SECTION 2: COMMUNITY PROFILE

Table of Contents

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Past earthquakes, floods, wildfires, strong winds, and landslides have exposed Newport Beach's residents and businesses to the financial and emotional costs of recovery. These same natural hazards have the potential to pose a future negative impact on the citizens, property, environment, and economy of the City of Newport Beach. Furthermore, as more people move to areas vulnerable to these hazards, the risk associated with these natural hazards increases. Even in communities that are essentially "built-out" (i.e., have little or no vacant land remaining for development), population density often increases, either as a result of low-density housing being replaced by medium- to high-density development, or, as in Newport Beach, the result of residential development in new mixed-use areas. The increased population density can place more people at risk from the hazards that can impact the area.

Given that natural hazards are inevitable, and that populations in vulnerable areas are increasing in response to development pressures, there is a need to develop strategies, coordinate resources, and increase public awareness to reduce the risk and losses from future natural hazard events. Identifying the risks posed by natural hazards, and developing strategies to reduce the impact of a hazard event can assist in protecting life and property. In Newport Beach, local residents and businesses are working together with the City to create a natural hazards mitigation plan that addresses the potential natural hazards of most concern to Newport Beach. This document summarizes the efforts that the City has undertaken and plans to undertake in the future to reduce its vulnerability to natural hazards.

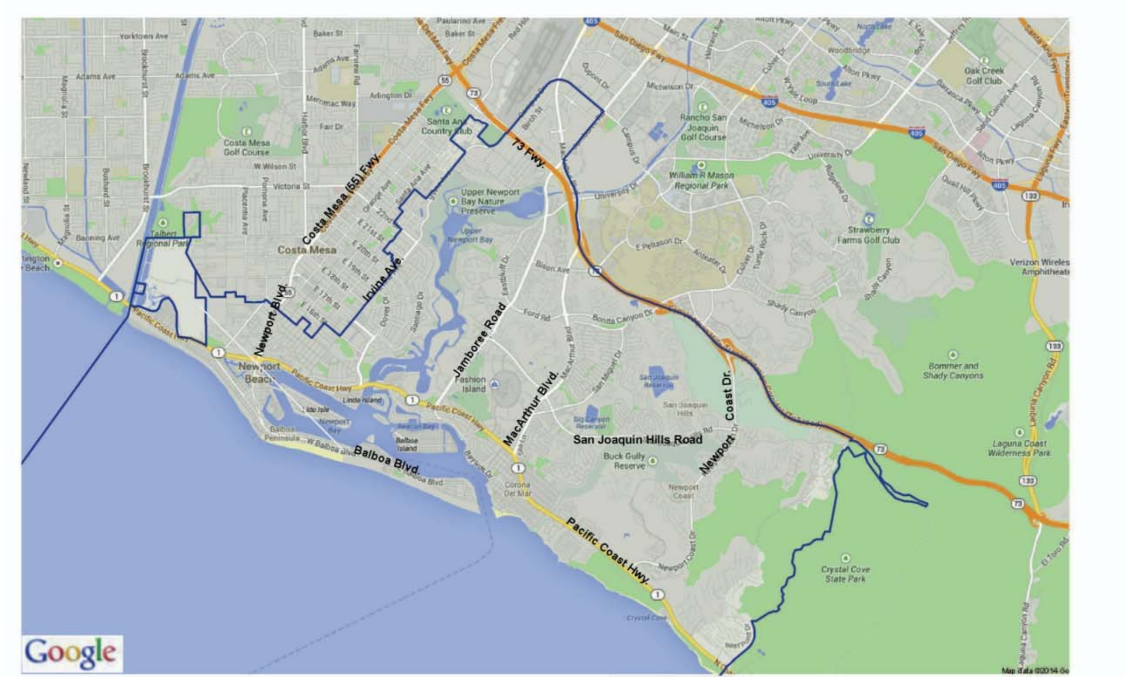
Geography and the Environment

The City of Newport Beach is located in Orange County, at the southwestern edge of the physiographic area known as the Los Angeles Basin. The City has a total area of approximately 15 square miles, with approximately 9.25 miles of shoreline along the Pacific Ocean, and nearly 35 miles of waterfront if one includes the shoreline, Newport Bay and the islands within City limits. Distinct topographic features separate the City into four specific areas: 1) the nearly flat-topped upland known as Newport Mesa, 2) the beaches, islands, sandbars, and mudflats that comprise Newport Bay, 3) the protective barrier beach known as Balboa Peninsula, and 4) the San Joaquin Hills, where the most recent large-scale developments in the area have occurred.

Newport Mesa ranges in elevation from about 50 to 75 feet above mean sea level in the Santa Ana Heights area, to about 100 feet above sea level in the Newport Heights, Westcliff, and Eastbluff areas. Elevation of the Balboa Peninsula and the harbor islands generally ranges from about 5 to 10 feet above mean sea level. The coastal platform occupied by Corona Del Mar is located at an elevation of about 95 to 100 feet above sea level, and the San Joaquin Hills rise to an elevation of 1,164 feet at Signal Peak.

The City is served by the 405, 55, and 73 freeways. Its major arterial roads include Coast Highway and San Joaquin Hills Road, which run generally east to west, and Superior Drive, Newport Boulevard, Dover Drive, Jamboree Road, MacArthur Boulevard, and Newport Coast Drive, which run primarily north to south (see Map 2-1). Passenger transportation is provided by the Orange County Transportation Authority (OCTA) bus lines and OCTA's ACCESS vans.

Map 2-1: Freeways and Major Arterial Roads in the Newport Beach Area



Source: Google Maps, 2014

Major Rivers

The two major drainages within the Newport Beach area are the Santa Ana River and the San Diego Creek Channel. At one time, the natural course of the Santa Ana River hugged the southwestern side of Newport Mesa, carving steep bluffs and feeding sediment into Newport Bay. However, in an attempt to reduce flooding on the costal plain, the river was confined to man-made levees and channels by the early 1920s. The Santa Ana River currently borders the western edge of the City where it empties into the Pacific Ocean.

San Diego Creek is the main tributary to Newport Bay. Its headwaters lie about 2.5 miles east of the Interstate 5 – Interstate 405 intersection, near the El Toro Memorial Park, at an elevation of about 500 feet. The creek flows westerly from its headwaters and empties into Newport Bay about ¾-mile west of the campus of the University of California at Irvine. Portions of San Diego Creek were channelized in 1968 for flood protection purposes. The channel collects water from numerous streams, including Peters Canyon Wash, Rattlesnake Wash, Hicks Canyon, Agua Chiñon, and Serrano Creek. The Bay also receives water from the Santa Ana Delhi Channel near Irvine Avenue and Mesa Drive.

The portion of the San Joaquin Hills that lies within the City is drained to the sea by several deep canyons, including Buck Gully, Los Trancos Canyon, and Muddy Canyon, as well as numerous smaller, unnamed canyons. Carrying significant amounts of water only during the winter, these streams flow directly into the Pacific Ocean. Drainage courses on the north side of the hills, including Bonita and Coyote Creeks, are tributaries of San Diego Creek.

Climate

Due to its coastal setting, the City of Newport Beach enjoys a mild, consistent climate with a yearly average maximum day temperature of about 68 degrees Fahrenheit (based on data between 1909 and 1996; Table 2-1). Average maximum day temperatures in the City generally range from a low of about 62 degrees in the winter month of January (the monthly mean of the maximum daily temperature) to a high of 73 degrees in August. Night temperatures are slightly lower, resulting in a 24-hour-average of 55 degrees for January, and 68.5 degrees for August (based on data collected between 1961 and 1990; Table 2-2). In the hilly areas of the City, away from the beach, higher temperatures can be reported, especially during periods of Santa Ana winds. These winds can bring low humidity and higher temperatures than those reported on Table 2-1.

Table 2-1: Average Maximum Temperature in Newport Beach (in °F) for the weather station in Newport Beach Harbor

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
°C	16.8	17.1	17.7	18.5	19.4	20.4	22.1	22.8	22.6	21.7	19.7	17.4	19.7
°F	62.2	62.8	63.9	65.3	66.9	68.7	71.8	73.0	72.7	71.1	67.5	63.3	67.5

Source: NEWPORT BEACH HARBOR, ORANGE COUNTY data derived from GHCH 2 Beta. 1005 months between 1909 and 1996. From http://www.worldclimate.com

Table 2-2: 24-Hour-Average Monthly Temperature in Newport Beach (in °F) for the weather station in Newport Beach Harbor

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
°C	12.8	13.3	13.6	14.8	16.2	17.7	19.5	20.3	19.8	18.2	15.3	13.0	16.2
°F	55.0	55.9	56.5	58.6	61.2	63.9	67.1	68.5	67.6	64.8	59.5	55.4	61.2

Source: NEWPORT BEACH HARBOR, ORANGE COUNTY data derived from NCDC TD 9641 Clim 81 1961-1990 Normals. 30 years between 1961 and 1990. From http://www.worldclimate.com

Rainfall in the City averages 11.9 inches of rain per year (based on the average of all records collected between 1931 and 1995; see Table 2-3), whereas about 14 inches of precipitation fall annually in Santa Ana. In general, areas closer to the coast receive a little less precipitation, on average, than inland areas. The term "average rainfall" is misleading, however, because over the recorded history of rainfall in Newport Beach, rainfall amounts have ranged from one-third the normal amount to more than double the normal amount. Furthermore, rainfall in Newport Beach, as in most of Southern California, tends to fall in large amounts during sporadic and often heavy storms rather than consistently in several moderate storms at somewhat regular intervals. In short, rainfall in Southern California might be characterized as "feast or famine" within a single year.

Table 2-3: Average Monthly Precipitation in Newport Beach, at Newport Beach Harbor (in inches)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Inches	2.5	2.4	1.9	1.1	0.2	0.1	0.0	0.1	0.3	0.3	1.2	2.0	**11.9**

Data based on 59 complete years between 1931 and 1995.

Rocks and Soil

The properties of the soils and rocks underlying the City of Newport Beach determine to some extent the potential geologic hazards that may occur in the area, such as the susceptibility of an area to earthquake-induced liquefaction, expansive soils, and landslides. Therefore, understanding the geologic characteristics of the bedrock and soils of Newport Beach is an important step in hazard mitigation and avoiding at-risk development. The types and characteristics of the bedrock, unconsolidated sediments (weathered rock material), and soil that underlie the City also reflect the geologic and climatic processes that have affected this region over the past few million years.

Alluvial sediments of late Holocene age (less than about 11,000 years old) are present in the active and recently active stream channels throughout the City, in addition to the beach, marshland, and intertidal deposits of Newport Harbor and Upper Newport Bay. Newport Mesa is underlain primarily by shallow marine sediments ranging in age from early to late Pleistocene (less than about 1.6 million years old). East of Upper Newport Bay, these deposits are capped with a thin veneer of late Pleistocene to early Holocene alluvial fan sediments shed from the San Joaquin Hills. Where streams have deeply incised the mesa, Tertiary-age sedimentary bedrock, also of marine origin, is exposed beneath the younger deposits. Similar bedrock formations underlie the San Joaquin Hills. The geologic units that are exposed at the surface are shown on the Geologic Map (Map 2-2 and Plates H-18 and H-18a).

There are many deposits of man-made fill throughout the City, including most notably, the harbor islands, road and bridge embankments, and canyon fills associated with mass-graded hillside developments. These deposits vary widely in size, age, and composition, and although some are significantly large and thick, due to the map scale they are not shown on the Geologic Map.

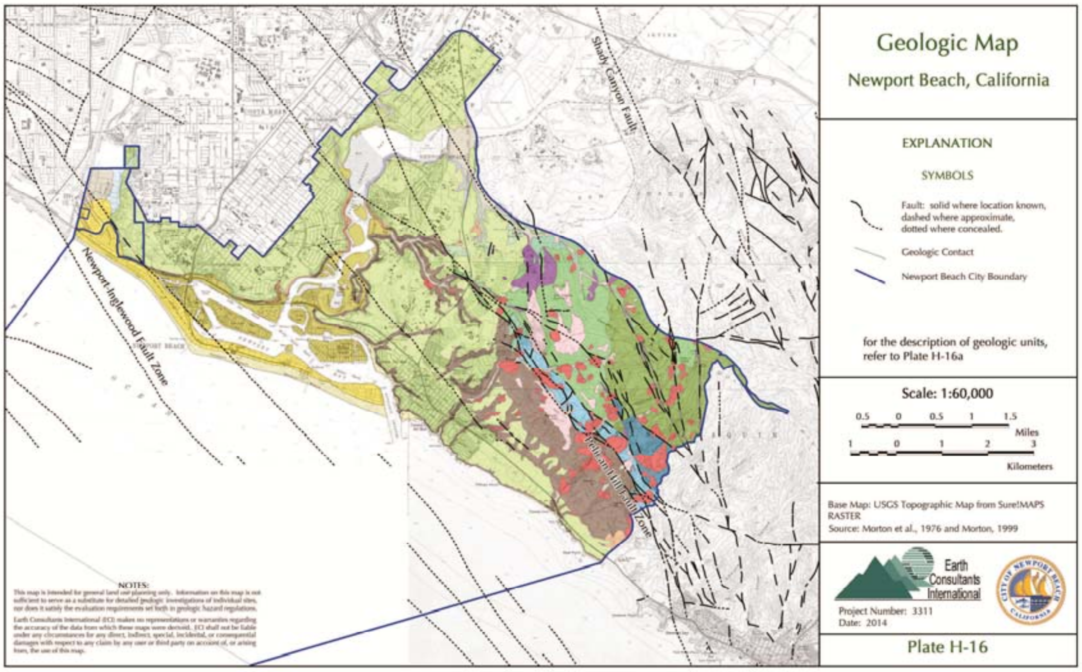
Other Significant Geologic Features

The City of Newport Beach lies in the Peninsular Ranges, a geologic/geomorphic province characterized by a northwest-trending structural grain aligned with the San Andreas fault, and represented by a series of northwest-trending faults, mountain ranges and valleys stretching from Los Angeles County to the Mexican border. Displacements on faults in this region are mainly of the strike-slip type, and where they have been most recently active, they have deformed the landscape and altered drainage patterns. An example of such faulting in the Newport Beach area is the Newport-Inglewood fault zone, which trends southeasterly across the Los Angeles Basin, leaving the coastline at the northwestern corner of Newport Beach, and continuing offshore to the south. Predominantly right-lateral in movement, the Newport-Inglewood fault is responsible for uplifting the chain of low hills and mesas that extends from Beverly Hills to Newport Beach across the relatively flat coastal plain. The location and structure of the fault zone is known primarily from a compilation of surface mapping and deep, subsurface data, driven initially by an interest in oil exploration (all of the hills and mesas, including Newport Mesa, have yielded petroleum), and later by a shift toward evaluating earthquake hazards. The fault is an active structure and was the source of the 1933 M6.4 Long Beach earthquake. Despite the name, this earthquake was actually centered closer to Newport Beach, near the mouth of the Santa Ana River (Hauksson and Gross, 1991) (see Section 6).

The San Joaquin Hills are the westernmost range in the Peninsular Ranges province. The hills are structurally complex, consisting of tilted fault blocks, and numerous north and northwest-trending Tertiary- and Quaternary-age faults. Within the hills, the major structural feature is the Pelican Hill fault zone, which trends northwesterly from Emerald Bay to the Big Canyon area. The fault zone is several hundred feet wide, and has left the adjacent bedrock in a highly sheared, folded, and fractured condition (Munro, 1992; Barrie et al., 1992). The Pelican Hill fault, as well as the other faults exposed in the hills, has largely been determined to be inactive during Holocene time (Clark et al., 1986).

In recent years, scientists have discovered that the northern end of the province, primarily the Los Angeles metropolitan area, is underlain by a series of deep-seated, low-angle thrust faults. When these faults do not reach the surface, they are called "blind thrusts." Faults of this type are thought to be responsible for the uplift of many of the low hills in the Los Angeles Basin, such as the Repetto or Montebello Hills. Previously undetected blind thrust faults were responsible for the M5.9 Whittier Narrows earthquake in 1987, and the destructive M6.7 Northridge earthquake in 1994.

Map 2-2: Geologic Map of Newport Beach, California
(for a larger scale of this map and a description of the units, refer to Plates H-16 and H-16a, respectively, in Appendix H)

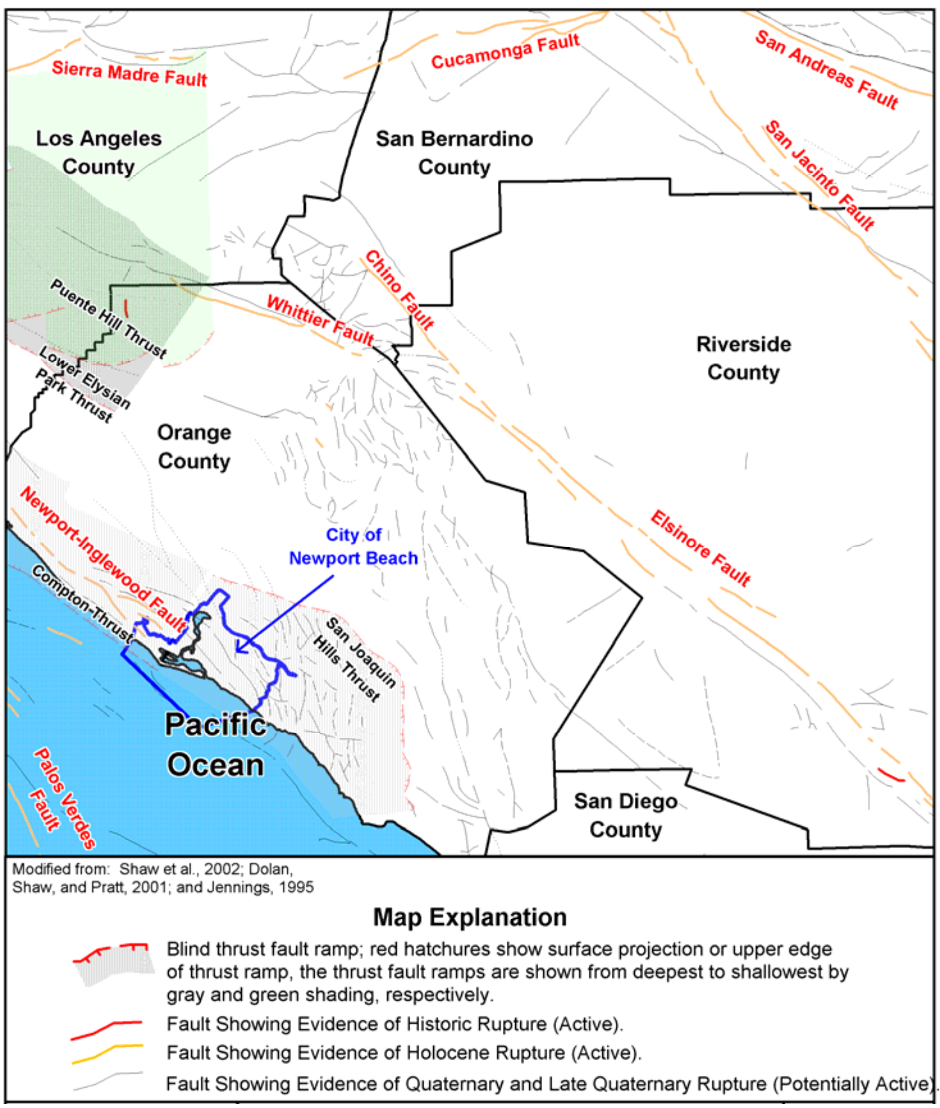


It has long been recognized that the San Joaquin Hills are part of a northwest-trending anticline (a convex fold) that extends from San Juan Capistrano to the Huntington Mesa (Vedder, 1957, 1975). Recent research suggests that the anticline, which includes the Newport and Huntington Mesas as well as the San Joaquin Hills, is part of a structure that is being uplifted by an active blind thrust fault that dips southward beneath the area (Grant et al., 1999). The growth of the San Joaquin Hills has been recorded in remnants of marine terraces of various ages that cap the northern and western slopes. These terraces consist of wave-eroded, sediment-covered platforms (similar to the one present at the base of the hills today) that have been uplifted as the hills rose above sea level. Based on measurements of terrace elevations and dating of the sediments, uplift of the hills started approximately 1.2 million years ago, and is thought to have continued through the Holocene at a rate of about 0.25 meters per 1,000 years (Barrie et al., 1992; Grant, 1999). Recognition of the San Joaquin Hills thrust fault extends the area of active blind thrust faulting and associated folding southward from Los Angeles into the Newport Beach area, and possibly southward and westward (Grant et al., 1999; Rivero et al., 2000, 2011).

The Los Angeles Basin experiences many small tremors every year, but its history has been shaped by several relatively infrequent, but powerful earthquakes. The first historical earthquake was recorded in 1769, when the Portolá expedition was camped next to the Santa Ana River in what is now the Olive community in the City of Orange, but earthquakes undoubtedly have shaken the area for millennia. Other more recent earthquakes were recorded in 1812, 1857, 1933 (Long Beach), 1987 (Whittier), and 1994 (Northridge). The 1857 Fort Tejon event was a large, magnitude 8+ earthquake on the San Andreas fault that caused only minor damage because the epicentral area was largely unpopulated. A similar-sized earthquake today would result in thousands of casualties and billions of dollars in property loss. Given that paleoseismological research indicates that great earthquakes (i.e., M8+) occur on the San Andreas fault at intervals between 45 and 332 years, with an average interval of 140 years, another similar M8 earthquake on the San Andreas fault is considered likely in the not-too-distant future. This fact alone should encourage local governments to strengthen their infrastructure and prepare for "the Big One." Furthermore, as we will discuss in this document, there are other lesser-known faults closer to Newport Beach that have the potential to cause more damage to the City than the more distant San Andreas fault. The earthquake hazard to the Los Angeles basin and the cities therein is severe.

In addition, many areas in the region, including portions of the City of Newport Beach, have sandy soils that are subject to liquefaction. The liquefaction-susceptible zones in the City of Newport Beach are shown on Plate H-4 (Appendix H). These zones include the youthful sandy sediments along the beach, the Balboa Peninsula and West Newport, and the area surrounding Newport Bay. Some of the larger canyons in the City are also underlain by sediments susceptible to liquefaction.

Map 2-3: Regional Active and Potentially Active Faults near Newport Beach



The City of Newport Beach also has areas of slope instability potential. Evidence of past slope failures are found throughout the San Joaquin Hills. The San Joaquin Hills contain numerous landslides or suspected landslides composed of highly fragmented, jumbled bedrock debris as well as largely coherent bedrock blocks. Landslides are typically identified by their distinctive morphology, which most often includes a steep, arcuate headscarp, undulating or relatively flat-topped head, and a blocked or diverted drainage at the toe. Most of the slides appear to be rotational failures, occurring in steep natural slopes composed of bedrock weakened by the intense fracturing, shearing and folding in or near the Pelican Hill fault zone. Some of the slides may be block glides associated with the failure of unsupported weak bedding planes. The larger slides are probably more than a hundred feet thick.

Landslide materials are commonly porous and very weathered in the upper portions and along the margins. They may also have open fractures and joints. The head of the slide may have a graben (pull-apart area) that has been filled with soil, bedrock blocks and fragments. Some of these slides have been reactivated in the late Holocene and pose a significant hazard to development. The larger of these landslides are shown in red on Plate H-18 (in Appendix H).

Historical Setting

The first known inhabitants of the Newport Beach area were native Americans from the Tongva, Juaneño and Luiseño nations. These groups occupied the area for thousands of years, taking advantage of the food supplies provided by both the coastal and littoral/back bay environments found in what is today Newport Beach. Europeans first sighted the California coastline in 1542, when Juan Cabrillo sailed past Southern California. The first land expedition by Europeans into what is now Orange County was led by Gaspar de Portolá in 1769. Many of the officers of the Spanish Army that accompanied Portola's expedition were given permission to settle these lands, with land titles awarded to them by the Spanish King for their years of service. Don Jose Antonio Yorba received title to more than 62,500 acres of land in 1801; his ranch included the lands now occupied by the community of Olive, and the cities of Orange, Villa Park, Santa Ana, Tustin, Costa Mesa and Newport Beach.

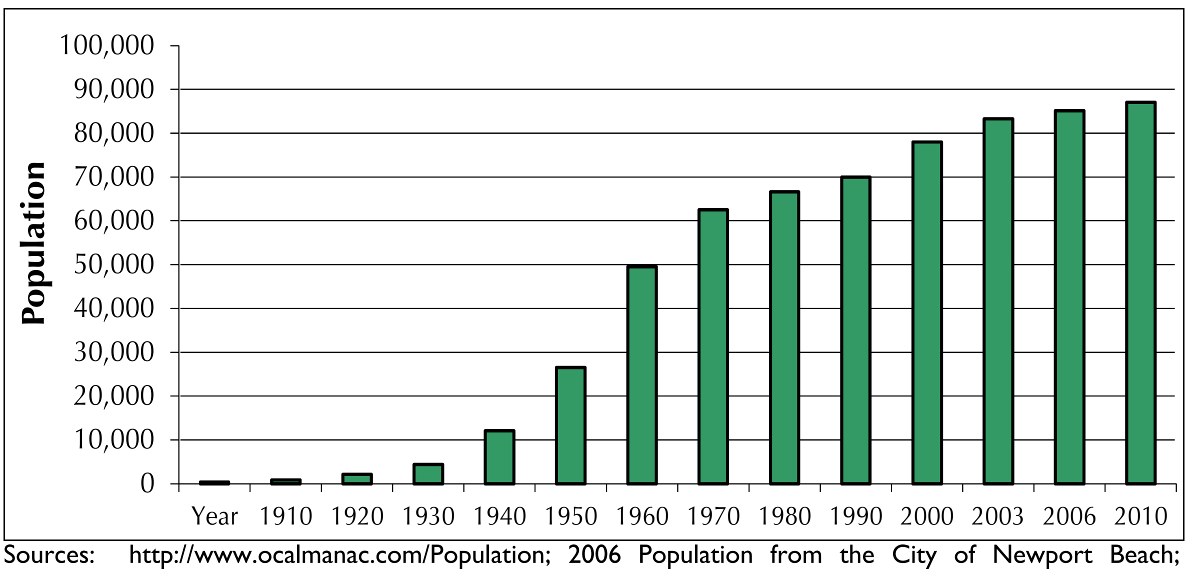
When Mr. Yorba took possession of this property, the Santa Ana River flowed out to sea through Alamitos Bay, near the present-day boundary between Los Angeles and Orange counties. In 1825, however, severe storms caused extensive flooding in the area, and the Santa Ana River resumed its ancient course through the Santa Ana Gap and around the toe of Newport Mesa. The down-coast littoral drift, plus continuing floods, caused the river to build what is today known as the Balboa Peninsula. During the floods of 1861-62, the river mouth swept farther to the southeast, to the rock bluffs that form the east side of the present channel entrance. For the next several decades, and until 1919, the river outlet to the sea continued to migrate back and forth from the rock bluffs to a point about 2,000 feet up-coast from the present channel entrance. Then, in 1919, a year after another serious flood, local interests built a dam at Bitter Point (near present-day 57th Street and Seashore Drive) to stop the flow into Newport Bay, and cut a new outlet for the Santa Ana River, where it has remained to date.

Local citizens' interest in developing a harbor reportedly date back to the 1870s, when Captain Samuel S. Dunnells guided a ship called the "Vaquero" into what was then an unnamed harbor that became known as the "New Port." Up to then, the bay had been considered too treacherous for ships, but arrival of the "Vaquero" proved differently. By this time, the Newport Beach area belonged to the McFadden brothers, James and Robert. In 1879, the brothers established a commercial trade and shipping business at Newport Landing that they operated successfully for 15 years. Then, in the late 1880s, the brothers built a large ocean pier near McFadden Square (the Newport Pier) and moved their entire business to the wharf. The wharf soon became the largest business in the newly created County of Orange, especially after completion of the Santa Ana – Newport Railroad (later the Southern Pacific Railroad) in 1891. Residential development of the area began at the turn of the century, first around the wharf, and then along the peninsula. Soils dredged from the bay to widen and deepen the channels were used to construct Balboa Island, Lido Isle, and the other islands in the bay. As soon as Balboa Island and Lido Isle were constructed, they were subdivided into lots. West Newport, Balboa, Balboa Island and Corona del Mar were subdivided between 1903 and 1907, and in 1906, the City of Newport Beach, consisting of West Newport and the Balboa Peninsula, was incorporated. Balboa Island was annexed in 1916, and Corona del Mar in 1923.

Population and Demographics

According to the 2010 Census data, in the year 2010, the City of Newport Beach had a population of 85,186. By 2012, the U.S. Census Bureau estimates the City had grown to 87,068. The City's population has steadily increased since 1910, with a sharp increase between 1940 and 1950, when the population tripled, and between 1950 and 1970, when the population doubled every decade (see Table 2-4 below). The City's growth rate slowed to about 6.5 percent from 1980 to 1990, and 5 percent between 1990 and 2000, but between 2000 and 2010, the population in Newport Beach increased at a rate of more than 24 percent. A substantial portion of this growth occurred in response to the recently developed areas in the San Joaquin Hills. Although much growth has occurred in the areas of the City away from the coast, its population is concentrated along the beach, in the Balboa Peninsula, West Newport and Corona del Mar, and in the tracts surrounding Newport Bay. Some of the population growth is also the result of infilling in the older communities, where mixed-use projects have sprung. In the year 2010, the population density in Newport Beach was estimated at 3,579 people per square mile, about one quarter the population density of San Francisco.

Table 2-4: Population Growth Through Time in Newport Beach



Sources: http://www.ocalmanac.com/Population; 2006 Population from the City of Newport Beach; http://quickfacts.census.gov/qfd/states/06/0651182.html.

An increase in population creates more community exposure in the face of natural hazards, and changes how agencies prepare for and respond to natural hazards. For example, more people living at the wildland/urban interface, such as in the San Joaquin Hills, can increase the risk of wildland fire. This increased potential for wildfires results from the fact that most fires are caused by human activities, and as there are more people living and playing in the interface, there are more opportunities for fires to get started. At the same time, a larger number of people at the wildland/urban interface means that a larger population is exposed to and can therefore be injured by fire, and there is also an increased potential for property damage. As a result, the City of Newport Beach has developed and implemented a series of mitigation measures designed to reduce the potential for wildland fire. Similarly, given that many people live and play in the low-lying areas of the City that are susceptible to inundation in the event of a tsunami, Newport Beach has taken a proactive approach, marking tsunami evacuation routes, and educating its residents on what to do in the event of an earthquake. These hazards and mitigation programs are discussed in more detail in other sections of this document.

Urban/wildland fires are not the only concern in Newport Beach. In the 1987 publication, "Fire Following Earthquake" issued by the All Industry Research Advisory Council, Charles Scawthorn explains how a post-earthquake urban conflagration would develop. The conflagration would be started by fires resulting from earthquake damage, but made much worse by the loss of pressure in the fire mains, caused by either lack of electricity to power water pumps, and/or loss of water pressure resulting from broken water mains. Furthermore, increased density can affect risk. High-density housing increases the chances of fire spreading from one structure to the next. Also, narrow streets in residential areas (and in the hillside areas) are more difficult for emergency service vehicles to navigate, and the higher ratio of residents to emergency responders affects response times.

Natural hazards do not discriminate, but the impacts in terms of vulnerability and the ability to recover vary greatly among the population. According to Peggy Stahl of FEMA's Preparedness, Training, and Exercise Directorate, 80 percent of the disaster burden falls on the public, and a disproportionate percentage of the burden is placed upon special-needs groups, including the elderly, women, children, minorities, and the poor. As the events associated with the hurricane Katrina in the Gulf Coast showed, vulnerable populations, including seniors, disabled citizens, women, and children, as well as those people living in poverty, are often disproportionately impacted by natural hazards.

The cost of natural hazards recovery can also place an unequal financial responsibility on the general population when only a small proportion may benefit from governmental funds used to rebuild private structures. Discussions about natural hazards that include local citizen groups, insurance companies, and other public and private sector organizations can help ensure that all members of the population are a part of the decision-making processes.

Land and Development

In the earliest days, development in Southern California was a cycle of boom and bust. The Second World War, however, dramatically changed that cycle. Military personnel and defense workers came to Southern California to fill the logistical needs created by the war effort. The available housing was rapidly exhausted and existing commercial centers proved inadequate for the influx of people. Immediately after the war, construction began on the freeway system, and the face of Southern California was forever changed. Home developments and shopping centers sprung up everywhere, and within a few decades the Los Angeles Basin, including the northern portion of Orange County was virtually built out. This pushed new development farther and farther away from the urban center. The largest growth period in the history of Newport Beach indeed occurred in the decade between 1940 and 1950, as discussed previously, when the City's population tripled. More recently, with the development of planned residential communities in the San Joaquin Hills area, the City has again seen a rapid increase in population.

Newport Beach's General Plan addresses the use and development of private land, including residential and commercial areas. This plan is one of the City's most important tools in addressing environmental challenges, including transportation and air quality, growth management, and the conservation of natural resources such as clean water and open spaces. However, the environment of most cities in Southern California is nearly identical with that of their immediate neighbors and the transition from one incorporated municipality to another is often seamless to most people. This means that many of the environmental challenges listed above need to be addressed on a regional scale, rather than on a city-by-city basis, to effect change. Similarly, the area's exposure to natural hazards is similar to that of several neighboring communities, but a city's response to that vulnerability can often be addressed independently. For example, liquefaction susceptible sediments underlie large portions of the Santa Ana River floodplain, oblivious to corporate boundaries. However, a city can choose to implement more strict building codes to study and mitigate the hazard posed by liquefaction, or even restrict development in the most highly susceptible areas, thereby reducing its risk to a level below that of adjoining municipalities with a similar susceptibility but less stringent development codes.

Housing and Community Development

Housing stock is in many direct and indirect ways one of the most important commodities in a city. If a natural disaster, such as an earthquake, flood or landslide, damages several houses, this has a significant impact not only on the residents of those structures, but on the city also. An extreme, but real example of this is New Orleans; more than two years after Hurricane Katrina, entire neighborhoods were vacant, the houses still in ruins. Many past residents of these communities started new lives in other cities and states and have not come back. In 2013, there were 120,000 less people in New Orleans than in 2005, substantially diminishing New Orleans' tax base. The city is rebuilding and recovering, but it has taken time.

In the year 2000, the median value of homes in the City of Newport Beach was estimated at $708,200, whereas in 2010, the median home price in Newport Beach was estimated at $1 Million. According to the U.S. Census Bureau, in the year 2010, there were 44,193 total housing units in the City of Newport Beach, of which 38,751 were occupied (2,841 of these are used occasionally, for seasonal or recreation use). Of the total housing units in 2010, 27,123 (62.1 percent) were single-family homes (1-unit, detached and attached), and 15,685 (35.9 percent) were duplexes, condominiums and apartments (2 or more units). There were approximately 792 (1.8 percent) mobile homes in the City. Sixty-four (64) percent of these housing units were built before the 1980s, before the more recent (and stringent) building and fire codes for public safety were adopted.

Subtle but very measurable changes that can result in an increase in potential loss during a major disaster are occurring constantly in our communities. First, populations are increasing, putting more people at risk within a defined geographic space. Second, inflation constantly increases the worth of real property and permanent improvements. Third, the amount of property owned per capita has increased over time. Information from the U.S. Census Bureau shows gains in average housing standards in the United States over time. The data show that the average size of new homes has continued to increase. The percentage of new houses with large numbers of bedrooms and bathrooms had decreased slightly between 2008 and 2011, but rose again in 2012 (Table 2-7).

Table 2-5: Historical Trends in Housing Standards in the United States

Property per Person	United States			
	1970	1990	2005	2012
Average size of new homes (in square feet)	1,500.	2,080	2,434	2,505
Homes with 4+ bedrooms	24%	2%	39%	41%
Homes with 2½ or more baths	16%	45%	59%	61%

Source: Housing Facts, Figures and Trends: National Association of Home Builders, Public Affairs and National Association of Home Builders Economics, May 2007; Characteristics of New Single-Family Houses Completed, https://www.census.gov/construction/chars/completed.html

If we look at the greatest recorded earthquakes in American history, and compare the level of population and development today with that which existed at the time of these events, the scale of potential damage is staggering (Source: Risk Management Solutions).

- 1886 Charleston, South Carolina M7.3 earthquake. Estimated insured damage if it happened today: $10 Billion.
- 1906 San Francisco earthquake, significant fire following seismic damage. Estimated insured damage if it happened today: $36 Billion.
- 1811-12 New Madrid, Missouri earthquakes, series of 4 earthquakes over 7 weeks. Estimated insured damage if this happened today: $88 Billion.

Employment and Industry

Since the late 1880s, when the McFadden brothers built the Newport Pier and moved their business interests to the wharf, Newport Beach has had a strong financial presence in the area. Traditionally, Newport Beach has been strong in retail, wholesale trade, professional services, and real estate. Other employment and industrial activities with a strong presence in Newport Beach include the service industries, manufacturing, entertainment, and tourism. In 2010, Newport Beach provided about 43,761 jobs; the professional, scientific, management and administrative services sectors combined accounted for the largest percentage (19.7%), followed by education and health-related services (16.9%). Finance, insurance, and real estate services accounted for the third largest percentage (15.7%), followed by retail trade (10.7%), manufacturing (9.9%); art, entertainment, accommodation and food services (8.7%); and construction (4.5%). Occupations of persons 16 years and older, per the 2010 Census, were apportioned as listed in Table 2-8.

Mitigation activities are needed at the business level to ensure the safety and welfare of workers and limit damage to industrial infrastructure. Employees are highly mobile, commuting from surrounding areas to retail, office, and industrial centers. This creates a greater dependency on roads, communications, accessibility and emergency plans to reunite people with their families. Before a natural hazard event, large and small businesses can develop strategies to prepare for natural hazards, respond efficiently, and prevent loss of life and property.

Table 2-6: Employment in Newport Beach by Industry

Employment by Industry	Percent
Agriculture, forestry, fishing and hunting, and mining	0.3
Construction	4.5
Manufacturing	9.9
Wholesale trade	4.3
Retail trade	10.7
Transportation and warehousing, and utilities	1.9
Information	2.4
Finance, insurance, real estate, and rental and leasing	15.7
Professional, scientific, management, administrative and waste mgt.	19.7
Educational, health care and social assistance	16.9
Arts, entertainment, recreation, accommodation and food services	8.7
Other services (except public administration)	3.0
Public administration	1.9

Source: U.S. Census Bureau, 2010 American Community Survey

One of the largest employers in the City is Hoag Memorial Hospital, with over 1,000 physicians on staff, and more than 4,000 employees. Hoag Memorial Hospital Presbyterian is a not-for-profit, acute care hospital. Its campus consists of two hospital towers (West Tower and the Sue & Bill Gross Women's Pavilion), the Hoag Heart and Vascular Institute, the Hoag Cancer Center, an ambulatory surgery center (James Irvine Surgical Center), a childcare center and conference center. Fully accredited by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) and designated as a Magnet hospital by the American Nurses Credentialing Center (ANCC), Hoag offers a comprehensive mix of health care services, including Centers of Excellence in cancer, heart and vascular, neurosciences, orthopedics and women's health services. Additional information regarding Hoag Memorial Hospital is provided in Section 6. Hoag Memorial Hospital was an active participant in the development of the City of Newport Beach Disaster Mitigation Plan.

Transportation and Commuting Patterns

Private automobiles are the dominant means of transportation in Southern California and in the City of Newport Beach, where 81.6 percent of workers 16 years old and over commute to work by car, truck or van that they drive themselves (2010 Census data). Only 3.9 percent of the work force carpools, less than 1 percent use public transportation, and 2.0 percent walk to work. 9.5 percent of the workers in the City work from home.

Public transportation in Newport Beach is provided by the OCTA through an established network of bus routes that link residential areas with employment centers, shopping and recreational areas. There are also paratransit programs, such as the one provided by the Oasis Senior Center and/or OCTA, which provide local transportation to seniors for a nominal fee. The City promotes alternative transportation activities, including bicycle trails, and pedestrian corridors. Equestrian trails are present locally in the Santa Ana Heights area, but these are used solely for recreational purposes, and not for transportation.

Newport Beach has included a mobility plan in its General Plan. The City benefits from a diverse transportation system that includes transit, bicycle, and pedestrian links, as well as vehicular links. The City's local system connects with the larger regional system, and the operation of the two systems is interdependent. The mobility plan establishes how the City manages the local system to provide for the safe and convenient movement of people and goods. It also addresses how the City influences and manages connections with the regional transportation system. Of significant importance is the effective operation of this system especially in the summer, when there is substantially increased traffic in and through the City due to the significant seasonal increase in visitors and population (the City's summer population increases to more than 200,000).

The vision of the mobility plan is to promote an overall transportation system that facilitates the movement of people and goods within and through the City of Newport Beach and accommodates conservative growth within the City.