V

ENVIRONMENTAL HAZARDS ELEMENT

HUNTINGTON BEACH

STATUTORY REQUIREMENTS

Government Code Section 65302 (g) states the following:

> *"The General Plan shall include a safety element for the protection of the community from any unreasonable risks associated with the effects of seismically induced surface rupture, ground shaking, ground failure, tsunami. seiche, and dam failure; slope stability leading to mudslides and landslides; subsidence and other geologic hazards known to the legislative body; flooding; and wild land and urban fires."*

This Element addresses flooding as it pertains to geologic, seismic and soils hazards. This Environmental Hazards Element and the referenced materials together satisfy the geologic and seismic portion of the Section 65302 (g) requirement.

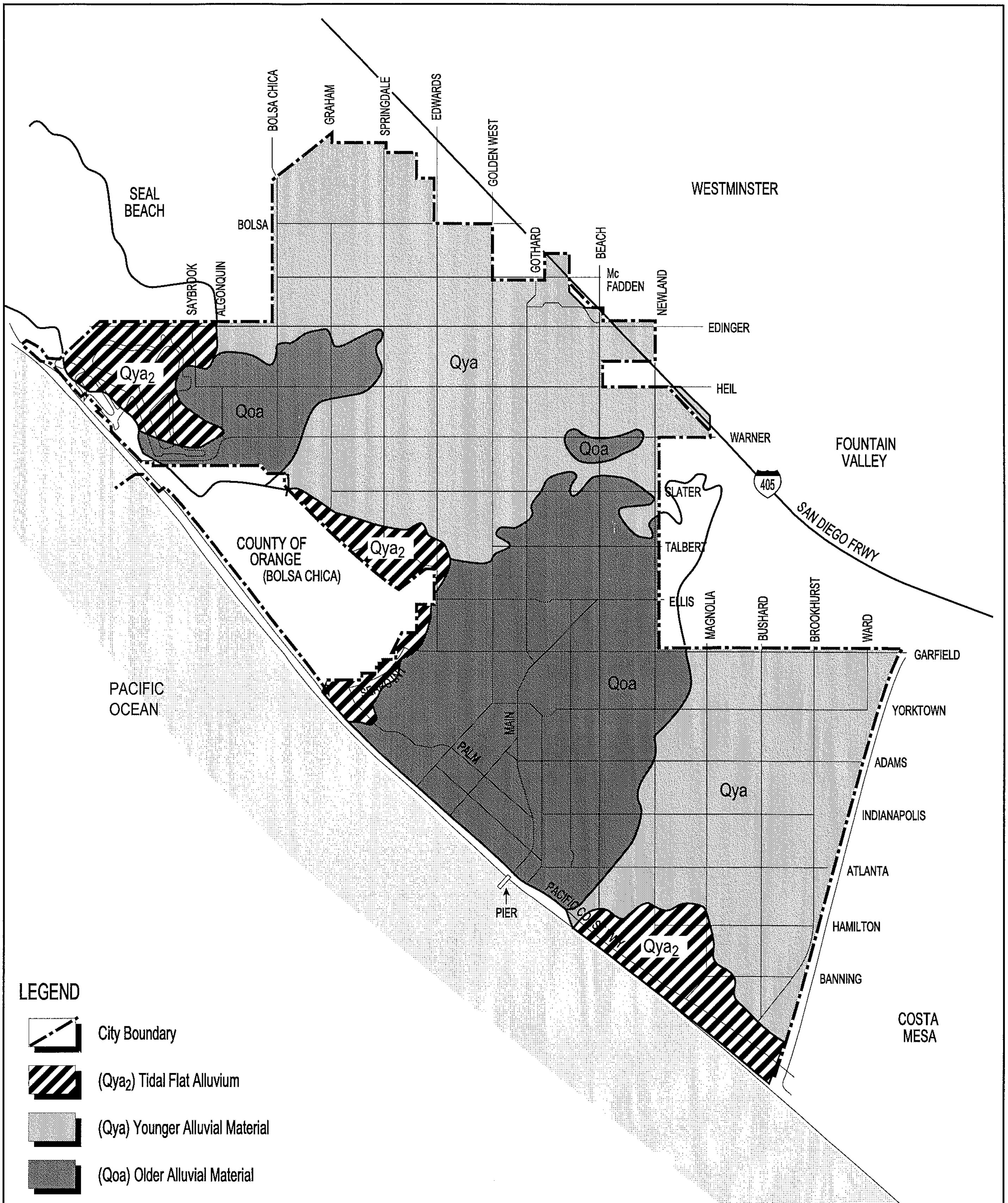
TECHNICAL SYNOPSIS

This Element of the General Plan is the first step in a comprehensive update to be completed for the geologic and seismic safety issues. This Element, when used in conjunction with Appendix A, the 1974 City of Huntington Beach Seismic Safety Element (the operative document on file with the California Department of Conservation Division of Mines and Geology), and the referenced materials, serves as an adequate basis for a geologic and seismic safety review. A regional perspective is provided to establish the geologic/seismic context for the City. Figures EH-1 through EH-11 are used to summarize the types and level of geologic/seismic hazards present in the City.

Most of the geologic and seismic hazards that have the potential to impact the City are due to the active Newport-Inglewood fault, the shallow water table, and the relatively loose nature of recent sedimentary deposits. Individually, or in combination, these factors may generate surface fault rupture, severe ground shaking, subsidence, methane, and other relatively minor hazards. Each of these hazards has been identified and described in the following sections: Surface Geology, Liquefaction, Tsunami and Seiche, Subsidence, Methane, Flooding, and Other Minor Geologic and Soil Engineering Hazards. A local Hazards Mitigation Plan has been prepared in conjunction with adjacent jurisdictions and local school districts to mitigate risks from natural disasters and is referenced in this element.

A. SURFACE GEOLOGY

The City of Huntington Beach lies on a coastal plain above recently deposited sediment. The sediment is deposited on top of older bedrock formations buried thousands of feet below the surface. These recent sedimentary deposits originally accumulated in beach, river, bay, and estuary environments at or near sea level. However, due to ongoing seismic uplift and folding, these deposits now form mesas at higher elevations. Subsequent erosion from wave action has produced coastal bluffs exposing these deposits.



SOURCE: Tinsley, J.C., and others, 1985, USGS Professional Paper 1360. Figure 146

SURFACE GEOLOGY

CITY OF HUNTINGTON BEACH GENERAL PLAN

MILES 0 0.5 1.0 NORTH

FIGURE EH-1

The sedimentary deposits found in Huntington Beach consist of Quaternary deposits (Pleistocene[1] and Holocene[2]) as shown on **Figure EH-1**. The older Quaternary deposits are exposed on the mesas (Bolsa Chica and Huntington Beach) and in the perimeter bluffs; these are termed older alluvium or terrace materials of the Lakewood and San Pedro Formations.[3]

The mesas (topographically high areas) are surrounded and separated by younger alluvium which (from north to south) fills the gaps (topographically low areas) at Seal Beach, Bolsa Chica and the Santa Ana River. Younger alluvium is divided into river floodplain deposits (washed in from the northeast as sand, gravel and silt), and tidal flat/lagoonal type deposits lie in the gaps (finer-grained silts and clays). Peat and organic soils are found within the younger alluvium up to about 25 feet (average 5-10 feet thick).[4] These fine-grained deposits are expansive,[5] compressible, and generally have fair to poor geotechnical engineering properties. Floodplain sands and silts are largely unconsolidated and contain the peat layers. On the whole, these deposits are subject to liquefaction (fine sand and peat), settlement, expansion, and have good to fair engineering properties, except for peat which have poor to very poor engineering properties.[6]

The oldest terrace deposits consist of sand with interbeds of silty clay and clay, overlain by interlayered sand-gravel and silt-clay beds. All older alluvium is unconsolidated to semi-consolidated, contains "aquifers" in the thicker sand units, has low-moderate expansive soil qualities, has a moderate to high erosion potential,[7] and is susceptible to landslide/slope instability/erosion (**Figure EH-2**) at the edge of the bluffs and in canyons.

1. Near Surface Water Depth

The City is underlain by shallow near surface water[8] which is of interest with regard to liquefaction potential (within depths of 0-50 feet) and as a hazard for construction (within depths of 0-30 feet) (**Figure EH-3**). This water is found in the alluvial valley and mesa areas as perched water and in shallow aquifers. In the gap areas between the mesas, the City appears to be entirely underlain by water at less than 50 feet deep. These alluvial floodplain (gap) areas have the greatest concentration of shallow water with depths less than 30 feet and most often less than 5 feet deep. The mesa areas (because of their higher elevations) have water depths of 10 feet to greater than 30 feet within the older alluvium. In the northeastern and eastern City areas water depths are 5-30 feet beneath the floodplain deposits. Narrow strips along the immediate coastline have water depths of less than 10 feet.

1 11,000-1,700,000 years before present.

2 0-11,000 years before present.

3 City of Huntington Beach Seismic Safety Element, 1974.

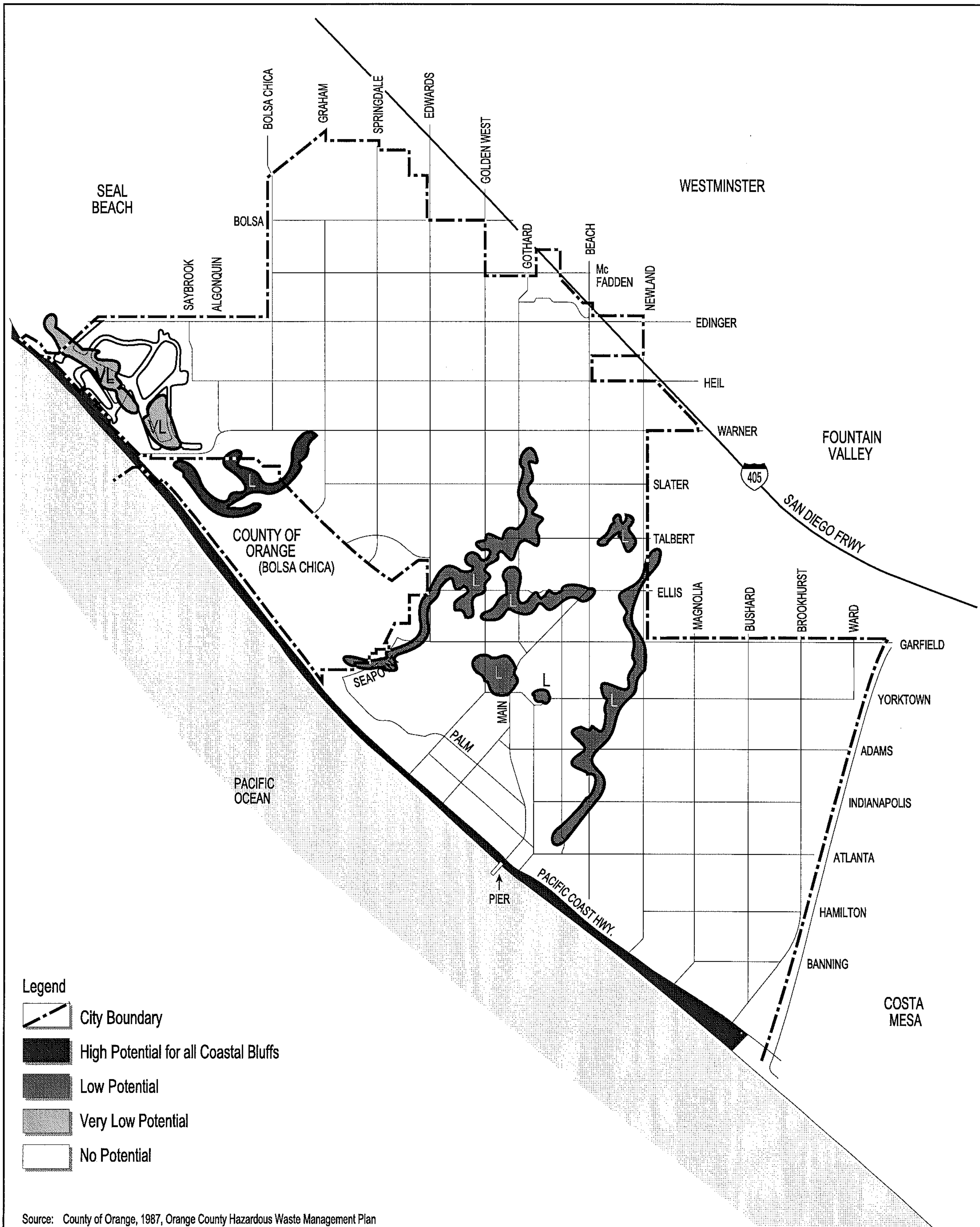
4 City of Huntington Beach Geotechnical Inputs, 1974.

5 City of Huntington Beach Seismic Safety Element, 1974.

6 City of Huntington Beach Seismic Safety Element, 1974.

7 City of Huntington Beach Seismic Safety Element, 1974.

8 Sprotte and others, 1980.

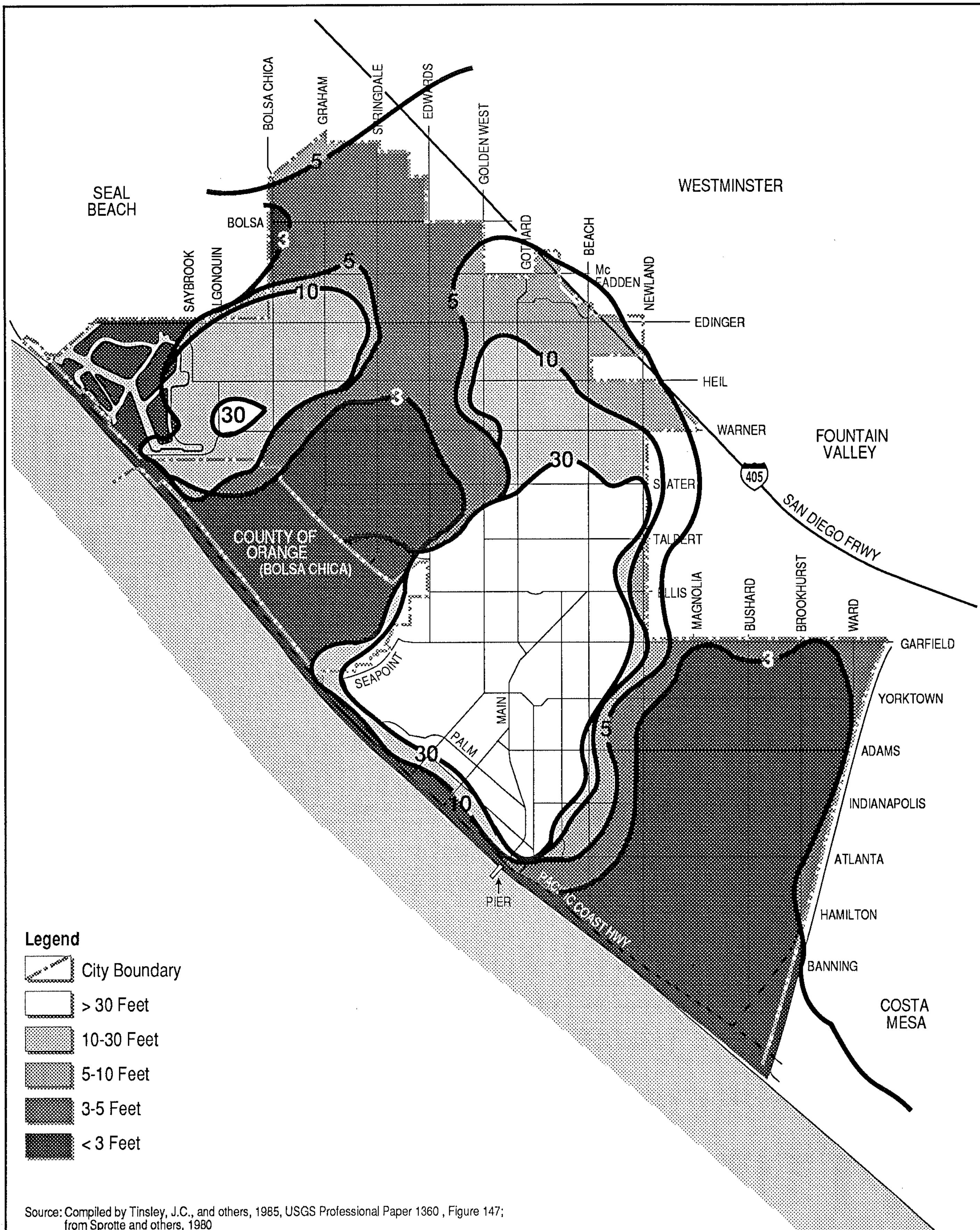


Source: County of Orange, 1987, Orange County Hazardous Waste Management Plan

POTENTIALLY UNSTABLE SLOPE AREAS

CITY OF HUNTINGTON BEACH GENERAL PLAN

FIGURE EH-2

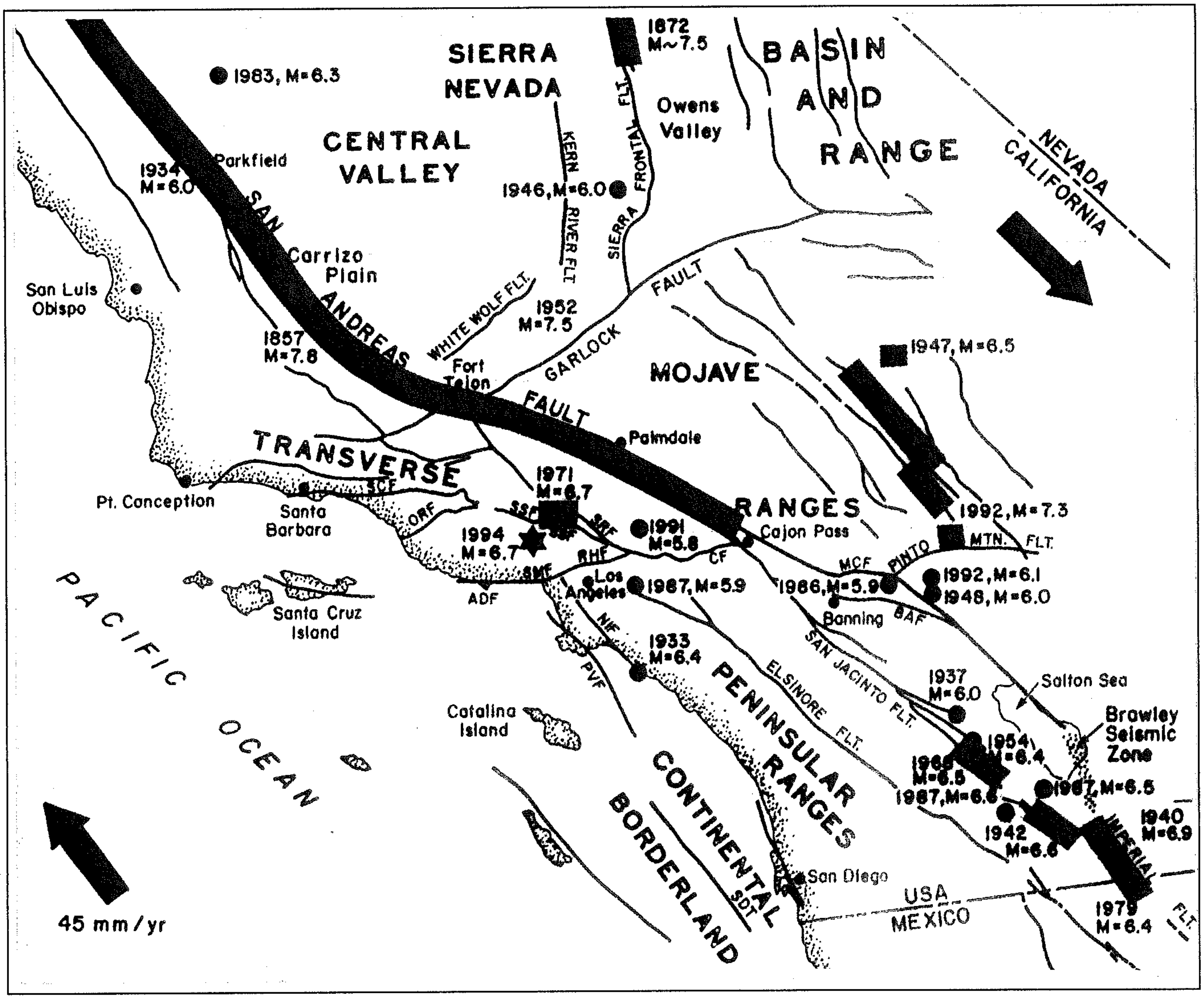


NEAR SURFACE WATER

CITY OF HUNTINGTON BEACH GENERAL PLAN

MILES 0 0.5 1.0 NORTH

FIGURE EH-3



SOURCE: Scientists of the USGS and Southern California Earthquake Center, 1994;
Science, October 21, 1994 Figure 1

REGIONAL FAULT MAP

City of Huntington Beach General Plan

KILOMETERS 0 50 Km. 100 Km. NORTH

FIGURE EH-4

2. Faults

a. General

All of southern California geology and seismicity is affected by plate tectonics and the forces which cause these plates to move within the earth's crust. Faults are formed at the plate boundaries and within the plates (**Figure EH-4**). Those which cause the plates to slip horizontally past one another are strike slip faults while mainly vertical movement is along normal, reverse or thrust faults[9]. These fault movements cause earthquakes deep in the crust and may cause surface fault rupture or deformation along buried (blind) thrust faults. This seismotectonic setting has been a part of the evolution of the Los Angeles/Orange County landscape for the past 5 million years or so. The most important fault to the City is the Newport-Inglewood.

b. Newport-Inglewood Fault Zone

The Newport-Inglewood fault zone is an active right-lateral fault system consisting of a series of en echelon[10] fault segments and anticlinal folds[11] that are believed to be the expression of a deep-seated fault within the basement rock.[12] The fault zone is visible on the surface as a series of northwest-trending elongated hills, including Signal Hill and the Dominguez Hills, extending from Newport Beach to Beverly Hills. The total fault length is about 44 miles. The surface and subsurface segments of the fault in the City are shown on **Figure EH-5**.

The estimated maximum earthquake assigned to the fault zone is magnitude (M) 7, based on its estimated rupture length versus magnitude relationship by Slemmons (1982) and its slip rate. The expected (average) amount of surface fault rupture on any given fault trace for the maximum probable or maximum credible earthquake range from zero to one foot or so for magnitudes under M6.0, and from one foot to ten feet or more for magnitudes between M6.0-7.5.

c. Other Fault Segments, Activity Criteria, and Fault Zoning

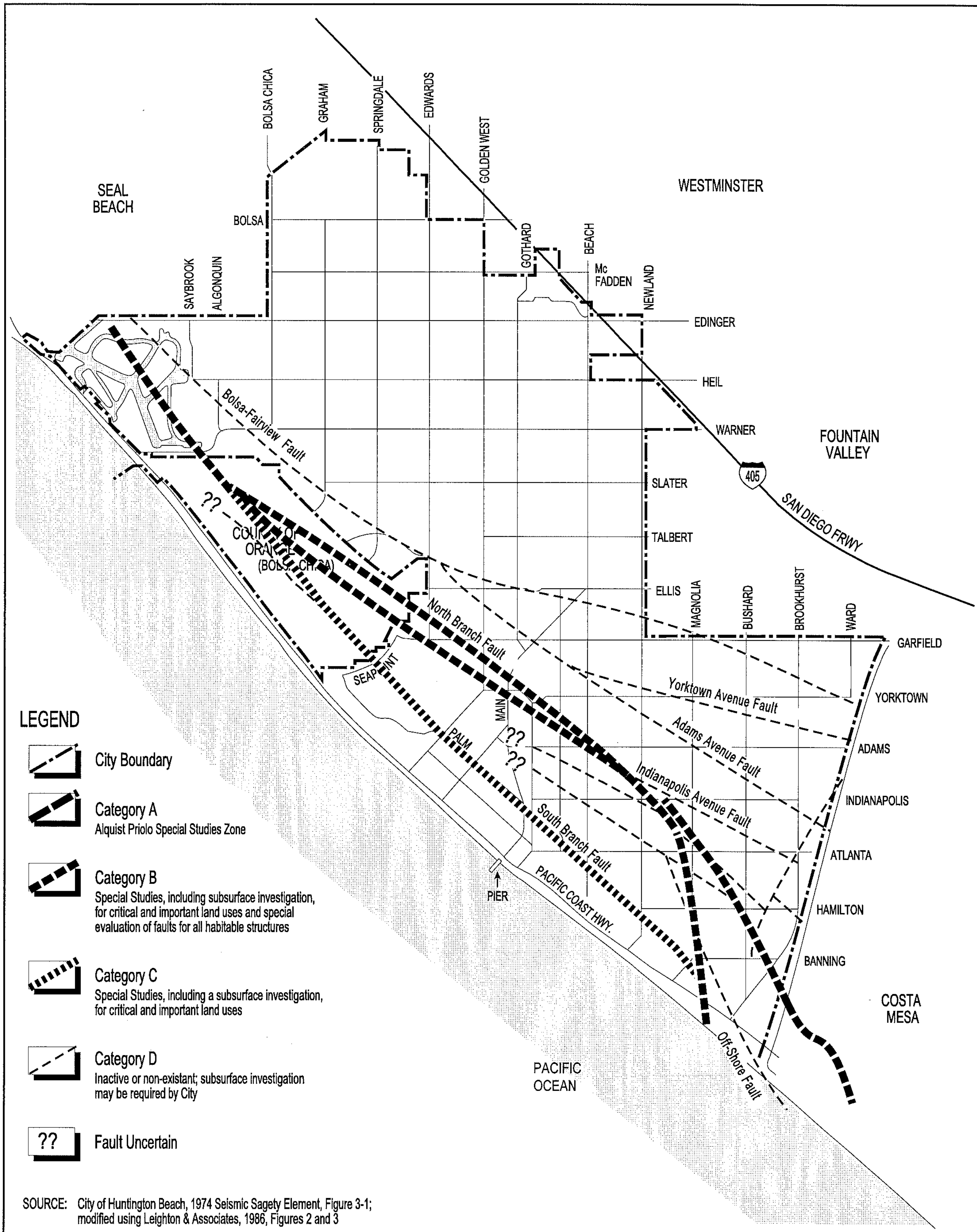
Faults adjacent to, within and beneath the City may be classified as inactive, potentially active, or active. Faults classified as inactive (no demonstrated movement in the past 2 million years) are of no present concern as earthquake sources and are not discussed further. Potentially active faults show evidence of movement and may be possible earthquake sources, but no data are known to conclusively demonstrate Holocene fault movement (within the past 10,000-12,000 years). Active faults are the most concern for earthquake generation and fault rupture potential since they have documented Holocene fault movement or are clearly associated with historic seismicity. Alquist-Priolo Earthquake Fault (formerly Special Studies) Zone Maps delineate active faults and potentially active faults considered by the State to be "sufficiently active" and "well-defined." The City Seismic Safety Element (1974) delineates fault zones of concern in the City; these are fault segments within the Newport-Inglewood fault zone which were deemed active of potentially active at the time the City of Huntington Beach Seismic Safety Element was adopted (1974). The California Division of Mines and Geology (1992) has delineated Alquist-Priolo study zones within the

9 A fault with a dip of 45 degrees or less with horizontal compression rather vertical displacement.

10 Faults that are in an overlapping or staggered arrangement.

11 Convex upward folds with cores containing the stratigraphically older rocks.

12 Bryant, 1988; Barrows, 1974.



SOURCE: City of Huntington Beach, 1974 Seismic Sagety Element, Figure 3-1; modified using Leighton & Associates, 1986, Figures 2 and 3

NEWPORT - INGLEWOOD FAULT ZONE

CITY OF HUNTINGTON BEACH GENERAL PLAN

FIGURE EH-5

City along the Newport-Inglewood fault zone. These zones generally coincide with a portion of the fault zones of concern in the 1974 Seismic Safety Element, specifically the southern segment of the North Branch fault. Upon review of the State Division of Mines and Geology's original determination by Leighton & Associates (1986), faults were suggested to be four categories (**Figure EH-5**).

Extensive fault activity investigation work for the Bolsa Chica Project[13] in large part confirmed the opinion of 1986 Leighton & Associates. In addition, the section of the northern segment of the North Branch fault within Bolsa Chica (as shown on the City of Huntington Beach's 1974 Seismic Safety Element fault map) is also considered active, and therefore equivalent to the "A" faults of Leighton & Associates. This investigation also concluded that the South Branch is classed neither active nor potentially active on the Bolsa Chica site, and the Bolsa-Fairview fault segment is pre-Holocene, but considered potentially active lacking specific field data to the contrary. No opinion was made regarding other faults shown on the City's 1974 Seismic Safety Element map.

d. Buried (Blind) Thrusts

The aforementioned strike-slip fault types have surface expressions (fault traces) which allow zoning in order to reduce the potential effects of fault rupture on structures. The blind or buried thrusts have been the focus of more study since the 1987 Whittier Narrows magnitude (M) 5.9 earthquake and the 1994 M = 6.7 Northridge earthquake. These faults typically do not offset surface deposits, however do generate co-seismic uplift and movement on fault traces at substantial depth.

Table EH-1 lists the following: 1) active or potentially active faults which may affect the City, including segments of the Newport-Inglewood fault zone in the City which are deemed capable of producing fault rupture due to co-seismic or primary seismic activity; and 2) the blind thrusts which are discussed below as earthquake sources.

e. Earthquake Ground Shaking

Both the strike-slip faults and blind thrusts identified in Table EH-1 have been identified in the region as either having generated or being capable of generating significant earthquakes. The near-City region has experienced several significant earthquakes in historic times which are catalogued by many authors (**Figure EH-6**). Large earthquakes in 1769 (name not identified), 1812 (possibly Newport-Inglewood), 1855 (Newport-Inglewood or concealed fault of unknown name), and 1920, 1933, and 1941 (Newport-Inglewood) have been associated with faults located in or near the City. The magnitude 6.3 1933 Long Beach earthquake actually occurred near Huntington Beach/Newport Beach on the Newport-Inglewood fault zone about 3.5 miles into the offshore area.

Frequency of Occurrence and Magnitude

Based on discussion by Dolan et al. (1994), some rough estimates of earthquake recurrence intervals are: 1) for a magnitude M7.6 over an entire zone of the Elysian, Compton-Los Alamitos, and Palos Verdes faults was 3,300 years, and 2) for the Newport-Inglewood fault zone 200-2,000 years for a M7+ event based on a wide range of possible slip rates. The Bolsa Chica EIS/EIR (1992) determined that the slip rate of 0.5 mm/yr was appropriate; this yields a recurrence interval at the high end of the 200-2,000 year range for the M7+ event.

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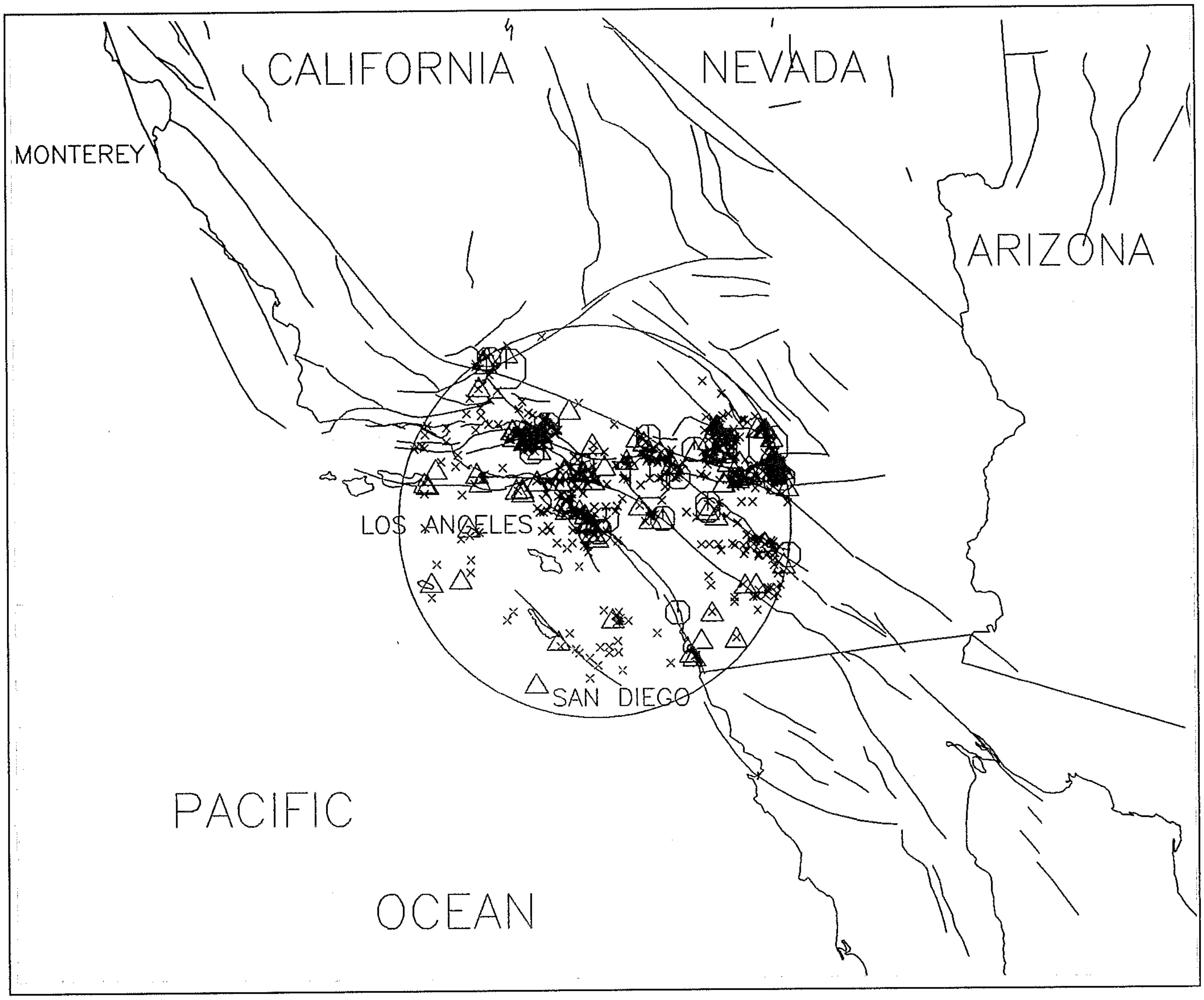
[13] County of Orange, 1993.

TABLE EH-1

Active/Potentially Active Faults Which May Affect the City of Huntington Beach

FAULT NAME (distance to City center in miles)	CITY IMPACTED BY OFFSET	ORIENTATION (COMPASS)	MAX. EARTHQUAKE		COMMENTS (acceleration in "g", e.g.)
			Propable	Credible	
FAULTS WITH MAPPED SURFACE TRACES					
Elsinore [28]	No	NW-SE	6.75	7.5	0.11-0.18g
Newport-Inglewood [<2]	Yes	NW-SE	5.75	7.0	0.55-1.0g
Palos Verdes-Coronado Bank [10]	No	NW-SE	6.75	7.5	0.34-0.53g
Raymond [30]	No	E-W	4.0	7.5	0.02-0.21g
San Andreas [51]	No	NW-SE	8.0	8.3	0.11-0.14g [long period motions impt.]
Sierra Madre-San Fernando [32]	No	E-W	6.0	7.5	0.07-0.20g
Whittier-North Elsinore [19]	No	NW-SE	6.0	7.5	0.11-0.30g
LIND OR BURIED THRUST FAULTS					
Elysian Park [25]	No	E-W, WNW-ESE	5.75	7+	Whittier 5.9
Compton-Los Alamitos [<10]	No	NW-SE	5-6 ?	7+	Little known; possible association w/NIFZ
Torrance-Wilmington [<10]	No	NW-SE	5-6 ?	7+	Little known; apparent association w/PVFZ



EXPLANATION

M = 8.0 +
M = 7.0–7.9
M = 6.0–6.9
M = 5.0–5.9
M = 4.0–4.9

SITE LOCATION (+):

Latitude – 33.6875 N
Longitude – 118.0000 W

SOURCE: Envicom, 1994, using EQSEARCH by Blake, 1994 update

REGIONAL EARTHQUAKES WITHIN 100 MILES OF CITY

City of Huntington Beach General Plan

MILES 0 50 100 NORTH

FIGURE EH-6

Faults in the region are shown on **Figure EH-4**; the associated earthquake epicenters (Richter magnitude M> 4.0 within 100 miles) since 1800 are shown on **Figure EH-6**. **Table EH-1** gives the geologic and estimated earthquake parameters associated with each fault within 50 miles (the San Andreas is 51 miles away). From a planning perspective, these are the faults which are most likely to have significant affects on the City during the foreseeable future with regard to producing seismic hazards. Moderate to large earthquakes can occur on previously unmapped and unexpected fault or fold structures possibly yielding much higher ground shaking intensities than previously considered.[14]

Earthquake epicenter data developed for this study (**Figure EH-6**), suggest that the 6.5 to 7.0 magnitude event represents a realistic magnitude of earthquake upon which to base structural design for the City. The Uniform Building Code provides standards for a seismic design of structures which have been used to provide the currently acceptable level of protection to most structures and occupants.

Intensity and Acceleration

The two most consistent (covering the entire City) data bases for assessing ground shaking hazard potential are the Toppozada and others (1988) planning scenario study for a major earthquake (magnitude 7+) on the Newport-Inglewood fault zone, and the Caltrans[15] estimates of peak horizontal acceleration from maximum credible earthquakes (MCEs) for rock and stiff-soil sites. The Toppozada and others map 5-S (1988) shows the modeled seismic intensity distribution using the Modified Mercalli Intensity (MMI) scale standard (**Table EH-2**). The MMI intensity values presented are XI for the floodplain (gap) areas (a XI+ along the fault zone) and an VIII+ for the mesa areas. These intensities would undoubtedly be higher in the liquefaction prone areas.

Mualchin and Jones (1992) published a map of peak horizontal ground acceleration (PGA) contours based on data through 1989. The City falls within a zone of 0.6g estimated PGA which is their highest contour level. Scientists of the U. S. Geological Survey and the Southern California Earthquake Center[16] suggest that "When earthquakes occur directly beneath a city, it will be subjected to ground motions approaching the force of gravity [1.0g], exceeding the amounts of shaking anticipated by building codes in some respects."

Table EH-1 shows deterministic values for the Newport-Inglewood of 1g. (maximum credible) and 0.55g (maximum probable) using mean plus one sigma values[17] which better fit the Landers earthquake data for short distances from the fault.[18] This suggests a range of 0.27g-0.55g for normal design considerations.

14 L. A. Times, October 21, 1994; Science, October 21, 1994.

15 Mualchin and Jones, 1992, but updated only through 1989.

16 Science, October 21, 1994.

17 Campbell, 1993 in Blake, 1993 update.

18 Campbell, 1994.

B. LIQUEFACTION

The liquefaction susceptibility for the City is based on Tinsley and others (1985) who used occurrences of shallow water and alluvial deposits to define the areas shown on **Figure EH-7** as very high, high, medium, and low. Liquefaction is the condition in relatively loose, saturated sandy sediments where internal shear strength is lost due to the repeated vibrations from earthquake shaking. Dynamic (seismically-induced) settlement can occur under these same conditions where sediments are only partially saturated. These types of failures have been observed in the 1933 Long Beach, 1971 San Fernando, and the 1994 Northridge earthquakes. Where alluvial areas have a surface slope of 0.5 to 5 percent, or more, flow failures and lateral spreading (a shallow landslide) can occur.

C. TSUNAMI AND SEICHE

Tsunamis are long period, seismically generated sea waves caused by seafloor displacements (faulting or landslides). Previous evaluations[19] put the tsunami hazards potential for the City at very low. The elevation of the run-up beyond the initial tidal elevation can be generally estimated from "maximum" past occurrence in California (estimated at 4-19 feet) from distant (South Pacific-South America-Alaska) or local (Santa Barbara Channel) earthquakes (**Figure EH-8**). Studies for the Bolsa Chica Project[20] indicate 100-year and 500-year runup elevations of 5-6 feet and 7-9.5 feet, respectively.

Seiches are generated by the "sloshing" of water in an enclosed or partially enclosed body of water caused by displacement within the water body, or more likely longer period earthquake motions. Of the most concern are seiches that are caused by tsunamis captured and reflected within the enclosed area of an inner harbor such as occurred in Los Angeles-Long Beach following the 1964 Alaskan earthquake. Huntington Harbour reported a 4-foot rise in water levels and damage to some moored boats. Seiche area damage would be most severe in the same areas as tsunami hazards.

D. SUBSIDENCE

The location of major oil drilling areas and state-designated oil fields are areas with subsidence potential; the pattern of subsidence (between 1-10 inches during 1976-1986) has been documented in an area corresponding roughly to the limits of the Huntington Beach Oil Field (**Figure EH-9**) with the maximum (about 5 feet) located roughly at the corner of Golden West Street and Pacific Coast Highway.[21] Re-pressurization by injection (water flooding) has been used to stabilize this vertical movement.[22] The rate of subsidence (about 0.6-1 inch/year) should diminish for fields with water flooding or re-pressurization programs; otherwise this rate could be continuing today.

19 Geotechnical Inputs, 1974.

20 USACOE/City of Huntington Beach, 1992.

21 Morton and others, 1976.

22 ANGUS Petroleum, 1986; Division of Oil, Gas, & Geothermal Resources, 1992.

Masonry A, B, C, D: To avoid ambiguity of language, the quality of masonry, brick or otherwise is specified by the following lettering.

Masonry A: Good workmanship, mortar and design; reinforced, especially laterally, and bound together by using steel, concrete, etc.; designed to resist lateral forces.

Masonry B: Good workmanship and mortar; reinforced, but not designed in detail to resist lateral forces.

Masonry C: Ordinary workmanship and mortar; no extreme weaknesses like failing to tie in at corners, but neither reinforced nor designed against horizontal forces.

Masonry D: Weak materials, such as adobe; poor mortar; low standards of workmanship; weak horizontally.

I.	Not felt. Marginal and long-period effects of large earthquakes
II.	Felt by persons at rest, on upper floors, or favorably placed.
III.	Felt indoors. Hanging objects swing. Vibration like passing of light trucks. Duration estimated. May not be recognized as an earthquake.
IV.	Hanging objects swing. Vibration like passing of heavy trucks; or sensation of a jolt like a heavy ball striking the walls. Standing motor cars rock. Windows, dishes, doors rattle. Glasses clink. Crockery clashes. In the Upper Range of IV wooden walls and frame creak.
V.	Felt outdoors; direction estimated. Sleepers wakened. Liquids disturbed, some spilled. Small unstable objects displaced or upset. Doors swing, close, open. Shutters, pictures move. Pendulum clocks stop, start, change rate.
VI.	Felt by all. Many frightened and run outdoors. Persons walk unsteadily. Windows, dishes, glassware broken. Knickknacks, books, etc., off shelves. Pictures off walls. Furniture moved or overturned. Weak plaster and Masonry D cracked. Small bells ring (church, school). Trees, bushes shaken visibly, or heard to rustle.
VII.	Difficult to stand. Noticed by drivers of motor cars. Hanging objects quiver. Furniture broken. Damage to masonry D, including cracks. Weak chimneys broken at roof line. Fall of plaster, loose bricks, stones, tiles, cornices also unbraced parapets and architectural ornaments. Some cracks in masonry C. Waves on ponds; water turbid with mud. Small slides and caving in along sand or gravel banks. Large bells ring. Concrete irrigation ditches damaged.
VIII.	Steering of motor cars affected. Damage to masonry C; partial collapse. Some damage to masonry B; none to masonry A. Fall of stucco and some masonry walls. Twisting, fall of chimneys, factory stacks, monuments, towers, elevated tanks. Frame houses moved on foundations if not bolted down; loose panel walls thrown out. Decayed piling broken off. Branches broken from trees. Changes in flow or temperature of springs and wells. Cracks in wet ground and on steep slopes.
IX.	General panic. Masonry D destroyed; masonry C heavily damaged, sometimes with complete collapse; masonry B seriously damaged. General damage to foundations. Frame structures, if not bolted, shifted off foundations. Frames racked. Serious damage to reservoirs. Underground pipes broken. Conspicuous cracks in ground. In alluviated areas sand and mud ejected, earthquake fountains, sand craters.
X.	Most masonry and frame structures destroyed with their foundations. Some well-built wooden structures and bridges destroyed. Serious damage to dams, dikes, embankments. Large landslides. Water thrown on banks of canals, rivers, lakes, etc. Sand and mud shifted horizontally on beaches and flat land. Rails bent slightly.
XI.	Rails bent greatly. Underground pipelines completely out of service.
XII.	Damage nearly total. Large rock masses displaced. Lines of sight and level distorted. Objects thrown into air.

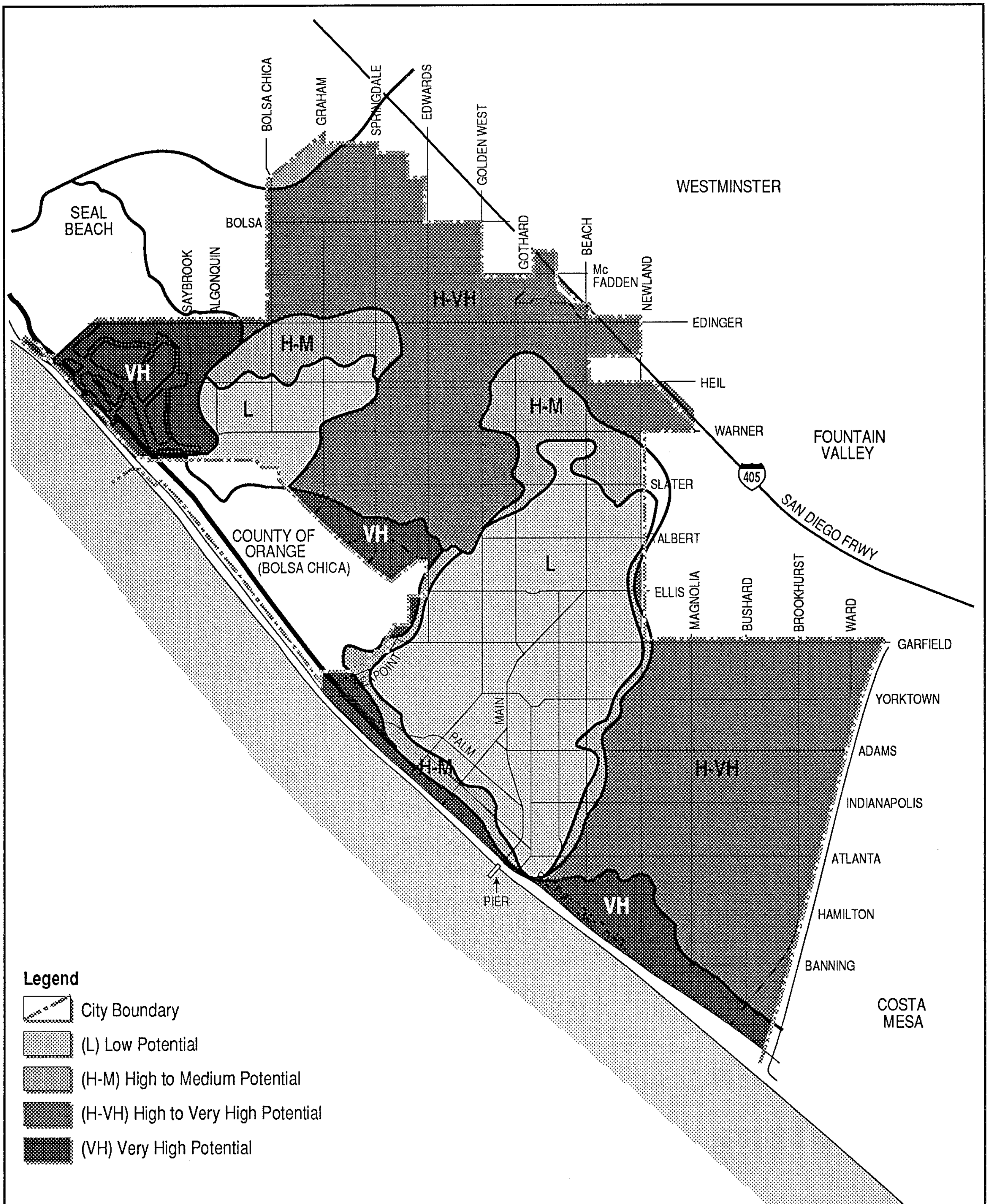
1. Original 1931 version in Wood, H. O., and Neumann, F., 1931. Modified Mercalli intensity scale of 1931:Seismological Society of America bulletin, v. 53, no. 5, p. 979-987.
2. 1956 version prepared by Charles F. Richter, in Elementary Seismology, 1958. p. 137-138. W. H. Freeman & Co.

SOURCE: Buena Engineers, Inc. Preliminary Geotechnical Engineering Report (May 1989)

MODIFIED MERCALLI INTENSITY SCALE OF 1931[1], (1956 version)[2]

CITY OF HUNTINGTON BEACH GENERAL PLAN

TABLE EH-2



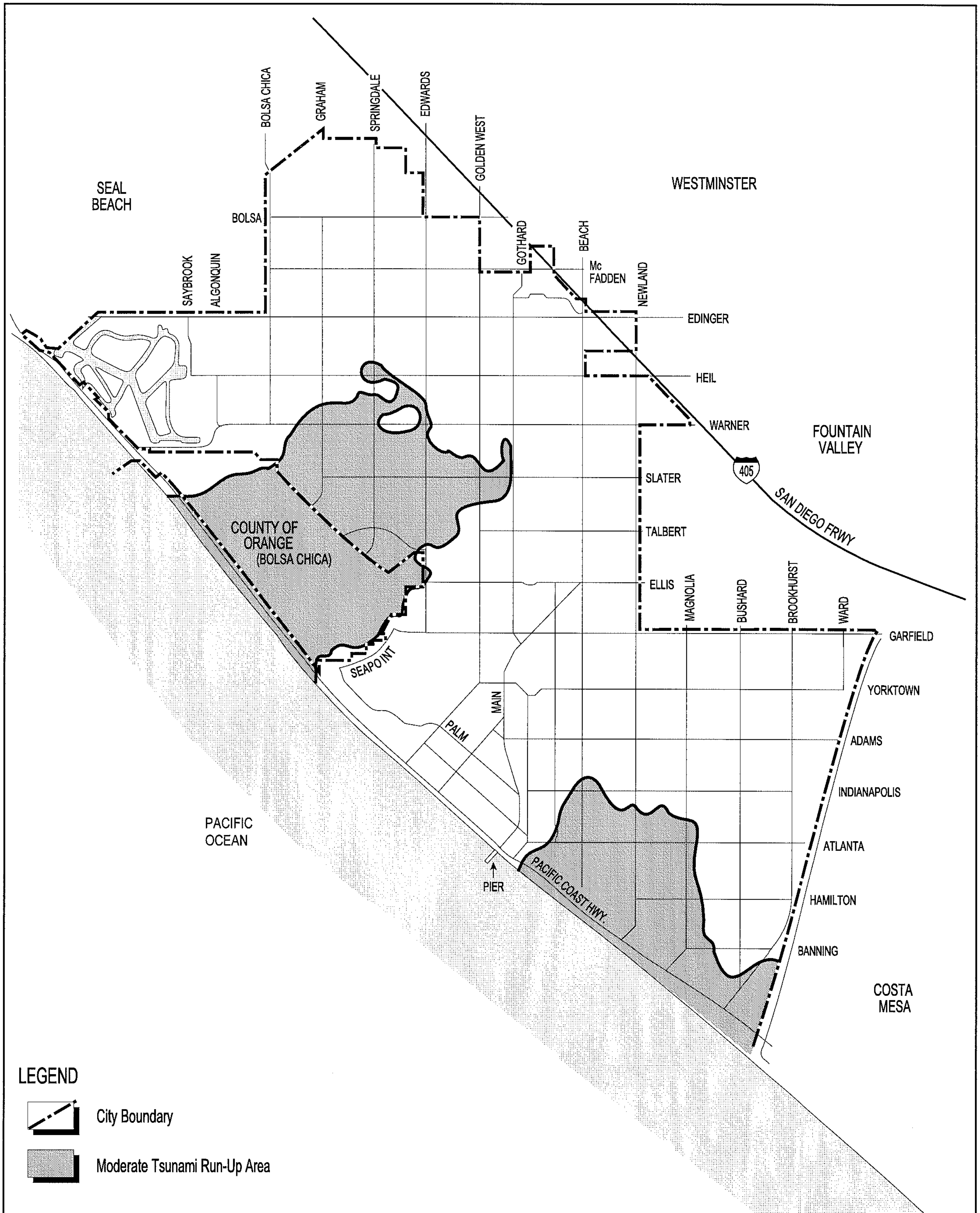
Source: Tinsley, J.C., and others, 1985, USGS Professional Paper 1360, Figure 148

LIQUEFACTION POTENTIAL

CITY OF HUNTINGTON BEACH GENERAL PLAN

MILES 0 0.5 1.0 NORTH

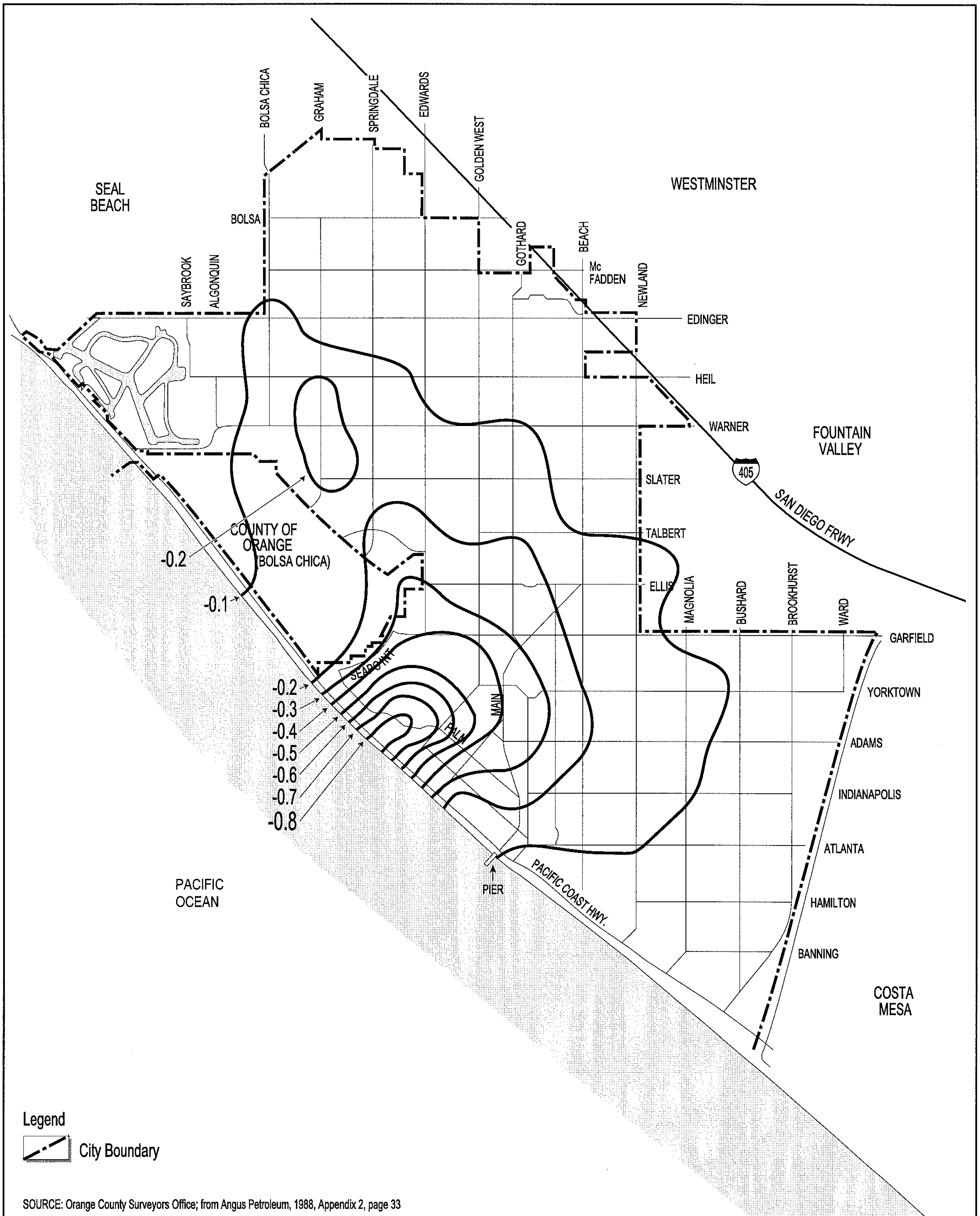
FIGURE EH-7



MODERATE TSUNAMI RUN-UP AREA

CITY OF HUNTINGTON BEACH GENERAL PLAN

FIGURE EH-8



SUBSIDENCE AREAS FROM 1976 - 1986

CITY OF HUNTINGTON BEACH GENERAL PLAN

FIGURE EH-9

E. METHANE

Figure EH-10 indicates the areas that have been affected by methane gas and have been designated as Methane Overlay Districts. Huntington Beach was identified as a high-risk area relative to methane gas migration into and/or from the shallow geology (peat and organic) deposits in the Roberti Report which discussed several oil fields.[23] A later study by GeoScience Analytical[24] indicating biogenic methane lead to the City enactment of methane seepage district regulations for these areas. All oil fields are considered high risk areas for methane seepage. The main conduit for petrogenic methane is through abandoned oil wells. Therefore, all areas which lie above or in the immediate vicinity of one of the identified major oil field areas or drilling areas in the City are potentially areas of concern. Methane may also be trapped beneath impervious surfaces (e.g., parking lots) or in enclosed underground areas (e.g., basements, subterranean garages, tunnels) where concentrations may cause an explosion or hazardous breathing conditions.

F. FLOODING

The Federal Emergency Management Agency (FEMA) has evaluated the City of Huntington Beach for its potential to experience flooding. Bolsa Chica and Huntington Beach Mesas have been determined to experience minimal flooding during major rainstorms. The northern part of the City would be subject to flood depths of one to three feet (**Figure EH-11**). The area of greatest flooding would occur in the Santa Ana gap between Huntington Beach Mesa and Newport Beach Mesa. Estimated flood elevations in this area are described as an elevation rather than a depth. Depending upon the location within that area, flood depth could be between three and six feet. Flood depths of seven feet would occur along the beach. Areas of localized flooding could reach depths exceeding nine feet.

Flooding will affect several government and public facilities and numerous private residences and commercial operations. The sewage treatment plant, fire stations, major highways, high schools, elementary schools, Southern California Edison Plant, major utility corridors, several neighborhood and community commercial centers, and thousands of private residences would be adversely affected.

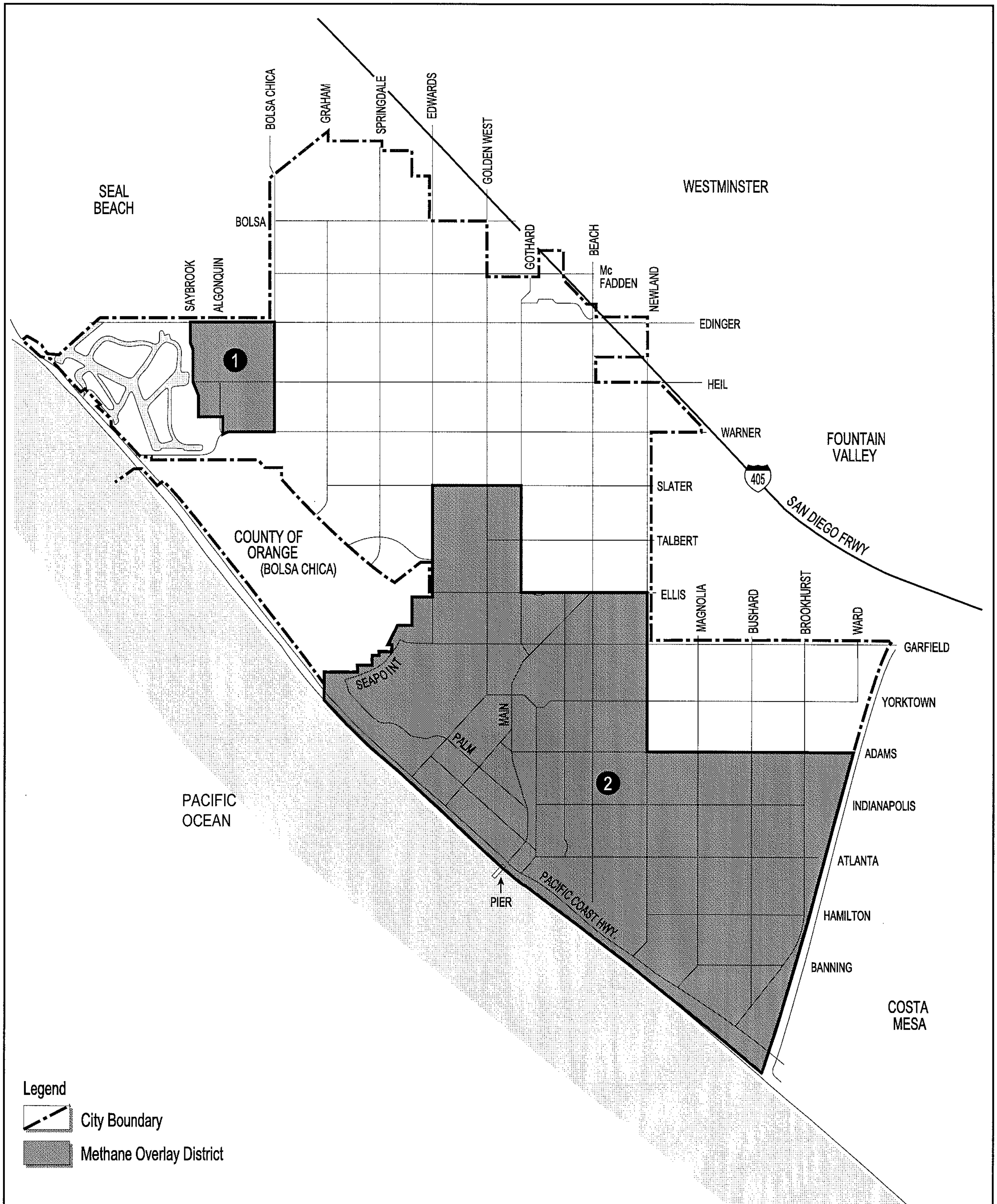
G. OTHER GEOLOGIC AND SOILS ENGINEERING HAZARDS

Geologic and soils conditions vary across the City. Conditions include expansive (**Figure EH-12**) and compressible soils, hydroconsolidation-prone sediments, peat (**Figure EH-13**) and other poor foundation materials, highly erosive deposits, and steep topography. Peat and organic soils occurrences are estimated to be quite widespread in the City in former marshes and closed depressions where quiet water and vegetation were abundant. Peat and organic soils are highly susceptible to large long-term settlements due to their low density.

Potential landslide areas within Huntington Beach are limited to those areas near the mesa bluffs, although no historical problems associated with landslides have occurred in the area. Thorough geologic investigations will be important in this area prior to development to insure slope stability.

23 ANGUS Petroleum, 1988.

24 ANGUS Petroleum, 1988.



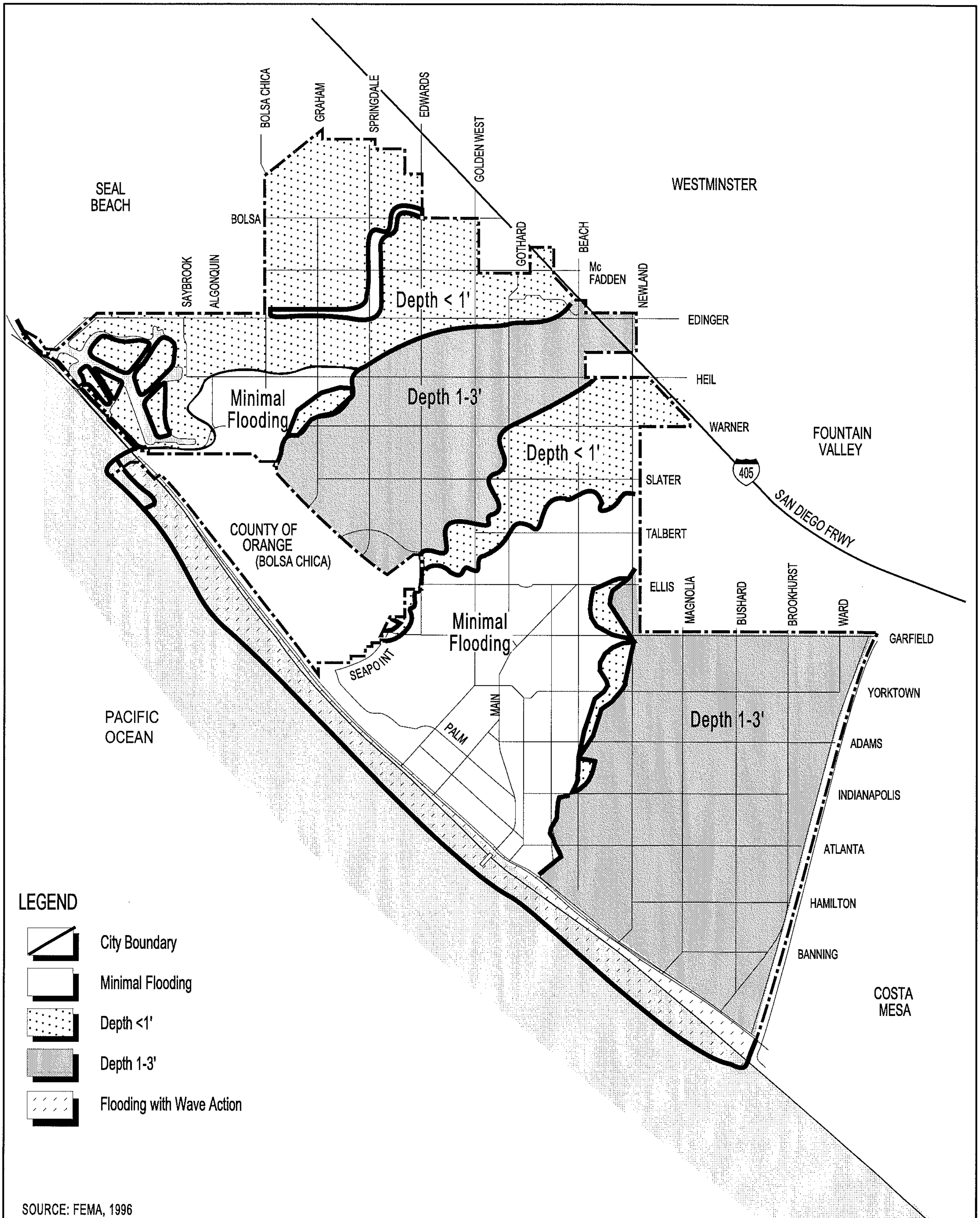
Source: City of Huntington Beach, 1990, Draft Safety Element Update, Figure 6.3.1

METHANE OVERLAY DISTRICTS

CITY OF HUNTINGTON BEACH GENERAL PLAN

MILES 0 0.5 1.0 NORTH

FIGURE EH-10

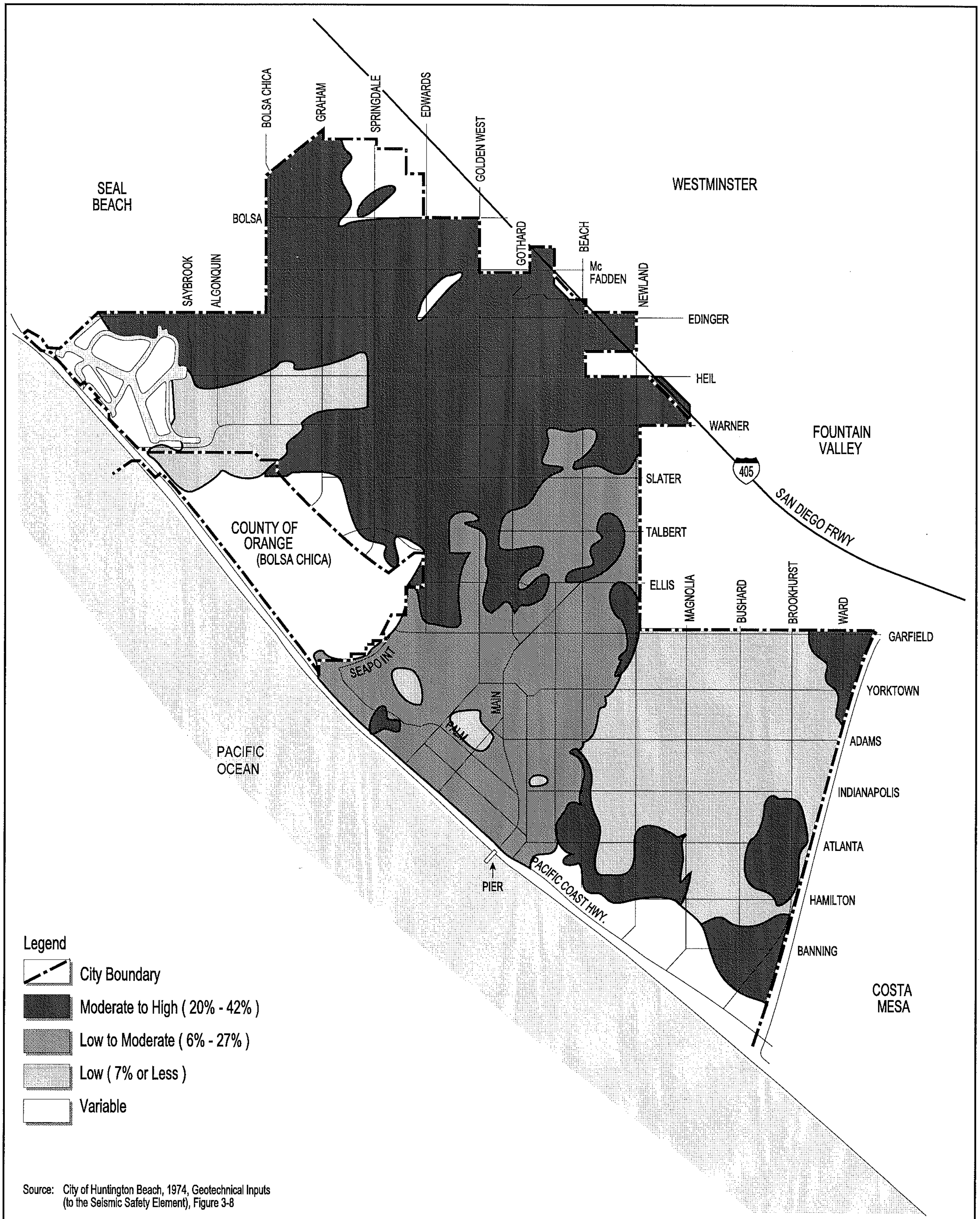


100 & 500 YEAR RAIN FLOOD LEVEL

CITY OF HUNTINGTON BEACH GENERAL PLAN

MILES 0 0.5 1.0 NORTH

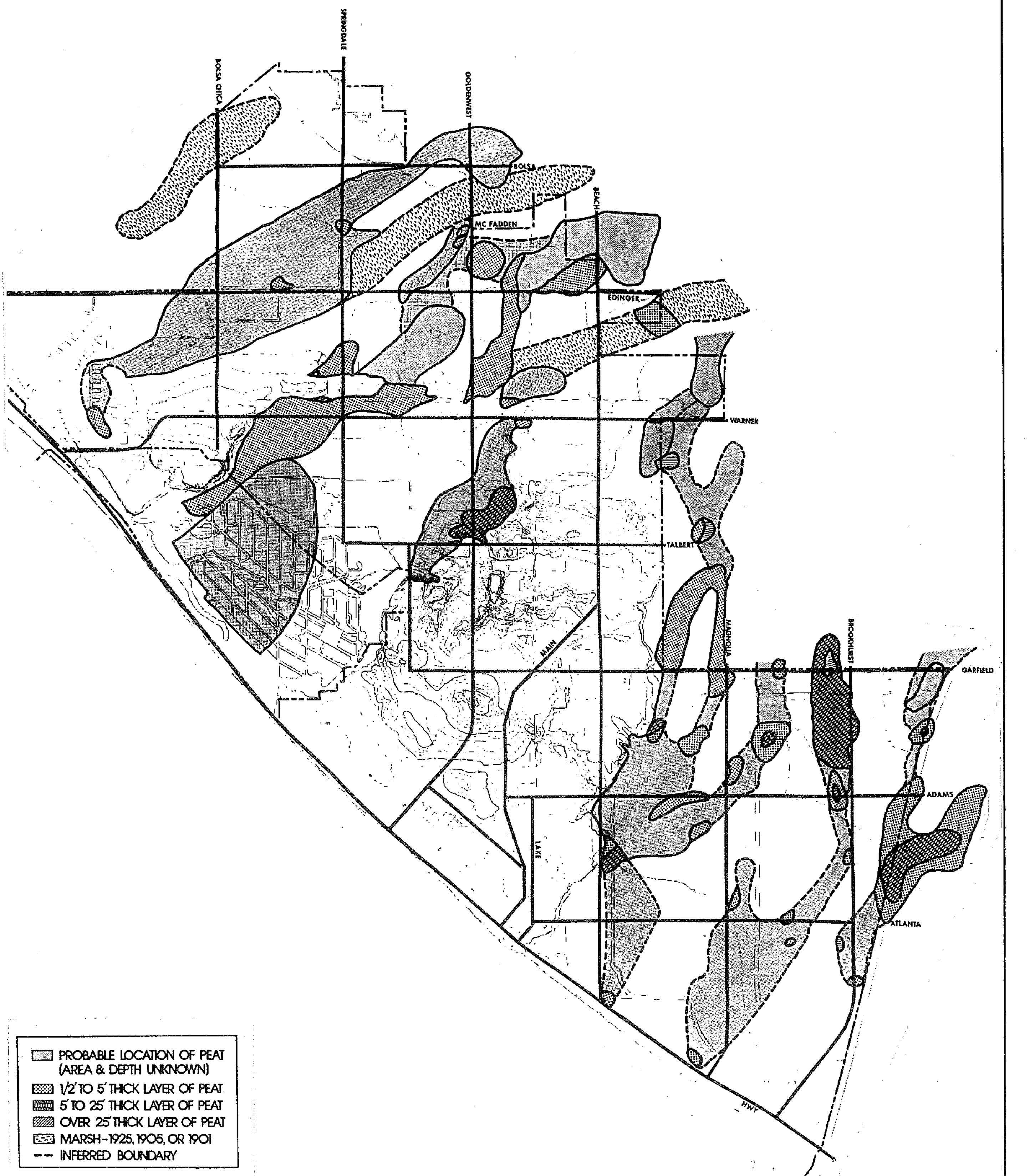
FIGURE EH-11



EXPANSIVE SOIL DISTRIBUTION MAP

CITY OF HUNTINGTON BEACH GENERAL PLAN

FIGURE EH-12



Source: City of Huntington Beach, 1974, Geotechnical Inputs (to the Seimic Safety Element), Figure 3-7

PEAT AND ORGANIC SOILS

CITY OF HUNTINGTON BEACH GENERAL PLAN

FEET 0 3,000 6,000 NORTH

FIGURE EH-13

Soil erosion in Huntington Beach ranges from a slight to a high hazard. With proper ground cover and drainage controls, the erosion is minimized. The seaward facing bluffs of Huntington Beach are subject to erosion during periods of extremely high tides. If beach sand replenishment has not maintained an adequately wide beach and the beach has narrowed due to the net loss of sand, the bluffs would be susceptible to ocean flooding and wave erosion endangering structures and people on the overlying mesa surface.

The perched (shallow) water table is high throughout the entire City of Huntington Beach. Most of the soils also cause water to percolate very slowly downward into deeper layers so any water entering the soil tends to remain fairly near the surface, or in local ponds.

Each of these other conditions represents a potential hazard that is routinely evaluated by standard soils and foundation engineering and testing required by City of Huntington Beach grading and building codes. These hazards are to be considered on a site-specific basis as projects within the various areas of the City are initiated.

ISSUES

1. The City of Huntington Beach lies astride segments of the Newport-Inglewood fault zone which have been determined to have fault rupture potential. These segments pass beneath existing developed areas and areas which would be developed under the General Plan. (*EH 1.1.1, EH 1.1.2, EH 1.1.3, EH 1.2.1, and EH 1.2.2*)
2. Due to Huntington Beach's location to the Newport-Inglewood fault zone, strong shaking may be higher than many other areas. (*EH 1.1.1, EH 1.1.2, EH 1.1.3, EH 1.2.1 and EH 1.2.2*)
3. Due to the high water table condition and the tightness of the subsoils of Huntington Beach, liquefaction and seismically induced settlement may be experienced in many areas of the City during strong earthquakes. (*EH 1.1.1, EH 1.1.2, and EH 1.2.1*)
4. Due to the location on the coast the City is subject to potential run-up and tsunami damage from both distant and locally generated tsunamis, although past experience indicates that this potential is low. Seiche damage would likely be associated with a tsunami. (*EH 5.1.1. and EH 5.1.2*)
5. The failure of Prado Dam near the head of Santa Ana Canyon poses a flooding threat to the City which would only be realized if this flood control basin were nearly full during the causative earthquake. (*EH 4.1.1, EH 4.1.2, EH 4.2.2, and EH 4.2.4*)
6. Erosion of soils left barren of vegetation can occur due to agents such as wind and rain. Proper vegetative cover and drainage will limit the amount of erosion to a level of insignificance. (*EH 1.1.1 and EH 2.2.1*)
7. The rate at which water can percolate into the soil varies amongst the soils of Huntington Beach, but is generally slow. Long term ponding of water during heavy rains or long term periods of precipitation is likely in some areas. *(EH 1.1.1 and EH 4.1.1)*
8. Expansive soils of Huntington Beach vary in their shrink-swell characteristics. Soils with a high shrink-swell potential may produce damage to overlying structures as they experience changes in moisture levels associated with periods of rains and droughts. (*EH 1.1.1*)

GOALS, OBJECTIVES, AND POLICIES

The following section presents the goals, objectives, policies, and programs for Environmental Hazards in the City of Huntington Beach. At the end of each policy is a reference to the appropriate implementation program. Each implementation program's schedule and possible funding sources are indicated in the Environmental Hazards Implementation Matrix.

Geologic/Seismic Safety

Goal
EH 1
Ensure that the number of deaths and injuries, levels of property damage, levels of economic and social disruption, and interruption of vital services resulting from seismic activity and geologic hazards shall be within levels of acceptable risk.[25]

Objective
EH 1.1
Ensure that land use planning in the City accounts for seismic and geologic risk, including ground shaking, liquefaction, subsidence, soil and slope stability, and water table levels.

Policies
EH 1.1.1
Maintain a complete database of the location and distribution of seismic and geologic hazards related to ground shaking, liquefaction, subsidence, soil stability, slope stability and water table levels. *(I-EH 1, I-EH 2 and I-EH 3)*

EH 1.1.2
Support land use patterns, Zoning Ordinances,[26] and locational criteria that mitigate potential risks posed by development in hazard areas, or which significantly reduce risk from seismic hazards. *(I-EH 3, I-EH 4, and I-EH 5)*

EH 1.1.3
Require seismic/geologic assessment prior to construction in Alquist-Priolo Earthquake Fault Zone as shown in **Figure EH-5**. *(I-EH 3 and I-EH 4)*

[25] Mitigation Measure GS-2 as specified in EIR No. 94-1, Table EX-1
[26] Mitigation Measure GS-3 as specified in EIR No. 94-1, Table EX-1

EH 1.1.4
Evaluate the levels of risk based on the nature of the hazards and assess acceptable risk based on the human, property, and social structure damage compared to the cost of corrective measures to mitigate or prevent damage. *(I-EH 3 and I-EH 4)*[27]

Objective
EH 1.2
Ensure that new structures are designed to minimize damage resulting from seismic hazards, ensure that existing unsafe structures are retrofitted to reduce hazards and mitigate other existing unsafe conditions.

Policies
EH 1.2.1
Require appropriate engineering and building practices for all new structures to withstand groundshaking and liquefaction such as stated in the Uniform Building Code (UBC). *(I-EH 5)*

EH 1.2.2
Establish specific priorities for improvement of existing structures based on hazard to life, type of occupancy, method of construction, physical condition, and location. *(I-EH 4 and I-EH 6)*[28]

EH 1.2.3
Rectify improperly abandoned water wells. *(I-EH 7)*

EH 1.2.4
Support the education and dissemination of information about the potential environmental hazards that may exist in Huntington Beach. *(I-EH 2 and I-EH 8)*

Objective
EH 1.3
Enhance emergency preparedness through community education, effective emergency response and efficient post-disaster recovery.

Policies
EH 1.3.1
Ensure that all citizens have access to information regarding local environmental hazards, emergency preparedness, and emergency response. *(I-EH 1 and I-EH 8)*

[27] Mitigation Measure GS-4 as specified in EIR No. 94-1, Table EX-1
[28] Mitigation Measure GS-5 as specified in EIR No. 94-1, Table EX-1

EH 1.3.2
Maintain and regularly update emergency plans for earthquake response. (*I-EH 2, I-EH 9, and I-EH 10*)

EH 1.3.3
Provide the Emergency Operations Center with information regarding seismic/geologic hazard locations. (*I-EH 2*)

EH 1.3.4
Require that earthquake survival and efficient post disaster functioning be a primary concern in the siting, design, construction, operations, and retrofitting standards for critical, essential, and high occupancy facilities, including public safety facilities. (*I-EH 2 and I-EH 9*)[29]

EH 1.3.5
Encourage property owners to take adequate steps to protect their property against economic risks resulting from seismic and geologic hazards. (*I-EH 2*)[30]

Erosion

Goal
EH 2
Reduce the potential for mesa edge and bluff erosion hazards, and the potential for beach sand loss.[31]

Objective
EH 2.1
Ensure that land use planning and City policy account for bluff and coastal sand erosion.

Policies
EH 2.1.1
Minimize bluff and mesa edge[32] erosion. (*I-EH 1* and *I-EH 4*)

EH 2.1.2
Minimize beach sand loss. (*I-EH 1*)

Objective
EH 2.2
Increase public safety from erosion hazards through public awareness and education. (*I-EH 1, I-EH 2 and I-EH 8*)

Policies
EH 2.2.1
Provide information to the public regarding erosion areas and emergency response plans. (*I-EH 1, I-EH 2 and I-EH 8)*

Methane

Goal
EH 3
Ensure the safety of the City's businesses and residents from methane hazards.

Objective
EH 3.1
Identify areas within the City most prone to methane gas seepage and buildup.

Policies
EH 3.1.1
Continue to establish, through the identification of Methane Overlay Districts, areas of existing methane seepage in the City as shown in **Figure EH-10**. (*I-EH 1*)

EH 3.1.2
Continue to investigate and evaluate new sources of methane. (*I-EH 1 and I-EH 11*)

Objective
EH 3.2
Minimize methane hazards in the identified Methane Overlay District, and other areas outside the Methane Overlay Districts as may later be defined, through the regulation of construction and adherence to the City's Methane Hazard Mitigation Plan.[33]

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[29] Mitigation Measure GS-6 as specified in EIR No. 94-1, Table EX-1
[30] Mitigation Measure GS-7 as specified in EIR No. 94-1, Table EX-1
[31] Mitigation MeasureGS-9 as specified in EIR No. 94-1, Table EX-1
[32] Mitigation Measure GS-10 as specified in EIR No. 94-1, Table EX-1
[33] Mitigation Measure GS-13 as specified in EIR No. 94-1, Table EX-1

Policies

EH 3.2.1

Maintain and revise as necessary, standards of construction within identified Methane Zones.[34] (*I-EH 4 and I-EH 6*)

EH 3.2.2

Establish, enforce, and periodically update[35] testing requirements for sites proposed for new construction within the identified Methane Overlay District. (*I-EH 12*)

EH 3.2.3

Provide mitigation measures and other assistance intended to reduce the potential for the buildup of methane to hazardous levels within existing buildings (residences and businesses). [36] (*I-EH 2, I-EH 4 and I-EH 8*)

EH 3.2.4

Remain current on new technologies, policies, and procedures to further protect against a major methane related catastrophe. [37] (*I-EH 2 and I-EH 8*)

Objective

EH 3.3

Maintain knowledge of methane levels and preparedness for the provision of emergency services.

Policies

EH 3.3.1

Monitor methane levels in the identified Methane Overlay District. (*I-EH 1*)

EH 3.3.2

Prepare emergency response plans for use in methane related emergencies. (*I-EH 13*)

EH 3.3.3

Conduct periodic training of Fire Department and other appropriate emergency personnel on procedures in the Methane Hazards Mitigation Plan [38] (*I-EH 2 and I-EH 8*)

Objective

EH 3.4

Increase public safety from methane hazards through public awareness and education.

Policies

EH 3.4.1

Provide information to the public regarding methane areas and emergency response plans. (*I-EH 8*)

Flooding

Goal

EH 4

Eliminate, to the greatest degree possible, the risk from flood hazards to life, property, public investment and social order in the City of Huntington Beach.

Objective

EH 4.1

Ensure that the City's flood prevention standards and practices provide satisfactory safeguards for public and private development.

Policy

EH 4.1.1

During major redevelopment or initial construction, require specific measures to be taken by developers, builders or property owners in flood prone areas (**Figure EH-11**), to prevent or reduce damage from flood hazards and the risks upon human safety. (*I-EH 1, I-EH 2, I-EH 4, and I-EH 15*)

EH 4.1.2

Establish and enforce standards which minimize financial loss and maximize protection of residents and business owners' property. (*I-EH 1, I-EH 2, I-EH 14, and I-EH 15*)

Objective

EH 4.2

Maintain and upgrade, as appropriate, the County of Orange and the City of Huntington Beach's flood control systems in conjunction with the Santa Ana River Main Stem Project to minimize hazards due to flooding.

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[34] Mitigation Measure GS-14 as specified in EIR No. 94-1, Table EX-1
[35] Mitigation Measure GS-15 as specified in EIR No. 94-1, Table EX-1
[36] Mitigation Measure GS-16 as specified in EIR No. 94-1, Table EX-1
[37] Mitigation Measure GS-17 as specified in EIR No. 94-1, Table EX-1
[38] Mitigation Measure GS-18 as specified in EIR No. 94-1, Table EX-1

Policies

EH 4.2.1

Support the Santa Ana River Main Stem Project. *(I-EH 2 and I-EH 16)*

EH 4.2.2

Increase the local storm drain and flood control capacity up to meet 100-year the demand of a storm. *(I-EH 1 and I-EH 2)*

EH 4.2.3

Coordinate with the County of Orange for the operation of the County's portion of the flood control system. *(I-EH 2)*

EH 4.2.4

Maintain the City's portion of the flood control system at a level necessary to protect residents from 100-year flood risks. *(I-U 1, I-U 3, I-U 4, and I-EH 2)*

Objective

EH 4.3

Protect individuals from physical harm in the event of flooding.

Policy

EH 4.3.1

Provide sufficient early warning and evacuation assistance to residents and others in the path of flooding. *(I-EH 13)*

Tsunami

Goal

EH 5

Protect human life, to the greatest extent feasible, from tsunamis and seiche hazards.[39]

Objective

EH 5.1

Provide information regarding tsunami, seiche, [40] and tidal/marine hazards, and promote methods to minimize potential damage.

Policies

EH 5.1.1

Identify tsunami and seiche[41] susceptible areas, and require that specific measures be taken by the developer, builder, or property owner, during major redevelopment or initial construction, to prevent or reduce damage from these hazards and the risks upon human safety (**see Figure EH-8**). *(I-EH 1 and I-EH 4)*

EH 5.1.2

Participate in the National Weather Service or other system for local tsunami and/or seiche[42] warnings. *(I-EH 17)*

Objective

EH 5.2

Increase public safety from tsunami hazards through Public awareness and education.

Policies

EH 5.2.1

Provide information to the public regarding tsunami areas and emergency response plans. *(I-EH 8 and I-EH 13)*

Peat

Goal

EH 6

Ensure the safety of the City's businesses and residents from peat hazards.

Objective

EH 6.1

Identify areas within the City most prone to peat conditions.

Policy

EH 6.1.1

Maintain a thorough knowledge of the location and distribution of peat conditions in the City of Huntington Beach (**Figure EH-13**). *(I-EH 1)*

Objective

EH 6.2

Minimize peat hazards through the regulation of construction. *(I-EH 4)*

[39] Mitigation Measure SD-1 as specified in EIR No. 94-1, Table EX-1
[40] Mitigation Measure SD-2 as specified in EIR No. 94-1, Table EX-1
[41] Mitigation Measure SD-3 as specified in EIR No. 94-1, Table EX-1
[42] Mitigation Measure SD-4 as specified in EIR No. 94-1, Table EX-1

Policy
EH 6.2.1
Establish standards of construction within identified peat zones. (*I-EH 4*)

Objective
EH 6.3
Increase public awareness about the location and hazards of peat conditions. (*I-EH 8*)
Policy

EH 6.3.1
Provide information to the public regarding peat condition areas and proper construction methods and standards. (*I-EH 8*)

All Hazards

Goal
EH 7
Ensure the safety of the public, to the greatest extent feasible, from the impacts of a natural disaster.

Policy
EH 7.1.1
Maintain and update as necessary the current local Hazards Mitigation Plan (HMP) as part of the Environmental Hazards Element. The HMP includes resources and information to help reduce risks and prevent losses from future natural disasters. (*I-EH 1*)

IMPLEMENTATION PROGRAMS

I-EH 1
Studies/Mapping/Master Plans

a. Conduct, prepare and/or update the following as funding permits:
   - comprehensive mapping of seismic/geologic hazard areas in the City, including fault locations, unstable soils and slope locations, areas of high liquefaction potential, areas of high seiche potential and locations of shallow water table depth;
   - maps of potential bluff erosion areas;
   - maps of existing methane seepage areas;
   - methane level monitoring on an on-going basis;
   - comprehensive mapping of flooding potential hazard areas in the City;
   - comprehensive mapping of groundwater potential hazard areas in the City;
   - comprehensive mapping of peat potential hazard areas in the City;
   - challenges to flood zone boundaries that appear to be unreasonable or incorrect;
   - a Local Drainage Master Plan assessing improvements necessary to achieve 100-year capacity for the local flood control system;
   - request that the Orange County Surveyor update its Subsidence Book report through 1993 for the Pacific Coast Highway, Huntington Beach Pump station, and Huntington Beach. The City shall perform an evaluation of the data to assess possible subsidence at the oil field and drilling areas underlying the City. Based on the results of this evaluation a mitigation program for reducing the potential hazards shall be prepared for use by the City;[43]
   - a Grading and Geotechnical Investigation Guidelines manual which will outline the minimum proper soils engineering and engineering geologic study for all sites where grading will occur. Topics shall include, but not necessarily be limited to, soils engineering and foundations, erosion control, peat and organic soils, slope stability, erosion, liquefaction and dynamic settlement, shallow groundwater, and fault location/activity. This manual shall be available at the permit stage prior to initial feasibility and design studies in order to enhance the development review and environmental review processes;[44]
   - a Methane Hazards Guidance manual which will outline methane overlay districts, standards of construction, definition of additional hazards areas, and hazard mitigation. This manual shall be available at the permit stage prior to initial feasibility and design studies in order to enhance the

[43] Mitigation Measure GS-20 as specified in EIR No. 94-1, Table EX-1
[44] Mitigation Measure GS-1, GS-8, and GS-19 as specified in EIR No. 94-1, Table EX-1

development review and environmental review processes;[45]

- an assessment of potential damage to essential utility and transportation infrastructure and public service facilities due to geologic/seismic hazards. The findings of the assessment should be utilized in the review of proposed development projects, and used for maintaining and updating emergency preparedness plans;[46]
- standards for tsunami/seiche studies to be completed for harbor areas, breakwaters, and coastal areas of concern. The City shall update its evaluation of the tsunami hazard, make its standards more specific, and disseminate available information on tsunami warnings and on procedural steps to prepare the populous for such an event. Mitigation measures shall be suggested for new construction;[47]
- determine the safety status of all dams which may fail and cause inundation within the City. This shall be done in cooperation with the County of Orange and the State Division of Safety of Dams in order to establish the safety status and to determine what follow up analyses, if any, are needed. Based on these results, the City shall develop risk guidelines and to allow evaluation of current regulatory measures for protection of future development;[48]
- operational strategies for the City's portion of the local flood control system intended to maximize system efficiency and minimize system overload during periods of heavy rainfall; and
- a hazardous waste sites map within the City.

[45] Mitigation Measure GS-11 as specified in EIR No. 94-1, Table EX-1
[46] Mitigation Measure GS-24 as specified in EIR No. 94-1, Table EX-1
[47] Mitigation Measure SD-5 as specified in EIR No. 94-1, Table EX-1
[48] Mitigation Measure SD-6 as specified in EIR No. 94-1, Table EX-1

b. Continue to:
   - evaluate methane sources, locations and concentrations on a site-specific basis and will include any previously unidentified methane areas in the Methane Overlay District;
   - assume the lead role in mitigating methane hazards in public rights-of-way and on public property;
   - supplement beach sand with sand from outside sources; and
   - work with property owners to maintain safe conditions on their property.

c. Use the EHE and the data from items a) and b) above to prepare and submit a formal update of the seismic safety components of the Safety Element requirement.[49]

d. The City's EOC will maintain, review and update, as necessary, the current local Hazards Mitigation Plan.

I-EH 2
<u>Interagency Participation and Coordination</u>

a. The Emergency Operations Center (EOC) will coordinate with the Departments of Police, Fire, Public Works, Community Development, Community Services and other departments in preparing and maintaining earthquake and other emergency response plans.

b. The City will provide the EOC with maps of seismic/geologic hazard areas in the City, including fault locations, areas of high liquefaction potential and areas of seiche hazard.

c. The City will work with and coordinate its earthquake and other emergency response plans with each school district as the school districts prepare earthquake education programs and develop their own earthquake and other emergency response plans.

d. The EOC will coordinate with the Building Division and the Department of Public Works to establish standards for the design and operation of public safety facilities which will ensure that they remain safe and functional during and after disasters.

[49] Mitigation Measure GS-21 as specified in EIR No. 94-1, Table EX-1

e. The EOC will coordinate with the Fire Department to establish and maintain an emergency response mutual aide agreement with other public agencies.

f. Work with FEMA to clarify, simplify and interpret the floodplain development standards in a way that benefits property owners in the City.

g. In conjunction with the Santa Ana River Flood Protection Association (SARFPA), the City will lobby County, regional, state and federal governments for funding support for the Santa Ana River Main Stem Project.

h. Coordinate with the Orange County Environmental Management Agency to improve the County portion of the local flood control system up to 100-year storm capacity.

I-EH 3
<u>Alquist-Priolo Earthquake Fault Zone</u>

a. Continue to implement the Alquist-Priolo Earthquake Fault Zone requirements.

b. Implement the fault classification system suggested by Leighton & Associates (April 17, 1986) with regard to faults in the City susceptible to fault rupture, and establish a study requirement based on risk and structure importance.[50]

I-EH 4
<u>Development Review or Environmental Review Process</u>

During development review (site plan, tract map, etc.) and/or environmental review, require:

a. building structures proposed in liquefaction, unstable soil/slope conditions, flood prone areas, high water tables, peat or other geologic hazards prone areas to determine potential problems and to require mitigation measures;

b. a potential seismic/geologic damage assessment be conducted for essential public utilities (gas, water, electricity, communications, sewer) and require that appropriate mitigation measures be incorporated;

c. critical or sensitive facilities and uses to be located in areas where utility services and continuous road access can be maintained in the event of an earthquake;

d. drainage plans addressing bluff erosion for all future bluff top developments;

e. the continued evaluation of all proposals for new construction within the Methane Overlay District be evaluated for necessary special construction methods;

f. that proposed critical, essential, and high-occupancy facilities be subject to seismic review, including detailed site investigations for faulting, liquefaction, ground motion characteristics, and slope stability, and application of the most current professional standards for seismic design.[51]

g. that proposed projects located in the tsunami hazard areas (**Figure EH-9**):
   - are designed to minimize beach/bluff erosion and the need for sand replenishment along city beaches; and
   - consider design options which reduce the potential for damage to private property and threats to public safety, i.e., raised foundations, ground floor parking with upper level uses.

I-EH 5
<u>Ordinances</u>

a. Enforce the most current Uniform Building code adopted by the State of California.

b. Prepare ordinances prohibiting the location of critical or sensitive facilities or high occupancy facilities within a predetermined distance of an active or potentially active fault.

I-EH 6
<u>Unsafe Structures Retrofitting or Demolition</u>

a. Continue to implement and enforce the City's earthquake hazard regulations as outlined in the Municipal Code.

b. Devise measures to retrofit existing structures for methane protection.

[50] Mitigation Measure GS-22 as specified in EIR No. 94-1, Table EX-1

[51] Mitigation Measure GS-23 as specified in EIR No. 94-1, Table EX-1

I-EH 7
Groundwater Mitigations

Mitigate, or require property owners to mitigate, groundwater problems related to improperly abandoned water wells.

I-EH 8
Public Education

a. The EOC will increase the development and use of verbal and written education tools including lectures and illustrations offered through cable television, clubs, public and private schools, neighborhood groups, service organizations, youth groups, business organizations and any other interested groups or organizations, regarding earthquake preparedness. The information will include emergency services available and strategies for survival and self-sufficiency in the days following an earthquake.

b. Provide technical guidance and direction to private businesses and residents found to have methane seepage or buildup on their property.

c. Maintain and provide methane emergency response plans to the public.

d. Maintain floodplain and erosion information available to the public.

e. Maintain peat information available to the public.

I-EH 9
Staff Training

Continue to implement City employee emergency training drills.

I-EH 10
Disaster Recovery Committee

Establish a Disaster Recovery Committee which will include representatives from EOC, Planning, Building, Public Works, Fire, Police, local utility providers and local emergency medical providers. This committee should participate in planning for post disaster assessments, rapid reconstruction, emergency housing and emergency funding and shall develop guidelines defining "chain of command" and responsibilities.

I-EH 11
Abandoned Oil Well Re-Evaluation

Establish a program to re-evaluate the safety and status of abandoned oil wells within the City, pursuant to Public Resources Code Section 3208.1.[53] The plan should specify that reevaluation should occur during major redevelopment or initial construction on the site of an abandoned oil well when it can be determined that it was abandoned incorrectly or prior to current standards.

I-EH 12
Methane Gas Testing Standards and Requirements

a. Coordinate with the Building Division to establish methane mitigation construction standards such as venting systems, impermeable barriers and locational criteria.

b. Maintain testing standards and requirements for new construction sites in the Methane Overlay District. Completion of the tests and the test results will be required prior to development review.

I-EH 13
Emergency Contingency Plans

a. Coordinate with the EOC to prepare a Methane Emergency Contingency Plan including early warning procedures, an evacuation plan and emergency methane hazard mitigation measures.

b. The City's EOC will maintain flooding contingency plans which provide for early warning, evacuation assistance, as needed, and damage assessment after the event.

c. Continue to support, assist and expand the Community Emergency Response Team (CERT).

d. Coordinate with local school districts in the preparation of emergency contingency plans, including early warning procedures, evacuation plans, emergency facility and shelter utilization, and emergency services availability.

[53] Mitigation Measure GS-12 as specified in EIR No. 94-1, Table EX-1

I-EH 14
Flood Insurance Programs

a. Participate in the National Flood Insurance Program in a manner that provides the most financial and physical protection to residents and property owners in the City while minimizing costs to them.

b. Participate in the FEMA's Community Rating System to reduce flood insurance premiums for property owners in the City.

I-EH 15
FEMA Development Standards

Adopt and enforce the most recent floodplain development standards promoted by the Federal Emergency Management Agency (FEMA).

I-EH 16
Santa Ana River Main Stem Funding

Pursue local funding to contribute to the Santa Ana River Main Stem Project.

I-EH 17
Local Tsunami Warnings Wire System

Use the Weather Wire's information from the National Weather Service or other appropriate warning systems to detect and warn of tsunami occurrences and other weather conditions in the region. This system should be monitored by the Marine Safety Division, which presently receive daily reports on weather conditions for marine operations. This warning system should be incorporated into the City's Emergency Preparedness Plan.

PROGRAM		RESPONSIBLE AGENCY												FUNDING SOURCE								SCHEDULE
		ADMINISTRATION — CITY OF HUNTINGTON BEACH												CITY OF HUNTINGTON BEACH								
No.	Name	Community Development Department	Community Services Department	Economic Development Department	Fire Department	Library Services Department	Police Department	Public Works	Planning Commission	City Council	School Districts	County of Orange	Other	General Funds	Assessment Districts	Development Fees	Redevelopment Tax Increment Revenue	Grants	Other Approved Fees	State Funds	Federal Funds	
EH-1	Studies/Mapping/Master Plans	●			●		●	●						●					●	●	●	Ongoing *
EH-2	Interagency Participation and Coordination	●	●		●		●	●			●		●									Ongoing *
EH-3	Alquist-Priolo Earthquake Fault Zone	●												●								Ongoing *
EH-4	Development Review or Environmental Review Process	●			●		●	●						●								Ongoing *
EH-5	Ordinances	●							●	●				●								Ongoing *
EH-6	Unsafe Structures Retrofitting or Demolition	●			●									●								Ongoing *
EH-7	Groundwater Mitigations							●						●								Ongoing *
EH-8	Public Education	●		●							●		●	●								Ongoing *
EH-9	Staff Training	●	●	●	●	●	●	●					●	●								Ongoing *
EH-10	Disaster Recovery Committee	●			●		●	●					●	●								Ongoing *
EH-11	Abandoned Oil Well Re-evaluation				●									●					●			Ongoing *
EH-12	Methane Gas Testing Standards and Requirements	●			●									●					●			Ongoing *
EH-13	Emergency Contingency Plans				●		●	●			●		●	●								Ongoing *
EH-14	Flood Insurance Programs	●						●		●				●								1 year upon Plan adoption*
EH-15	FEMA Development Standards	●						●		●				●								Ongoing *
EH-16	Santa Ana River Main Stem Funding	●						●					●	●								Ongoing *
EH-17	Local Tsunami Warnings Wire System		●											●								Ongoing *

* As funding permits

ENVIRONMENTAL HAZARDS IMPLEMENTATION PROGRAM MATRIX

CITY OF HUNTINGTON BEACH GENERAL PLAN

MATRIX EH