/. These zones will assist cities and counties in fulfilling their responsibilities for protecting the public from the effects of surface fault rupture and earthquake-triggered ground failure as required by the AP Earthquake Fault Zoning Act (Public Resources Code Sections 2621-2630) and the Seismic Hazards Mapping Act (Public Resources Code Sections 2690-2699.6). For information regarding the general approach and recommended methods for preparing these zones, see California Geological Survey (CGS) Special Publication 42, *Fault-Rupture Hazard Zones in California*, and Special Publication 118, *Recommended Criteria for Delineating Seismic Hazard Zones in California*.

For information regarding the scope and recommended methods to be used in conducting the required site investigations refer to CGS Special Publication 42, Appendix C *Guidelines for Evaluating the Hazard of Surface Rupture*, and CGS Special Publication 117A, *Guidelines for Evaluating and Mitigating Seismic Hazards in California*. For a general description of the AP and Seismic Hazards Mapping acts, the zonation programs, and related information, please refer to the website at www.conservation.ca.gov/cgs/ .

MAP EXPLANATION

EARTHQUAKE FAULT ZONES

Active Fault Traces
Faults considered to have been active during Holocene time and to have potential for surface rupture; solid line where accurately located, long dash where approximately located, short dash where inferred, dotted where concealed; query (?) indicates additional uncertainty. Evidence of historic offset indicated by year of earthquake-associated event or C for displacement caused by fault creep.

ZONES OF REQUIRED INVESTIGATION

Earthquake Fault Zones
Zones are areas delineated as straight-line segments that connect encircled turning points encompassing active faults that constitute a potential hazard to structures from surface faulting or fault creep such that avoidance as defined in Public Resources Code Section 2621.5(a) would be required.

SEISMIC HAZARD ZONES

Liquefaction
Areas where historical occurrence of liquefaction, or local geological, geotechnical and ground water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

Earthquake-Induced Landslides
Areas where previous occurrence of landslide movement, or local topographic, geological, geotechnical and subsurface water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

OVERLAPPING ZONES

Overlap of Earthquake Fault Zone and Liquefaction Zone
Areas that are covered by both Earthquake Fault Zone and Liquefaction Zone. Note: Mitigation methods differ for each zone – AP Act only allows avoidance; Seismic Hazard Mapping Act allows mitigation by engineering/geotechnical design as well as avoidance.

Overlap of Earthquake Fault Zone and Earthquake-Induced Landslide Zone
Areas that are covered by both Earthquake Fault Zone and Earthquake-Induced Landslide Zone. Note: Mitigation methods differ for each zone – AP Act only allows avoidance; Seismic Hazard Mapping Act allows mitigation by engineering/geotechnical design as well as avoidance.

IMPORTANT - PLEASE NOTE THE FOLLOWING FOR ZONES SHOWN ON THIS MAP

1) This map may not show all faults that have the potential for surface fault rupture, either within the Earthquake Fault Zones or outside their boundaries. Additionally, this map may not show all areas that have the potential for liquefaction, landsliding, strong earthquake ground shaking or other earthquake and geologic hazards. Also, a single earthquake capable of causing liquefaction or triggering landside failure will not uniformly affect the entire area zoned.

2) Faults shown are the basis for establishing the boundaries of the Earthquake Fault Zones.

3) The identification and location of these faults are based on the best available data. However, the quality of data used is varied. Traces have been depicted as accurately as possible at this map scale.

4) Liquefaction zones may also contain areas susceptible to the effects of earthquake-induced landslides. This situation typically exists at or near the toes of existing landslides, downslope from rockfall or debris flow source areas, or adjacent to steep stream banks.

5) Landslide zones on this map were determined, in part, by adapting methods first developed by the U.S. Geological Survey (USGS). Landslide hazard maps prepared by the USGS typically use experimental approaches to assess earthquake-induced and other types of landslide hazards. Although aspects of these new methodologies may be incorporated in future CGS seismic hazard zone maps, USGS maps should not be used as substitutes for these Official SEISMIC HAZARD ZONES maps.

6) USGS base map standards provide that 90 percent of cultural features be located within 40 feet (horizontal accuracy) at the scale of this map. The identification and location of liquefaction and earthquake-induced landslide zones are based on available data. However, the quality of data used is varied. The zone boundaries depicted have been drawn as accurately as possible at this scale.

7) Information on this map is not sufficient to serve as a substitute for the geologic and geotechnical site investigations required under Chapters 7.5 and 7.8 of Division 2 of the California Public Resources Code.

8) Seismic Hazard Zones identified on this map may include developed land where delineated hazards have already been mitigated to city or county standards. Check with your local building/planning department for information regarding the location of such mitigated areas.

9) DISCLAIMER: The State of California and the Department of Conservation make no representations or warranties regarding the accuracy of the data from which these maps were derived. Neither the State nor the Department shall be liable under any circumstances for any direct, indirect, special, incidental or consequential damages with respect to any claim by any user or any third party on account of or arising from the use of this map.

REFERENCES USED TO COMPILE FAULT DATA

Painted Gorge Quadrangle

Clark, M.M., 1982, Map showing recently active breaks along the Elsinore and associated faults, California, between Lake Henshaw and Mexico: U.S. Geological Survey Miscellaneous Investigations Series Map I-1329, 2 sheets, 1:24,000.

Kahle, J.E., 1988, Preliminary map of Quaternary faults in southeastern San Diego County and in southwestern Imperial County, California: California Division of Mines and Geology Open-File Report 88-6, 1:100,000 (map dated 1985).

Morgan, G.J., and Morgan, J.R., 2006, The Painted Gorge Wash Fault: recent left-lateral faulting, east side Coyote Mountains, Imperial County, California in Bloom, D.M, Farquharson, P.T., and Ziegler, C.L., eds., Geology and History of Southeastern San Diego County, California: San Diego Association of Geologists, 2005/2006 Field Guides, p.187-204

Rymer, M.J., Treiman, J.A., Kendrick, K.J., Lienkaemper, J.J., Weldon, R.J., Bilham, R., Wei, M., Fielding, E.J., Hernandez, J.L.,Olson, B.P.E., Irvine, P.J., Knepprath, N., Sickler, R.R., Tong, X., and Siem, M.E., 2011, Triggered surface slips in southern California associated with the 2010 El Mayor-Cucapah, Baja California, Mexico, earthquake: U.S. Geological Survey Open-File Report 2010-1333 and California Geological Survey Special Report 221.

Treiman, J.A., 2012, Faults of the Yuha Desert and the southeastern portion of the Elsinore Fault Zone, Imperial County, California: California Geological Survey Fault Evaluation Report FER-254, 54p. (unpublished).

For additional information on faults in this map area, the rationale used for zoning, and additional references consulted, refer to unpublished Fault Evaluation Reports on file at regional offices of CGS.

EARTHQUAKE FAULT ZONES

Delineated in compliance with
Chapter 7.5 Division 2 of the California Public Resources Code
(Alquist-Priolo Earthquake Fault Zoning Act)

PAINTED GORGE QUADRANGLE
OFFICIAL MAP
Released: September 21, 2012

John G. Parrish
STATE GEOLOGIST

SEISMIC HAZARD ZONES

Delineated in compliance with
Chapter 7.8 Division 2 of the California Public Resources Code
(Seismic Hazards Mapping Act)

PAINTED GORGE QUADRANGLE
AREA NOT EVALUATED

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