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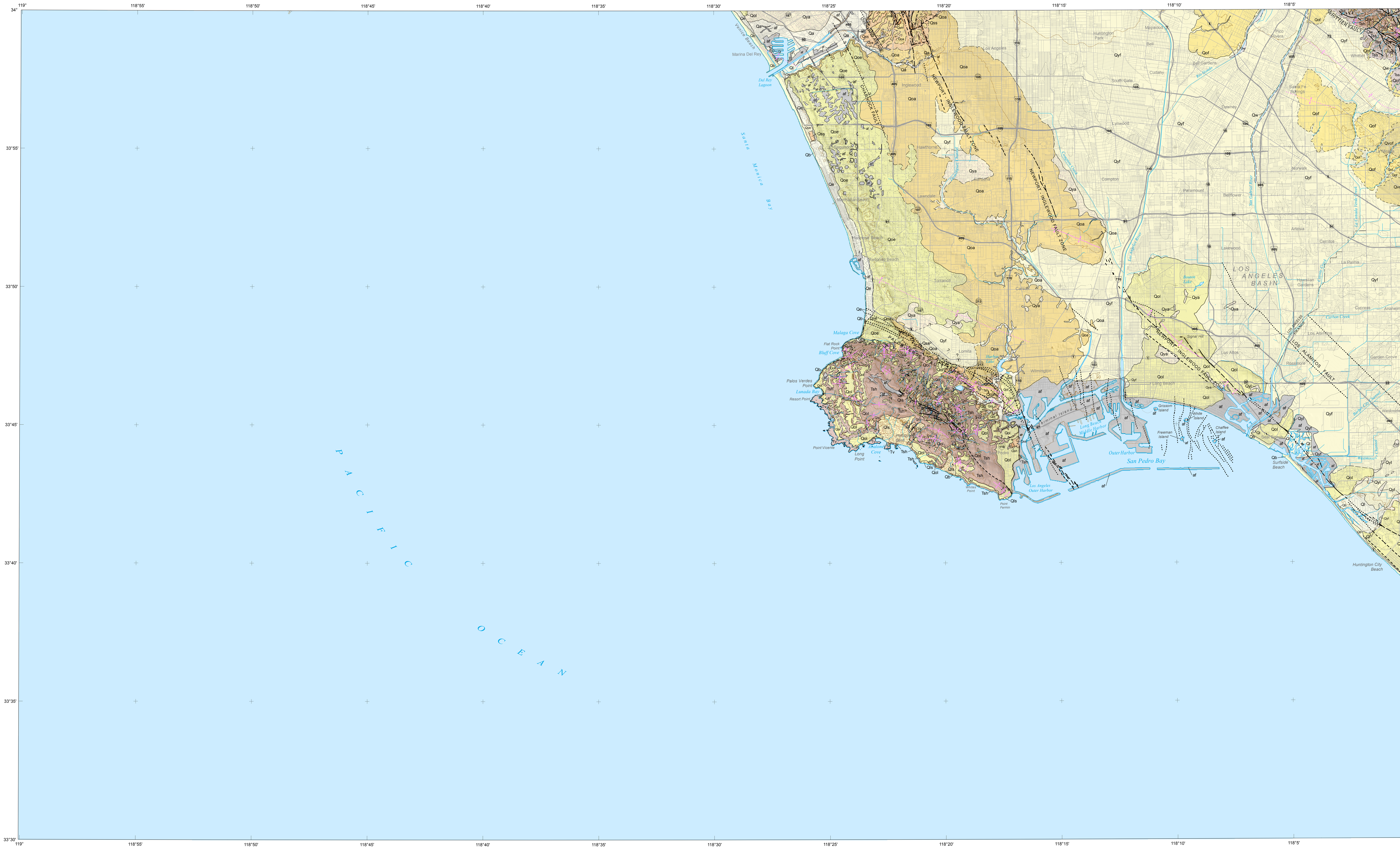


MAP UNITS

Late Holocene (Surficial Deposits)

af — **Artificial Fill** - deposits of fill resulting from human construction, mining, or quarrying activities; includes engineered fill for buildings, roads, dams, airport runways, harbor facilities, and waste landfills

Qls — **Landslide Deposits** - may include debris flows and older landslides of various earth material and movement types; unconsolidated to moderately well-consolidated

Qb — **Beach Deposits** - unconsolidated marine beach sediments consisting mostly of fine- and medium-grained, well-sorted sand

Qw — **Alluvial Wash Deposits** - unconsolidated sandy and gravelly sediment deposited in recently active channels of streams and rivers; may contain loose to moderately loose sand and silty sand

Qa — **Alluvial Valley Deposits** - unconsolidated clay, silt, sand, and gravel recently deposited parallel to localized stream valleys and/or spread more regionally onto alluvial flats of larger river valleys; sandy sediment generally more dominant than gravelly sediment

Ql — **Lacustrine, Playa, and Estuarine (Paralic) Deposits** - mostly unconsolidated fine-grained sand, silt, mud, and clay from fresh water (lacustrine) lakes, saline (playa) dry lakes that are periodically flooded, and estuaries; deposits may contain salt and other evaporites

Qe — **Eolian and Dune Deposits** - unconsolidated, generally well-sorted wind-blown sand; may occur as dune forms or sheet sand

Holocene to Late Pleistocene (Surficial Deposits)

Qyf — **Young Alluvial Fan Deposits** - unconsolidated to slightly consolidated, undissected to slightly dissected boulder, cobble, gravel, sand, and silt deposits issued from a confined valley or canyon

Qya — **Young Alluvial Valley Deposits** - unconsolidated to slightly consolidated, undissected to slightly dissected clay, silt, sand, and gravel along stream valleys and alluvial flats of larger rivers

Qyl — **Young Lacustrine, Playa, and Estuarine (Paralic) Deposits** - unconsolidated to slightly consolidated, undissected to slightly dissected fine-grained sand, silt, mud and clay from lake, playa, and estuarine deposits of various types

Qye — **Young Eolian and Dune Deposits** - unconsolidated to slightly consolidated, undissected to slightly dissected wind-blown sands

Late to Middle Pleistocene (Surficial Deposits)

Qof — **Old Alluvial Fan Deposits** - slightly to moderately consolidated, moderately dissected boulder, cobble, gravel, sand, and silt deposits issued from a confined valley or canyon

Qoa — **Old Alluvial Valley Deposits** - slightly to moderately consolidated, moderately dissected clay, silt, sand, and gravel along stream valleys and alluvial flats of larger rivers

Qol — **Old Lacustrine, Playa, and Estuarine (Paralic) Deposits** - slightly to moderately consolidated, moderately dissected fine-grained sand, silt, mud, and clay from lake, playa, and estuarine deposits of various types

Qoe — **Old Eolian and Dune Deposits** - slightly to moderately consolidated, moderately dissected wind-blown sands

Middle to Early Pleistocene (Surficial Deposits)

Qvof — **Very Old Alluvial Fan Deposits** - moderately to well-consolidated, highly dissected boulder, cobble, gravel, sand, and silt deposits issued from a confined valley or canyon

Quaternary (Bedrock)

Qss — **Coarse-grained formations of Pleistocene age and younger** - primarily sandstone and conglomerate

Qsh — **Fine-grained formations of Pleistocene age and younger** - includes fine-grained sandstone, siltstone, mudstone, shale, siliceous and calcareous sediments

Tertiary (Bedrock)

Tss — **Coarse-grained Tertiary age formations** - primarily sandstone and conglomerate

Tsh — **Fine-grained Tertiary age formations** - includes fine-grained sandstone, siltstone, mudstone, shale, siliceous and calcareous sediments

Tv — **Tertiary age formations of volcanic origin**

Mesozoic and Older (Bedrock)

pKm — **Cretaceous and pre-Cretaceous metamorphic formations of sedimentary and volcanic origin**

SYMBOL EXPLANATION

[For geologic line symbols: lines are solid where location is accurate, long-dashed where location is approximate, short-dashed where location is inferred, dotted where location is concealed. Queries added where identity or existence may be questionable.]

Contacts
- Contact
- Reference contact -- Used to delineate geologic units that were mapped as separate units on the original source map, but are consolidated on this map.

Fault -- Includes strike-slip, normal, reverse, oblique, and unspecified slip

Folds -- Showing direction of plunge where appropriate
- Anticline
- Syncline

Stream

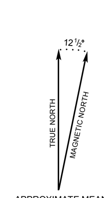
Wet area

Road

County boundary

Projection: Universal Transverse Mercator, Zone 11 North, North American Datum of 1983.

Topographic contours derived from USGS 1/3 arc-second National Elevation Dataset (NED). Shaded topographic relief derived from USGS 1 arc-second NED. Base map of hydrography from National Hydrography Dataset Plus (NHDPlus) and California Department of Fish and Game. Base map of geographic names from USGS Geographic Names Information System (GNIS).



APPROXIMATE MEAN DECLINATION, 2010

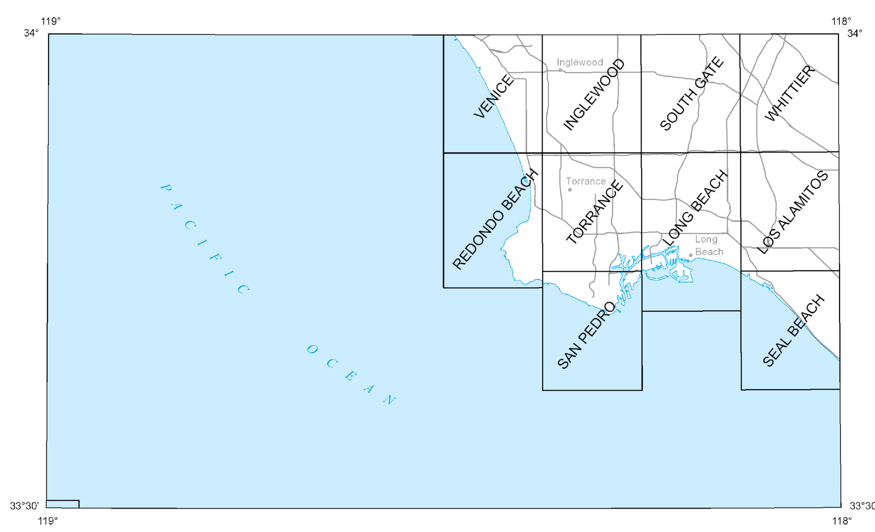
MAP LOCATION

SCALE 1:100 000

5 2.5 0 5 MILES
5000 0 5000 10000 15000 20000 25000 30000 35000 40000 45000 50000 FEET
5 2.5 0 5 10 KILOMETERS
5000 0 5000 10000 METERS

CONTOUR INTERVAL 50 METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

INDEX TO USGS 7.5' QUADRANGLES



GEOLOGIC COMPILATION OF QUATERNARY SURFICIAL DEPOSITS IN SOUTHERN CALIFORNIA
ONSHORE PORTION OF THE LONG BEACH 30' X 60' QUADRANGLE

A Project for the Department of Water Resources by the California Geological Survey

Compiled from existing sources by
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Digital preparation by
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July 2010

MAP EXPLANATION

This map of Quaternary surficial deposits in the Long Beach 30' x 60' quadrangle was compiled by the California Geological Survey (CGS) for the Department of Water Resources (DWR) to assist in identifying where flooding and deposition of sediment occurred in the geologically recent past. The focus of this project is on Quaternary (Q) surficial deposits (less than 1.8 million years) on alluvial fans, floodplains, and in basins where such deposits are subject to a number of geologic hazards including flooding, amplification of seismic shaking, liquefaction, and collapsible soils. In general, areas of most recent deposition during Late Holocene time (within the last 500 years) have a greater potential to be areas of future flooding and deposition than those underlain by older surficial deposits.

Project Overview

The Long Beach 30' x 60' quadrangle represents one of several 100,000 scale quadrangles included in the detailed Geographic Information System (GIS) based geologic data set compiled by CGS from recent high resolution geologic mapping available for southern California. The GIS database merges more than 2100 geologic units from source maps published primarily by the U.S. Geological Survey (USGS) and by CGS (Source GIS Database) into a common format that depicts 40 derivative categories of surficial deposits and bedrock for the entire area (Derivative GIS Database). Quaternary surficial deposits are divided into 28 categories modified from the methodology of Matti and Cossette (2007), the Southern California Areal Mapping Project (SCAMP, 2000), and the USGS and California Division of Mines and Geology (2000). While specific variations in age and physical properties exist within units on each source map, CGS retained the basic premise of Matti and Cossette (2007) that surficial deposits within each of the Quaternary derivative map units formed during a particular range of geologic time, have a similar origin, and have generally similar physical properties. Within the 28 derivative units, progressively older surficial deposits are typically better consolidated and more highly dissected by erosion, have more developed and/or eroded soil profiles with stronger degrees of weathering and surface armoring, and occupy a higher topographic position within alluvial fan and floodplain terrains. Geologic bedrock formations from the source geologic maps are divided into 12 categories on the derivative maps, based on age and rock type. CGS rectified inconsistencies along the boundaries of mapped areas to create a seamless Derivative GIS Database, but retained links to the original mapping in the Source GIS Database so that the more detailed basic geologic information can be retrieved. Correlation of equivalent deposits across the whole southern California project area is represented in the GIS table entitled Correlation of Derivative and Source Geologic Map Units.

Onshore Portion of the Long Beach Quadrangle

The onshore portion of the Long Beach quadrangle lies predominantly within the Los Angeles Basin, located at the northwestern end of the Peninsular Ranges geomorphic province. Most of the mapped area is underlain by Quaternary alluvial deposits, with modern beach and eolian (sand dune) deposits, older eolian deposits, marine terrace deposits, estuarine deposits, and large areas of artificial fill present along the western coastal plain (California Division of Mines and Geology, 1998c, 1998d, and 1998f). In the eastern portion of the mapped area, relatively flat-lying Quaternary-age basin deposits, consisting of more than 4200 feet of partially consolidated marine and nonmarine sediments, end abruptly on the west side of the basin at the Newport-Inglewood uplift, which runs through the center of the quadrangle (California Division of Mines and Geology, 1998a and 1998e). Older alluvial fan deposits, associated with uplift along the Whittier Fault Zone, are present in the northeast corner of the quadrangle. In the southern portion of the basin, extensive estuarine deposits and Holocene alluvium are present near the mouths of the Los Angeles, Rio Hondo and San Gabriel River systems (California Division of Mines and Geology, 1998a and 1998b). West of the Newport-Inglewood Fault Zone, the area is characterized by a series of northwest-trending uplifted hills and broad coastal mesas (flat-topped hills), which are covered by marine terrace deposits and have been deeply incised by regional river systems. The marine terrace deposits are overlain by a thin veneer of older alluvium composed of dense silty sand. Farther west, ancient dunes extend inland about two miles from the coast (California Division of Mines and Geology, 1998g). To the southwest, the Palos Verdes Hills form a northwest-trending dome-like ridge that extends across the Palos Verdes Peninsula and is underlain primarily by Tertiary sedimentary and volcanic bedrock. Landscape in this area is characterized by a series of elevated step-like wave-cut marine terraces, steep cliffs and headlands along the coast, and massive recently active and ancient landslides (Haydon, 2007). The terraces are generally covered by a nonmarine veneer over thin marine deposits. Alluvium and slope wash deposits are present within the major drainages of the peninsula.

In preparing this derivative map of the onshore portion of the Long Beach 30' x 60'quadrangle, CGS used geologic source data compiled in digital format by Saucedo and others (2009). CGS retained the boundaries of Quaternary age surficial deposits shown on the source map with very few revisions. Quaternary surficial deposits on the source map are represented on this map by 16 of the 28 generalized project derivative units; boundaries of more detailed source map subdivisions are shown without label within the generalized derivative unit. This indicates more detailed geologic information is available in the Source GIS Database. For example, an area designated Qyf (young alluvial fan deposits) on this map may have been further divided on the source map into several units to distinguish different depositional surfaces and compositions. Bedrock units identified by Saucedo and others (2009) are represented on this map by 6 of the 12 project derivative bedrock units (see Map Units and Correlation of Map Units). Quaternary surficial deposits and geologic formation names originally compiled by Saucedo and others (2009) are correlated with derivative categories used by CGS in the Geologic Labels GIS spreadsheet for the Long Beach quadrangle.

This map, along with others in the Geologic Compilation of Quaternary Surficial Deposits in Southern California Derivative GIS Database, is regional in nature and should not be used as a substitute for detailed geologic studies in any specific area. It is intended only for rapid identification of areas subject to previous and potential future flooding and other geologic hazards on alluvial fans and floodplains.

MAP REFERENCES

DIGITAL GEOLOGIC DATA FILE USED IN GIS COMPILATION OF QUATERNARY UNITS

Saucedo, G.J., Greene, H.G., Kennedy, M.P., and Bezore, S.P., 2009 (in progress), Geologic map of the Long Beach 30' x 60' quadrangle, California: A digital database, http://conservation.ca.gov/cgs/rghm/rgm/Pages/preliminary_geologic_maps.aspx: California Geological Survey, Preliminary Geologic Map, scale 1:100,000.

REFERENCES USED IN PREPARING LEGENDS AND MAPS FOR QUATERNARY UNITS

Matti, J. C., and Cossette, P.M., 2007, Classification of surficial materials, Inland Empire Region, southern California: conceptual and operational framework: U.S. Geological Survey, Open-File Report (in progress).

Southern California Areal Mapping Project (SCAMP), 2000, A proposed classification for surficial geologic materials in southern California, version 1.0.

U.S. Geological Survey and California Division of Mines and Geology, 2000, Classification of Quaternary deposits, Southern California Areal Mapping Project (SCAMP), a working model, version 1.0: (09/10/2000).

OTHER REFERENCES CITED

California Division of Mines and Geology, 1998a, Seismic hazard evaluation of the Inglewood 7.5-minute quadrangle, Los Angeles County, California: Open-File Report 98-18, 37 p., scale 1:24,000.

California Division of Mines and Geology, 1998b, Seismic hazard evaluation of the Long Beach 7.5-minute quadrangle, Los Angeles County, California: Open-File Report 98-19, 39 p., scale 1:24,000.

California Division of Mines and Geology, 1998c, Seismic hazard evaluation of the Los Alamitos 7.5-minute quadrangle, Los Angeles and Orange counties, California: Open-File Report 98-10, 27 p., scale 1:24,000.

California Division of Mines and Geology, 1998d, Seismic hazard evaluation of the Redondo Beach 7.5-minute quadrangle, Los Angeles County, California: Open-File Report 98-22, 44 p., scale 1:24,000.

California Division of Mines and Geology, 1998e, Seismic hazard evaluation of the Seal Beach 7.5-minute quadrangle, Los Angeles and Orange counties, California: Open-File Report 98-11, 37 p., scale 1:24,000.

California Division of Mines and Geology, 1998f, Seismic hazard evaluation of the South Gate 7.5-minute quadrangle, Los Angeles County, California: Open-File Report 98-25, 25 p., scale 1:24,000.

California Division of Mines and Geology, 1998g, Seismic hazard evaluation of the Venice 7.5-minute quadrangle, Los Angeles County, California: Open-File Report 98-27, 39 p., scale 1:24,000.

Haydon, W.D., 2007, Landslide inventory map of the Palos Verdes Peninsula, Los Angeles, California: California Geological Survey, Landslide Inventory Map Series, scale 1:24,000.

CORRELATION OF MAP UNITS*

Quaternary Surficial Deposits:

	Artificial Fill	Landslide Deposits	Beach Deposits	Alluvial Deposits: Alluvial Wash Deposits	Alluvial Deposits: Alluvial Fan Deposits	Alluvial Deposits: Alluvial Valley Deposits	Lacustrine, Playa, and Estuarine Deposits	Eolian and Dune Deposits
Late Holocene	af	Qls	Qb	Qw		Qa	Ql	Qe
Holocene to Late Pleistocene					Qyf	Qya	Qyl	Qye
Late to Middle Pleistocene					Qof	Qoa	Qol	Qoe
Middle to Early Pleistocene					Qvof			

Bedrock:

	Coarse-grained	Fine-grained	Volcanic	Cretaceous and Pre-Cretaceous Metamorphic (sedimentary and volcanic)
Quaternary (Bedrock)	Qss	Qsh		
Tertiary (Bedrock)	Tss	Tsh	Tv	
Mesozoic and Older (Bedrock)				pKm

* Boundaries of Quaternary units are gradational and time transgressive in a regional sense.

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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.