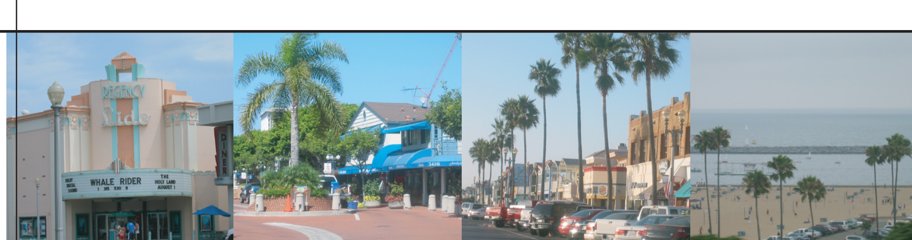
City of Newport Beach General Plan Update

TECHNICAL BACKGROUND REPORT



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Prepared by:
EIP Associates
In association with
Urban Crossroads, Inc.
and
Applied Development Economics

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INTRODUCTION

Chapter 1 INTRODUCTION

1.1 BACKGROUND

The current General Plan for the City of Newport Beach was adopted in 1970. Since then, various elements of the General Plan have been updated although the Plan has not been comprehensively revised until now. Much of the data, analyses, and policies in these documents do not reflect the existing conditions in the City. Thus, an update of the General Plan would be necessary to reflect the current vision for future development within the City of Newport Beach for the next twenty years.

The General Plan update process began in 2001 with a Community Visioning Process to elicit the values, aspirations, and ideas of the Newport Beach community. Lasting a little more than one year, this process led to a series of findings that form a framework for updating the plan and directing future City planning efforts. Details on the visioning process are provided below, in Section 1.6.

1.2 GENERAL PLAN

A General Plan is a State required legal document that provides guidance to decision makers regarding the allocation of resources and determining the future physical form and character of development for cities. It is the official statement of the jurisdiction regarding the extent and types of development needed to achieve the community's physical, economic, social, and environmental goals. Although the General Plan consists of individual sections, or "elements," that address a specific area of concern, it also embodies a comprehensive and integrated planning approach for the jurisdiction.

The General Plan clarifies and articulates the City's intentions with respect to the rights and expectations of the general public, property owners, special interest groups, prospective investors, and business interests. Through the General Plan, the City informs the community of its goals, policies, and development standards, thereby communicating the City's expectations of the private sector in meeting the intentions of the General Plan.

Under State law, each General Plan must contain seven elements:

- Land Use
- Circulation
- Housing
- Conservation
- Open Space
- Noise
- Safety

Government Code Section 65303 permits local jurisdictions to formulate other elements, which, in the "judgment of the planning agency," relate to the physical development of a region. These "optional" elements are as legally binding as a mandatory element, once adopted. The City of Newport Beach has directed that optional elements also be prepared and incorporated into the updated General Plan. These optional elements include the Growth Management Element, and the Harbor and Bay Element.

A list of current elements of the General Plan and when they were last revised is shown in the table below. It is anticipated that there will be a minor reorganization of the existing elements with the update of the General Plan; the specific elements proposed will be determined at a later date.

Required Elements	*Current Elements*
Land Use	Land Use (Adopted in 1988 with amendments in 2000)
Housing	Housing (Council adopted in 2003; document not certified)
Open Space	Recreation and Open Space (1998)
Conservation	Conservation of Natural Resources (1974)
Transportation	Circulation (1996)
Public Safety	Public Safety (1975)
Noise	Noise (1974, amended in 1994)
—	Growth Management (1992)
—	Harbor and Bay (2001)

1.3 TECHNICAL BACKGROUND REPORT

PURPOSE

The purpose of this document, the City of Newport Beach General Plan Technical Background Report (TBR), is to serve as a comprehensive database that describes the City's existing conditions for physical, social, and economic resources. This information includes discussion of the existing characteristics, trends and forecasts, and issues associated with each resource. The planning issues, which were identified based on existing conditions, will be presented as a separate document. The TBR is the foundation document from which subsequent planning policies and programs will be formulated. In addition, the TBR will serve as the "Environmental Setting" section for each technical environmental issue analyzed in the Environmental Impact Report, which will be completed as a component of the preparation of the General Plan.

CONTENTS

This document consists of six chapters, as described below.

- *Chapter 1—Introduction*: This chapter outlines the purpose and contents of this document, as well as defining the Planning Area boundaries, and provides the regional setting.
- *Chapter 2—Community Development*: Chapter 2 includes exhibits identifying General Plan and zoning designations for the Planning Area. Existing land uses within the City, as well as existing specific and development plans, are also described. Lastly, it provides fiscal, population, demographic, and housing information.
- *Chapter 3—Infrastructure*: This chapter provides information on existing infrastructure within the Planning Area. A section that describes the existing circulation system, as well as traffic volumes, capacities, and levels of service are included. Other infrastructure associated with

water, wastewater, storm drain, solid waste, energy, and telecommunications are described. Specifically, existing utility providers, type and capacity of services, and location of infrastructure are discussed.

- *Chapter 4—Public Services*: Information on public services that include fire protection, police protection, education, parks and recreation, and arts and culture are provided in this chapter. Specifically, location of stations, types of services, and response time are provided for fire and police services. Existing school enrollment, as well as locations of facilities and planned improvements, are discussed. Facilities within the Planning Area that provide parks and recreational facilities, and arts and cultural services are described.
- *Chapter 5—Environmental Resources*: Chapter 5 provides information on environmental resources present in the area. These include plants and animals, as well as marine resources. Existing surface and ground water resources and their quality are described. Air quality, topography, visual resources, and mineral resources are also discussed in this chapter. Lastly, historic, archaeological, and paleontological resources are included.
- *Chapter 6—Public Safety*: This chapter provides background information on public safety issues affecting the area. Hazards associated with geology, seismic, flooding, marine, and fire are discussed. Lastly, existing noise conditions are described.

1.4 REGIONAL SETTING

Located in the Southern California region, Newport Beach is at the western edge of Orange County, adjacent to the Pacific Ocean, as shown in Figure 1-1. Generally, Newport Beach is bordered by Costa Mesa to the northwest, Irvine to the northeast, and unincorporated portions of Orange County and Laguna Beach to the southeast. Regional access to the City is provided by several freeways. The 405 Freeway runs north to south within Southern California, and intersects both the 73 and 55 Freeways. State Route 55 extends south from Highway 91 and terminates in the City of Newport Beach. The 73 Freeway extends along the northern boundary of the City, connecting the 55 and 405 Freeways with Interstate 5. Highway 1 (Coast Highway) runs along the California coast and all the way through Newport Beach.

1.5 GENERAL PLAN PLANNING AREA

For the update of the General Plan, the City has identified a Planning Area for which the Plan will provide policies. As shown in Figure 1-2, the Planning Area includes the existing City boundaries, its sphere of influence (SOI), and proposed annexation areas. Annexed in 2002 and 2003, the Newport Coast, Newport Ridge, Bay Knolls, and Santa Ana Heights areas are included within the current City boundaries, which total 13,062 acres, excluding waterways. Approximately 45 acres of the area known as Banning Ranch is within the City's SOI. In addition, the City has jurisdiction of a one-foot strip located along the perimeter of Banning Ranch that totals approximately 25 acres, and Orange County has jurisdiction over the remainder of the area. Proposed annexation areas include the Emerson Tract (Emerson). Area 7 is under consideration for annexation. The City of Newport Beach General Plan TBR provides existing data for the entire Planning Area with the exception of these proposed annexation areas. Information associated with Area 7 and Emerson was not available during preparation of this document.

1.6 GENERAL PLAN PREPARATION PROCESS

As previously mentioned, the update of the City's General Plan began with a Community Visioning Process that was initiated in fall 2001. Beginning in January 2002, the City offered a series of opportunities for residents to become actively involved in the process. These opportunities included a Community Visioning Festival, nine neighborhood workshops, resident and business surveys, and a Community Visioning Summit, as well as several meetings of a citizen General Plan Advisory Committee (GPAC). As a result of these efforts, the City's vision and strategic directions to implement the vision were identified and documented in the *Community Directions for the Future,* January 2003.

The next step of the General Plan update process is the preparation of the TBR. From the key physical, environmental, and economic conditions and trends identified in the technical analyses contained in the TBR, implications for the City will be assessed and presented as planning issues. Consideration of the planning issues, supplemented with findings of the Community Visioning Process, will be crucial in updating the General Plan.

Next, a framework of principles will be identified to guide the formulation of land use alternatives and updated General Plan policies, in consideration of the planning issues. All future policy options should be consistent with these guiding principles.

Alternative land use development scenarios will be formulated in context of the visions and principles previously identified. These alternatives will be evaluated according to their environmental and economic impacts, and a preferred land use plan will be selected based on this evaluation. The update of the General Plan, inclusive of policies, will be based on this land use plan.

Two groups, the GPAC and the General Plan Update Committee (GPUC), are integral to the General Plan process. Approved by the City Council, the GPAC is comprised of 38 people who live and work in the City of Newport Beach. The GPAC provides an advisory role to City staff and its consultants in the General Plan process. Functioning much like a steering committee, the GPUC provides oversight of the General Plan process. The GPUC is comprised of members from the City Council, Planning Commission, other boards, and community leaders.

Figure 1-1 Southern California Regional Map

Fig p.2 (11x17)

Figure 1-2 Planning Area

Fig p.2 (11x17)

Chapter 2
COMMUNITY DEVELOPMENT

Section 2.1 Land Use

Chapter 2 COMMUNITY DEVELOPMENT

2.1 LAND USE

EXISTING CONDITIONS

Information regarding existing land uses and potential development within the City of Newport Beach is presented in this section. It is derived from a visual field survey and discussion with City staff, a review of July 2003 aerial data, and review of adopted Specific Plans, the General Plan, and Zoning Code. The City of Newport Beach Planning Area (as defined in Section 1.5) contains 26,676 acres or 41.7 square miles. The Planning Area includes land and water areas, approximately 13,062 acres of land and 11,119 acres of water. These are net acres and do not include streets and roadways, which account for approximately 20 percent of the total gross land acreage. Approximately 42 percent (11,119 acres) of the Planning Area is water, which includes the Upper and Lower Newport Bay and its channels, and the Pacific Ocean. The following discussion pertains to the 13,062 acres of developed and undeveloped land in the Planning Area.

Existing Land Uses[1]

Existing land uses in the Planning Area have been classified into seven primary categories:

- *Residential*—Residential uses include a mix of housing developed at varying densities and types. Residential uses in the Planning Area include single-family, multiple-family, condominium, mobile, and senior housing.
- *Commercial/Office*—This category includes commercial uses that offer goods for sale to the public (retail) and service and professional businesses housed in offices (accountants, architects, etc). Retail and commercial businesses include those that serve local needs, such as restaurants, neighborhood markets and dry cleaners, and those that serve community or regional needs, such as entertainment complexes, auto dealers, and furniture stores. Visitor-serving retail uses such as hotels, and amusement parks are included in this category.
- *Industrial*—The industrial category includes a mix of manufacturing and light industrial uses, some of which are found in business, research, and development parks. Light industrial activities include warehousing and some types of assembly work. This category also includes wholesaling and warehousing.
- *Governmental, Educational, and Institutional Facilities (GEIF)*—Government buildings, libraries, schools and other public institutions are found in this category. Uses in this category support civic, cultural, and educational needs of residents.
- *Open Space*—This category encompasses public and private recreational spaces, local and regional parks, coastal bluffs and beaches. Recreational areas such as golf courses, also contribute to open space uses in the Planning Area.

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[1] As of Summer 2003, based on visual field surveys and discussions with City staff.

- *Vacant*—Vacant lands are undeveloped lands (as of June 2003) that are not preserved in perpetuity as open space or for other public purposes.
- *Water*—The bay, harbor, channels and reservoirs are included in this category.

Existing land uses are listed below in Table 2.1-1 and illustrated in Figure 2.1-1.

Table 2.1-1 Existing Land Use

Land Use	*Acres*	*Percent of City's Total*
RESIDENTIAL	**5,436.0**	**41.6%**
Single-Family Detached	3,932.8	
Single-Family Attached	625.3	
Two-Family Residential	360.9	
Multi-Family Residential	480.0	
Mixed Residential	37.0	
COMMERCIAL	**1,154.6**	**8.8%**
Retail	382.0	
Administrative, Professional, and Financial	473.0	
Marine and Auto Related	73.7	
Visitor-serving	225.9	
INDUSTRIAL	**114.4**	**0.9%**
Industrial	68.9	
Multi-Tenant Industrial	20.5	
Industrial Business Park	25.0	
OTHER	**6,356.7**	**—**
Government, Educational, Institutional Facilities	446.6	**3.4%**
Quasi-Public	53.5	0.4%
Right of Way/Undesignated	4.8	<1%
Recreation & Environmental Open Space	4,516.4	**34.6%**
Vacant Land	1,260.2	**9.6%**
Water	75.2	**0.6%**
Total	***13,061.7***	***100%***

SOURCE: EIP Associates GIS 2003

Residential

Residential uses represent the largest percentage of total land area in Newport Beach. Within this category, single-family detached homes account for the greatest amount of residential land uses and are distributed throughout the city. Much of the single-family attached housing in the city is located in Newport Crest, the Bluffs and Jasmine Creek. Generally, multi-family residential development is located in the southernmost portion of the city along the beaches, and in Balboa Peninsula areas such as Cannery Village and McFadden Square, and on Balboa Island. In addition, multi-family residential development is located in the northern portion of the City in Bonita Canyon Village and along San Joaquin Hills Road. Large multi-family residential developments are located near Fashion Island Shopping Center and along pockets of Coast Highway.

Figure 2.1-1 Existing Land Use

Fig p.2 (11x17)

The Lido Peninsula has single-family attached homes located next to recreational marine commercial uses. In the northern portion of the city, the area west of Bonita Canyon Village contains a mix of single-family detached and single-family attached uses. Manufactured and/or mobile homes are found along Coast Highway in West Newport, west of Newport Dunes, and near the Newport Pier on the Balboa Peninsula.

Commercial

Administrative, professional, and financial related uses are located throughout the city. A major regional retail center, Fashion Island Shopping Center, is located in the center of the city. Newport Center, one of the prime office and hotel areas in the city, surrounds Fashion Island. The other primary office and hotel uses are found within the vicinity of the Airport.

Retail and service commercial uses are found along major thoroughfares such as: Coast Highway on Mariner's Mile, Balboa Blvd. on the Balboa Peninsula, near the Airport along Bristol North, and along MacArthur Blvd. Neighborhood-serving centers containing uses such as grocery stores, dry cleaners, video stores and restaurants are located throughout the city. Pedestrian-oriented commercial districts include Corona del Mar and Cannery Village.

Some commercial uses in the city attract visitors as well as residents. Visitor-serving uses include but are not limited to hotels, specialty stores, and arcades. Many visitor-serving uses are located in proximity to harbor and coastal areas in the city, such as those found in Central Balboa, Cannery Village, and Newport Coast. Marine recreation areas serving both residents and visitors are found near harbor and bay areas, such as Newport Dunes.

Industrial

The majority of industrial uses in the city are located in the West Newport industrial area east of Banning Ranch, and adjacent to the Airport. Industrial uses in the West Newport industrial area include hospital, medical and light manufacturing uses. Research and development uses are clustered in the Airport Business Area and in a small area off of Jamboree Road.

Governmental, Educational, and Institutional Facilities

Governmental, Educational, and Institutional uses include the City Hall, schools, libraries and religious uses.

Quasi-Public

Private recreational uses such as tennis and yacht clubs, lodges and marinas are located in various portions of the city.

Recreation and Environmental Open Space

Recreational and environmental open space areas can be found along the city's periphery from the Santa Ana River Jetty at the far west, to the beaches along the Pacific Ocean, to the Newport Coast area. Open space rims Upper Newport Bay. Much of Newport Coast is open space interspersed with planned development areas. Parks of varying sizes are located throughout the city.

Water

Newport Beach is adjacent to the Pacific Ocean to the South and contains Newport Harbor at its center. Two reservoirs (Big Canyon, and San Joaquin) are located in the eastern portion of the city. The Santa Ana River lies at the northwest boundary of the city.

Developed Land Uses[2]

Developed lands are those that include existing development, exclusive of land dedicated for open space or recreation areas. These developed areas can be examined in more detail than solely acres of development. Residential uses can be further described by the number of housing or dwelling units located within the residential acreage, while commercial and industrial uses can be defined by the number of square feet (sf) of each type of development. Table 2.1-2 provides summary information for lands developed with residential, commercial, or industrial land uses.

Residential

As of 2000, there were approximately 39,991 dwelling units in the City of Newport Beach (this total includes the Newport Coast and Newport Ridge areas). Single-family dwelling units comprise 40.2 percent of total units, while multi-family structures comprise 57.4 percent of total units.

Commercial/Industrial

Commercial/Industrial development includes office, retail, industrial and research and development uses. There were more than 19,491,508 square feet of commercial and industrial uses as of 2000. Approximately 59.9 percent (11,676,649 square feet) of this development was office related. Retail development comprised approximately 32.0 percent (6,245,630 square feet) of commercial and industrial building area, while industrial uses accounted for 6.4 percent (1,241,820 square feet). Research and development uses represented 1.7 percent (327,409 square feet) of the category.

Table 2.1-2 Existing Development—Residential, Commercial, and Industrial

Land Use	*City of Newport Beach*	*Percent of City's Total*
RESIDENTIAL	**39,991**	**100%**
Single-Family Residential (Dwelling Units)	16,105	40.2%
Multi-Family Residential (Dwelling Units)	22,939	57.4%
Mobile Homes (Dwelling Units)	947	2.4%
COMMERCIAL AND INDUSTRIAL	**19,491,508**	**100%**
Office (Square Feet)	11,676,649	59.9%
Retail (Square Feet)	6,245,630	32.0
Industrial (Square Feet)	1,241,820	6.4
Research and Development (Square Feet)	327,409	1.7

SOURCE: Applied Development Economics 2003

[2] Based on Economic data reported by Applied Development Economics, 2003.

CITY OF NEWPORT BEACH GENERAL PLAN

This section presents information regarding the General Plan Land Use Designations that guide the proposed use and development of lands within Newport Beach. It is derived from the Land Use Element of the Newport Beach General Plan, which was adopted by the City Council in 1988.

A General Plan defines a jurisdiction's policy for land use development within its boundaries. General Plan designations identify the proposed distribution, location, and extent of planned land uses. Designations provide guidelines for the maximum intensity and density of development, such as the number of dwelling units per acre and commercial building square footage.

1988 General Plan Land Use Designations

The City of Newport Beach describes allowable uses within its limits in the Newport Beach General Plan adopted in 1988. The City's Land Use Plan illustrates the proposed use and development of all lands in four major categories:

- Residential
- Commercial/Office
- Industrial
- Public, Semi-Public, and Institutional

These major land use categories are divided into subcategories. The uses described in these categories should be considered as predominant, although different land uses may be present within each category. The General Plan Land Use Designations are illustrated in Figure 2.1-2.

Residential

The residential land use categories defined below reflect various housing product types in the City of Newport Beach. The application of these categories to the Land Use Plan and Map is a way of illustrating the patterns of residential development in the City. In many cases, the descriptions in the classifications allow more than one product type in the area discussed. In those cases, the map illustration is not intended to limit future development to that product type, but is merely a depiction of anticipated development, given the density allowed in the area. The language in the Land Use Element text is the controlling factor in these instances.

The residential land use categories are described below in a specific order that forms a hierarchy of residential land uses. Each residential category allows the uses contained in that description, as well as the allowed residential types described in the preceding category(ies).

- *Single-Family Detached*. This land use category has been applied to all single-family detached subdivisions, and to vacant parcels where the development is anticipated to follow that product type. These areas are characterized by one single-family dwelling constructed on each individual subdivided lot.

- *Single-Family Attached*. This land use category has been applied to existing townhouse and condominium projects of ten dwelling units or more; and to vacant areas where development is anticipated to follow that product type. These are characterized by individually owned, attached dwelling units constructed on common lots or on footprint lots with common open spaces.

- *Two-Family Residential*. This land use category has been applied in areas that allow the construction of two dwelling units, attached or detached, on a single subdivided lot. This category allows either single ownership or condominium development. A minimum of 2,000 sf of buildable lot area is required for two-family development.
- *Multi-Family Residential*. This land use category has been applied where multiple dwelling units are allowed on a single subdivided lot. Smaller condominium and other individually owned attached housing units are also given the designation, and this category allows either single ownership or condominium development.

Commercial

Areas designated for commercial uses are used predominantly for private business ventures, but may also accommodate incidental uses and in certain cases mixed-use residential. The specific character of mixed land uses is defined for each commercial area in the General Plan. Also defined are intensity limits, which usually take the form of a Floor Area Ratio (FAR) or a specific square footage limit. Floor Area Ratio is defined as the ratio of gross building square footage to gross land area.

- *Retail and Service Commercial*. This land use category has been applied to areas that are predominantly retail in character, but also accommodate some service office uses. Uses allowed include retail sales, offices that provide goods or services to the general public, hotels and motels, restaurants, commercial recreation, and senior citizen housing facilities. Separate "corporate" type offices are not allowed in these areas.
- *Administrative, Professional, and Financial Commercial*. This land use category has been applied to areas that are predominantly used for office, but also accommodate support retail and service uses. Uses allowed include corporate, medical and other offices, retail and service commercial, restaurants, hotels and motels, commercial recreation, and senior citizen housing facilities.
- *Recreational and Marine Commercial*. This land use category has been applied to waterfront commercial areas where the City wishes to preserve and encourage uses that facilitate a marine commercial and visitor-serving orientation. Specific and detailed land use provisions are contained in the Local Coastal Program and in the Newport Beach Municipal Code that further refine the land use limitations for each area and set forth incentives for certain types of uses.

  Uses that are given priority include marine commercial (such as marinas, marine supply sales, yacht brokers, boat charters and rentals, boat sales, dry boat storage, boat launching, commercial fishing facilities, marine service stations and gas docks, marine related offices and yacht clubs); marine industrial (such as marine construction, boat repair and servicing, and new boat construction) and visitor-serving commercial (such as social clubs, commercial recreation, hotels, motels, "bed and breakfasts", restaurants and bakeries). Senior citizen housing facilities are also permitted in this category.

Industrial

The industrial land use category is designed to recognize the changing character of industrial land uses in the City. Industrial areas are a mix of manufacturing, research and development, professional service offices (such as architects and engineers), warehousing and support commercial uses.

Figure 2.1-2 General Plan Land Use Designations

Fig p.2 (11x17)

- *General Industry*. This land use category has been applied to those areas that are predominantly used for research and development, manufacturing and professional services. Permitted uses include manufacturing, high technology, warehousing, wholesale sales, professional service offices, service retail, and restaurants.

Public, Semipublic, and Institutional

Areas designated public, semipublic, and institutional are used for publicly-owned facilities, institutions and open space; or for privately-owned facilities of a public use, institutional, or open space nature.

- *Governmental, Educational, and Institutional Facilities*. This land use category has been applied to areas developed with uses that form the physical and social "infrastructure" of the community. Permitted uses include governmental facilities, such as Newport Beach City Hall, Corporation Yard, Utility Yard, police stations, fire stations and libraries, and postal service facilities; educational facilities such as schools and day care centers; and institutional facilities, such as hospitals, churches, utility yards, reservoirs, museums, the YMCA, and senior citizen housing facilities.

- *Recreational and Environmental Open Space*. This land use category has been applied to land used or proposed for open space of both a public and private nature. Some areas which carry this designation are special use open space that are included due to the particular nature of the geographic land form, including beaches, bluffs, canyons, and Newport Bay uplands. These areas provide for active or passive open space use, depending on the nature of the area. Other areas designated for open space can be used for a wide range of public and/or private open space uses, including parks (both active and passive), wildlife refuges, golf courses, yacht clubs, marina support facilities, aquatic facilities, tennis courts, private recreation facilities, drainage courses, interpretive centers, greenbelts, and landscaped areas.

Distribution of 1988 General Plan Land Use Designations

The adopted General Plan land use designations for the City of Newport Beach are shown in Table 2.1-3.

- Nearly half of the City's total acres are designated for **Residential** development. Within the Residential category, single-family residential dominates with the *Single-Family Detached* category accounting for 31.3 percent (4,088 acres) followed by *Single-Family Attached* at 11.4 percent (1,490 acres). Single-Family Detached and Single-Family Attached are designated land uses in the Corona del Mar, Newport Heights, Upper Newport Bay, Lido Isle, Newport Shores, Banning Ranch, Big Canyon, Harbor View, Bonita Canyon Village, and Newport Coast areas. *Single-Family Attached, Single-Family Detached* (74 acres) is designated north of Ford Road and east of Jamboree Road in the Central portion of the City. The *Single-Family Attached, Recreational Marine Commercial* designation applies to five acres on the Lido Peninsula.

Table 2.1-3 General Plan Land Use Designations		
Land Use	*Acres*	*Percent of City's Total Acres*
RESIDENTIAL	**6,432**	**49.3%**
Single-Family Detached	4,088	31.3%
Single-Family Attached	1,490	11.4%
Two-Family	374	2.9%
Multi-Family	480	3.7%
COMMERCIAL AND INDUSTRIAL	**1,242**	**9.4%**
Retail	551	4.2%
Administrative, Professional and Financial	607	4.6%
Recreation and Marine Commercial	84	0.6%
INDUSTRIAL	**101**	**0.8%**
RECREATION AND ENVIRONMENTAL OPEN SPACE	**4,702**	**36.0%**
GOVERNMENT, EDUCATIONAL AND INSTITUTIONAL	**472**	**3.6%**
UNDESIGNATED/RIGHT-OF-WAY	**38**	**0.3%**
WATER	**75**	**0.6%**
Total	***13,062***	***100%***
SOURCE: City of Newport Beach Planning Department 2003		

Two-Family Residential, which allows for the construction of two dwelling units, attached or detached, on a single subdivided lot, and *Multi-Family Residential*, which allows for multiple dwelling units on a single subdivided lot, comprise 2.9 and 3.7 percent (374 and 480 acres) respectively, of residential uses. Two-Family Residential development is designated in the southernmost portion of the City along the beaches, in the Cannery and McFadden Square districts, in Corona del Mar, and on Balboa Island. The majority of Multi-Family Residential development is designated in the central portion of the City, north of Fashion Island Shopping Center, Bonita Canyon Village, east of Newport Shores, and just south of Coast Highway, near Linda Isle. *Multi-Family Residential and Administrative, Professional, and Financial Commercial* designation applies to one acre located east of Banning Ranch.

- **Commercial** designated land uses comprise 9.4 percent of the City's land area. Within this category, the *Retail and Service Commercial* designation makes up 4.2 percent (551 acres) and is designated mainly along commercial corridors such as Mariner's Mile and Corona del Mar along Coast Highway, in the Fashion Island Shopping Center, on the Balboa Peninsula and Balboa Island, and within the Airport Business area. There are also pockets designated in the eastern portion of the City, north of Coast Highway, adjacent to Newport Coast Drive. The *Retail and Service Commercial, General Industry* land use category is designated northwest of the Lido Peninsula and comprises six acres of commercial uses.

  The *Administrative, Professional, and Financial Commercial, and General Industry* categories designate those areas of the City that are predominantly used for office but also support retail and service uses. These uses are concentrated around the Airport, north of the Corona del Mar Freeway, and around Fashion Island Shopping Center, and comprise 607 acres or 4.6 percent of commercial uses.

Recreational and Marine Commercial has been applied to waterfront commercial areas in order to facilitate marine commercial or visitor-serving uses, and *Recreation and Marine Commercial, Multi-Family Residential*, which extends this category to include multi-family housing, are both found along Coast Highway, along the Lido Channel, and west of Newport Dunes. These designations account for 84 acres, or 0.6 percent of land area.

In addition, certain areas have been designated for special planning or additional study, leading to the development of Specific Area Plans for physical improvement. These Specific Area Plans may include local street pattern revisions, designated parking areas, specific public improvements in the street right-of-way (such as landscaping, lighting, street furniture and signs), architectural design standards and criteria for private development. These Specific Plans pertain primarily to commercial areas.

- **Industrial** uses comprise approximately 0.8 percent (101 acres) of the City's land area. The *Industrial* category is designated east of the Newport Shores area, north of Coast Highway, and adjacent to the Airport. This designation applies to those areas that are used for research and development, manufacturing, and professional services.
- Other designated land uses in the City include **Governmental, Educational, and Institutional Facilities**, which together account for 3.6 percent (472 acres) of the City's land area. This designation is found throughout the City, and has been applied to areas developed with uses that form the physical and social "infrastructure" of the City.
- The **Recreation, Environmental, Open Space** land use designation applies to 36 percent (4702 acres) of the City, for land used or proposed for open space of both a public and private nature. This category and these types of uses are located throughout the City. Some areas which carry this designation are special use open spaces, including beaches, bluffs, canyons, and Newport Bay uplands.
- Approximately 0.3 percent (38 acres) of land within the City is **Undesignated**, and/or used as public **Right-of-Way**. This designation applies to land located just south of the Corona del Mar Freeway, and the City's Sphere of Influence Boundary.

COMPARISON OF EXISTING LAND USES AND GENERAL PLAN DESIGNATIONS

Table 2.1-4 provides a comparison between the City's General Plan designations and existing development. For most categories shown, the designated areas have development potential that meet or exceed the areas of existing development. The difference in acreage between existing land uses and General Plan designations indicates a potential for development exists under the current General Plan, but does necessitate that the development occur. This difference does not include any recycling or infill development that could occur on previously developed lands. The calculations include the City's Sphere of Influence area.

Table 2.1-4 Comparison of Existing Land Uses vs. General Plan Designations			
Existing Land Use Category	*Existing Land Use (Net Acres)*	*General Plan (Net Acres)*	*Difference (GP-LU)*
RESIDENTIAL	**5,436**	**6,432**	**996**
Single-Family Detached	3,932.8	4,088	155
Single-Family Attached*	662.3	1,490	828
Two-Family	360.9	374	13
Multi-Family	480.0	480	0
COMMERCIAL AND INDUSTRIAL	**1154.6**	**1,242**	**87**
Retail**	607.9	551	–57
Administrative, Professional and Financial	473	607	134
Recreation and Marine Commercial	73.7	84	10
INDUSTRIAL	**114.4**	**101**	**–13**
RECREATION AND ENVIRONMENTAL OPEN SPACE	**4,516.4**	**4,702**	**186**
GOVERNMENT, EDUCATIONAL AND INSTITUTIONAL	**500.1**	**472**	**–28**
UNDESIGNATED/RIGHT-OF-WAY	**4.8**	**38**	**33**
WATER	**75.2**	**75**	**0**
VACANT	**1,260.2**	**—**	**–1,260.2**
Total	***13,062***	***13,062***	***0***

SOURCE: City of Newport Beach Planning Department 2003

* Single-Family Attached category includes Mixed Residential land uses.

** Retail category contains visitor-serving uses, which can also be found in areas designated Admin/Prof/Finance. Data is not disaggregated; therefore entire sum of visitor-serving is included within the retail category.

CITY SPHERE OF INFLUENCE

The Sphere of Influence (SOI) surrounding the City is demarcated by the Local Agency Formation Commission (LAFCO) and represents the "probable ultimate physical boundaries and service area" of the City (refer to Figure 1-2). The LAFCO is a State-mandated agency formed to discourage urban sprawl and to encourage orderly and efficient provision of services, such as water, sewer, fire protection, etc. A major function of a sphere of influence is to facilitate coordination and sequencing of annexations to a city. In addition, a SOI helps guide the LAFCO consideration of specific annexation requests.

The area known as Banning Ranch, located in the western portion of the Planning Area, along with the Emerson Tract, located south of 21st Street and Tustin Avenue, represents the current City of Newport Beach SOI, and is included in the calculations in Table 2.1-4. West Santa Ana Heights, including the Santa Ana Country Club and Area 7, is currently under consideration for addition to the City's SOI. West Santa Ana Heights is currently within the City of Costa Mesa's SOI.

DEVELOPMENT PLANS

Newport Coast/Newport Ridge Development Plan

While many development plans exist for portions of the city, the Newport Coast/ Newport Ridge Development Plan is unique because it is the only current plan subject to another jurisdiction's entitlement process. This area was annexed from the County of Orange in 2002. The Newport Coast/Newport Ridge Development is a planned development under construction in the southeastern portion of the City. This development will contain housing, commercial uses, a school or other public facility, resort development, recreational and environmental open space, and preserved open space. At build out, the plan area will contain up to 3,063 single-family units, and 1,763 condominium units, and a total population of 11,601.[3]

Specific Plans

The City has identified Specific Plans for several areas of Newport Beach. Specific Plan areas are shown on Figure 2.1-3. The Specific Plans establish policies to guide the orderly development and improvement of the plan areas. The Specific Plans include land use plan maps, design guidelines and development standards for each Specific Plan area. Specific Plan areas include the following:

- *Newport Shores Specific Plan.* Newport Shores is planned to serve as a residential neighborhood. The intent of the Specific Plan is that "a portion of the commercial strip on the West Coast Highway be rezoned to a two-family district" and that a service commercial area be accommodated that provides convenience goods and services to nearby residences.
- *Cannery Village/McFadden Square Specific Plan.* The Cannery Village area is intended to serve as an active pedestrian-oriented specialty retail area with a wide range of visitor-serving, neighborhood commercial and marine-related use. The focus of the area is the establishment of a specialty retail district. Mixed-use is permitted. The McFadden Square area is designated for "Retail and Service Commercial" uses, providing for a broad range of coastal-related and visitor-serving commercial uses. The Specific Plan is intended to result in "higher quality" uses to upgrade the area.
- *Central Balboa Specific Plan.* The Central Balboa Specific Plan is intended to promote preservation of the historic character of the area while remaining a pedestrian-oriented central business district. The Specific Plan seeks to maintain a district that is year-round, with active commercial and recreational uses that serve the needs of the permanent residents and visitors of the Balboa Peninsula.
- *Old Newport Blvd Specific Plan.* The Specific Plan is intended to enhance the appearance, access and identity of the area as one of the primary entry points to Newport Beach and to encourage redevelopment and upgrading of Old Newport Boulevard as a commercial and mixed-use district with retail sales and office opportunities. The Specific Plan establishes guidelines and standards for new development, public improvements and landscaping that will encourage harmonious transitions and minimize conflicts between different uses.
- *Mariner's Mile Specific Plan.* This Specific Plan encourages a continuation of marine-oriented and visitor-serving uses, maintains the marine theme and character of the area, and encourages public physical and visual access to the bay. The area inland of Coast Highway is designated for "Retail and Service Commercial" use. This area is intended to serve as an active

[3] Build out data from the Fiscal Impact Analysis and Model, January 2004 prepared by Applied Development Economics, Inc.

pedestrian-oriented retail area with a wide range of visitor-serving, neighborhood commercial and marine-related uses.

- *Corona del Mar Specific Plan.* This Specific Plan has not been adopted.
- *Santa Ana Heights Specific Plan.* The intent of the Specific Plan is to encourage the upgrading of existing residential neighborhoods and business areas and to buffer adjacent residential neighborhoods from commercial areas. The Specific Plan also seeks to enhance equestrian opportunities within the residential equestrian neighborhood and enhance the overall aesthetic character of the community.

REGULATORY SETTING

State

Local Coastal Program

The California Coastal Act (California State Public Resources Code, Division 20, Sections 30000 *et seq*.) directs each local government lying wholly or partly within the Coastal Zone, as defined by the Coastal Act, to prepare a Local Coastal Program for its portion of the Coastal Zone. More than 63% of the City is in the local coastal zone. Local Coastal Programs are used to carry out the policies and requirements of the Coastal Act by local governments. Local Coastal Programs must be reviewed and certified by the California Coastal Commission before being implemented by a local government.

The Local Coastal Program is divided into two components: (1) a coastal element or coastal land use plan and (2) an implementation program. The coastal element provides a technical synopsis of the resources located within the Coastal Zone. The document discusses resources in the context of a coastal zone overview; subarea description and land use plan; shoreline and coastal resource access; public recreational and visitor-serving commercial facilities; visual resources; historic and cultural resources; water and marine resources; environmentally sensitive habitats; energy facilities; water, sewer, and drainage facilities; and hazards. Issues, goals, objectives, and policies related to each of these areas are also provided. The Implementation Program provides the mechanism to implement each of the identified policies. As of early 2004, the City is in the process of attaining LCP certification; once certified, the City will be able to issue most Coastal Development Permits, a process currently under jurisdiction of the Coastal Commission.

Local

Zoning

Zoning is the instrument that implements the land use designations of the General Plan. In addition to establishing permitted uses, zoning may also establish development standards relating to issues such as intensity, setbacks, height, and parking. Projects submitted for review and approval are generally evaluated for consistency with the zoning designations.

Zoning Districts

The City of Newport Beach's General Plan and Zoning Ordinance controls the boundaries of the zoning districts in the City as well as the zoning regulations that are in effect in each district. Zoning districts are designed to protect citizens and their homes and businesses from conflicting activities in scope or purpose within the vicinity. For example, you cannot conduct a commercial business in a

Figure 2.1-3 Specific Plan Areas

Fig p.2 (11x17)

residential area except under certain conditions. Newport Beach has more than twenty zoning designations within its boundaries as illustrated in Figure 2.1-4. District types are as follows:

- Residential districts are designed for dwellings and to promote family life.
- Business districts contain commercial retail and office businesses.
- Industrial districts allow the operation of assembly and research and development businesses.
- Open Space districts contain undeveloped land and allow recreation facilities.
- Planned Community and Specific Plan districts are established with supplemental zoning requirements that encourage cohesive development within a specific area.

Airport Land Use Law

This law requires counties containing airports to prepare an Airport Environs Land Use Plan (AELUP) to provide for the orderly growth of public use airports for a 20-year span and minimize land use conflicts over height and noise within the surrounding area. The AELUP may include building height restrictions, specify allowable land uses, and determine building standards (including soundproofing) within the planning area of each airport. Once an AELUP has been adopted, pertinent city and county general plans and other local land use and building regulations must be made consistent with the AELUP unless findings can be made to justify not making amendments. While John Wayne Airport is not within Newport Beach incorporated City limits, it is immediately adjacent to the northernmost portion of the city referred to the as the "Airport Business Area". This area is therefore subject to compliance with the Orange County AELUP.

Growth Management

The Growth Management Element of the General Plan was adopted in May 1992, and mandates that growth and development in the City be based on the City's ability to provide an adequate circulation system. Additionally, many Federal, State, and local plans and laws affect growth management within Newport Beach. These include regional jurisdictions such as the County of Orange. Regulatory frameworks have been set forth by the Orange County Growth Management Plan, the Southern California Association of Governments (SCAG) Regional Comprehensive Plan, State Assembly Bill 471 (Proposition 111—Congestion Management), and Measure M (Orange County).

Measure M

In November 1990, Orange County voters approved Measure M, a half-cent sales tax provision for transportation improvement projects. The Orange County Transportation Authority (OCTA), which is the County's transportation monitoring authority, oversees the implementation of Measure M. Local jurisdictions receive Local Turnback funds based on their taxable sales, total population and Master Plan of Arterial Highways (MPAH) mileage. Each jurisdiction must re-qualify on a yearly basis for eligibility to receive funding for the Measure M and Congestion Management Programs by submitting specific documentation. The City of Newport Beach will receive approximately $1,086,000 in Funds from Measure M in Fiscal Year 2003/04. For Fiscal Year 2003/04, in order to continue to receive funding, the City was required to have satisfied the following requirements by June 30, 2003:

- Adopt a Seven-Year Capital improvement Program (CIP) that includes all projects with Measure M funding. This program is a continuation of the CIP adopted last year with other projects to reflect funding priority changes.
- Certify the requirements of the Maintenance of Effort (MOE).
- Submit a Pavement Management Program (PMP) Update to OCTA.

The City has complied with the above criteria since the inception of the Measure M program in Newport Beach in 1993. Since that time the City has received approximately $8.3 million in Measure M Local Turnback funds.

Additionally, the City has received approximately $12.2 million from the OCTA Measure M Competitive program since 1993. The Competitive program requires jurisdictions to submit an application for funding. The applications are then graded on specific criteria and funds are awarded to the jurisdictions with the highest rankings. Types of projects funded under Measure M include road widening, addition of turn lanes, new roads, curbs, gutter, sidewalks and traffic signals.

Transportation Demand Management Ordinance

In 2002, the City Council of Newport Beach implemented a Transportation Demand Strategy as part of a region-wide effort to reduce traffic congestion, improve air quality, conserve energy, and enhance the effectiveness of existing transportation facilities.

The City wrote the Transportation Demand Management Ordinance to meet the requirements of Government Code Section 65089(b)(3), which requires the addition of a trip reduction ordinance and travel demand element to the Congestion Management Program, and Government Code 65089.3(b), which requires adoption and implementation of a Trip Reduction and Travel Demand Ordinance. The ordinance became effective on July 23, 2002.

The Ordinance applies to all new, non-residential development projects that are estimated to employ a total of one hundred (100) or more persons, or the current limit set by the South Coast Air Quality Management District in Rule 2202, whichever is lower at the time of project submittal.

The Ordinance states that the City will not issue any building or grading permit, or allow construction to commence on any new, nonresidential project (as described in the Ordinance) until the Planning Commission makes written findings that a Transportation Demand Management Program has been developed, which will do all of the following:

- Reduce the number of peak-period vehicle trips generated in association with the additional development,
- Promote and encourage the use of alternative transportation modes, such as ridesharing, carpools, vanpools, public transit, bicycles and walking, and
- Provide those facilities that support such alternate modes.

Traffic Phasing Ordinance

The Traffic Phasing Ordinance evaluates new development projects and their future impacts on roadways. The Ordinance requires developments generating more than 300 daily cares to complete a study and to make roadway improvements if significant impacts result.

Measure S

In November 2000, voters in the City of Newport Beach approved Measure S, an amendment to the Newport Beach City Charter. Measure S amends the City Charter by adding Section 423, which requires voter approval of certain amendments to the Newport Beach General Plan. In its text, Measure S suggests that the City Council adopt implementing guidelines consistent with its purpose and intent. Thus, after conducting a series of public meetings to gather public input on Measure S Guidelines, the City Council adopted implementing guidelines determined to be consistent with the Measure's purpose and intent. The guidelines outline the information to be provided to the applicant, the Planning Commission, and the City Council during the amendment process. They also describe the informational and procedural requirements after amendment approval to determine if voter approval is required by Measure S. As required, the City Council shall submit the amendment to voters if:

- The amendment relates to a non-residential use and authorizes an increase in floor area for the entire property or geographical area that is the subject of the amendment that exceeds 40,000 square feet when compared to the General Plan before approval of the amendment; or
- The amendment relates to a residential use and authorizes an increase in the number of dwelling units for the entire property or geographical area that is the subject of the amendment that exceeds 100 dwelling units when compared to the General Plan before approval of the amendment; or
- The amendment modifies the type or amount of residential use or non-residential use specified for the property or geographical area that is the subject of the amendment such that the proposed use(s) as approved by the amendment generate(s) at least 101 more morning or evening peak hour trips than allowed use(s) before the amendment; or
- The increase in morning or evening peak hour trips, dwelling units, or floor area resulting from the amendment when added to 80 percent of the increases in morning or evening peak hour trips, dwelling units, or floor area resulting from prior amendments exceeds one or more of the voter approval thresholds in Measure S as specified above.

Current development limits for each statistical area are listed in the current adopted General Plan Land Use Element.

Figure 2.1-4 Zoning Classifications

Fig p.2 (11x17)

2.1.1 Special Study Areas

Newport Beach developed as distinct villages due in part to its proximity to the waterfront and in response to the landforms created by coastal processes. This section examines land uses in detail for specific areas of the City. The pattern of Newport Beach's development is described in Section 2.2 Urban Form. A few of the long-standing villages are identified for study in this section, along with Specific Plan Areas that have been previously identified for analysis by the City. Several of the areas are identified for study due to the nature of changing land uses and/or economies within the area. A few of the areas are included as they present opportunities to protect and preserve what remains of their village character. Study area descriptions are based on visual field surveys conducted in summer 2003. These descriptions represent generalized land use data organized by categories of uses that are described at a finer level of detail than the citywide existing land use data. Tables identifying acreage data and figures illustrating land uses are presented for each study area.

Santa Ana Heights

Santa Ana Heights is bound by Bristol Street North to the north, Mesa Drive to the South, Irvine Avenue to the west, and Bay View Avenue to the east. This study area is primarily residential, with a mix of commercial and professional office uses, such as business park developments. Table 2.1-1(a) and Figure 2.1-1(a) detail land uses in the study area. Residential uses account for 56.1 percent of land uses in the area; of that, the majority is single-family homes. The commercial land uses are concentrated along the northern boundaries of the study area, and open space lies to the west. Commercial lands comprise about 20 percent of the study area, with professional office uses representing the largest commercial use. This study area lacks most neighborhood-serving commercial uses, such as a grocery, banks, gyms, and restaurants. Open space along the Santa Ana Delhi Channel comprises almost 19 percent of the area's land uses. Vacant buildings account for 2.3 percent of land uses, while 1.3 percent of the area is vacant. This area was originally developed under Orange County Planning jurisdiction. This area was annexed to the City in 2003, when the City adopted the County Specific Plan for the area.

Business park development in Santa Ana Heights

Office uses

Table 2.1-1(a) Santa Ana Heights Area—Detailed Existing Land Use		
Land Use	***Acres***	***Percent of Total Land in Area***
RESIDENTIAL	**108.7**	**56.1%**
SF Residential	106.9	55.2
MF Residential	1.8	0.9
COMMERCIAL	**39.7**	**20.5%**
Professional Office/Business/Medical/Vet	25.3	13.0
Multi-Tenant Commercial	6.7	3.5
Auto-Related Commercial	3.9	2.0
Dine-in Restaurant	3.2	1.7
Fast Food Restaurant	0.5	0.2
Food Stores	0.2	0.1
INDUSTRIAL	**1.4**	**0.7%**
Business Park Industrial	1.4	0.7
OTHER	**44.1**	**22.7%**
Open Space	36.4	18.8
Vacant Building	4.5	2.3
Vacant Lot	2.6	1.3
Schools	0.6	0.3
Total	***193.8***	***100%***

SOURCE: EIP Associates GIS 2003

Slight discrepancy due to rounding may occur with data.

Figure 2.1-1a Santa Ana Heights Existing Land Use

Fig p.2 (11x17)

Mariner's Mile

Mariner's Mile is primarily auto-oriented. The study area is located along Coast Highway, which runs north to south, from the Arches Bridge at the north, to Dover Drive at the south. The study area is comprised of commercial land uses just east and west of Coast Highway. Table 2.1-1(b) and Figure 2.1-1 (b) detail land uses in the study area. Commercial uses account for 82.9 percent of land uses in the study area: a mix of marine-related commercial uses (boat sales, sailing schools, marina), some auto-related uses (auto dealerships and service) and neighborhood-serving commercial are located throughout the area. The Balboa Bay Club and Resort, a hotel and a private club located on City tidelands, represents 19.4 percent of uses in the study area. Marine related uses account for 12.8 percent of the area, while auto-oriented uses account for 9.0 percent of the area. Multi-tenant commercial uses that combine a number of related or complementary uses in a single building or buildings that are connected physically or through design, account for almost 25 percent of area land uses.

Waterfront development, such as dockside restaurants, is concentrated on the southern side of Coast Highway, while there are more general commercial uses along the northern side. Secondary uses include salons, restaurants, apparel, and other specialty shops ranging from wine stores to home furnishings stores.

There are a high number of vacancies in Mariner's Mile relative to the other study areas; 8.5 percent of the area contains vacant buildings. Many of these vacancies are sites with development potential, which raise questions about the community's long-term vision for the area along with the area's ability to accommodate additional traffic. The City has recently embarked on a plan, Mariner's Mile Strategic Vision and Design Plan, to create a pedestrian-friendly area along the northern portion of Coast Highway with new landscaping and streetscape amenities. Parts of the study area may not easily adopt a pedestrian character as uses and urban form vary in the area, and traffic on Coast Highway is heavy. In addition, there is a possibility that Coast Highway could be widened in this area in the future, which would detract from the intentions of a more pedestrian-friendly environment. The variety of commercial uses along Mariner's Mile could present issues of use compatibility as well. An issue to consider is how future development will affect the character of Mariner's Mile, and what kind of uses the community would like to have in this area. The western half of this study area is within the Mariner's Mile Specific Plan area.

Newly renovated neighborhood serving commercial

Older neighborhood serving uses

Auto-oriented development in Mariner's Mile

Pedestrian-oriented streetscape along Coast Highway

Table 2.1-1(b) Mariner's Mile Area—Detailed Existing Land Use

Land Use	*Acres*	*Percent of Total Land in Area*
RESIDENTIAL	**0.5**	**0.8%**
Multi-Family Residential	0.5	0.8
COMMERCIAL	**53.7**	**82.9%**
Multi-Tenant Commercial	16.1	24.8
Hotel	12.6	19.4
Marine-Related Commercial	8.3	12.8
Auto-Related Commercial	5.8	9.0
Professional Office/Business/Medical/Vet	4.1	6.3
Dine-in Restaurant	3.4	5.3
Fast Food Restaurant	1.9	2.9
Furniture/Home Furnishings	1.0	1.5
Personal Services	0.3	0.5
Community Related Commercial	0.2	0.4
INDUSTRIAL	**0.5**	**0.8%**
Multi-Tenant Industrial	0.5	0.8
OTHER	**10.0**	**15.5%**
Vacant Building	5.5	8.5
Schools	2.2	3.3
Public Parking Lot	1.3	2.0
Public/Semi Public	0.5	0.8
Vacant Lot	0.5	0.8
Total	***64.8***	***100%***

SOURCE: EIP Associates GIS 2003

Slight discrepancy due to rounding may occur with data.

Figure 2.1-1b Mariner's Mile Existing Land Use

Fig p.2 (11x17)

Newport Center / Fashion Island

Newport Center is situated in the center of the city, north of Coast Highway, with Fashion Island as its nucleus. Together the two areas form the study area that is primarily commercial; commercial uses represent 57.4 percent of land uses. Table 2.1-1(c) and Figure 2.1-1(c) detail land uses in the study area. Fashion Island is a retail area, containing a regional mall and a mix of specialty shopping that account for 15.8 percent of the uses within the study area. Newport Center consists of professional office uses (26.6 percent of the study area), hotel (6.3 percent), multi-tenant commercial (5.9 percent), and entertainment (1.5 percent) uses along the perimeter of Newport Center Drive.

Within the study area, there is a large open space parcel (26.1 percent) used as the Newport Beach Country Club and some residential uses (10.4 percent). These are located in the western portions of the study area. There is also a considerable amount of vacant land (approximately 16 acres) between MacArthur Blvd. and Avocado Avenue. The study area is largely built out, but there has been discussion of future development of office, hotel, retail, and residential uses.

Professional offices along Newport Center Drive

Business park offices in Newport Center

Table 2.1-1(c) Newport Center / Fashion Island Area—Detailed Existing Land Use

Land Use	*Acres*	*Percent of Total Land in Area*
RESIDENTIAL	**53.7**	**10.4%**
SF Residential	27.0	5.2
MF Residential	26.7	5.2
COMMERCIAL	**296.0**	**57.4%**
Professional Office/Business/Medical/Vet	137.4	26.6
Regional Shopping Mall	81.4	15.8
Hotel	32.5	6.3
Multi-Tenant Commercial	30.2	5.9
Entertainment	7.5	1.5
Auto-Related Commercial	3.4	0.7
Specialty Retail	2.2	0.4
Personal Services	0.6	0.1
Fitness/Gyms	0.6	0.1
Dine-in Restaurant	0.2	0.0
OTHER	**166.4**	**32.2%**
Open Space	134.8	26.1
Vacant Lot	16.8	3.3
Public/Semi Public	14.8	2.9
Total	***516.1***	***100%***

SOURCE: EIP Associates GIS 2003
Slight discrepancy due to rounding may occur with data.

Figure 2.1-1c Newport Center / Fashion Island Existing Land Use

Fig p.2 (11x17)

West Newport Industrial

The study area is generally bounded by Newport Boulevard to the east, 16th Street to the north, and abuts residential neighborhoods to the southwest. This study area is a mix of industrial (32.9 percent of land uses), professional/medical office (13.2 percent), and residential (41.8 percent) uses. Table 2.1-1(d) and Figure 2.1-1(d) detail land uses in the study area. Other uses include industrial uses on Superior Avenue, public uses (such as the City Corporation Yard), Carden Hall Elementary School in the north, and single-family residential uses located directly southeast of industrial uses on Superior Avenue. Development in the area dates back to mid-century. There are few neighborhood-serving retail uses in the study area (about 2.0 percent of the area).

While not located within the study area, Hoag Hospital just south of the study area is a strong presence. The proximity of Hoag Hospital to West Newport Industrial and Old Newport Blvd. study areas may be a draw for new medical and related uses, and has a potential to influence the existing uses and character of these areas.

There are significant amounts of multi-family uses (32.1 percent) in the center of the study area, separating industrial uses to the north and south of the area. Light industrial uses (30.0 percent) account for the majority of industrial uses in the area, while marine-related industry and multi-tenant use together account for less than 3.0 percent of the area. The mix of industrial and residential uses is not always complementary within and at the edges of the study area. Some discussion has arisen as to the future of the study area as an industrial area.

Light Industrial uses in West Newport

Hoag Hospital

Table 2.1-1(d) West Newport Industrial Area—Detailed Existing Land Use

Land Use	*Acres*	*Percent of Total Land in Area*
RESIDENTIAL	**59.3**	**41.8%**
MF Residential	45.6	32.1
SF Residential	11.2	7.9
Residential	2.4	1.7
COMMERCIAL	**24.5**	**17.2%**
Professional Office/Business/Medical/Vet	18.8	13.2
Auto-Related Commercial	2.6	1.8
Multi-Tenant Commercial	1.4	1.0
Fitness/Gyms	0.8	0.6
Furniture/Home Furnishings	0.5	0.3
Food Stores	0.3	0.2
INDUSTRIAL	**46.8**	**32.9%**
Light Industrial	42.6	30.0
Marine-Related Industrial	2.3	1.6
Multi-Tenant Industrial	1.9	1.3
OTHER	**11.5**	**8.1%**
Schools	5.1	3.6
Public/Semi Public	3.4	2.4
Vacant Lot	3.0	2.1
Total	***159.7***	***100%***

SOURCE: EIP Associates GIS 2003
Slight discrepancy due to rounding may occur with data.

Figure 2.1-1d West Newport Industrial / Old Newport Boulevard Existing Land Use

Fig p.2 (11x17)

Old Newport Boulevard

This study area is situated east of Newport Boulevard and runs from 15th Street at the north end to Catalina Drive at the south end. Old Newport Boulevard was formerly the primary roadway leading into the city from the north. A residential neighborhood lies directly to the east. This study area is primarily commercial (71.3 percent of the area) comprised mainly of professional offices, and multi-tenant commercial uses. Secondary uses include personal services, restaurants, and specialty shopping such as home furnishing stores and beauty salons. Table 2.1-1(d2) and Figure 2.1-1(d) detail land uses in the study area. Most specialty retail appears to occupy converted residential buildings. Recently, this study area has experienced a transition towards increased medical office uses. This transition is likely attributable to the proximity of Hoag Hospital, which is located directly west of the study area across from Newport Blvd.

There are two vacant buildings at the northern end of the study area, (3.5 percent of the area), as well as a few auto-related uses (4.7 percent) such as auto service repair. The mix of uses is not always complementary, with auto repair uses adjacent to hair salons and/or specialty retail. This study area is not pedestrian-oriented. While there are some walkable areas, there are a mix of uses and lot configurations that do not create a consistent walkway. This study area is within a Specific Plan area.

Personal services commercial along Old Newport Blvd.


Scale is not pedestrian-friendly

Table 2.1-1(d2) Old Newport Boulevard Area—Detailed Existing Land Use		
Land Use	***Acres***	***Percent of Total Land in Area***
RESIDENTIAL	**0.6**	**5.3%**
SF Residential	0.6	5.3
COMMERCIAL	**8.7**	**71.3%**
Professional Office/Business/Medical/Vet	5.9	48.6
Multi-Tenant Commercial	2.2	18.0
Personal Services	0.6	4.8
Auto-Related Commercial	0.6	4.7
Building/Hardware/Garden Supply	0.5	3.9
Marine-Related Commercial	0.4	3.4
Dine-in Restaurant	0.4	3.2
Community-Related Commercial	0.2	1.7
Specialty Retail	0.1	1.2
Drinking Establishment	0.1	1.0
OTHER	**0.4**	**3.5%**
Vacant Building	0.4	3.5
Public/Semi Public	0.1	0.7
Total	***12.2***	***100%***

SOURCE: EIP Associates GIS 2003

Slight discrepancy due to rounding may occur with data.

Central Balboa

Central Balboa is the historic center for commercial, recreational and social activities in the community. Central Balboa is located on the Balboa Peninsula between Coronado Boulevard to the northwest, and A Street to the southeast. Table 2.1-1(e) and Figure 2.1-1(e) detail land uses in the study area. This study area has a mix of commercial uses that represent 33.5 percent of land uses within the area. Of the retail uses, multi-tenant buildings with a variety of commercial uses are the largest commercial land use, representing 15.3 percent of the area. The retail uses are a mix of neighborhood-serving and visitor-serving commercial, i.e., ice cream, bike rentals, and T-shirt shops. Fast food and dine-in restaurants, apparel and specialty shops predominate along Balboa Boulevard and Bay Avenue. A "fun zone" along Edgewater Place on the Channel includes entertainment uses such as an arcade, amusement park rides, fast food restaurants, and souvenir shops. Marine-related commercial uses such as ferries to Balboa and Catalina Islands, and harbor tours are present in the area. There are a number of commercial vacancies throughout the area, as shown on the table, as well as in the multi-tenant complexes along Edgewater Place. This study area is pedestrian-oriented with articulated building facades, and signage that is pedestrian scale.

The single largest land use category in the study area is public parking. Two parking lots account for 36.9 percent of the area's land uses, providing parking for the adjacent beach area as well as the study area. This is appropriate in a pedestrian-oriented area where buildings typically have zero lot lines (built to the property line), and relatively limited private parking areas.

Residential land uses (21.5 percent of the area) are located primarily within the western portion of the study area from Adams Street to Coronado Street, at the eastern boundary of the area, and along Ocean Front. A large park, Peninsula Park, accounts for 4.8 percent of the area. The City has embarked upon on a number of public improvements in the area within the last few years, which include the addition of street furniture, lighting, landscaping and decorative paving. This study area is within a Specific Plan area.

Pedestrian scale development in Central Balboa

Visitor-serving commercial

Table 2.1-1(e) Central Balboa Area—Detailed Existing Land Use		
Land Use	***Acres***	***Percent of Total Land in Area***
RESIDENTIAL	**4.1**	**21.5%**
SF Residential	2.0	10.6
Residential	1.6	8.5
MF Residential	0.5	2.5
COMMERCIAL	**6.4**	**33.5%**
Multi-Tenant Commercial	2.9	15.3
Professional Office/Business/Medical/Vet	0.6	3.1
Dine-in Restaurant	0.5	2.8
Hotel	0.5	2.5
Visitor-Serving	0.4	2.1
Specialty Retail	0.3	1.8
Food Stores	0.3	1.7
Apparel/Accessory	0.2	1.3
Community Related Commercial	0.2	1.0
Entertainment	0.2	0.8
Fast Food Restaurant	0.1	0.4
Fitness/Gyms	0.1	0.4
Personal Services	0.1	0.3
INDUSTRIAL	**0.1**	**0.3%**
Marine-Related Industrial	0.1	0.3
OTHER	**8.5**	**44.7%**
Public Parking Lot	7.0	36.9
Parks	0.9	4.8
Vacant Building	0.4	1.9
Public/Semi Public	0.2	1.0
Total	***19.0***	***100%***

SOURCE: EIP Associates GIS 2003
Slight discrepancy due to rounding may occur with data.

Figure 2.1-1e Central Balboa Existing Land Use

Fig p.2 (11x17)

Lido Village & City Hall

This study area is comprised of two distinct locales, Lido Village and City Hall. Table 2.1-1(f) and Figure 2.1-1(f) detail land uses in the study area. Commercial land uses predominate at 53.5 percent of the study area, with some residential condominiums (2.9 percent of the area) located along Via Lido. Lido Village is situated between Finley Avenue, which borders City Hall, and the Lido Channel with Newport Boulevard to the west. Lido Village is a primarily pedestrian-oriented retail area, with a mix of neighborhood-serving commercial and specialty shopping. A public parking structure, located in the center of the village accounts for 8.3 percent of the area. Primary uses in Lido Village include salons, home furnishings, apparel, and other specialty shops ranging from jewelry stores to wine merchants. The Lido Theatre is also located in this area.

While Lido Village contains more specialty retail and restaurants, the City Hall area is more public-use oriented. This area contains retail and public/semi-public uses, with City government offices and a fire station. It consists of City Hall, a public parking lot, and a park-like stretch of lawn that fronts on Newport Boulevard; these uses account for 24.8 percent of the study area. In addition, this area also contains multi-tenant commercial uses (38.0 percent of the study area), located both north and west of City Hall. Community-related commercial uses such as a grocery store, coffee house, bank, Blockbuster, hair salons, and apparel stores are situated here. Vacancies account for 3.1 percent of land uses in the study area.

Via Oporto in Lido Village

Lido Theatre

City Hall

Neighborhood commercial uses near City Hall

Table 2.1-1(f) Lido Village & City Hall Area—Detailed Existing Land Use		
Land Use	*Acres*	*Percent of Total Land in Area*
RESIDENTIAL	**0.5**	**2.9%**
MF Residential	0.3	1.5
SF Residential	0.3	1.4
COMMERCIAL	**9.7**	**53.5%**
Multi-Tenant Commercial	6.9	38.0
Specialty Retail	1.5	8.2
Professional Office/Business/Medical/Vet	0.9	4.8
Dine-in Restaurant	0.3	1.5
Auto-Related Commercial	0.1	0.4
Furniture/Home Furnishings	0.1	0.4
Apparel/Accessory	0.0	0.2
INDUSTRIAL	**0.3**	**1.7%**
Multi-Tenant Industrial	0.3	1.7
OTHER	**7.6**	**42.1%**
Public/Semi Public	4.5	24.8
Public Parking Lot	1.5	8.3
Churches/Religious Institutions	1.0	5.5
Vacant Building	0.6	3.1
Open Space	0.1	0.4
Total	***18.1***	***100%***

SOURCE: EIP Associates GIS 2003

Slight discrepancy due to rounding may occur with data.

Figure 2.1-1f Lido Village & City Hall / Cannery Village Existing Land Use

Fig p.2 (11x17)

Cannery Village

Cannery Village is the historic center of the City's commercial fishing and boating industry and has a mix of small shops, unique galleries, and eclectic professional offices and service establishments. This area is bounded by 32nd Street to the north, Balboa Boulevard to the west, Lido Channel to the east, and 26th Street to the south. The area is primarily commercial (71.3 percent of the study area) with a variety of neighborhood-serving commercial and specialty shops. Table 2.1-1(f2) and Figure 2.1-1(f) detail land uses in the study area. Residential uses comprise 15.4 percent of the area; these are mostly multi-family and/or attached homes. A new loft-style development has recently been constructed. Additionally, older developments in the area include some single-family residential units combined with commercial uses on single lots.

Specialty retail in the area includes home furnishings and art galleries, and many architectural and design offices. There are also professional offices, located mostly in the northern portion of the area. Community-related commercial uses, such as Albertson's grocery, gyms, and are located in the area. Dine-in and fast food restaurants account for more than 7.0 percent of the land area. Marine-related commercial (boat sales) and marine-related industrial uses (boat repair) can also be found between Newport Boulevard and the Lido Channel, representing 2.2 percent and 1.5 percent of the area respectively.

Religious institutions are located in the northwest portion of the area and represent 4.8 percent of land uses. Public parking is available on several small lots throughout the area, accounting for 3.1 percent of land uses. Vacant lots or buildings account for less than 2.0 percent of the area. This area is included within the Cannery Village/McFadden Square Specific Plan.

New loft-style development

Marine-related use in Cannery Village

Table 2.1-1(f2) Cannery Village Area—Detailed Existing Land Use		
Land Use	*Acres*	*Percent of Total Land in Area*
RESIDENTIAL	**4.1**	**15.4%**
MF Residential	3.6	13.7
Residential	0.4	1.5
SF Residential	0.1	0.2
COMMERCIAL	**18.8**	**71.3%**
Multi-Tenant Commercial	8.6	32.6
Professional Office/Business/Medical/Vet	4.1	15.5
Dine-in Restaurant	1.5	5.5
Specialty Retail	1.2	4.5
Drinking Establishment	0.7	2.7
Marine-Related Commercial	0.6	2.2
Fast Food Restaurant	0.5	1.8
Community-Related Commercial	0.4	1.5
Personal Services	0.4	1.3
Furniture/Home Furnishings	0.2	0.8
Hotel	0.2	0.8
Food Stores	0.2	0.6
Visitor-Serving	0.1	0.5
Apparel/Accessory	0.1	0.4
Auto-Related Commercial	0.1	0.4
Fitness/Gyms	0.1	0.2
INDUSTRIAL	**0.6**	**2.2%**
Marine-Related Industrial	0.4	1.5
Multi-Tenant Industrial	0.2	0.7
OTHER	**2.9**	**11.1%**
Churches/Religious Institutions	1.3	4.8
Public Parking Lot	0.8	3.1
Public/Semi Public	0.4	1.6
Vacant Lot	0.4	1.5
Vacant Building	0.1	0.2
Total	***26.4***	***100%***

SOURCE: EIP Associates GIS 2003

Slight discrepancy due to rounding may occur with data.

McFadden Square

McFadden Square lies south of Cannery Village, and is bounded by 26th Street to the north, 19th Street to the south, and Ocean Front and the Pacific Ocean to the west. It is in the center of the Balboa Peninsula and features commercial operations from restaurants, beach hotels, dory fishing boats, and tourist-oriented shops to service operations and facilities that serve the Peninsula. Table 2.1-1(g) and Figure 2.1-1(g) detail land uses in the study area. McFadden Square is known for its marine-related industries such as shipbuilding and repair facilities on the harbor, some of which have been in continuous operation for over fifty years. Commercial land uses are largely concentrated in the commercial strips of Balboa and Newport Boulevards, with residential along Ocean Front.

This study area is a combination of residential (39.6 percent) and commercial (27.8 percent) uses, with multi-tenant and visitor-serving commercial uses, such as t-shirt shops, and rental shops. Dine-in and fast food restaurants account for 7.0 percent of the area. There are also many bars and clubs featuring live music in the area, especially along Ocean Front. The Newport Pier extends from McFadden Square, and there are many nearby recreational uses (bike rentals, surf shops, etc.).

Other uses in the study area include industrial and public uses. There are a number of marine-related industrial uses (boat storage, restoration and repair, etc.) between Newport Boulevard and the West Lido Channel. The wide variety of commercial operations in McFadden Square, from tourist-serving commercial to marine industrial uses, could present issues of compatibility. Balboa Community Center is located just south of the pier and accounts for 7.0 percent of the land uses within the study area. Public parking (22.1 percent of area land use) is available in two lots, of which the easternmost one is separated from commercial uses by residential uses. Much, but not all, of the study area is pedestrian-oriented. Certain areas present difficulty for pedestrian street crossing; specifically the intersection of Newport and Balboa Boulevards, known as "Mixmaster" is one such crossing.

Pedestrian -oriented streetscape

Commercial uses in McFadden Square

Table 2.1-1(g) McFadden Square Area—Detailed Existing Land Use		
Land Use	*Acres*	*Percent of Total Land in Area*
RESIDENTIAL	**11.1**	**39.6%**
Residential	6.9	24.8
SF Residential	4.0	14.2
MF Residential	0.2	0.6
COMMERCIAL	**7.8**	**27.8%**
Multi-Tenant Commercial	4.0	14.3
Dine-in Restaurant	1.8	6.3
Professional Office/Business/Medical/Vet	0.7	2.4
Visitor-Serving	0.5	1.6
Community Related Commercial	0.2	0.9
Specialty Retail	0.2	0.6
Drinking Establishment	0.1	0.5
Personal Services	0.1	0.5
Hotel	0.1	0.5
Fast Food Restaurant	0.1	0.3
INDUSTRIAL	**0.7**	**2.6%**
Marine-Related Industrial	0.7	2.6
OTHER	**8.4**	**29.9%**
Public Parking Lot	6.2	22.1
Public/Semi Public	1.9	7.0
Vacant Lot	0.2	0.8
Total	***28.0***	***100%***

SOURCE: EIP Associates GIS 2003
Slight discrepancy due to rounding may occur with data.

Figure 2.1-1g McFadden Square Existing Land Use

Fig p.2 (11x17)

Corona del Mar

The Corona del Mar study area is located along Pacific Coast Highway from Avocado Avenue to Hazel Drive. Commercial land uses front Coast Highway with residential land uses directly to the east and west of the commercial uses. This area is primarily commercial (78.6 percent), with a mix of neighborhood-serving commercial (approximately 10.0 percent) and specialty shops (6.0 percent). Table 2.1-1(h) and Figure 2.1-1(h) detail land uses in the study area. Primary retail uses include restaurants (more than 8.0 percent), home furnishings, and other specialty shops ranging from apparel to architectural design services. A large percentage of commercial uses (about 40.2 percent of the study area) is located in multi-tenant buildings with retail on the first floor of buildings and professional services located on the second floor. While there were a few commercial vacancies at the time of the land use survey, the most prominent was that of the Port Theatre located at the corner of Coast Highway and Heliotrope.

Sherman Library and Gardens (about 9.0 percent of the area) is a private facility and research library open to the public. There is an assisted-living residential complex representing 7.4 percent of land uses in the study area. Corona del Mar is pedestrian-oriented with a dense mix of commercial uses, streetscape amenities, street medians, and signalized crosswalks.

The Corona del Mar Business Improvement District (BID) was established in 1996 to enhance the cultural shopping district of Corona del Mar to create an exciting, pedestrian and resident friendly experience. In 1999, the BID developed "Vision 2004" Plan to implement community improvements for Corona del Mar. The plan envisions the creation of a linear park-like environment along Coast Highway from Avocado Street to Seaward Drive. The plan also calls for sidewalk landscaping, street furniture, street lighting fixtures, pedestrian activated crosswalks, parking lanes and various other improvements. A Specific Plan has also been contemplated for this area, but one has not been developed.

Specialty retail in Corona del Mar

Multi-tenant commercial uses

Table 2.1-1(h) Corona del Mar Area—Detailed Existing Land Use

Land Use	*Acres*	*Percent of Total Land in Area*
RESIDENTIAL	**2.1**	**8.8%**
MF Residential	1.8	7.4
Residential	0.3	1.4
COMMERCIAL	**18.6**	**78.6%**
Multi-Tenant Commercial	9.5	40.2
Dine-in Restaurant	2.6	10.8
Professional Office/Business/Medical/Vet	1.2	5.0
Community Related Commercial	1.2	4.9
Food Stores	1.1	4.7
Auto-Related Commercial	1.0	4.3
Furniture/Home Furnishings	0.9	3.9
Personal Services	0.3	1.4
Apparel/Accessory	0.3	1.2
Fast Food Restaurant	0.3	1.1
Building/Hardware/Garden Supply	0.2	0.9
Drinking Establishment	0.1	0.3
OTHER	**3.0**	**12.8%**
Public/Semi Public	2.2	9.2
Vacant Lot	0.6	2.5
Vacant Building	0.2	0.8
Churches/Religious Institutions	0.1	0.3
Total	***23.7***	***100%***

SOURCE: EIP Associates GIS 2003

Slight discrepancy due to rounding may occur with data.

Figure 2.1-1h Corona del Mar Existing Land Use

Fig p.2 (11x17)

Newport Shores

Newport Shores is located along Coast Highway, which runs northwest to southeast, from Summit Street to just past 60th Street. This is the residential neighborhood closest to Banning Ranch. The study area consists of residential land (69.9 percent of the area's land uses) and commercial uses (30.0 percent of the area's land uses) on the north side of Coast Highway, and is about one block in depth on average. Table 2.1-1(i) and Figure 2.1-1(i) detail land uses in the study area. Half of the residential uses are multi-family residential (35.1 percent) and half are mobile homes (34.8 percent). A portion of the mobile homes are situated along Semeniuk Slough and the Army Corps restored wetlands, while a number of the single-family homes outside the study area are also located along the Slough.

This area contains a "commercial strip" that serves a residential neighborhood and beach visitors. Primary commercial uses include community-related retail such as a dry cleaners, liquor store, deli, and grocery. A few hotels and motels (9.3 percent of the area's land uses) are interspersed among the commercial uses. There are also a number of dine-in, family-style restaurants, as well as a handful of fast food establishments, equaling 5.9 percent of the area's land uses.

Architectural styles in the study area are varied. Newer residential development includes "manufactured homes," while older commercial and residential development, including mobile homes, appears to have been built in the 1960's to 1980's. The commercial area is mostly highway-oriented, with parking lots fronting many of the commercial uses. This area is governed by an adopted Specific Plan.

Architectural variety in Newport Shores

Newer development

Table 2.1-1(i) Newport Shores Area—Detailed Existing Land Use		
Land Use	***Acres***	***Percent of Total Land in Area***
RESIDENTIAL	**7.9**	**69.9%**
MF Residential	4.0	35.1
Mobile Homes	3.9	34.8
COMMERCIAL	**3.4**	**30.0%**
Hotel	1.1	9.3
Dine-in Restaurant	0.7	5.9
Multi-Tenant Commercial	0.5	4.4
Food Stores	0.5	4.0
Professional Office/Business/Medical/Vet	0.4	3.9
Surf-Related	0.2	2.1
Building/Hardware/Garden Stores	0.0	0.4
Total	***11.3***	***100%***

SOURCE: EIP Associates GIS 2003
Slight discrepancy due to rounding may occur with data.

Figure 2.1-1i Newport Shores Existing Land Use

Fig p.2 (11x17)

Airport Business Area

The Airport Business area is primarily commercial. It is bounded by Campus Drive to the north, Bristol Street North/Corona del Mar Freeway to the west and Jamboree Road to the southeast. As the study area name implies, the area is in close proximity to the John Wayne Airport, as well as the University of California, Irvine. This proximity has influenced the uses in this area; many uses support the airport and university, such as research and development, high technology industrial or visitor-serving uses, such as hotel and car rental agencies. This study area consists of 83.7 percent commercial uses with administrative, professional, and financial office uses accounting for 62.0 percent of the area's land uses. Table 2.1-1(j) and Figure 2.1-1(j) detail land uses in the study area. Multi-tenant commercial uses accounting for 7.5 percent of the area's land uses provide supporting retail for adjacent office and industrial employment centers. A number of industry headquarters are located in this study area; these include Conexant, and Jazz Industries, along with other major industries located in the Koll Center at MacArthur Blvd. and Jamboree Road. Industrial related uses account for 13.1 percent of the study area.

There are three large hotel developments accounting for 4.5 percent of the area. Also significant are a number of auto-related commercial uses located mainly in the northwest portion of the area. These uses include carwash, auto-detailing, rental, repair, and parts shops. The area covers approximately 360 acres.

Recent development activity directly outside of the study area has occurred under other jurisdictional purview. Many current development proposals in the nearby Irvine Business Complex have included the transfer of development rights, bringing more intense development closer to the Airport Business area as those rights are transferred from entitled areas that are located further away. The excess of development rights being sold is resulting in the concentration of development closer to the Airport Business area and has the potential to impact traffic and circulation within the study area. This is a concern for the future of the Airport Business area as increased congestion in and around the study area could result.

Technology industry headquarters

Multi-tenant commercial at Bristol North and Jamboree Road

Table 2.1-1(j) Airport Business Area—Detailed Existing Land Use

Land Use	*Acres*	*Percent of Total Land in Area*
COMMERCIAL	**301.4**	**83.7%**
Administrative, Professional, and Financial	225.7	62.7
Multi-Tenant Commercial	27.0	7.5
Hotel	16.3	4.5
Auto-Related	15.4	4.3
Dine-In Restaurant	11.4	3.2
Specialty Retail	2.4	0.7
Fitness/Gyms	1.4	0.4
Fast Food Restaurant	1.1	0.3
Community Commercial	0.7	0.2
INDUSTRIAL	**47.1**	**13.1%**
Business Park Industrial	25.0	6.9
Multi-Tenant Industrial	16.9	4.7
Light Industrial	5.2	1.4
OTHER	**11.5**	**3.2%**
Public/Semi-Public	7.8	2.2
Vacant Land	3.7	1.0
Total	***360.0***	***100.0%***

SOURCE: EIP Associates GIS 2003

Slight discrepancy due to rounding may occur with data.

Figure 2.1-1j Airport Business Area Existing Land Use

Fig p.2 (11x17)

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Section 2.2 Urban Form

2.2 URBAN FORM

This section identifies the relationships between land uses and the built urban form of the City. A region's built urban form defines the character and a sense of place and contributes to the overall quality of life. For example, it can distinguish socially and economically vital pedestrian districts from auto-oriented districts. Urban form is defined by the density of development; location, lot coverage, interrelationships, massing, modulation and design of buildings; and the landscape and design of the intervening spaces that connect buildings. Urban form allows for the differentiation of residential neighborhoods, commercial centers and corridors, and industrial districts.

The City of Newport Beach has developed as a variety of small communities, or villages. Early development was concentrated along the beachfront, in a traditional grid street pattern. Many of the newer developments located inland from the bay have been based on the "Planned Community" concept. The various villages provide for a wide variety and style of development, both residential and commercial. The city includes lower density single-family areas, as well as more intensively developed residential beach areas. Commercial areas range from master planned employment centers to marine industrial and visitor commercial areas.

HISTORICAL PATTERN OF DEVELOPMENT

Newport Beach's urban form takes its shape from its early beginnings as a shipping town, evolving to a waterfront vacation and tourist destination, and then a residential and resort community. Developing west to east, scattered early settlements marked the early stages of the "villages" now known as Balboa Peninsula, West Newport, Balboa Island, Lido Isle, and Corona del Mar. In the early 1930's Newport Harbor was created and later became a hub for naval activity.

Around Newport Beach, development in Orange County resulted in various military bases and industrial facilities, attracting more residents to the region. Vacation cottages and seasonal rentals became year-round housing. Road and freeway projects, such as the Santa Ana Freeway, also helped to bring development to Newport Beach. The development pattern spread northward from the waterfront to the hills and mesa areas. Traditional subdivisions with grid street patterns and modest homes gave way to curvilinear streets and ranch-style homes on larger lots. Harbor industries such as shipping and fishing declined, to be replaced by new businesses and commerce centers. By the 1970's, The Irvine Company, a major landholder in the region, had developed major portions of the city, building Newport Center and Fashion Island, and spurring additional investment in hotels, restaurants, and new homes in planned communities.

Residential Development

While Newport Beach contains older, traditional housing types in its village areas, major portions of the city reflect master planned development of mainly single-family housing on moderate to large lots. Most neighborhoods contain a single-predominant housing type, such as single-family detached, or single-family attached. Separate pockets of multi-family housing are distributed along major corridors.

Older portions of the city exhibit housing of varied architectural styles on small parcels, grid street patterns, and generally more compact development. This applies to waterfront areas along the coast and lower Newport Bay, Balboa Peninsula, Newport Shores, Lido Isle, Balboa Island, Corona del Mar, and Newport Heights. An exception applies to the Upper Bay/Santa Ana Heights area where large ranch estates are located; these homes lie on half-acre to acre parcels and can accommodate horses and stables. Equestrian trails can be found in these neighborhoods.

Newer housing development has followed the planned community concept; Newport Coast, Bonita Canyon, Big Canyon, and Eastbluff are examples of these types of development. These developments are characterized by large homes on generous-sized lots, curvilinear streets and cul-de-sacs, and post war Southern California "Mediterranean" and regional architecture. Some of these developments are gated communities with secure access. Master planned developments have integrated parks and open spaces, schools and neighborhood-serving commercial uses to serve nearby residents.

Commercial and Industrial Development

Commercial and industrial centers and districts have been developed within the pattern of Newport Beach's residential neighborhoods. Similar to traditional residential developments, older retail and shopping areas typically consist of compact, low-rise buildings on small lots. Most of these older commercial districts are pedestrian-oriented with a variety of uses located in proximity to one another, and a streetscape and building scale that invites strolling and shopping. Corona del Mar, McFadden Square, and Lido Village are examples of pedestrian-oriented commercial districts. Commercial districts can also be characterized by their major uses, such as visitor-serving commercial districts—Cannery Village, McFadden Square and Central Balboa, for instance.

Mid-century developments reflect national trends toward auto-oriented strip commercial centers such as those found along Mariner's Mile and Old Newport Boulevard. These "strip" developments often line both sides of major thoroughfares, and are made up of many individually constructed structures. Later-constructed commercial centers of the 1980's and 1990's are also auto-oriented. These typically consist of a single development containing many individual commercial uses. Newport North and The Bluffs, on opposite sides of MacArthur Blvd., exemplify this type of development. Both types of auto-oriented commercial areas are characterized by low-rise buildings, a mix of community serving uses and large expanses of parking lots, to the front or rear of the development.

The regional commercial center also distinguishes Newport Beach's urban form. Newport Center and Fashion Island were developed around a ring road, with large lots for office and professional uses outside the ring surrounding a retail core of regional-attracting shopping and entertainment uses within the ring. The development was designed with a high visual quality, with buildings massed at the northern perimeter and heights transitioning towards the coast. The buildings are sited to act as a visual backdrop when viewed from the lower elevations at the coast, as well as to take advantage of the views afforded by the site. This area is one of the few high-rise office and hotel developments in the city.

The Airport Area also includes high-rise office and hotel development. Development in this part of the city is manifested in "office park" type development with clusters of medium- to high-rise buildings set in a campus type environment, generally on large lots with extensive landscaping. The area is predominantly professional and office high-rise buildings with supporting retail and restaurant uses in low-rise buildings.

The Airport Area also contains one of the three industrial districts in the city. Similar to the commercial office development, industrial uses are found in campus like settings, but in low- to medium-rise buildings. Instead of the clustered buildings of the "office park," industrial business parks contain fewer, larger buildings that often appear "box-like."

The other major concentration of industrial development is located in West Newport. This area is situated atop a coastal bluff, and contains industrial uses interwoven with older residences, that are now legally-non-conforming under the City's Zoning Code. West Newport industrial also contains Hoag Hospital, in a high-rise development, surrounded with medical-related uses in medium- to low-rise buildings. The remaining industrial uses are a mix of light manufacturing and specialty boat and automotive uses, found in warehouses and low-rise building development. The incongruous nature of residential uses mixed with light industrial uses does not lend the area a distinct cohesive urban form.

Undeveloped Lands

Harbor, bay and coastal features have greatly influenced urban form in Newport Beach. Due to the extent of Newport Beach's natural resources, large areas of open space have been preserved to be enjoyed as amenities or to provide habitat for biota. The Upper Newport Bay divides the city into west and east. This division has resulted in distinct differences in the types and timing of development on both sides of the Bay. In addition, this division has resulted in circulation challenges between the two sides, with only two east/west connections present in the area.

Lower Newport Bay contains seven islands that have been claimed for residential and recreational uses. Newport Coast and Newport Ridge developments have focused development upon the ridges, akin to the famed villas of the Italian coast. Throughout the city, higher scale development has occurred atop of the coastal bluffs, well away from bluff faces, and at lower heights in the coastal plain so that bluffs and views to and from the bluffs remain preserved. Much of development in Newport Beach has been designed to capture views of its natural resources—beaches, bluffs, canyons, harbor, bay, and ocean—creating the urban form that is visible today.

Section 2.3 Population and Demographics

2.3 POPULATION AND DEMOGRAPHICS

This section provides a descriptive profile of the existing demographic conditions in the City, including baseline data and trends related to population and employment. Information for this section is based on the City's 2004 Fiscal Impact Analysis and Model, the 2002 Orange County and Region Economic Outlook Report, and 2000 Census data. It should be noted that information pertaining to population and demographics for the areas of Santa Ana Heights and Bay Knolls are not available as these areas were annexed after 2000. In addition, population and demographics information for the Emerson Tract, Area 7, and Banning Ranch is not included in the documents referenced above because these areas are not located within City boundaries. However, information for the areas of Newport Coast and Newport Ridge has been included in the 2004 Fiscal Impact Analysis and Model prepared for the City. Growth projections for Newport Beach from 2000 to 2025 are based on Orange County Projections (OCP) 2000 data.

EXISTING CONDITIONS

Population

Newport Beach was incorporated in 1906 and the population has increased every decade since. Table 2.3-1 shows the population growth that occurred during the last 50 years based on available data. As shown, the population in 1950 was 12,120 and by 1960, had more than doubled to 26,564 persons.[1] In 1970, the population nearly doubled again to 49,442 persons and by 1980, the population had reached 62,556 persons. During the following decade, the population increased only slightly to 66,643 persons in 1990. As of 2001, the City had a population of 75,662.

Table 2.3-1 Population

Year	*Population*	*Year*	*Population*
1950[a]	12,120	1994[b]	68,572
1960[a]	26,564	1995[b]	68,920
1970[a]	49,442	1996[b]	69,246
1980[a]	62,556	1997[b]	70,512
1990[a]	66,643	1998[b]	72,951
1991[b]	67,028	1999[b]	74,317
1992[b]	67,572	2000[a]	70,032
1993[b]	68,199	2001[c]	75,662

SOURCE: City of Newport Beach website (www.city.newport-beach.ca.us/pln/demo_main.htm)
[a] April Decennial Census of Population, U.S. Census Bureau
[b] January *Revised* Estimate, State Department of Finance (rates per 1,000 population)
[c] Population figure includes January 1, 2002, annexation of Newport Coast

According to the Fiscal Impact Analysis and Model prepared for Newport Beach in 2004, the current residential population, including Newport Coast and Newport Ridge areas that were annexed in 2002, is estimated at 81,361[2]. In addition, the total average "daytime population" within

[1] http://www.city.Newport-beach.ca.us/pln/demo_main.htm
[2] Applied Development Economics, Inc., Fiscal Impact Analysis and Model, January 2004.

Newport Beach's 1999 jurisdictional boundaries, which includes the City's resident population, the average visitor population, and the number of employees in businesses within the City, is 151,732.[3]

Median Income

Census data for 2000 listed on the City's website indicates that the median household income for the six zip codes within Newport Beach are as follows:

- 92625—100,080
- 92657—114,004
- 92658—n/a
- 92659—n/a
- 92660—$79,288
- 92661—$51,887
- 92662—$50,338
- 92663—$53,800

Ethnicity

The ethnic composition of the City of Newport Beach in 2000 is shown in Table 2.3-2. Since this information is based on U.S. Census 2000 data, the segments of population associated with the areas of Newport Coast, Newport Ridge, Santa Ana Heights, and Bay Knolls have not been included because these areas were not under the City's jurisdiction then. As shown in Table 2.3-2, a majority of the residents in the City are White, accounting for approximately 85 percent of the resident population.[4] Although Hispanic residents are the second largest ethnic group, they account for approximately 4.5 percent of the total resident population. Asian and Pacific Islander residents are a close third, making up 4.4 percent of the total resident population.

Table 2.3-2 2000 Racial and Ethnic Population

Race	*Number*	*Percent*
White	64,331	85.0%
Hispanic	3,413	4.5%
Asian and Pacific Islander	3,362	4.4%
Black	366	0.5%
All Other Races	1,252	1.7%
NA*	2,938	3.9%
Total Population	***75,662***	***100.0%***

SOURCE: City of Newport Beach website (www.city.newport-beach.ca.us/pln/demo_main.htm); April Decennial Census of Population, U.S. Census Bureau

* Segment of population not counted as part of Newport Coast in Census 2000 counts

[3] Applied Development Economics, Inc., Fiscal Impact Analysis and Model, January 2004.

[4] http://www.city.Newport-beach.ca.us/pln/demo_main.htm

Employment

Out of the total average daytime population of 151,732 within Newport Beach's 1999 jurisdictional boundaries, approximately 60,879 are employees.[5] The employment figures are further allocated to visitor-serving and non visitor-serving business activity. A total of 5,456 employees are employed for visitor-serving businesses and a total of 55,423 employees are employed for non-visitor serving businesses. Of the total daytime population, residents comprise about 50 percent, visitors (on average) are 13 percent, workers serving visitors are four percent, and the remaining workers are 33 percent.

According to City demographic data, a total of 902 workers are employed by the City of Newport Beach, 710 of which are full-time and 192 of which are part-time.[6] The major employers in Newport Beach include the Hoag Memorial Hospital and Pacific Mutual, which employ approximately 2,700 and 2,020 employees, respectively. The unemployment rate in the City is 4.2 percent.[7]

The 2000 U.S. Census indicates that there are approximately 38,316 employed residents in Newport Beach. Table 2.3-3 shows the general occupation types of the City's residents.

Table 2.3-3 Occupations of Employed Civilian Population 16 Years and Over

Occupation	Number	Percent
Management, Professional, and Related	22,070	57.6
Service	2,806	7.3
Sales and Office	11,143	29.1
Farming, Fishing, and Forestry	29	0.1
Construction, Extraction, and Maintenance	1,032	2.7
Production, Transportation, and Material Moving	1,236	3.2
Total	***38,316***	***100***

SOURCE: 2000 U.S. Census Bureau website

According to the 2002 Orange County and Region Economic Outlook Report, the total payroll employment in the Orange County region is expected to increase steadily through 2005. The payroll employment growth in Orange County is expected to be at approximately 3 percent per year for the period 1996–2005.[8] Orange County's employment growth is expected to fall between the 1 percent per year growth for Los Angeles County, and the 5 percent per year growth for the Inland Empire that is projected for 2005.

Projections

The projected population growth for the City of Newport Beach, according to Orange County Projections (OCP), is shown in Table 2.3-4. Although the projected population for the City in 2025 is approximately 89,826, this does not include the populations of Newport Coast and Newport Ridge because these areas were annexed in 2002. The 2004 Fiscal Impact Analysis and Model for the

[5] Applied Development Economics, Inc., Fiscal Impact Analysis and Model, January 2004.
[6] www.city.Newport-beach.ca.us/pln/demo_main.htm
[7] www.city.Newport-beach.ca.us/pln/demo_main.htm
[8] Munroe Consulting Inc., Economic Outlook Report 2002—Orange County & Region, June 2002.

City of Newport Beach, however, includes the future projected populations for the Newport Coast and Newport Ridge areas, which are estimated to be a total of approximately 11,601 by 2025. Thus, adding City projections with Newport Coast and Newport Ridge projections, the total projected population for the City is estimated to be 101,427.

Table 2.3-4 Population Projections (OCP 2000)

Year	Number
CITY OF NEWPORT BEACH	
2005	82,409
2010	86,579
2015	87,457
2020	88,676
2025	89,826
NEWPORT COAST	
2025	11,601

SOURCE: City of Newport Beach website (www.city.newport-beach.ca.us/pln/demo_main.htm); Center for Demographic Research, California State University, Fullerton

In terms of future job growth, projections provided by the Southern California Association of Governments (SCAG) suggest that Newport Beach will continue to expand its employment base. Although these projections provide one indicator of the City's future, they are preliminary and have not been approved by the City. As shown in Table 2.3-5, SCAG projects that employment in Newport Beach will increase from about 67,359 jobs in 2000 to 80,575 jobs by the year 2025.[9] As discussed in the 2002 Orange County and Region Economic Outlook Report, the services sector, which is the existing dominant sector of Orange County's economy, along with the construction, finance/real estate/insurance, high-tech, and international trade sectors will continue to grow in Orange County.

Table 2.3-5 SCAG Employment Projections

Year	Number
2000	67,359
2005	71,018
2010	74,217
2015	76,701
2020	78,915
2025	80,757

SOURCE: Southern California Association of Governments, 2001 RTP Growth Forecast

[9] http://www.scag.ca.gov/forecast/rtpgf.htm

References

Applied Development Economics, Inc. 2004. *Fiscal Impact Analysis and Mode*, January.

Munroe Consulting Inc. 2002. *Economic Outlook Report 2002—Orange County & Region*, June.

Newport Beach, City of. 2004. Demographics Data: http://www.city.Newport-beach.ca.us/pln/demo_main.htm, 30 January.

Southern California Association of Governments, 2001 RTP Growth Forecast: http://www.scag.ca.gov/forecast/downloads/city_projections.xls

U.S. Census Bureau: http://factfinder.census.gov

Section 2.4 Housing

2.4 HOUSING

This section provides a descriptive profile of the City of Newport Beach's existing housing conditions, including baseline data and trends related to the City's households and housing affordability. Information for this section is based on the 2003 Housing Element and the 2004 Fiscal Impact Analysis and Model for the City of Newport Beach. It should be noted that because the Housing Element provides information for the area encompassed within the City's 1999 jurisdictional boundaries, the areas of Newport Coast, Newport Ridge, Santa Ana Heights, and Bay Knolls are not included as they were recently annexed into the City. Wherever possible, data pertaining to Newport Coast and Newport Ridge have been included in the 2003 Housing Element, and will be included in this section. Housing information for the Emerson Tract (Emerson), Area 7, and Banning Ranch were not included in the Housing Element because these areas are not located within City boundaries. The certified Housing Element covers the planning period between the years 1998 to 2005.

EXISTING CONDITIONS

Residential Growth and Dwelling Unit Types

According to the Housing Element, 6,551 housing units were added to the housing inventory within the City of Newport Beach's 1999 jurisdictional boundaries between 1980 and 2000. This indicates an average yearly increase in the housing stock of approximately 328 housing units. This rate of increase has slowed since 1990, with an average of 271 housing units per year being added to the housing stock between 1990 and 2000. The net additional and total housing units that occurred between 1990 and 2000 within the City's 1999 jurisdictional boundaries are shown in Table 2.4-1.

Table 2.4-1 Net Additional and Total Housing Units within 1999 City Jurisdictional Limits, 1980–2000

Year	Total Housing Units at Beginning of Year	Net Change in Housing Units	Year	Total Housing Units at Beginning of Year	Net Change in Housing Units
1980	31,016	1,233	1991	35,275	414
1981	32,249	152	1992	35,439	164
1982	32,401	109	1993	35,527	88
1983	32,510	225	1994	35,565	38
1984	32,735	108	1995	35,598	33
1985	32,843	216	1996	35,631	33
1986	33,059	306	1997	35,978	347
1987	33,365	971	1998	36,807	829
1988	34,336	312	1999	37,044	237
1989	n/a	—	2000	37,567	523
1990	34,861	525*			

SOURCE: City of Newport Beach; State Department of Finance, Population Research Unit
* Two-year growth change

The total number of housing units in the City, excluding the Newport Coast and Newport Ridge annexation areas, as of January 1, 2000, was estimated to be 37,567. Table 2.4-2 shows the number of units for each housing unit type.

Table 2.4-2 Housing Unit Mix Within 1999 City Jurisdictional Boundaries, 2000		
Housing Unit Type	*Number of Units*	*Percent of Total*
Single-Family Detached	15,645	41.6%
Single-Family Attached	6,102	16.2%
Duplex to Fourplex	5,743	15.3%
Multi-Family	9,130	24.3%
Mobile Home	947	2.5%
City Total	***37,567***	***100.0%***
SOURCE: Orange County Progress Report 2000		

According to the 2004 Fiscal Impact Analysis and Model prepared for the City of Newport Beach, the Newport Coast and Newport Ridge annexation areas have approximately 2,400 housing units as of 2000. Table 2.4-3 shows the number of units for each housing unit type in these two annexation areas.

Table 2.4-3 Housing Unit Mix in Newport Coast and Newport Ridge Annexation Areas, 2000	
Housing Unit Type	*Number of Units*
Single-Family	1,264
Condominium	1,136
Apartment	0
High Density	0
Total	***2,400***
SOURCE: Applied Development Economics, Inc., Fiscal Impact Analysis and Model, January 2004	

Thus, with the 37,567 housing units in the City's 1999 jurisdictional boundaries and the 2,400 housing units in the Newport Coast and Newport Ridge annexation areas, the total amount of housing units in Newport Beach, as of 2000, was 39,967.

Residential Densities

According to City figures that were estimated by dividing residential acreage by current dwelling unit counts within the City's 1999 jurisdictional boundaries, residential densities in many older neighborhoods in the City of Newport Beach are comparatively high. The residential density in selected areas within the City is shown in Table 2.4-4.

Table 2.4-4 Residential Density by Area	
Area	*Estimated Density (DU/acre)*
Balboa Peninsula	22.4
West Newport	19.3
Balboa Island	27.7
Corona del Mar	16.9
Lido Island	13.9
SOURCE: City of Newport Beach Planning Department	

In addition, the City is experiencing a trend toward higher density development, as discussed in the Housing Element. Since 1980, multi-family permits issued in the City have exceeded single-family permits. This trend is opposite to the State trend, where single-family permits have exceeded multi-family permits in recent years.

Housing Tenure

Tenure of housing within Newport Beach's 1999 jurisdictional boundaries, which is shown in Table 2.4-5, has varied since 1980.

Table 2.4-5 Housing Tenure within 1999 City Jurisdictional Boundaries

Year	Total Occupied Units	Owner Occupied	Renter Occupied
1980	27,820	14,888 (53.5%)	12,932 (46.5%)
1990	30,860	17,207 (55.8%)	13,653 (44.2%)
2000	33,071	18408 (55.7%)	14,663 (44.3%)

SOURCES: U.S. Census 1980, 1990, 2000

The percentage of rental housing in the City's 1999 jurisdictional boundaries is higher than the corresponding figure for Orange County.[1] Since 1960, when only 36 percent of all occupied units were rented, the percentage of rental housing increased in the City due to a sizeable amount of new rental construction. New construction had subsided substantially in the 1980's. In addition, the City contains many rented duplex, triplex, and fourplex units in older neighborhoods. Areas where this type of rental housing is predominant include West Newport, Balboa Peninsula, Balboa Island, and Corona del Mar.

Vacancy Rates

The overall housing unit vacancy rate of the City of Newport Beach, excluding the Newport Coast and Newport Ridge annexation areas, increased slightly between 1980 and 1990. The amount of vacancies as a percentage of all housing stock within the City's 1999 jurisdictional boundaries was 10.1 percent in 1980 and 11.5 percent in 1990. However, the amount of vacancies for sale in the City as a percentage of all housing stock was 3.8 percent in 1980 and 0.8 percent in 1990. Additionally, the amount of vacancies for rent in the City as a percentage of all housing stock was 6.1 percent in 1980 and 4.3 percent in 1990. The discrepancy between overall vacancy rates and vacancy rates among available units may be due to the large number of seasonal units and second homes in the City. According to the 1990 U.S. Census, 1,207 of 4,001 vacant units were identified as "seasonal use."

In addition, the percentages of vacant rental apartments within the City's 1999 jurisdictional boundaries have decreased from 4.8 percent in 1991 to 2.7 percent in 1993 before increasing to 8.0 percent in 1995. This percentage decreased to 4.4 percent in 1996 before eventually returning to 8.0 percent in 2000. Generally, this fluctuation reflects construction activities and rental units leased with the development phases of Bonita Village.

[1] City of Newport Beach, Draft Housing Element, March 2003.

Housing Condition

Deficient units are defined as deteriorated, dilapidated units, as well as those units inadequate in original construction, or which were under extensive repair. The Housing Element indicated that the condition of housing in Newport Beach is considered to be very good. During 2000, through its ongoing code enforcement program, the City Building Department identified only four properties within the City's 1999 jurisdictional boundaries in need of repair. Extremely high property values and the lack of code enforcement cases indicate that property owners within Newport Beach are, for the most part, conscientious about maintaining their properties. Substandard housing does not appear to be a problem for the community at this point in time.

Mobile Homes

There are presently 972 mobile home spaces in ten mobile home parks that are located within the 1999 jurisdictional boundaries of Newport Beach. Nine of these parks contain a total of 774 spaces occupied by permanent residents. The remaining homes are occupied by persons who use the units for vacations and weekend visits to the area. In total, the ten parks house 1,211 permanent residents.

The character of the City's ten mobile home parks varies. Three of the parks are located on or close to Newport Harbor. These three parks appeal to retirees and a substantial number of spaces in these parks are occupied by permanent residents. Space rents depend on the location of the space in relationship to Newport Bay and the size of the mobile home. One of these parks, Bayside Village, is occupied primarily by retired persons, a large portion of who have occupied their mobile homes for 20 years or more.

The California Department of Housing and Community Development is responsible for issuing permits for mobile home parks. The City of Newport Beach has notified the State that mobile home units affordable to low- and/or moderate-income households have been converted, or are in the process of converting to market rate status and thereby may lose their affordable status. To date, the State has taken no action regarding this continuing loss of affordable housing.

Housing Unit Projections

As described in the Housing Element, the 2000 Orange County Progress Report indicates that the ultimate residential capacity within the City is 41,782 dwelling units within the 1999 City limits. The recently annexed areas of Newport Ridge and Newport Coast will have an ultimate residential build-out of 5,150 units. With the annexations of Bay Knolls and Santa Ana Heights in 2002 and the proposed annexation of Area 7 and Emerson in the near future, the ultimate residential capacity within the City will also subsequently be changed.

As housing costs continue to rise in the future, an increasing number of units may be occupied by unrelated persons who share housing expenses. In addition, vacancy rates are anticipated to decline as a result of demand for housing and increased housing prices in Orange County. An overall vacancy rate of 10 percent through the year 2010 has been projected, which includes seasonal and migratory units not available for occupancy.

Table 2.4-6 shows the 1980 to 2000 housing trends within the 1999 City limits. As shown, the total number of dwelling units is expected to be 39,320 in 2005.

Table 2.4-6 Housing Trends within the 1999 City Jurisdictional Boundaries

Year	Total # of Units	Single Family	2 to 4	5 or More	Mobile Homes	Occupied Units	Percent Vacant	Population/ Housing
1980*	31,016	17,490	7,149	5,762	615	28.282	8.81%	2.297
1985*	32,843	19,78	5,836	7,052	877	29,605	9.86%	2.239
1990	34,861	20,767	5,355	7,792	947	30,860	11.48%	2.252
1995	35,598	20,776	5,637	8,238	947	31,512	11.48%	2.164
2000	37,567	21,747	5,743	9,130	947	33,255	11.48%	2.252
2005**	39,320							

SOURCES: State Department of Finance, Population Research Unit, 2000

* 1992 Housing Element, City of Newport Beach

** Orange County Progress Report 2000

According to the 2004 Fiscal Impact Analysis and Model for the City, it is estimated that the total number of dwelling units in the Newport Coast and Newport Ridge annexation areas will be approximately 4,826 by 2025.

Housing Affordability

According to the 1990 Census of Population and Housing, the majority of for-sale/owner housing in the City's 1999 jurisdictional boundaries in 1990 was priced over $200,000 and the median value of housing in the City was $500,000. Data from the 1990 U.S. Census showed that for renters, 39 percent of households paying rent spent 30 percent or more of their income on rent. For homeowners, 34 percent of households paying a mortgage spent 30 percent or more of their monthly income on mortgage payments. Currently, lenders are allowing households to pay between 29 percent and 35 percent of their gross income for housing.

In its 1988 Regional Housing Needs Assessment, the Southern California Association of Governments (SCAG) calculated that 4,431 lower-income households within the 1999 City limits paid more than 30 percent of their income for housing. According to SCAG estimates, 2,625 very low–income households and 1,806 low-income households paid more than 30 percent of their income for housing. In 1990, 2,583 very low–income and 4,071 low-income households paid more than 30 percent of their income for housing. "Low Income" households are those households with annual incomes between 80 to 100 percent of the County median household income. "Very Low–Income" households are those households with annual incomes of 50 to 80 percent of the County median household income. In addition, higher-income households are also paying more than 30 percent of their income for housing.

A higher allocation of income toward housing was perceived as justified because of investment qualities of housing in the City. Also, higher expenditures on housing may be justified when tax advantages are considered and incomes are expected to increase while housing expenses remain fixed.

Housing Needs

Also as discussed in the Housing Element, the Regional Housing Needs Assessment (RHNA) allocates Newport Beach's share of housing units required to satisfy housing needs resulting from projected growth in the region. To accommodate projected growth in the region, SCAG estimates the City, excluding the Newport Coast and Newport Ridge annexation areas, needs to target its housing unit production to accommodate 476 new housing units. The projected regional demand for housing in Newport Beach, within its 1999 City limits, for 1998 to 2005 is shown in Table 2.4-7. The total construction need of housing by income within the 1999 City limits is shown in Table 2.4-8.

Table 2.4-7 Projected Regional Demand Within 1999 City Limits, 1998–2005

Household Growth	Net Vacancy Adjustment	Demolition Adjustment	Total Construction Need
971 Units	–669 units	174 units	476 units

SOURCE: Southern California Association of Governments

Table 2.4-8 Total Construction Need by Income Within 1999 City Limits, 1998–2005

Very Low	Low	Moderate	Above Moderate	Total
86	53	83	254	476
18%	11%	17%	53%	100%

SOURCE: Southern California Association of Governments

The "special needs" population in Newport Beach most numerous and in need of affordable housing is senior citizens (age 65 and older). Thirty-six percent of this population has a disability and a significant percentage live near or below the national poverty level.

The City of Newport Beach has agreed to transfer a portion of the County's Regional Housing Needs allocation to the Newport Coast and Newport Ridge areas, which were annexed to the City on January 1, 2002. The City will work with both the County of Orange and the Irvine Company, which approved and built the Newport Coast and Newport Ridge planned community, respectively, to ensure that affordable housing commitments are satisfied. The total construction need by income for the Newport Coast and Newport Ridge areas for 1998 to 2005 is shown in Table 2.4-9.

Table 2.4-9 Total Construction Need by Income—Newport Coast and Newport Ridge, 1998–2005

Very Low	Low	Moderate	Above Moderate	Total
—	95	—	850	945

SOURCE: Southern California Association of Governments

REFERENCES

Newport Beach, City of. 2003. *Housing Element*.

Section 2.5 Economic Development

FISCAL IMPACT ANALYSIS AND MODEL

NEWPORT BEACH GENERAL PLAN UPDATE

January 2004

Prepared for the
City of Newport Beach

Prepared by

Applied Development Economics, Inc.
2029 University Avenue, Berkeley, CA 94704 (510) 548-5912
1029 J Street, Suite 310, Sacramento. CA 95814

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INTRODUCTION

This report discusses how various land uses and business types contribute to the revenues and costs for city government. The focus of this discussion is on the existing land use mix in Newport Beach, although it also includes an analysis of the future buildout of the existing General Plan. As the General Plan update process moves forward, a similar analysis will be conducted to determine the potential fiscal impact of future land use alternatives.

It is important to recognize that the point of this analysis is to understand how the mix of land uses in Newport Beach contributes to the revenues needed for municipal services for both residents as well as businesses. For purposes of the General Plan, the goal of the fiscal analysis is to identify the best mix of land uses to balance the revenues generated with the cost for municipal services in the City. Therefore, the fiscal "performance" of individual land uses should be viewed from an overall citywide perspective.

The report is written to provide a detailed explanation of the methodology, assumptions, and data sources used to estimate fiscal impacts for each land use. This analysis is intended to serve as a planning tool for decision makers in the General Plan update process. Based on this analysis, ADE will develop an interactive software program for the City to use in estimating fiscal impacts, not only for General Plan land uses, but also for individual development projects that may be proposed in the future.

APPROACH TO THE ANALYSIS

City government uses a variety of revenue sources to fund the operation of local services and the construction of public facilities. Some of these revenue sources are more affected by the land use mix in the City than are others. For example, property taxes and sales taxes are directly related to the type of property and the business mix in the City. On the other hand, the City's federal entitlement of Community Development Block Grant funds is affected by the population size of the City but is otherwise not a function of the land use mix in the City.

Also, because Newport Beach is a Charter City (as opposed to a "General Law" city) the Newport Beach City Council has the ability to set certain tax rates and fees, such as the business license tax rate or building permit fees. However, the Council has only limited authority to set other tax rates, such as the property tax or the sales tax, or to apply additional taxes or fees, without the consent of a simple majority or a supermajority of electors responding in an election. In considering the effect of existing and future land uses on the City budget, it is important to sort out the types of revenue and costs that are most pertinent.

In general, it is most important to isolate the effect of development on revenues which the City has less ability to raise, such as general taxes, than on direct charges for services which can be increased to meet rising costs as necessary. Consequently, the analysis is focused more on services funded by general tax revenues, such as the property tax and the sales tax among others, than on services funded by direct charges such as the water and sewer enterprise funds, building permit and plan check fees, or other fees charged directly to customers at City Hall. At this point, our assumption is that fees charged for specific services are adequate to cover the costs of those services. [1]

At this stage in the process, the fiscal analysis addresses the effect of land use, including related population and business activity, on municipal operating costs and revenues. In the present report, such costs are primarily estimated on an average basis with only a brief discussion of the marginal costs to serve future development. As we move forward with a projection of the effects of potential future land uses, it will be important to consider the existing capacity in the city's service system and determine whether or not the incremental, or marginal, cost of serving new development is the same as the average cost of serving existing development. That analysis will likely depend to some degree on the location of the proposed new development in addition to the type of land use.

This chapter begins with an overview of land uses in Newport Beach, followed by a discussion of the City budget to help clarify some of the distinctions between costs and revenues raised above.

EXISTING LAND USES

Newport Beach's physical setting encompasses about 25 square miles of land, of which approximately three-quarters is developed into a mix of residential (70 percent of developed land) and non-residential (30 percent of developed land) uses. The remaining one quarter of undeveloped land, including the City's coastal beaches, is primarily used for recreation and open space [2].

Currently, the City is estimated to have about 36,600 dwelling units. Approximately 40 percent of housing units are single-family units and 60

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[1] A more in-depth study of City operations would be necessary to verify this assumption. However, if it is not the case, it is within the authority of the City Council to adjust the fee schedules.

[2] *Newport Beach: Current Conditions, Future Choices*, November 2001, p. 26.

percent are multi-family units. The average assessed valuation for existing housing is $625,000 for single-family units ($814,000 in Newport Coast) and $431,000 for multi-family units. In 2001, the median price of "for sale" housing in Newport Beach was $718,400. [3]

While residential development is treated as a single land-use category for purposes of this fiscal analysis, non-residential uses were split into seven distinct categories: office, retail, light industrial, lodging, marine-related, service commercial, and institutional. Newport Beach businesses were segmented into one of these categories based on their standard industrial classification (SIC) code through an analysis of the City's business license records. Appendix A shows the detailed SIC code definitions for each category, and a general description of the business types included in each category is provided in Table 1 below.

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[3] Ibid. p. 28.

TABLE 1
Land Use Descriptions

Land Use Category	Description
Retail	All retail stores (including auto dealerships) and eating and drinking places, except those that are included in one of the categories below
Office	Business and professional services, financial institutions, health care services, etc.
Industrial	Construction contractors, wholesale distributors, manufacturing, transportation, public utilities, etc.
Service Commercial	Primarily includes personal services (e.g. beauty salons, dry cleaners), repair services, entertainment (e.g. movie theaters), and recreation (e.g. health clubs)
Lodging	Hotels, motels, B&Bs, vacation rentals, etc.
Institutional	Schools, churches, social services, membership organizations, etc.
Marine	Several detailed business types that would otherwise fall within one of the categories above, but which have a direct relationship with activity along the Newport Beach coast. Examples include yacht building and maintenance, boat dealers and repair services, marinas, equipment manufacturers for marine vessels, sport fishing outfitters, etc.
Public	The most significant component of this category is the beaches, which attract most of the visitors to Newport Beach.

BUDGET OVERVIEW

The total budgeted expenditures according to the 2002-2003 budget for the City of Newport Beach are $158.9 million, of which $34.5 million are for Capital Improvement Projects. Estimated General Fund expenditures for the current fiscal year are $94.5 million, while revenues are estimated at $95.5 million (Table 2). The top three revenue categories – property tax ($36.8 million), sales tax ($19.8 million), and transient occupancy tax ($8.3 million) – account for nearly seventy percent of total General Fund revenues. On the expenditure side, Police ($30.6 million), Fire ($20.1 million), and Public Works ($20.3 million) account for three-quarters of all service costs (Table 3). The General

Fund also includes about $4 million of appropriations for projects within the City's Capital Improvement Program (CIP), excluding rebudgets.[4]

In addition to the General Fund, three other major funds are of importance for the fiscal analysis. The first is the Tidelands Fund (also known as the 'Tide and Submerged Lands Fund'), which collects revenue from the use of public property that the State of California designates as "tidelands" (i.e. land once under water or currently below the mean high tide line). The Tidelands Fund has total 2002-03 revenues of about $6.5 million and expenditures of $3 million, including CIP projects but excluding transfers to the General Fund. The Tidelands Fund provides about $3.4 million to the General Fund in 2003-03 to pay for Tidelands-qualified city services in the coastal area.

The second fund is the Gas Tax, which is funded from the State based on primarily population in each city. According to State law, these funds must be accounted for separately and used exclusively for repair, construction, and maintenance of the street and highway system. Newport Beach has a total of 2002-03 Gas Tax revenues of approximately $1.5 million.

Finally, the Measure M Fund is funded in part from the county sales tax for transportation programs and in part from competitive grants from the countywide pool of Measure M funds. Measure M revenues for 2002-03 are approximately $2.2 million. Of these, however, only the annual "turn back" revenues are included in the fiscal analysis as net revenues.

Both the Gas Tax and Measure M funds are used exclusively for projects within the City's CIP.

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[4] Rebudgeted funds for CIP projects appear in Table 3 as adjustments to expenditures, since the fiscal analysis is intended to match revenues from the current fiscal year with current year expenditures.

Budget Adjustments

Some adjustments were made to the original budget figures, as shown in tables 2 and 3, in order to account for budget items that are not annually recurring. On the revenue side, these include intergovernmental grants (e.g. 'competitive' Measure M funds), fees for zoning and building activities, and construction-related permits. On the cost side, the value of development–related fees and permits are deducted from the budgets of the planning and building departments.[5] These adjustments are made for development-related costs and revenues because they typically occur at the building, planning and construction phase and do not represent an ongoing cost of government services once the buildings are completed.

The total estimated General Fund Budget after adjustments (i.e. net revenue) is approximately $92.3 million for 2002-03, with another $9.2 million of revenue in the Tidelands, Gas Tax, and Measure M Funds, for total revenues of $101.5 million. Adjusted General Fund Expenditures are $96.2 million, plus $5.3 million in expenditures within the other three funds included in the analysis. The overall budget figure upon which this analysis is based is approximately $101 million.

TABLE 2
2002-03 Budget Revenues Included In Fiscal Analysis

	REVENUE	ADJUSTMENTS	NET BASIS
General Fund			
Property Tax	$36,880,101		$36,880,101
Sales Tax	19,841,351		19,841,351
Transient Occupancy Tax	8,298,000		8,298,000
Franchises	2,390,000		2,390,000
Business Licenses	2,365,000		2,365,000
Motor Vehicle-in-Lieu	1,700,000		1,700,000
Other Intergovernmental	1,990,127	426,174	1,563,953
Charges for Service	9,515,855	1,048,300	8,467,555

[5] Adjustment include the following budget accounts: Intergovernmental: 4824-4827,4858, 4862, 4893, 4896-4898; Charges for service: 5000-5004, 5007, 5023; Licenses and permits: 4610, 4612, 4614, 4616, 4618, 4622.

Fines, Forfeitures, Penalties	3,125,250		3,125,250
Licenses/Permits	1,819,860	1,446,200	373,660
Use of Property	5,284,288		5,284,288
Other Revenue	730,435	175,000	555,435
Interest Income	1,500,000		1,500,000
General Fund Subtotal	95,440,267	3,095,674	92,344,593
Tidelands Fund			
Licenses/Permits/Fees	1,153,000		1,153,000
Charges for Service	33,500		33,500
Use of Money and Property	5,359,492		5,359,492
State Gas Tax Fund	1,457,000		1,457,000
Measure M Fund	2,205,580	1,005,580	1,200,000
Subtotal Other Funds	10,209,072	1,110,580	8,047,492
TOTAL	**105,649,339**	**4,101,254**	**101,548,085**

Source: ADE, Inc., based on City of Newport Beach, *Fiscal year 2002-03 Budget Detail*.

TABLE 3
2002-03 Budget Expenditures Included In Fiscal Analysis

	COST	ADJUSTMENTS	NET BASIS
GENERAL FUND			
General Government	$9,368,986		$9,368,986
Police	30,132,466		30,132,466
Fire	21,525,002		21,525,002
Public Works [a]	20,389,515		20,389,515
Community Development	4,747,238	2,494,500	2,252,738
Community Services	8,293,665		8,293,665
CIP - Streets	2,366,000	1,061,000	1,305,000
Other CIP Projects	4,766,265	1,873,115	2,893,150
General Fund Subtotal	101,596,546	8,127,868	96,167,931
TIDELANDS FUND			
Harbor Resources	1,282,138		1,282,138
Oil and Gas	351,887		351,887
CIP Projects	1,466,442	400,785	1,065,657
GAS TAX FUND	2,274,721	716,334	1,558,387
MEASURE M FUND	2,061,605	1,005,580	1,056,025
Subtotal Other Funds	7,436,793	2,122,699	
			5,314,094
TOTAL	**109,033,339**	**10,250,567**	**101,482,025**

Source: ADE, Inc., based on City of Newport Beach, *Fiscal year 2002-03 Budget Detail*.

[a] Includes Public Works, General Services and Utilities.

REVENUE AND COST CALCULATIONS BY LAND USE

Major Revenues

The major revenue categories of property tax, sales tax, transient occupancy tax (TOT) and business license tax were allocated among the various land uses based on actual 2001 data provided by the City Revenue Division. Each of these revenues and how they were distributed across land uses is described below.

Property Tax

In general, the City receives about 17 cents of every property tax dollar paid by property owners within the city's boundaries. The distribution of property tax revenue across the various land uses was based on an analysis of assessed valuation (AV) data obtained from the Orange County Assessor. This data set includes over 29,000 records with detailed parcel information such as owner name and address, site address, valuation, and a set of land use codes used by the Orange County Assessor. The analysis involved sorting the data by land use and, in some cases, site address in order to calculate the total assessed valuation by land use and then the local share of the property tax revenue. [6] The results of this analysis are summarized in the table below:

TABLE 4
Assessed Valuation And Property Tax Estimates By Land Use

Land Use Category	Assessed Valuation (millions)	Property Tax Estimate (millions)	% of Total
Residential	15,740	29.31	79.5%
Office	1,697	3.16	8.6%
Service Commercial	761	1.42	3.8%
Light Industrial	690	1.28	3.5%
Marine Industry	282	0.52	1.4%
Lodging	236	0.44	1.2%
Institutional	206	0.38	1.0%
Retail	192	0.36	1.0%
Total	**19,803**	**36.88**	100%

Source: ADE, Inc., based on data provided by the City of Newport Beach Revenue Division.

Significantly, residential properties – which account for about 70 percent of developed land in Newport Beach - generate nearly eighty percent of the property tax for the City. At under 10 percent of property tax revenue, office development is a distant second.

Sales Tax

The city receives one cent of every dollar spent within the city's boundaries on taxable products. Taxable transactions occur not only at retail stores, but at a wide variety of commercial locations throughout the city. For example, many taxable business-to-business transactions, in which products are sold to end users rather than to entities with resale permits, occur at office and light

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[6] For properties within Newport Beach, the City receives approximately 17 percent of the one percent property tax levy.

industrial locations. Examples of non-retail businesses that generate sales tax revenue in Newport Beach include parts manufacturers for marine vessels, food processing equipment distributors, landscaping product wholesalers, medical equipment suppliers, and software developers.

In addition, many service commercial businesses generate sales tax by carrying products related to their service, such as beauty salons that sell shampoos and cosmetics. This category also includes auto rental firms. Large hotels also have ancillary retail shops and food services that generate sales tax revenue. The marine category includes a number of sales tax generating businesses that are both retail and industrial in nature, including sales of new and used boats, marine fuels, and manufacturing and sales of boat parts. Finally, sales tax revenue that is attributed to the residential category is the result of taxable sales that occur at home-based businesses in Newport Beach.[7]

The sales tax revenue that accrues to the city was distributed across the various land uses through an analysis of 2001 sales tax data provided by the Revenue Division.[8]

TABLE 5
Sales Tax Revenue By Land Use

Land Use Category	Estimated Sales Tax Revenue	% of Total

[7] Sales taxes are distributed to cities based on the location of the point of sale, not the residency of the buyer. Thus, Newport Beach gets a portion of all the sales generated by Fashion Island and other retail businesses in the City, whether or not the customers are Newport Beach residents. Conversely, if residents shop outside the City, Newport Beach receives none of that sales tax. For this reason, residential uses generate sales tax revenue indirectly, through resident spending at Newport Beach businesses, as well as directly, through taxable sales at home-based businesses.

[8] Annual audit report of Newport Beach sales tax prepared by MBIA. All Newport Beach businesses that generate sales tax are assigned a State Board of Equalization (BOE) business code, which was the primary basis for the sales tax analysis. The data was cross-referenced with the other primary data sourced used in the fiscal analysis for consistency.

	(1,000s)	
Retail	13,922,674	70.2%
Office	1,938,437	9.8%
Service Commercial	1,438,043	7.2%
Marine Industry	978,688	4.9%
Light Industrial	892,789	4.5%
Lodging	594,391	3.0%
Residential	76,329	0.4%
Institutional	0	0.0%
Total	19,841,351	100%

Source: ADE, Inc., based on data provided by the City of Newport Beach Revenue Division.

Table 5 displays the results of the analysis of this important revenue source. Over 70 percent of Newport Beach's sales tax revenue is derived from retail establishments, and nearly 10 percent are from taxable transactions at office-based businesses. The remaining 20 percent is divided into the other categories as shown.

It is important to note that the figures in Table 5 reflect the direct impact of each type of business, and not the indirect impact of their employees. For example, in the office category, the figures include only the actual sales taxes generated by office-based businesses. In addition, office employees spend money at retail establishments, which could be considered an indirect benefit of office development in Newport Beach. However, the analysis treats this revenue as the direct impact of the retail businesses, not the office businesses.

Transient Occupancy Tax (TOT)

The TOT, also known as the Hotel Bed Tax, accrues to the City at the rate of 9 percent of room charges (with an additional 1 percent going to the Newport Beach Conference and Visitors Bureau). The City separates TOT into two land use categories: lodging and residential. Newport Beach has several major hotels such as the Four Seasons and the Hyatt Newporter, as well as numerous smaller inns and motels. Altogether, these lodging facilities provide a total of about 2,600 guestrooms. In addition, there are approximately 625 seasonal vacation rental properties that also generate TOT if they are rented for less than a month at a time. [9]

A detailed analysis of the City's 2001 TOT revenue is shown in Table 6 below. For the current 2002-03 budget year, the City's is expecting this revenue source to decline somewhat and has projected revenues of about $7.45 million in TOT from hotels and motels/inns, plus $840,000 from vacation rentals.

Business Licenses

Total annual business license revenue is approximately $2.4 million according to the 2002-03 budget. Nearly half the business license revenues are derived from residential-based businesses and out of town businesses.[10] Business license revenue from home-based businesses is about $358,000 (15 percent of the total), while out-of-town businesses generate about $685,000 (29 percent). Revenues from out-of-town businesses and in-town residential businesses are of particular benefit to the City because such businesses do not carry the same service costs that are associated with commercial locations within the City.

The total amount of business license tax revenue from all commercial land uses within Newport Beach is approximately $1.7 million. These revenues were distributed among the various land uses based on SIC code. The full results of the analysis of the City's business license tax revenues are displayed in Table 7 below.

TABLE 6
2001 Transient Occupancy Tax By Lodging Type

Name	Address	Number of Rooms	2001 TOT Amount
Inns and Motels			

[9] Importantly, "timeshare" units, many of which already exist or are planned for development in the Newport Coast area, are not subject to TOT unless the timeshare operator rents the unit(s) on a nightly basis.

[10] "Out of town" businesses are those that provide services in Newport Beach but have no permanent physical or mailing address in the City

Newport Classic Inn	2300 Coast Hwy W	50	
Newport Beach Inn/Best Western	6208 Coast Hwy W	46	
Balboa Inn	105 Main St., Balboa CA	34	
Newport Channel Inn	6030 W Coast Hwy	30	
Bay Shores Inn	1800 Balboa Blvd.	24	
Little Inn by the Bay	2627 Newport Blvd.	18	
Portofino Beach Hotel	2306 Ocean Front Way	15	
Doryman's Oceanfront Inn	2102 Ocean Front West	10	
Marriott Suites	500 Bayview Circle	250	
Balboa Bay Club	1221 W Coast Hwy	123	
Subtotal		600	$1,786,420
Major Hotels			
Marriott Hotel & Tennis	900 Newport Center Dr.	570	
The Sutton Place	4500 Macarthur Blvd.	435	
Hyatt Newporter	1107 Jamboree Rd.	405	
Radisson Hotel	4545 Macarthur Blvd.	335	
Four Seasons	690 Newport Center	295	
Subtotal		2,040	$ 6,588,259
Vacation Rentals		625 Units	$958,771
Grand Total		2,640 rooms; 625 vac. rentals	$9,333,450

Source: ADE, Inc., based on data provided by the City of Newport Beach Revenue Division.

TABLE 7
Business License Revenue By Land Use

Land Use Category	No. of Active Businesses	Business License Tax Revenue	% of Total
Office	4,055	742,200	30.9%
Retail	1,145	240,299	10.0%
Service Commercial	953	210,064	8.7%
Light Industrial	630	112,668	4.7%
Marine Industry	100	26,993	1.1%
Institutional	85	18,417	0.8%
Lodging	39	10,585	0.4%
Subtotal	7,045	1,718,733	56.6%
Residential-based	3,388	357,507	14.9%
Out-of-town	4,174	684,641	28.5%
Total	**14,607**	**$2.4 Million**	**100%**

Source: ADE, Inc., based on data provided by the City of Newport Beach Revenue Division.

Other Revenues

All of the other recurring general fund revenues included in Table 13 were calculated based on employment and population factors, with the following exceptions:

- Franchise fees were estimated on a per capita basis (not including visitors, however), with the additional assumption that 60 percent of these revenues are generated by business uses and the remainder by residents.[11] This split reflects the typical distribution of utility usage for a city like Newport Beach.

[11] Franchise fees are paid to the city by private companies that have contracts with the City to provide services such as gas, electricity, cable TV and solid waste disposal. The company that provides towing services for the Police Department also pays a franchise fee; however, these fees are included in the *Licenses and Permits* category. The 60/40 split between non-residential and residential uses is based on analysis of franchise revenues in other California communities in lieu of specific data pertaining to Newport Beach.

- Revenues categorized under "Use of Money or Property" in both the General Fund and the Tidelands Fund were categorized based on the nature of the activity associated with the revenue. A table summarizing each of these revenues is provided in Appendix B. City parking lot revenues were allocated to both public and commercial land uses based on the business types located in the vicinity of each lot, as well as their proximity to visitor-serving public areas such as the beaches.

- The Marine category also included an estimate of property tax revenue derived from boats that are moored in Newport Beach marinas. According to data provided by the Revenue Division, there are 3,535 boats from which the City currently receives unsecured property tax revenue. The total assessed valuation of these vessels is approximately $133 million.

- Interest income was estimated at a rate of 1.6% of all other revenues, based on the ratio of total interest income to all other revenues for the current budget year.

Major Cost Categories

In general, costs were calculated on a per capita basis as described in the next section, with the following exceptions or refinements:

General Government

The General Government category, with a total budget amount of approximately $9.4 million, was allocated among the various land uses in proportion to each land use's share of all other expenditures. The underlying assumption of this approach is that general government services are essentially administrative overhead and a direct function of the costs of services provided by the City's various departments.

Fire and Lifeguards

Eighty percent of Fire Department costs (less the $2.7 million cost for lifeguards, which was wholly ascribed to public uses) were distributed on a per-capita basis; the remaining 20 percent of fire costs were allocated among the various land uses in proportion to their assessed valuation. This approach is based on information provided by the NBFD that indicates that, aside from the lifeguarding function, 80 percent of their activity is associated with responding to EMS calls and 20 percent is for fire fighting and prevention.

Police

The Police Department is organized into four divisions, in addition to the office of the Chief of Police: Traffic, Patrol, Detective and Support Services (Table 8). In order to estimate the distribution of police activities by land use category, we reviewed police records on the types of services provided both citywide and by reporting district. Most of the Police Department reporting districts contain a mix of land uses. Therefore, in order to isolate the services provided to specific types of development, it was necessary to use a modified per-capita approach. Table 9 summarizes this analysis.

TABLE 8
Police Department Budget
2003-2003

Division	Budget
Police Chief	$1,387,010
Traffic Division	$3,769,036
Patrol Division	$12,106,233
Detective Division	$5,295,066
Support Services	$7,582,531
Total	$30,139,876

Source: ADE, Inc., based on City of Newport Beach, *Fiscal year 2002-03 Budget Detail*.

In the left hand column of Table 9, the resident population, the average visitor population, and the number of employees by business type are presented. The employment figures are further allocated to visitor-serving and non-visitor serving business activity. The total average "daytime population" in Newport

Beach is 151,732, including all of these resident, visitor and worker groups.[12] Of the total daytime population, residents comprise about 50 percent, visitors (on average) are 13 percent, workers serving visitors are four percent and the remaining workers are 33 percent.

An important consideration in Newport Beach is the extent to which police services are related to visitor activity and visitor-serving businesses. As shown in Table 9, visitors represent 13 percent of the daytime population on an average basis, but visitorship peaks heavily in the summer months. The change in demand for police services during the summer months may be expected to indicate the effect of visitors on police services overall. Table 10 shows five main types of police activity: calls for service, citations, crimes, arrests, and traffic accidents. The table shows the monthly average for each type of activity for the September to May (non peak) period and the June to August (peak) period. In every case, there is a measurable peak during the summer months. For example, calls for service are 28 percent higher during the summer months while other citations are more than doubled. This peak effect, when measured against the annual service load, represents about 7 percent of total police activity (and more than 30% of non-vehicle code citations).[13]

TABLE 9
Police Department Cost Analysis

Land Use	Per Capita Factors	Per Cap Share	Traffic Division	Patrol Division	Detective Division	Other	Total	Percent
Residential Pop.	75,662	48.4%	$1,753,582	$5,939,544	$2,445,043	$4,295,384	$14,433,553	47.9%
Visitors	19,671	12.6%	216,564	995,136	580,341	759,260	2,551,301	8.5%
Employees								
Visitor Serving	5,456	3.5%	161,216	823,471	480,205	620,652	2,085,545	6.9%

[12] In actuality, some Newport Beach residents commute out of the city to work, but for the purposes of standard fiscal impact methodology, the term "daytime" population includes all residents.

[13] This calculation measures the additional incremental service load during the three summer months against what the service load would be for 12 months if there were no peak.

Retail	3,317	2.1%	98,013	719,180	419,410	523,930	1,760,533	5.8%
Lodging	2,139	1.4%	63,203	104,291	60,795	96,723	325,012	1.1%
Non-Visitor Serving	55,423	35.5%	1,637,630	4,348,096	1,789,484	3,294,235	11,069,445	36.7%
Office	30,802	19.7%	910,134	1,631,296	671,252	1,361,164	4,573,846	15.2%
Retail	7,740	5.0%	228,698	1,822,770	750,352	1,187,088	3,988,908	13.2%
Industrial	11,332	7.3%	334,837	600,151	246,953	500,770	1,682,710	5.6%
Service Commercial	3,039	1.9%	89,796	160,948	66,227	134,296	451,267	1.5%
Marine	1,152	0.7%	34,039	61,011	25,105	50,908	171,063	0.6%
Institutional	1,358	0.9%	40,126	71,921	29,594	60,011	201,652	0.7%
Total Employment	60,879	39.0%	1,798,846	5,171,567	2,269,689	3,914,887	13,154,990	0
Total	156,212	100.0%	$3,769,036	$12,106,233	$5,295,066	$8,969,541	$30,139,87 9	100.0%
Total Visitor-Serving	25,127	16.1%	$377,780	$1,818,607	$1,060,546	$1,379,912	$4,636,846	15.4%
Residential			46.5%	49.1%	46.2%	47.9%	47.9%	
Visitor-Serving			10.0%	15.0%	20.0%	15.4%	15.4%	
Business (non-Vis.)			43.5%	35.9%	33.8%	36.7%	36.7%	
Total			100.0%	100.0%	100.0%	100.0%	100.0%	

Source: Applied Development Economics, Inc.

Although not nearly in similar numbers, many visitors do come to Newport Beach during off-peak seasons. Business travelers alone represent 21 percent of total visitors to the city. Assuming their trips are more evenly distributed throughout the year, it is likely that visitors represent at least 6-8 percent of the average daytime population during non-peak months. Thus, the impact of visitors appears to represent about 13-15 percent of total police services.[14] This is about the same as the per capita share that visitors, plus visitor-serving employment, represent of the daytime population.

TABLE 10
Analysis Of Summer Peak Demand For Police Services

	Monthly Averages						
Time Period	**Calls for Service**	**Veh. Code Citations**	**Other Citations**	**Total Citations**	**Part 1 and Part 2 Crimes [a]**	**Total Arrests**	**Accidents**
Sep-May	4,253	1,595	278	5,612	538	306	117
Jun-Aug	5,433	1,854	674	7,208	739	431	150

[14] With the exception of lifeguards, neither the Police Department nor the Fire Department add staff during summer months to handle peak service demands. Existing staff are re-distributed to activities that require more attention during the summer. Therefore, the annual averages are suitable indicators of cost impacts on these departments.

Peak Effect	27.8%	16.3%	142.3%	28.4%	37.4%	40.7%	28.5%
Peak as Percent of Annual	6.9%	4.1%	31.4%	7.1%	9.3%	10.4%	7.2%

Source: ADE, Inc., based on data provided by Newport Beach Police Department.

[a] As defined by the FBI, Part 1 crimes are the 8 most serious crimes (homicide, forcible rape, robbery, aggravated assault, burglary, larceny-theft, auto theft, and arson). Part 2 crimes are all other lesser offenses such as forgery, fraud, embezzlement, vandalism, prostitution, etc.

The following sections address the cost estimates for each division.

Traffic Division*:* The Traffic Division includes the parking enforcement, animal control, accident investigations and other moving vehicle violations. (The Patrol Division also issues vehicle code citations and responds to traffic related incidents). Based on the distribution of labor costs for parking enforcement, this function is estimated to require 21 percent of the Traffic Division budget. Parking enforcement records indicate that about 53 percent of this activity occurs in residential neighborhoods and 47 percent in commercial areas, and the parking enforcement costs have been attributed in this analysis accordingly. (Parking meter revenue is attributed solely to business and public uses since few meters exist in residential neighborhoods). All animal control costs are attributed to residential land uses, about 11 percent of the Division budget.

The remaining budget for the Traffic Division is distributed on the basis of estimated traffic generation in the City. Based on the land use mix in the City and the trip generation rates used in the General Plan Update traffic model, it is estimated that approximately 36 percent of all vehicle trips in the City are generated by residential uses, and 64 percent by business and public land uses.[15] This is clearly an approximate split. There is some overlap between trips from residents to retail stores and employment centers and these figures do not account for through-traffic that is unrelated to land use in Newport Beach. However, the 36/64 percent split provides a reasonable basis for allocating the $2.56 million in non-parking and animal control enforcement costs for the

[15] Trip generation rates were provided by Urban Crossroads, Inc., per a City of Newport Beach study. ADE prepared the estimates of the distribution of total trips.

Traffic Division. In the calculations, visitors were limited to 10 percent of total cost for this division, to reflect the lower effect on vehicle citations, as shown in Table 10.

Patrol Division*:* This is the largest division and is responsible for maintaining beat patrols as well as responding to traffic incidents, enforcing traffic laws and responding to most other incidents or calls for service. The costs for this division have generally been allocated on a straight per capita basis, with one exception. Retail businesses on average tend to generate more police activity than do other kinds of businesses. Certain kinds of retail, such as restaurants and bars, generate a disproportionate amount of alcohol-related incidents. Retail shopping centers create more opportunity for burglary and theft. The effect of this activity can be seen in comparing the crime statistics for the Newport Center area and the Airport area. Both areas have approximately the same total employment, but the Newport Center area has three times as many retail employees and a corresponding 20 percent reduction in other kinds of jobs. Yet the Newport Center area registers twice as many crimes and three times as many arrests as does the Airport Area. On a per-employee basis, the disparity between retail and other kinds of business activity is even greater. Therefore, in the analysis in Table 9, retail businesses are given a weighting of three times the per capita cost compared to other businesses.

Overall, 49 percent of the cost of the division activities is distributed to residences, 15 percent to visitor-serving uses and 36 percent to other business and public uses. Looking at the land area distribution in the City, 52 percent of the area is devoted to residential uses, with 22 percent in business uses and 26 percent in open space. The per capita allocation fairly well represents the geographic coverage of the patrol function of this division.

Detective Division*:* This division is primarily responsible for investigating non-traffic related crimes that occur in the City and also performs a number of crime prevention and proactive criminal pursuit activities. In terms of the activities shown in Table 10, this division is most involved with investigation of the Part 1 and Part 2 crimes, as well as following up on arrests. Both of these activities show substantial increases during the summer peak months. Based on the peak effect figures in Table 10 and the additional visitor activity during non-peak months, 20 percent of the costs for this division have been allocated to visitor-serving uses, 46 percent to residences and 34 percent to other businesses. As with the Patrol Division costs, retail businesses are assigned a weighting of three compared to other businesses in the per capita cost calculations.

Support Activities: The office of the Police Chief includes a number of functions such as community relations, legal affairs and crime prevention. The Support Services Division includes communications, records, fleet maintenance, personnel and a variety of other functions. All of these services and activities represent about 30 percent of the total Police Department budget, or 42.4 percent above the budgets of the other three divisions. The allocation of costs for this division has been treated as an overhead function based on the distribution of costs for the other divisions.

Summary*:* As shown in Table 9, the total police cost allocation by land use works out to about 47 percent for residential, nearly 25 percent for visitor serving uses and less than one-third for other business uses.

Capital Improvement Program

In addition to providing services, the City also incurs annual 'capital outlay' costs associated with the provision of public improvements, on-going projects, and maintenance programs. The Capital Improvement Program (CIP) serves as a plan for meeting the City's long-term capital needs as well as ongoing maintenance activities. Projects in the CIP include the construction, repair, and maintenance of arterial highways and local streets; storm drains; bay and beach improvements; park and facility improvements; water and wastewater system improvements; and planning programs. The FY 2002-03 CIP, including rebudgets of revenue from prior years, totals $34.5 million and consists of over 150 projects.[16] Funding for these projects comes from a variety of sources,

[16] City of Newport Beach Capital Improvement Program, pg. I-17.

including the General Fund, enterprise funds, grant programs such as CDBG, State subventions, etc.

As shown in Table 11 below, the four funds that are included in the fiscal analysis contribute a total of approximately $13 million to the 2002-03 CIP. However, since the fiscal analysis is intended to match revenues from the current fiscal year with current year's costs (and then distribute these costs and revenues by land use), funds that were rebudgeted from 2001-02 have been subtracted from the CIP appropriations as shown, resulting in approximately $7.9 million in net CIP expenditures for the current fiscal year.

TABLE 11
2002-03 CIP Expenditures Included In Fiscal Analysis

	Total CIP Appropriation	Rebudget Amount	Net Appropriation
General Fund - Streets	2,366,000	1,061,000	1,305,000
General Fund - Other	4,766,265	1,873,115	2,893,150
Tidelands Fund	1,466,442	400,785	1,065,657
Gas Tax Fund	2,274,721	716,334	1,558,387
Measure M Fund	2,061,605	1,005,580	1,056,025
Total	**12,935,033**	**5,056,814**	**7,878,219**

Source: ADE, Inc., based on City of Newport Beach, *Fiscal Year 2002-03 Capital Improvement Program*.

These CIP expenditures that relate directly to traffic/circulation improvements – including the street projects under the general fund and all of the Gas Tax and Measure M projects - were distributed across the various land uses on the basis of trip generation data cited in the discussion above regarding police costs for the Traffic Division. For the Tidelands Fund, those CIP expenditures that related directly to beach and other public uses (e.g. lifeguard towers replacement or pier repair) were attributed to the 'Public' category, while costs relating directly to boating activity (e.g. Balboa Yacht Basin Facilities) were attributed to the 'Marine' category. The remaining Tidelands Fund CIP expenditures, as well as CIP spending under the General Fund that does not relate to traffic/circulation, was distributed across land uses on a per capita basis, as described in the discussion below.

Per Capita Costs And Revenues

In cases where specific information about the land use origin of certain revenues or costs could not be determined, we developed unit cost and revenue factors to apply to each land use. Unless otherwise indicated, the per capita factors shown in Table 12 are based on the three population segments which generate revenues (via spending on goods and services, payment of fees and fines, etc.) while simultaneously exerting demand for City services: residents, employees, and visitors. As described above in the police cost analysis, these groups comprise a total constituency of approximately 156,000 persons. This estimate is based on the current population of approximately 76,000, plus a citywide employment estimate of 60,879, and an average of 19,671 daily visitors to Newport Beach.[17]

TABLE 12
Unit Costs And Revenues

UNIT REVENUES	Per Capita ($)	UNIT COSTS	Per Capita ($)
Motor Vehicle-in-Lieu	$22.47	**Public Works**	$59.98
Other Intergovernmental	$10.01	**Community Development**	$14.42
Charges for Service	$54.21	**Community Services***	$109.61
Fines, Penalties, and Forfeitures	$20.01		
Licenses and Permits	$2.39		
Other Revenue	$3.56		
Gas Tax Fund*	$19.26		
Measure M Fund*	$15.86		

Source: ADE, Inc.
*Based on residential population only.

[17] According to the U.S. Census Bureau, the City of Newport Beach had a population of 70,032 in 2000. The Resource Allocation Plan indicates a January 1, 2002 population of 75,662, which includes newly annexed Newport Coast and is the figure used in this analysis. The employment figures come from the California Employment Development Department (EDD), adjusted to include an estimate of self-employment (excluding home-based businesses) . The average daily visitors is based on estimates obtained from a 2001 study prepared for the Newport Beach Conference and Visitors Bureau, which indicates that there are 7.2 million visitors to Newport Beach annually.

ANALYSIS OF FISCAL IMPACTS BY LAND USE TYPE

CITYWIDE SUMMARY

Based on the current land use mix in the city of Newport Beach as described above, Table 13 shows the full results of the fiscal impact analysis, which are summarized below. This analysis represents the average, existing cost of services for existing land uses. The incremental cost to serve new development in Newport Beach may be different.

Revenues

- Residential land uses generate about 80 percent of property tax revenues.

- Seventy percent of sales taxes, the second largest city revenue, are generated by retail uses. Table 14 provides a detailed summary of the fiscal impacts of the retail category. Eating and drinking places (i.e. restaurants) generate the most sales tax revenue (over $3 million per year) among the various retail categories shown in Table 14. However, due primarily to the high employment associated with restaurants and the number of police incidents associated with some of these establishments, the net fiscal impact of eating and drinking places is slightly negative. Besides restaurants, the top retail categories in terms of the sales tax revenue produced are automobile dealerships, grocery stores, and department stores. Together, these three categories account for almost half of all the sales taxes, and all three also result in a significant fiscal benefit to the City.[18]

- The remaining 30 percent of the City's sales tax revenues are generated by taxable transactions at Newport Beach businesses as follows: office (10% of sales tax revenues); service commercial (7%); boat and marine equipment

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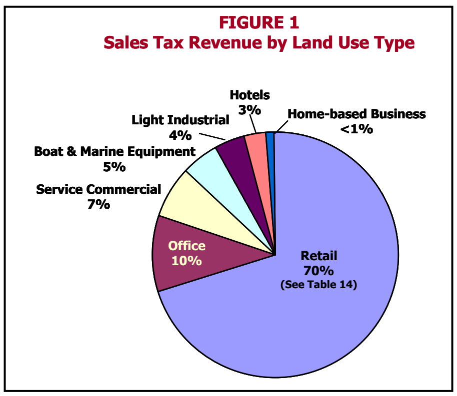
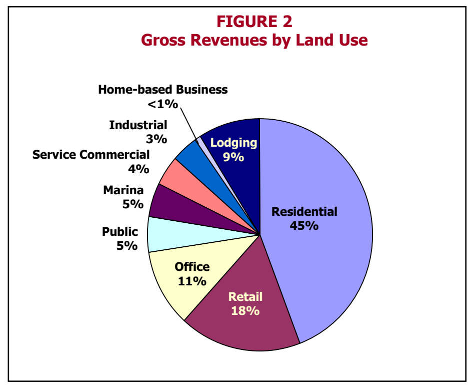
[18] Approximately 65% of the net revenues from the retail land use category is derived from auto dealerships, grocery stores, and department stores (Table 14).

sales (5%); light industrial (4%); hotels (3%); and home-based businesses (less than 1%) (Figure 1).

- The transient occupancy tax equals about eight percent of revenues in the analysis and is primarily generated by lodging facilities in Newport Beach (i.e. hotels and motels). However, residential properties which are leased as vacation rentals (of less than 31 days) also generate significant TOT revenue (nearly $1 million annually).

- Residential uses generate 40 percent of franchise fees and 100 percent of the motor vehicle in lieu subvention from the state.





- Other revenues are generated approximately in proportion to the population and employment supported by each land use.

- Overall, residential land uses create about 44 percent of the revenues. Retail uses generate 18 percent followed by office uses at 11 percent and lodging at 8.7 percent (Figure 2).

Costs

- Residential uses require about 48 percent of both police and fire department services, which constitute the largest expenditures for the City (followed closely by street and facility maintenance performed by the public works department).

- Retail businesses require about one-fifth of total police services, while public land uses, mainly the beaches serving visitors, require about 8 percent. Lodging facilities are estimated to require just one percent of total police services.
- The beaches and other visitor-serving public land uses require about 21 percent of fire department costs, primarily because of the City's lifeguard services.

Net Impact

- In total, residential uses require about 51 percent of municipal services, while generating slightly less than half the revenue needed to operate city government. This results in an annual net cost for residential uses of about \$6.0 million per year for Newport Beach. This is normal for most cities in California, and in fact is probably much worse in many other communities that do not enjoy the higher housing values found in Newport Beach.
- The lodging sector generates the largest net revenue, at \$7.8 million, followed by the retail sector at about \$7.1 million.
- The marine industry, including boat sales and manufacturing, generates about \$2.7 million in net revenue, followed by service commercial uses at \$1.8 million.
- Industrial and institutional uses essentially break even, contributing very modest net revenues.
- Office uses currently generate a negative impact (-\$6.6 million) due to their high employment, which adds to municipal costs. However, these uses, along with industrial uses, also create jobs and income that contribute significantly to the city's economic base, as discussed in more detail below.
- Public land uses also reflect a negative impact due to the lack of direct revenues. However, this should be viewed in the context of the overall visitor impact as discussed below and summarized in Table 15.

As mentioned at the outset, the key point in this analysis is to identify how the mix of land uses in the City provides a balance of revenues to fund services for residents and businesses alike. Although the analysis indicates that residential, office, and public uses create a negative fiscal impact for the City, this one-dimensional view does not tell the whole story. Land uses within the City are linked economically and do not function in isolation of each other. In a broad sense, the city economy is driven by land uses that draw dollars into the community by selling goods and services to the outside world (see Figure 3). This includes hospitality and retail businesses that serve tourists, but office and industrial businesses generate an even larger share of the City's "economic base." These businesses create jobs and incomes for people living in Newport Beach who in turn buy retail goods locally. As Figure 3 illustrates, while retail and visitor-serving businesses generate net tax revenue to help provide services to other land uses, particularly residential, those land uses ultimately generate the tax dollars by patronizing Newport Beach businesses. The primary goal, again, is to maintain a well-balanced land use mix that can support the level of services desired by residents and businesses alike. The following discussion focuses on certain prominent economic sectors in Newport Beach.

TABLE 13
Summary Of Fiscal Analysis

REVENUES	Total	Residential	Office	Retail	Industrial	Lodging	Marine	Service Commercial	Institutional	Public
GENERAL FUND										
Property Tax	$36,879,169	$29,311,725	$3,160,525	$357,210	$1,284,735	$439,521	$524,860	$1,416,413	$384,180	$0
Sales Tax	$19,841,351	$76,329	$1,938,437	$13,922,674	$892,789	$594,391	$978,688	$1,438,043	$0	$0
Transient Occupancy Tax	$8,298,000	$840,000	$0	$0	$0	$7,458,000	$0	$0	$0	$0
Franchise Fees	$2,348,673	$963,881	$900,307	$260,559	$33,591	$0	$27,487	$130,891	$31,958	$0
Business Licenses	$2,377,807	$357,507	$742,200	$240,299	$112,668	$10,585	$26,993	$210,064	$18,417	$12,807
Motor Vehicle-in-Lieu	$1,700,000	$1,700,000	$0	$0	$0	$0	$0	$0	$0	$0
Other Intergovernmental	$1,570,200	$764,280	$382,501	$110,700	$14,271	$20,906	$11,678	$55,610	$13,578	$196,675
Charges for Service	$8,501,375	$4,137,967	$2,070,939	$599,353	$77,268	$113,191	$63,227	$301,084	$73,512	$1,064,836
Fines, Penalties, and Forfeitures	$3,137,732	$1,527,263	$764,353	$221,212	$28,519	$41,777	$23,336	$111,126	$27,132	$393,015
Licenses and Permits	$375,152	$182,602	$91,387	$26,448	$3,410	$4,995	$2,790	$13,286	$3,244	$46,990
Use of Property	$5,284,288	$1,027,072	$407,215	$675,556	$154,480	$53,747	$991,056	$51,353	$91,268	$1,832,541
Other Revenue	$732,653	$271,433	$135,845	$39, 315	$5,068	$7,425	$179,147	$19,750	$4,822	$69,849
Interest Income	$1,420,786	$646,898	$166,497	$258,591	$40,970	$137,435	$44,466	$58,900	$10,186	$56,843
SUBTOTAL GENERAL FUND	$92,467,187	$41,806,956	$10,760,206	$16,711,917	$2,647,770	$8,881,972	$2,873,728	$3,806,520	$658,296	$3,673,555
TIDELANDS FUND										
Licenses, Permits, and Fees	$1,153,000	$0	$0	$520,000	$0	$0	$633,000	$0	$0	$0
Charges for Service	$33,500	$0	$0	$0	$0	$0	$33,500	$0	$0	$0
Use of Money and Property	$5,359,492	$2,285,528	$0	$106,514	$0	$0	$997,896	$61,800	$110,000	$1,797,754
STATE GAS TAX FUND	$1,472,496	$1,472,496	$0	$0	$0	$0	$0	$0	$0	$0
MEASURE M FUND	$1,200,000	$4,616	$117,236	$842,040	$53,996	$35,949	$59,191	$86,972	$0	$0
SUBTOTAL OTHER FUNDS	$9,218,488	$3,762,641	$117,236	$1,468,554	$53,996	$35,949	$1,723,587	$148,772	$110,000	$1,797,754
TOTAL REVENUE	$101,685,675	$45,569,597	$10,877,442	$18,180,471	$2,701,765	$8,917,921	$4,597,315	$3,955,292	$768,296	$5,471,309

TABLE 13 (continued)
Summary Of Fiscal Analysis

EXPENDITURES	Total	Residential	Office	Retail	Industrial	Lodging	Marine	Service Commercial	Institutional	Public
GENERAL FUND										
General Government	$9,375,533	$4,993,431	$1,602,600	$959,110	$245,294	$99,302	$57,630	$220,233	$64,607	$1,133,327
Police	$30,139,845	$14,433,553	$4,573,846	$5,749,441	$1,682,710	$325,012	$171,063	$451,267	$201,652	$2,551,301
Fire	$21,582,789	$10,322,444	$4,017,635	$1,103,797	$273,287	$247,801	$167,958	$685,295	$171,375	$4,593,196
Public Works	$20,389,485	$9,882,582	$4,986,733	$1,443,216	$186,059	$272,558	$152,247	$724,997	$177,013	$2,564,080
Community Development	$2,252,735	$1,091,878	$550,960	$159,454	$20,557	$30,114	$16,821	$80,101	$19,557	$283,293
Community Services	$8,293,655	$8,293,665	$0	$0	$0	$0	$0	$0	$0	$0
CIP - Streets	$1,304,999	$234,900	$289,398	$652,828	$16,825	$35,333	$8,413	$42,064	$8,413	$16,825
Other CIP Projects	$2,893,146	$1,402,279	$707,588	$204,784	$26,401	$38,674	$21,603	$102,873	$25,117	$363,828
SUBTOTAL GENERAL FUND	$96,232,197	$50,654,733	$16,728,760	$10,272,629	$2,451,132	$1,048,794	$595,735	$2,306,830	$667,734	$11,505,850
TIDELANDS FUND										
Harbor Resources Division	$1,282,138	$0	$0	$0	$0	$0	$1,282,138	$0	$0	$0
Oil and Gas	$351,887	$0	$0	$0	$0	$0	$0	$0	$0	$351,887
CIP	$1,065,656	$404,741	$189,094	$54,726	$7,055	$10,335	$40,773	$27,491	$6,712	$324,728
STATE GAS TAX FUND	$1,558,388	$280,510	$345,590	$779,585	$20,093	$42,194	$10,046	$50,231	$10,046	$20,093
MEASURE M FUND	$1,056,384	$190,084	$234,185	$528,637	$13,615	$28,593	$6,808	$34,039	$6,808	$13,615
SUBTOTAL OTHER FUNDS	$5,314,453	$875,335	$768,869	$1,362,948	$40,763	$81,122	$1,339,765	$111,761	$26,566	$710,323
TOTAL EXPENDITURES	$101,546,64 9	$51,530,068	$17,497628	$11,635,577	$2,491,895	$1,129,916	$1,935,500	$2,418,591	$691,300	$12,216,173
NET (COST)/REVENUE	$139,026	($5,960,471)	($6,620,186)	$6,544,894	$209,870	$7,788,005	$2,661,815	$1,539,701	$76,996	($6,744,865)

TABLE 14
Retail Employment And Fiscal Impacts

NAICS	Description	No. of Empls	Percent	Sales Tax Revenue	Percent	Other Revenue	Costs	Net Revenue	Percent
4411	Automobile Dealers	613	5.5%	2,345,749	16.8%	219,505	619,895	1,945,359	29.0%
4412	Other Motor Vehicle Dealers	207	1.8%	616,017	4.4%	74,170	209,461	480,726	7.2%
442	Furniture and Home Furnishings Stores	235	2.1%	520,694	3.7%	84,258	237,950	367,002	5.5%
4431	Electronics and Appliance Stores	148	1.3%	174,080	1.3%	53,159	150,123	77,116	1.2%
4441	Building Material and Supplies Dealers	67	0.6%	59,919	0.4%	23,867	67,402	16,385	0.2%
4442	Lawn & Garden Equipment and Supplies Stores	25	0.2%	164,727	1.2%	9,041	25,531	148,237	2.2%
4451	Grocery Stores	786	7.1%	1,828,051	13.1%	281,343	794,528	1,314,866	19.6%
4452	Specialty Food Stores	99	0.9%	69,680	0.5%	35,439	100,082	5,037	0.1%
4453	Beer, Wine, and Liquor Stores	24	0.2%	68,566	0.5%	8,679	24,510	52,735	0.8%
4461	Health and Personal Care Stores	419	3.8%	314,269	2.3%	150,074	423,816	40,526	0.6%
4471	Gasoline Stations	115	1.0%	500,011	3.6%	41,225	116,422	424,814	6.3%
4481	Clothing Stores	574	5.2%	700,350	5.0%	205,402	580,067	325,685	4.9%
4482	Shoe Stores	21	0.2%	58,350	0.4%	7,594	21,446	44,498	0.7%
4483	Jewelry, Luggage, and Leather Goods Stores	130	1.2%	184,697	1.3%	46,649	131,741	99,606	1.5%
4511	Sporting Goods, Hobby, and Musical Instrument Stores	89	0.8%	186,618	1.3%	31,823	89,869	128,571	1.9%
4512	Book, Periodical, and Music Stores	88	0.8%	112,427	0.8%	31,461	88,848	55,040	0.8%
4521	Department Stores and Other General Merchandise	1,295	11.7%	1,989,761	14.3%	463,601	1,309,235	1,144,126	17.1%
4531	Florists	59	0.5%	40,504	0.3%	20,974	59,232	2,246	0.0%
4532	Office Supplies, Stationary, and Gift Stores	144	1.3%	104,900	0.8%	51,712	146,038	10,574	0.2%
4533	Used Merchandise Stores	24	0.2%	26,120	0.2%	8,679	24,510	10,289	0.2%
4539	Other Miscellaneous Retailers	194	1.0%	655,425	4.6%	69,412	196,023	528,814	8.0%
722	Eating and Drinking Places	5,772	52.2%	3,226,259	23.2%	2,067,038	58,37,432	-544,135	-8.1%
	Total	**11,057**	**100.0%**	**13,922,674**	**100.0%**	**3,959,774**	**11182625**	**6,699,823**	**100.0%**

Source: California Economic Development Department, California Board of Equalization, and Applied Development Economics

Figure 3
Economic and Fiscal Relationships in Newport Beach

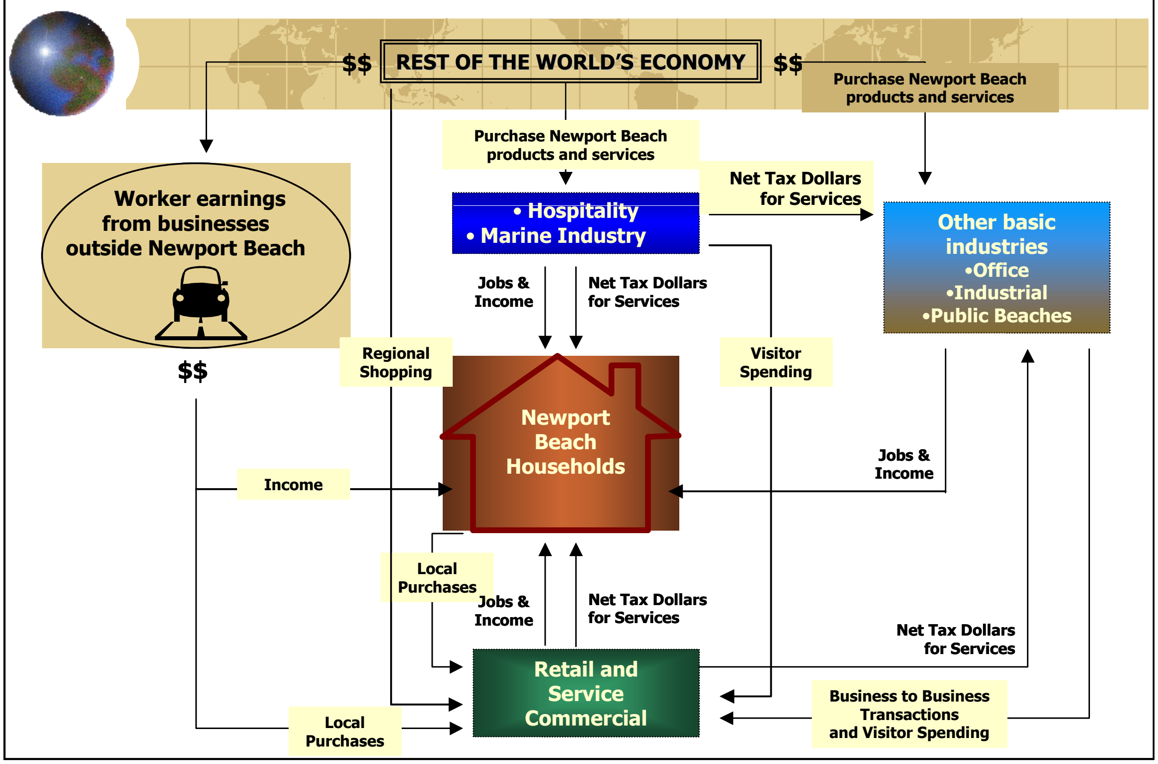


TABLE 15
Fiscal Impact Of Visitors In Newport Beach

REVENUES	Total	Residential	Office	Retail	Industrial	Lodging	Marine	Service Commercial	Institutional	Public
GENERAL FUND										
Property Tax	$1,273,612	$726,928	$0	$107,163	$0	$439,521	$0	$0	$0	$0
Sales Tax	$4,771,193	$0	$0	$4,176,802	$0	$594,391	$0	$0	$0	$0
Transient Occupancy Tax	$8,298,000	$840,000	$0	$0	$0	$7,458,000	$0	$0	$0	$0
Franchise Fees	$86,048	$7,881	$0	$78,168	$0	$0	$0	$0	$0	$0
Business Licenses	$89,078	$0	$0	$72,090	$0	$10,585	$0	$0	$0	$6,403
Motor Vehicle-in-Lieu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Intergovernmental	$250,791	$0	$0	$33,210	$0	$20,906	$0	$0	$0	$196,675
Charges for Service	$1,391,665	$33,833	$0	$179,806	$0	$113,191	$0	$0	$0	$1,064,836
Fines, Penalties, and Forfeitures	$513,643	$12,487	$0	$66,364	$0	$41,777	$0	$0	$0	$393,015
Licenses and Permits	$59,919	$0	$0	$7,935	$0	$4,995	$0	$0	$0	$46,990
Use of Property	$2,490,233	$0	$0	$667,556	$0	$53,747	$120,036	$51,353	$0	$1,597,541
Other Revenue	$91,287	$2,219	$0	$11,794	$0	$7,425	$0	$0	$0	$69,849
Interest Income	$303,574	$25,514	$0	$84,884	$0	$137,435	$1,887	$807	$0	$53,049
SUBTOTAL GENERAL FUND	$19,619,045	$1,648,862	$0	$5,485,771	$0	$8,881,972	$121,923	$52,160	$0	$3,428,357
TIDELANDS FUND										
Licenses, Permits, and Fees	$520,000	$0	$0	$520,000	$0	$0	$0	$0	$0	$0
Charges for Service	$33,500	$0	$0	$0	$0	$0	$33,500	$0	$0	$0
Use of Money and Property	$1,188,814	$0	$0	$98,900	$0	$0	$37,410	$61,800	$0	$990,704
STATE GAS TAX FUND		$12,015	$0	$0	$0	$0	$0	$0	$0	$0
MEASURE M FUND	$288,561	$0	$0	$252,612	$0	$35,949	$0	$0	$0	$0
SUBTOTAL OTHER FUNDS	$2,030,875	$12,015	$0	$871,512	$0	$35,949	$70,910	$61,800	$0	$990,704
TOTAL REVENUE	$21,649,919	$1,660,876	$0	$6,357,283	$0	$8,917,921	$192,833	$113,960	$0	$4,419,061

TABLE 15 (continued)
Fiscal Impact Of Visitors In Newport Beach

EXPENDITURES	Total	Residential	Office	Retail	Industrial	Lodging	Marine	Service Commercial	Institutional	Public
GENERAL FUND										
General Government	$1,590,714	$66,303	$C	$291,782	$C	$99,302	$C	$C	$C	$1,133,327
Police	$4,925,517	$288,671	$C	$1,760,533	$C	$325,012	$C	$C	$C	$2,551,301
Fire	$5,309,182	$137,045	$0	$331,139	$0	$247,801	$0	$0	$0	$4,593,196
Public Works	$3,351,071	$81,468	$0	$432,965	$0	$272,558	$0	$0	$0	$2,564,080
Community Development	$370,243	$9,001	$C	$47,836	$C	$30,114	$C	$C	$C	$283,293
Community Services	$68,369	$68,369	$C	$C	$C	$C	$C	$C	$C	$0
CIP - Streets	$261,056	$13,050	$0	$195,848	$0	$35,333	$0	$0	$0	$16,825
Other CIP Projects		$11,560	$0	$62,188	$0	$38,674	$0	$0	$0	$363,828
SUBTOTAL GENERAL FUND	$15,615,097	$650,857	$C	$2,864,255	$C	$974,787	$C	$C	$C	$11,125,197
TIDELANDS FUND										
Harbor Resources Division	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Oil and Gas	$351,887	$0	$0	$0	$0	$0	$0	$0	$0	$351,887
CIP	$354,57C	$3,089	$C	$16,418	$C	$10,335	$C	$C	$C	$324,728
STATE GAS TAX FUND	$311,746	$15,584	$C	$233,875	$C	$42,194	$C	$C	$C	$20,093
MEASURE M FUND	$211,611	$10,560	$0	$158,843	$0	$28,593	$0	$0	$0	$13,615
SUBTOTAL OTHER FUNDS	$1,229,814	$29,233	$0	$409,136	$0	$81,122	$0	$0	$0	$710,323
TOTAL EXPENDITURES	$16,844,911	$680,091	$C	$3,273,391	$C	$1,055,909	$C	$C	$C	$11,835,521
NET (COST)/REVENUE	**$4,805,008**	**$980,786**	**$0**	**$3,083,892**	**$C**	**$7,862,012**	**$192,833**	**$113,960**	**$0**	**($7,416,459)**

HOSPITALITY AND VISITOR SECTOR

According to a recent report presented by the Newport Beach Conference and Visitors Bureau, the city attracts about 7.18 million visitors per year, of which 81 percent are here on leisure trips.[19] Of this number, 86 percent are day visitors, 7 percent stay in local hotels and the balance stay in private homes. About 64% of the visitors reported visiting the beaches during their stay. This would amount to about 4.6 million visitors, or an annual average of 12,500 per day. During the peak summer season, this average figure climbs to 100,000. Non-beach goers likely include many business travelers and other Southern California residents coming to Newport Beach to shop.

From an economic standpoint, visitors bring substantial income to Newport Beach. Visitors spend an estimated $1 billion in the city each year, of which about $449 million are retail purchases and $83 million are lodging expenses. These two categories of spending alone generated about $4.8 million in sales taxes and $8.3 million in Transient Occupancy Tax (TOT) for the City budget in 2001. Visitors generate other revenues as well, including indirect business license and property taxes, revenues from use of public property, and others. Table 15 summarizes the comprehensive revenues and cost impact on local government by visitors to Newport Beach. Overall visitors generate about $21.6 million per year against $16.7 million in service costs. The service costs include $4.9 million in police services, $2.7 million for beach lifeguards included in the fire department budget, as well as other emergency medical calls made by the fire department. The net positive fiscal impact of visitor business

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[19] CIC Research, Inc. *Profile of Visitors to Newport Beach FY2001*. November 16, 2001. For purposes of the study, visitors were defined as persons who lived outside of Newport Beach and were not in the City for purposes of daily employment. About 18 percent of the survey respondents live in Orange or Los Angeles counties. An additional 15 percent live in Riverside or San Bernardino counties. Overall, about 8 percent listed shopping as the main purpose of their trip to Newport Beach. Although this is not broken down by place of origin, it is likely that many of the visitors from elsewhere in Southern California come to Newport Beach solely for shopping and would not be considered "tourists" in the commonly understood meaning of that term.

activity in Newport Beach, then is about $4.9 million per year, not counting the net fiscal benefit of the marine industry, discussed below. These are revenues that contribute toward City services provided to residents and businesses in the community.

MARINE INDUSTRY

As noted above, marine industries in Newport Beach, which include marina slip rentals, boat sales, chartered vessels for events and sport fishing, boat repair, and boat maintenance and manufacturing, account for over 1,000 jobs and generate nearly $2.7 million in net revenues This positive fiscal result is largely due to property tax derived from boats moored in Newport Beach marinas, sales tax generation among boat dealers and other marina-related businesses, a marine charter fee, and lease income from coastal property owned by the State of California but that the City operates as the State's trustee.

For purposes of the fiscal analysis we have included the City's Harbor Resources Division in the costs associated with this industry. However, as noted above, there is significant overlap between the marine industry and the hospitality industry.

The marine industries that manufacture, sell, and service the boats have undergone a significant transformation in the past twenty years. There are issues today about the continued viability of the marine industry in Newport Beach that should be recognized in the general plan update process.

Twenty years ago, there were five to six major boat manufacturers in Southern California, and a number of smaller outfits. Since that time, all of the major manufacturers have left California, mostly to Florida. While a few of the smaller manufacturers remain, others have moved inland to Riverside County. This has largely been due to increased environmental regulation in California affecting fiberglass manufacturing processes, as well as real estate price inflation in coastal communities.

There has been a consolidation among boat supply and servicing companies as well. As costs have risen, fewer firms are now serving the demand for specialty boat parts, and boat repair and servicing. Those that do not have to be on the water have moved to inland locations. Some have found locations in the West Newport industrial areas, but many have gone further inland to the Costa Mesa, Huntington Beach, and Long Beach industrial areas, as well as locations in Riverside and San Diego counties and Mexico.

Those businesses still in the industry report very strong demand for their goods and services. Although the total number of slips in Southern California is not growing dramatically, there is a lot of "move up" sales activity as existing boaters purchase larger and more expensive boats that require a greater level of support and servicing.

Businesses throughout the industry have expressed concern about the real estate pressure on their locations near the water. This is an issue that continues to affect businesses leasing space, particularly in the Cannery and Mariner's Mile areas of town. As noted above, many businesses have moved inland and service boats in the harbor from more remote locations. If this issue reduces the availability of boat services in Newport Beach sufficiently, it may cause the consumer market in boats to shift as well to other locations. Currently, the city realizes significant sales and property tax revenues from boats and related industries.

The indirect benefit of the boating industry could also be improved by increasing access for visiting boats to dock and launch facilities in Newport Harbor. This issue is complicated by the fact that over 90% of the harbor frontage is in private ownership. This leaves little opportunity for the City to increase the availability of public facilities. However, if private entrepreneurs could add to the available facilities, it would help increase the capture of visitor spending in Newport Beach on restaurants and other retail goods and services.

PRELIMINARY ANALYSIS OF NEWPORT COAST FISCAL IMPACTS

INTRODUCTION

This chapter demonstrates how the fiscal model can be used to analyze future development in the City by presenting an example of existing and projected development in the Newport Coast area.

The analysis primarily illustrates the distinction between ***marginal*** service costs and ***average*** service costs, which will be important in considering the impacts of future development in other areas of the City as well. ***Marginal costs*** represent the actual incremental costs of providing services to a new proposed development. In contrast, an ***average cost*** approach would treat the proposed development the same as existing development in the City and assume that the costs to serve it are similar on a per capita basis as the costs to serve all other development in the City. The analysis in the previous chapter is done on an average cost basis, because the intent is to show the levels of cost the City incurs to provide for the existing residents and businesses.

The true marginal costs, on the other hand, can be either higher or lower than the average depending on the levels of available service capacity. This can be most easily illustrated with fire services, as the Newport Coast analysis shows. If the existing fire stations in the City can serve a proposed development, then the incremental cost of providing service is likely to be lower than the average since existing facilities, equipment and manpower can be used. If a new station is needed, then the marginal cost of that is likely to be higher than the average unless the development is so large that it supports the need for a fire station all by itself.

As the City considers future development options in the General Plan Update process, the location of the development and the status of existing services at those locations will play a role in the fiscal impact analysis.

PROJECT DESCRIPTION

The land use data for the analysis is taken from the traffic model database for the year 2000 and the projection for the year 2025. The fiscal analysis evaluates the year 2000 as the existing land use case and the year 2025 as full buildout of the area. As shown in Table 16, buildout is about double the development levels in the year 2000. The traffic model tracks non-residential development in terms of three employment categories: retail, services and other. It was necessary for us to make assumptions about the more specific business types this would entail in Newport Coast, as shown in the table.

The assessed value estimates for both scenarios are based on residential unit values of $815,000 for single-family units and $600,000 for the condominiums. These values are based on a review of property tax data in the Newport Coast area, and are higher than the values obtained for the City of Newport Beach as a whole.

TABLE 16
Newport Coast Development: Year 2000 and 2025

	Year 2000			Year 2025		
Land Use	**Units**	**Population**	**Assessed Value**	**Units**	**Population**	**Assessed Value**
RESIDENTIAL						
Single Family	1,264	3,001	$1,030,160,000	3,063	7,378	$2,496,345,000
Condominium	1,136	2,697	$681,600,000	1,763	4,223	$1,057,800,000
Apartment	0	0	$0	0	0	$0
High Density	0	0	$0	0	0	$0
Total Residential	**2,400**	**5,699**	**$1,711,760,000**	**4,826**	**11,601**	**$3,554,145,000**
NON-RESIDENTIAL	Sq. Ft.	Employment		Sq. Ft.	Employment	
Office	15,000	50	$1,995,000	45,000	150	$5,985,000
Retail	68,600	196	$6,311,200	68,600	196	$6,311,200
Industrial	0	0	$0	0	0	$0
Lodging	150,000	250	$15,600,000	297,600	496	$30,950,400
Marine	0	0	$0	0	0	$0
Service Commercial	835,000	835	$100,200,000	1,329,000	1,329	$159,480,000
Institutional	100,000	100	$7,200,000	150,000	150	$10,800,000
Total Non-Residential	**1,168,600**	**1,431**	**$131,306,200**	**1,890,200**	**2,321**	**$213,526,600**

COST ANALYSIS

At the time of the annexation, City departments made estimates of expected service costs, both for the initial development levels and for ultimate buildout. In some cases the full service cost for buildout was funded initially, and in other cases the costs were deferred until further development occurs. This situation raises the opportunity to consider both the marginal cost of the initial annexation and the average cost of serving the area at full buildout.

Fire Protection Services

Newport Coast has an existing fire station, designated No. 8 by the City, which was in place at the time of annexation. At that time, the City estimated the cost of operating the station at $1.39 million per year.[20] This is less than the average cost of operating other stations in Newport Beach, estimated at about $2 million, but more than the incremental per capita cost of adding the amount of development in Newport Coast in 2000. Since the City assumed operation of the station, we have shown $1.39 million as the cost of fire protection services in 2000 in Table 17.

As Newport Coast develops further, the City's plan is to move the existing Station No. 5 in Corona del Mar further south to obtain better response times to Newport Coast as well as CdM. Thus, at buildout the City will serve Newport Coast from two stations. However, based on the amount of development at buildout and the fact that Station No. 8 would also serve development west of Newport Coast, the net cost effect would be approximately equal to the cost of one full station. This is estimated by the fiscal model at nearly $1.9 million (Table 18), not including the cost of moving Station No. 5.

Therefore, the marginal cost of the initial annexation–at $1.39 million–was higher than the average per capita cost would have been but, conversely, the marginal cost of completing buildout of the area–at $487,000–is much less than the average cost.

Police Services

In the case of police services, part of the departmental expansion needed to serve full buildout of the Newport Coast area was made at the time of annexation, and

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[20] Terry, Ulaszewski, Fiscal/Information Services Manager, Newport Beach Fire and Marine Department.

part was deferred until a later time. Specifically, the detective division received the entire complement of personnel needed to serve full development of the area[21], while the patrol and traffic divisions received an incremental increase that reflected immediate service demands at the time of annexation.[22]

In estimating the costs of service, the full detective division cost–estimated at 25 percent of the total police services cost–was included in Table 17, along with the incremental cost of the traffic and patrol division as estimated by the fiscal model. This results in a slightly higher cost for police services in Table 17, reflecting the year 2000, than would be commensurate with the amount of development alone. As with the fire services, the net increase at full buildout is accordingly less than it would be otherwise, estimated at $944,000 compared to nearly $1.7 million to serve about the same amount of development currently.

SUMMARY OF FISCAL IMPACT

Overall, the analysis suggests that the year 2000 development generates about $800,000 per year in net revenues, while doubling the development to achieve full buildout would add another $1.9 million per year. Because the marginal costs of the annexation were higher than the average cost, the second half of buildout of the area generates 40 percent more in net revenue for the City than does the first half. Overall, Newport Coast does very well for the City–including the residential land uses at buildout–primarily because of the higher property values obtained in the area. Also, the fact that many of the streets are privately maintained reduces the City's costs.

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[21] Captain Tim Newman, Detective Division Commander, Newport Beach Police Department

[22] Captain Paul Henisey, Traffic and Patrol Division Commander, Newport Beach Police Department.

TABLE 17
Newport Coast Impact Year 2000

Revenues	Total	Residential	Office	Retail	Industrial	Lodging	Marine	Service Commercia l	Institutional	Public
GENERAL FUND										
Property Tax	3,133,213	2,909,992	3,392	10,729	0	26,520	0	170,340	12,240	$0
Sales Tax	614,643	5,737	3,146	243,408	0	68,478	0	293,873	0	0
Transient Occupancy Tax	1,031,060	0	0	0	0	1,031,060	0	0	0	0
Franchise Fees	105,508	71,857	1,176	4,609	0	5,879	0	19,635	2,352	0
Business Licenses	55,498	0	1,939	7,601	0	9,696	0	32,383	3,878	0
Motor Vehicle-in-Lieu	127,780	127,780	0	0	0	0	0	0	0	0
Other Intergovernmental	71,264	56,961	500	1,959	0	2,499	0	8,346	1,000	0
Charges for Service	385,837	308,396	2,706	10,607	0	13,529	0	45,187	5,412	0
Fines, Penalties, and Forfeitures	142,407	113,824	999	3,915	0	4,993	0	16,678	1,997	0
Licenses and Permits	17,026	13,609	119	468	0	597	0	1,994	239	0
Use of Property	240,786	192,459	1,689	6,619	0	8,443	0	28,200	3,377	0
Other Revenue	25,309	20,229	177	696	0	887	0	2,964	355	0
Interest Income	112	90	1	3	0	4	0	13	2	0
SUBTOTAL GENERAL FUND	5,950,442	3,820,934	15,843	290,614	0	1,172,585	0	619,614	30,851	0
TIDELANDS FUND										
Licenses, Permits, and Fees	0	0	0	0	0	0	0	0	0	0
Charges for Service	0	0	0	0	0	0	0	0	0	0
Use of Money and Property	0	0	0	0	0	0	0	0	0	0
GAS TAX	137,062	109,552	961	3,768	0	4,806	0	16,052	1,922	0
MEASURE M	54,680	43,705	383	1,503	0	1,917	0	6,404	767	0
SUBTOTAL OTHER FUNDS	191,742	153,257	1,345	5,271	0	6,723	0	22,456	2,689	0
TOTAL REVENUE	6,142,184	3,974,192	17,188	295,885	0	1,179,309	0	642,070	33,540	0

TABLE 17 (continued)
Newport Coast Impact Year 2000

Expenditures	Total	Residential	Office	Retail	Industrial	Lodging	Marine	Service Commercial	Institutional	Public
GENERAL FUND										
General Government	445,835	374,212	2,270	16,810	0	11,080	0	36,753	4,710	0
Police	1,635,119	1,354,633	11,135	100,516	0	46,655	0	105,859	16,321	0
Fire	1,369,628	1,120,245	7,752	27,979	0	34,834	0	160,654	18,164	0
Public Works	929,079	742,605	6,516	25,541	0	32,578	0	108,809	13,031	0
Community Development	102,649	82,047	720	2,822	0	3,599	0	12,022	1,440	0
Community Services	624,667	624,667	0	0	0	0	0	0	0	0
CIP Streets	33,911	8,756	470	11,413	0	4,071	0	8,596	605	0
Other CIP Projects	131,831	105,371	925	3,624	0	4,623	0	15,439	1,849	0
SUBTOTAL GENERAL FUND	5,272,719	4,412,536	29,787	188,706	0	137,439	0	448,132	56,120	0
TIDELANDS FUND										
Harbor Resources	0	0	0	0	0	0	0	0	0	0
Oil and Gas	0	0	0	0	0	0	0	0	0	0
CIP	0	0	0	0	0	0	0	0	0	0
GAS TAX	40,495	10,456	561	13,629	0	4,861	0	10,265	723	0
MEASURE M	27,448	7,085	380	9,242	0	3,294	0	6,956	490	0
SUBTOTAL OTHER FUNDS	67,943	17,541	941	22,871	0	8,155	0	17,221	1,213	0
TOTAL EXPENDITURES	5,340,662	4,430,077	30,728	211,577	0	145,594	0	465,353	57,333	0
NET (COST)/REVENUE	801,522	(455,886)	(13,540)	84,308	0	1,033,715	0	176,717	(23,793)	$0

TABLE 18
Newport Coast Impact at Full Buildout

Revenues	Total	Residential	Office	Retail	Industrial	Lodging	Marine	Service Commercial	Institutional	Public
GENERAL FUND										
Property Tax	6,405,042	6,042,047	10,175	10,729	0	52,616	0	271,116	18,360	$0
Sales Tax	868,120	11,679	9,439	243,408	0	135,861	0	467,734	0	0
Transient Occupancy Tax	1,031,060	0	0	0	0	1,031,060	0	0	0	0
Franchise Fees	200,860	146,281	3,527	4,609	0	11,664	0	31,252	3,527	0
Business Licenses	90,014	0	5,817	7,601	0	19,236	0	51,542	5,817	0
Motor Vehicle-in-Lieu	260,122	260,122	0	0	0	0	0	0	0	0
Other Intergovernmental	139,154	115,955	1,499	1,959	0	4,958	0	13,284	1,499	0
Charges for Service	753,409	627,805	8,117	10,607	0	26,842	0	71,921	8,117	0
Fines, Penalties, and Forfeitures	278,072	231,713	2,996	3,915	0	9,907	0	26,545	2,996	0
Licenses and Permits	33,247	27,704	358	468	0	1,184	0	3,174	358	0
Use of Property	470,175	391,790	5,066	6,619	0	16,751	0	44,883	5,066	0
Other Revenue	49,420	41,181	532	696	0	1,761	0	4,718	532	0
Interest Income	166,262	124,103	747	4,567	0	20,618	0	15,499	727	0
SUBTOTAL GENERAL FUND	10,744,957	8,020,380	48,274	295,178	0	1,332,456	0	1,001,667	47,001	0
TIDELANDS FUND										
Licenses, Permits, and Fees	0	0	0	0	0	0	0	0	0	0
Charges for Service	0	0	0	0	0	0	0	0	0	0
Use of Money and Property	0	0	0	0	0	0	0	0	0	0
GAS TAX	88,971	88,971	0	0	0	0	0	0	0	0
MEASURE M	106,771	88,971	1,150	1,503	0	3,804	0	10,192	1,150	0
SUBTOTAL OTHER FUNDS	195,742	177,942	1,150	1,503	0	3,804	0	10,192	1,150	0
TOTAL REVENUE	10,940,699	8,198,322	49,424	296,682	0	1,336,260	0	1,011,859	48,152	0

TABLE 18 (continued)
Newport Coast Impact at Full Buildout

Expenditures	Total	Residential	Office	Retail	Industrial	Lodging	Marine	Service Commercial	Institutional	Public
GENERAL FUND										
General Government	872,951	761,787	6,810	16,810	0	21,982	0	58,497	7,065	0
Police	2,556,081	2,190,467	22,271	100,516	0	74,288	0	146,778	21,761	0
Fire	1,853,958	1,575,365	16,065	19,328	0	47,741	0	176,637	18,822	0
Public Works	1,814,177	1,511,727	19,547	25,541	0	64,634	0	173,182	19,547	0
Community Development	200,440	167,023	2,160	2,822	0	7,141	0	19,134	2,160	0
Community Services	1,271,640	1,271,640	0	0	0	0	0	0	0	0
CIP Streets	53,312	17,824	1,409	11,413	0	8,076	0	13,682	908	0
Other CIP Projects	257,421	214,505	2,774	3,624	0	9,171	0	24,573	2,774	0
SUBTOTAL GENERAL FUND	8,879,980	7,710,338	71,035	180,055	0	233,034	0	612,483	73,036	0
TIDELANDS FUND										
Harbor Resources	0	0	0	0	0	0	0	0	0	0
Oil and Gas	0	0	0	0	0	0	0	0	0	0
CIP	0	0	0	0	0	0	0	0	0	0
GAS TAX	63,664	21,285	1,683	13,629	0	9,644	0	16,338	1,084	0
MEASURE M	43,148	14,424	1,140	9,242	0	6,536	0	11,071	735	0
SUBTOTAL OTHER FUNDS	106,812	35,709	2,823	22,871	0	16,180	0	27,409	1,819	0
TOTAL EXPENDITURES	8,986,792	7,746,047	73,858	202,926	0	249,214	0	639,892	74,854	0
NET (COST)/REVENUE	1,953,907	452,275	(24,434)	93,756	0	1,087,046	0	371,967	(26,703)	$0

GENERAL PLAN BUILDOUT

Buildout of the existing General Plan would maintain an overall positive fiscal balance for the City, in terms of annual operating costs and revenues. As summarized in the Table 19, the City's housing units, population and total employment would all grow about 16 percent. However, within these broad averages are some important variations.

TABLE 19
Growth Rates
2002 - Buildout

VARIABLE	PERCENT GROWTH
Occupied Single-Family Dwelling Units	3%
Occupied Multi-Family Dwelling Units	25%
Total Occupied Dwelling Units	16%
Group Quarters Population	0%
Population	16%
Employed Residents	16%
Retail Employees	24%
Service Employees	16%
Other Employees	10%
Total Employees	16%
Elementary/High School Students	1%
Lodging Rooms	19%

Future residential growth is projected to focus heavily on multi-family development, which will tend to shift the tax base to slightly lower cost housing. However, as noted in the analysis of Newport Coast, housing prices for all types of units in Newport Beach are rapidly reaching levels that can generate sufficient property tax to support public services. For the buildout analysis we assumed a modest 5 to 10 percent real growth in housing prices, which had a marked positive effect on the net cost of residential uses as shown in Table 20.

Within the employment figures, the buildout projection shows higher growth for retail and lodging employment, at 24 percent and 19 percent, respectively. As discussed in the earlier section of this report, these two business sectors are particularly strong net revenue generators. Along with the growth in hotels rooms and regional population, we have assumed a 20 percent growth in visitors to Newport Beach over the 20 to 25 years time period needed to achieve buildout. The increased visitors add sales tax and transient occupancy tax (TOT) to the City's revenues but would also increase costs for police protection and emergency response among others. We have not assumed, however, a commensurate increase in the marine industry or the number of boats moored in Newport Harbor. The general plan buildout projection does not include additional marina berths, and as discussed earlier, some elements of the marine industry are under pressure from rising real estate prices and may not be able to expand readily in Newport Beach.

As shown in Table 20, the individual land uses perform about the same as in the existing land use scenario earlier, but the total net revenue is higher as a percent of revenue due to the increased proportion of sales tax, TOT tax and property tax from residential units. The analysis also includes the assumption that City would see increased revenues from the use of public property, as uses on these sites intensify to serve the increased resident and visitor population.

It should further be noted that this analysis only addresses the annual costs of providing services and does not include any capital costs or improvements to public facilities needed to support the growth in the buildout projection. Due to the long time frame (20-25 years) to achieve buildout, we have not attempted to estimate the marginal costs of expanding or upgrading city facilities. As these costs are identified through subsequent analysis in the General Plan Update process, a discussion of financing for public improvements will be included in the fiscal analysis.

TABLE 20
Fiscal Impact of Existing General Plan Buildout

REVENUES	Total	Residential	Office	Retail	Industrial	Lodging	Marine	Service Commercial	Institutional	Public
GENERAL FUND										
Property Tax	$43,839,479	35,821,978	$3,333,991	$367,462	$1,195,363	$493,736	$524,860	$1,676,490	$425,599	$0
Sales Tax	$23,932,382	88,480	$2,336,795	16,940,997	$908,606	$730,552	$987,067	$1,939,884	$0	$0
Transient Occupancy Tax	$10,132,212	965,756	$0	$0	$0	$9,166,456	$0	$0	$0	$0
Franchise Fees	$2,850,120	1,108,183	$1,085,324	318,921	$34,186	$60,480	$27,722	$176,569	$38,736	$0
Business Licenses	$2,789,700	414,409	$894,726	294,123	$114,664	$13,010	$27,224	$283,371	$22,323	$14,956
Motor Vehicle-in-Lieu	1,970,618	1,970,618	$0	$0	$0	$0	$0	$0	$0	$0
Other Intergovernmental	1,854,784	878,700	$461,107	$135,496	$14,524	$25,695	$11,778	$75,017	$16,457	$236,010
Charges for Service	$10,042,171	4,757,459	$2,495,527	$733,601	$78,637	$139,120	$63,768	$406,155	$89,102	$1,277,803
Fines, Penalties, and Forfeitures	3,706,418	1,755,908	921,431	$270,761	$29,024	$51,347	$23,536	$149,906	$32,886	$471,618
Licenses and Permits	443,145	209,939	$110,168	$32,373	$3,470	$6,139	$2,814	$17,923	$3,932	$56,387
Use of Property	6,234,562	1,191,404	$472,369	$837,689	$157,570	64,496	$1,149,625	$56,488	$105,871	$2,199,049
Other Revenue	833,723	312,069	163,761	$48,127	$5,158	9,126	$179,183	$26,642	$5,845	$83,818
Interest Income	1,696,115	777,579	$192,941	$314,011	$39,939	169,113	$47,112	$75,573	$11,642	$68,205
SUBTOTAL GENERAL FUND	110,325,429	50,252,481	$12,469,141	$20,293,555	$2,581,142	$10,929,272	$3,044,688	$4,884,017	$752,392	$4,407,847
TIDELANDS FUND										
Licenses, Permits, and Fees	1,274,894	0	$0	$636,474	$0	$0	$638,420	$0	$0	$0
Charges for Service	$33,787	0	$0	$0	$0	$0	$33,787	$0	$0	$0
Use of Money and Property	6,248,790	2,651,212	$0	$132,077	$0	$0	$1,157,559	$67,980	$127,600	$2,112,361
STATE GAS TAX FUND	1,689,515	1,689,515	$0	$0	$0	$0	$0	$0	$0	$0
MEASURE M FUND	1,453,441	5,307	$141,329	1,030,647	$54,952	$44,184	$59,698	$117,324	$0	$0
SUBTOTAL OTHER FUNDS	$10,700,426	4,346,035	$141,329	1,799,198	$54,952	$44,184	$1,889,463	$185,305	$127,600	$2,112,361
TOTAL REVENUE	$121,025,855	54,598,516	$12,610,469	22,092,753	$2,636,094	$10,973,455	$4,934,152	$5,069,321	$879,992	$6,250,208

TABLE 20 (continued)
Fiscal Impact of Existing General Plan Buildout

EXPENDITURES	Total	Residential	Office	Retail	Industrial	Lodging	Marine	Service Commercial	Institutional	Public
GENERAL FUND										
General Government	11,055,740	5,805,709	$1,924,851	$1,172,951	$247,800	$115,570	$57,630	$293,585	$77,651	$1,359,992
Police	35,480,007	16,731,187	$5,513,794	$7,037,249	$1,712,522	$399,465	$171,063	$608,748	$244,418	$3,061,561
Fire	25,526,657	12,118,949	$4,780,764	$1,342,316	$261,906	$247,442	$167,958	$892,556	$201,930	$5,511,836
Public Works	24,179,820	11,455,760	$6,011,531	$1,766,479	$189,355	$334,995	$152,247	$978,003	$214,553	$3,076,897
Community Development	2,671,510	1,265,691	$664,185	195,170	$20,921	37,012	$16,821	$108,055	$23,705	$339,951
Community Services	9,613,909	9,613,909	$0	$0	$0	$0	$0	$0	$0	$0
CIP - Streets	1,576,311	272,293	$348,871	$799,054	$17,123	$43,427	$8,413	$56,743	$10,197	$20,190
Other CIP Projects	3,430,972	1,625,504	$853,000	$250,653	$26,868	$47,534	$21,603	$138,773	$30,444	$436,593
SUBTOTAL GENERAL FUND	113,534,925	58,889,002	$20,096,99 6	$12,563,872	$2,476,495	$1,225,445	$595,735	$3,077,463	$802,898	13,807,020
TIDELANDS FUND							0			
Harbor Resources Division	1,282,138	0	$0	$0	$0	$0	$1,282,138	$0	$0	$0
Oil and Gas	422,264	0	$0	$0	$0	$0	$0	$0	$0	$422,264
CIP	1,259,582	469,171	$227,953	$66,984	$7,180	$12,703	$40,773	$37,085	$8,136	$389,597
STATE GAS TAX FUND	1,876,969	325,164	$416,610	954,203	$20,449	$51,860	$10,046	$67,760	$12,177	$18,701
MEASURE M FUND	1,272,348	220,343	$282,311	647,046	$13,856	$35,143	$6,808	$45,918	$8,252	$12,672
SUBTOTAL OTHER FUNDS	6,113,302	1,014,677	$923,875	1,668,232	$41,485	$99,705	1,339,765	$150,763	$28,564	$843,234
TOTAL EXPENDITURES	119,648,227	59,903,679	21,023,871	14,232,104	$2,517,980	$1,325,150	$1,935,500	$3,228,226	$831,462	14,650,254
NET (COST)/REVENUE	1,377,628	($5,305,163)	($8,413,401	7,860,649	$118,114	$9,648,305	$2,998,652	$1,841,095	48,530	($8,130,046)

APPENDIX A

LAND USE DEFINITIONS BY SIC AND NAICS

SIC	DESCRIPTION	NAICS	DESCRIPTION
	INDUSTRIAL		
01 thru 09	Agriculture, Forestry, and Fishing	11	Agriculture, Forestry, Fishing
15 thru 17	Construction	21	Mining
20 thru 39	Manufacturing	22	Utilities
40 thru 49	TCPU	23	Construction
50 – 51	Wholesale	31-33	Manufacturing
		42	Wholesale Trade
		48-49	Trans and Warehousing
	RETAIL		
52	Building Materials and Garden Supplies	44-45	Retail Trade
53	General Merchandise Stores	722	Food Service & Drinking Places
54	Food Stores		
55	Automobile Dealers and Service Stations		
56	Apparel and Accessory Stores		
57	Furniture and Home Furnishings Stores		
58	Eating and Drinking Places		
59	Miscellaneous Retail		
	OFFICE		
60	Depository Institutions	52	Finance and Insurance
61	Nondepository Institutions	53	Real Estate
62	Security and Commodity Brokers	54	Professional, Scientific, & Technical Services
63	Insurance Carriers	621-623	Health Care
64	Insurance Agents, Brokers, and Service	51	Information
65	Real Estate	561	Administrative and Support Services
67	Holding and Investment Companies		
73	Business Services		
80	Health Services		
81	Legal Services		
87	Engineering and Management Services		
	SERVICE COMMERCIAL		
72	Personal Services	81	Other Services
75	Auto Repair, Services, and Parking	71	Arts, Entertainment, and Recreation
76	Miscellaneous Repair Services	51213	Motion Picture & Video Exhibition
78	Motion Pictures		
79	Amusement & Recreation Services		
	INSTITUTIONAL		
82	Educational Services	61	Educational Services
83	Social Services	624	Social Assistance
84	Museums, Botanical, Zoological Gardens		
86	Memberships Organizations		
91 thru 97	Public Administration		

LAND USE DEFINITIONS BY SIC AND NAICS

SIC	DESCRIPTION	NAICS	DESCRIPTION
	MARINE		
2394	Mfg Of Canvas & Related Products	441222	Boat Dealers, New and Used
2499	Miscellaneous Wood Products Mfg	713930	Marinas
3663	Mfg Of Radio & TV Communications Equip	334220	Marine Radio Comm Equip Mfg
3731	Ship Building & Repairing	336612	Boat yards (i.e. boat mfg facilities)
3732	Boat Building & Repairing	811490	Boat, Pleasure, Repair & Maint Services
3993	Mfg Of Signs & Advertising Specialties	713990	Boating Clubs w/o Marinas
4422	Coastwise Transportation - Water		
4469	Miscellaneous Water Transportation Services		
4489	Water Passenger Transportation		
4491	Marine Cargo Handling		
4492	Towing & Tugboat Service		
4493	Marinas		
4499	Yacht Maintenance		
5063	Electrical Apparatus & Equipment		
5091	Sporting & Recreation Goods & Supplies		
5099	Miscellaneous Durable Goods Wholesalers		
5146	Fish & Seafood		
5551	Boat Dealers		
7699	Miscellaneous Repair Services		
	LODGING		
7011	Hotels & Motels	721	Accommodation
	GOVERNMENT		
NA	*Not included as category in Bus Lic File*	NA	*Includes only City of Newport Beach departments, which are classified into a variety of different NAICS codes*

APPENDIX B
DISTRIBUTION OF 'USE OF PROPERTY' REVENUES BY LAND USE

GENERAL FUND

Properties	Residen.	Office	Retail	Light Ind.	Lodging	Marine	Service	Inst.	Public	Total
Visitor-Serving	0	0	667,556	0	53,747	120,636	51,353	0	1,547,541	2,490,232
W.J. Carden Telescopes							2,000			2,000
Temp. Slip rentals						1,500				1,500
Galley café			20,000							20,000
Orange Co. Dock						40,000				40,000
Garages									36,096	36,096
Pay Telephones									25,000	25,000
CDM Concession									90,000	90,000
Misc. Concessions									2,600	2,600
Parking Meter Income			344,249		28,573	41,751	26,236		767,567	1,208,376
City Parking Lots			303,307		25,174	36,785	23,116		676,278	1,064,660
Non-Visitor-Serving	1,027,072	407,215	8,000	154,480	0	871,020	0	91,268	235,600	2,794,056
Beacon Bay	650,000									650,000
Balboa Yacht Basin						806,520				806,520
Basin Marine Shipyard						60,000				60,000
Electricity									10,000	10,000
Heritage Yacht Brok.			8,000							8,000
Balboa Yacht Club						4,500				4,500
Apartments	27,072									27,072
Intercity Bus Shelters									60,000	60,000
City facility Fees									55,000	55,000
OASIS									108,000	108,000
Library facility									2,000	2,000
Parking Meter Income		216,481		82,124				48,520		347,124
City Parking Lots		190,734		72,357				42,749		305,840
Marinapark	350,000									350,000

TIDELANDS FUND

Properties	Res.	Office	Retail	Light Ind.	Lodging	Marine	Service	Inst.	Pub.	Total
Visitor-Serving	0	0	98,900	0	0	37,410	61,800	0	990,704	1,188,814
W.J. Carden Telescopes							1,800			1,800
Temp. Slip rentals						1,410				1,410
Galley café			20,000							20,000
Garages									40,704	40,704
Orange Co. Dock						36,000				36,000
Balboa Island Ferry							60,000			60,000
Balboa Pier Conc.			50,000							50,000
Newport Pier Conc.			25,000							25,000
Harbor Bait Barge			3,900							3,900
Balboa Parking Lot									950,000	950,000
Non-Visitor-Serving	2,285,528	0	7,614	0	0	960,486	0	110,000	807,050	4,170,678
Amer. Legion								110,000		110,000
Beacon Bay	650,000									650,000
Balboa Yacht Basin						900,486				900,486
Basin Marine Shipyard						60,000				60,000
Electricity									7,050	7,050
Bayside Yacht Sales			7,614							7,614
Apartments	30,528									30,528
Balboa Bay Club	1,605,000									1,605,000
Petroleum Royalty									750,000	750,000
Sale of gas									50,000	50,000

D R A F T

NEWPORT BEACH GENERAL PLAN UPDATE Retail Commercial Market Analysis

December 2002

Prepared for
The City of Newport Beach

Prepared by
Applied Development Economics
2029 University Avenue • Berkeley, California 94704 • (510) 548-5912
1029 J Street, Suite 310 • Sacramento, California 95814 • (916) 441-0323
www.adeusa.com

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EXECUTIVE SUMMARY

INTRODUCTION

This report presents a preliminary retail commercial market analysis for Newport Beach, with a particular focus on commercial centers in the coastal area of the City. This represents the first report to be prepared as part of the economic studies for the Newport Beach General Plan update.[1] These economic studies are intended to provide a baseline of the City's current economic and fiscal performance, and help identify realistic market opportunities for economic development. Other economic studies that will be completed as the project progresses include a fiscal and revenue analysis, and an economic opportunity analysis.

Within the context of the general plan revision, these studies will provide the technical background for an economic strategy, as well as a vital informational input into the public review and committee planning processes. The economic analysis will outline options for future business development for public discussion and possible inclusion in the proposed land use element, and identify whether the current land use plan for the City provides for the right types of economic development in the right places. This retail report focuses on retail commercial business types, and does not address the market for hotels, office space or other commercial land uses.

In addition to a citywide overview, the report discusses in detail the commercial centers in the coastal area of the City, in view of the fact that the schedule for updating the City's Local Coastal Program must run slightly ahead of the process for the citywide General Plan update. The "coastal area" as denoted in this report is not necessarily coterminous with the "coastal zone" of the city. The coastal zone of the city includes nearly two-thirds of the city's land area, whereas the coastal area analysis in this report focuses on retail uses that are in some way related to the coast or the neighborhoods along the coast. From a geographic perspective, this generally means businesses located along or west of the Pacific Coast Highway (see Figure 1).

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[1] The present report addresses the existing market performance and potential for new retail business development. The report includes estimates of retail spending by visitors but does not address the economic impact or future potential of other visitor serving uses such as hotels or entertainment venues. The report also does not make specific estimates or recommendations regarding land use or building space for commercial uses. These analyses will be included in subsequent stages of the work.

APPROACH TO THE ANALYSIS

The purpose of the report is to answer the question, "How well does the retail business mix in Newport Beach serve the shopping needs of its residents and visitors to the City?" The report presents a fairly technical analysis and it is useful to review the basic approach and some of the terminology used in the analysis (see below for a brief glossary).[2]

The analysis begins by estimating the retail ***purchasing power*** of residents in the City. This is done based on recent national consumer expenditure surveys correlated to the income levels of households in Newport Beach. In this way, the analysis can estimate the likely spending by resident households for nearly forty different types of retail stores, ranging from department stores at Fashion Island to local markets in the neighborhoods. However, the estimates of ***purchasing power*** do not assume households will necessarily make these expenditures in Newport Beach, only that they will spend a certain amount of money somewhere.

In addition to residents, tourists and business visitors in the City spend money while they are here. The analysis includes estimates of visitor spending calculated by other consultants in a separate report presented to the Newport Beach Conference and Visitors Bureau. Similarly, employees who work in Newport Beach but do not live here also make some retail purchases while they are in town. The estimates of total purchasing power for the City include this incidental employee spending. Unlike the estimates of household purchasing power, the estimates of ***demand*** for visitors and employees only include the amounts thought to be spent in Newport Beach.

As noted above, ***purchasing power*** reflects the household retail ***demand*** for goods and services by Newport Beach residents, but may not represent the amounts actually spent in Newport Beach. Residents may go to South Coast Plaza in Costa Mesa, or restaurants in Laguna Beach, or auto dealers in Tustin, or a variety of other places to buy retail products. In order to estimate how much spending occurs in Newport Beach, we reviewed actual sales tax records for all retail businesses in the City. Based on prior research on the product types generally carried in each type of store, we adjusted the sales figures to include non-taxable, as well as taxable retail items. The sales posted by retail stores constitute the amount of retail demand that is ***captured*** locally.

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[2] A detailed description of the methodology for the retail market study is provided in Appendix B.

By comparing the total retail ***demand*** to the actual ***sales*** by Newport Beach stores, we can estimate how well the businesses ***capture*** the available retail market. When businesses post higher sales than the estimates of demand, it means they are attracting shoppers from outside the City (in addition to visitors and employees counted in the aggregate demand estimates). This is referred to as ***net capture***. If sales are lower than demand, then the City is experiencing a sales ***leakage*** in that particular retail category. This may be because a particular store type does not exist or is underrepresented in the City. Or it may be that the local retailers do not adequately serve the current needs of local shoppers. The analysis, therefore, can be used to identify opportunities both for new stores and for expansions of existing stores in the community.

In addition to the citywide retail market analysis, the report discusses the performance of smaller commercial centers in the coastal area. For this part of the analysis, it was necessary to make assumptions about where residents of each neighborhood would logically shop for certain retail items. We were aided in this effort by earlier commercial studies in Newport Beach that actually surveyed business owners and shoppers to determine local shopping patterns. We also made estimates of how much visitor spending occurs in the smaller commercial centers based on analysis of the types of stores in each center and their proximity to visitor attractions.

It is important to recognize that none of the smaller commercial centers would be expected to meet all the needs of residents in the neighborhoods. ***Leakage*** from neighborhood commercial centers is generally ***captured*** by larger regional centers in the city such as Fashion Island and the separate boat and auto dealerships. Therefore, use of the term ***leakage*** in the analysis of the coastal area centers should not be construed to mean that City as a whole is not sufficiently capturing local ***demand***. The analysis describes the performance of the neighborhood stores in terms of ***sales per square foot***, to indicate how well the stores are doing given their size and type.

To summarize the approach for the study, it is assumed that the City should capture an amount of retail spending at least equal to the purchasing power of its residents plus the actual amounts spent by visitors and non-resident workers. In reality, local residents will naturally shop for some goods outside the City, just as Newport Beach stores would be expected to attract some spending from residents of adjacent cities. The analysis leaves aside the question of whether the City should attempt to capture an even greater share of spending by visitors. Also, the City may decide to accept a lower level of retail sales if the types of stores currently underrepresented are not ones for which the City has sufficient land or which are consistent with the desired commercial character of the City. These are questions to be discussed by the policy committees involved with the General Plan Update.

Glossary

Purchasing Power: The total amount of spending by households, tourists and non-resident workers on retail goods and services. For resident households, the estimates of purchasing power do not reflect where the spending takes place, only the total amount of their spending over the course of one year. For visitors and non-resident employees, the estimates of purchasing power are limited to amounts spent only in Newport Beach.

Demand: Synonymous with Purchasing Power.

Capture: The amount of sales in local retail stores. This term reflects the amount of demand that is actually spent in retail stores in the Newport Beach.

Net Capture: The amount of retail sales in Newport Beach stores that exceeds the estimated local purchasing power.

Leakage: The amount of local demand that is not captured by Newport Beach stores.

Sales per Sq.Ft.: The dollar value of sales for a retail store divided by the floor area of the store. This measure can be compared to national averages by store type to determine how well a particular store is performing.

SUMMARY OF THE RETAIL MARKET ANALYSIS

Citywide Analysis

Citywide in 2001, Newport Beach retail businesses generated about $1.57 billion in retail sales. City residents have an estimated retail purchasing power of $1.04 billion and the city is estimated to capture $449 million in visitor spending as well as about $55 million from employees not residing in Newport Beach (Figure 2).

As an overall conclusion, it can be fairly stated that the City does very well in serving the retail shopping needs of both residents and visitors. Although the balance between demand and sales is very close, the city actually captures large amounts of spending in some categories from the surrounding region, while losing local spending in other categories. The City's retail base is particularly strong in boats, autos, restaurants, furniture, apparel and specialty retail stores. It is estimated that the city captures at least $229 million, or 14.5 percent, of its sales from shoppers living in the surrounding region.

Conversely, relatively large sales leakages occur in other general merchandise, family clothing, discount department stores and home improvement store categories. This leakage amounts to about $118 million annually. Most of these spending categories represent "big box" retail store categories that require large tracts of land and seek more central locations than tourist oriented coastal areas (Figure 3).

Coastal Areas

The commercial centers in the coastal area largely serve the visitor market and do not capture a large proportion of residents' spending, with the exception of Corona del Mar, which has the broadest base of local-serving retailers (see Figure 4).

Except for the Balboa Village area, most of the coastal commercial centers perform adequately in terms of sales per square foot among existing businesses. In Balboa Village, the average is relatively low in a number of the visitor-serving store types categories, reflecting the less accessible location and attractiveness of this older commercial area.

In terms of opportunities for new retail establishments in the coastal subareas, the focus should be on retail categories that have retail leakage throughout all of Newport Beach and would also be at the appropriate scale of commercial development. Certain specialty retail categories such as music and bookstores would fit these criteria.

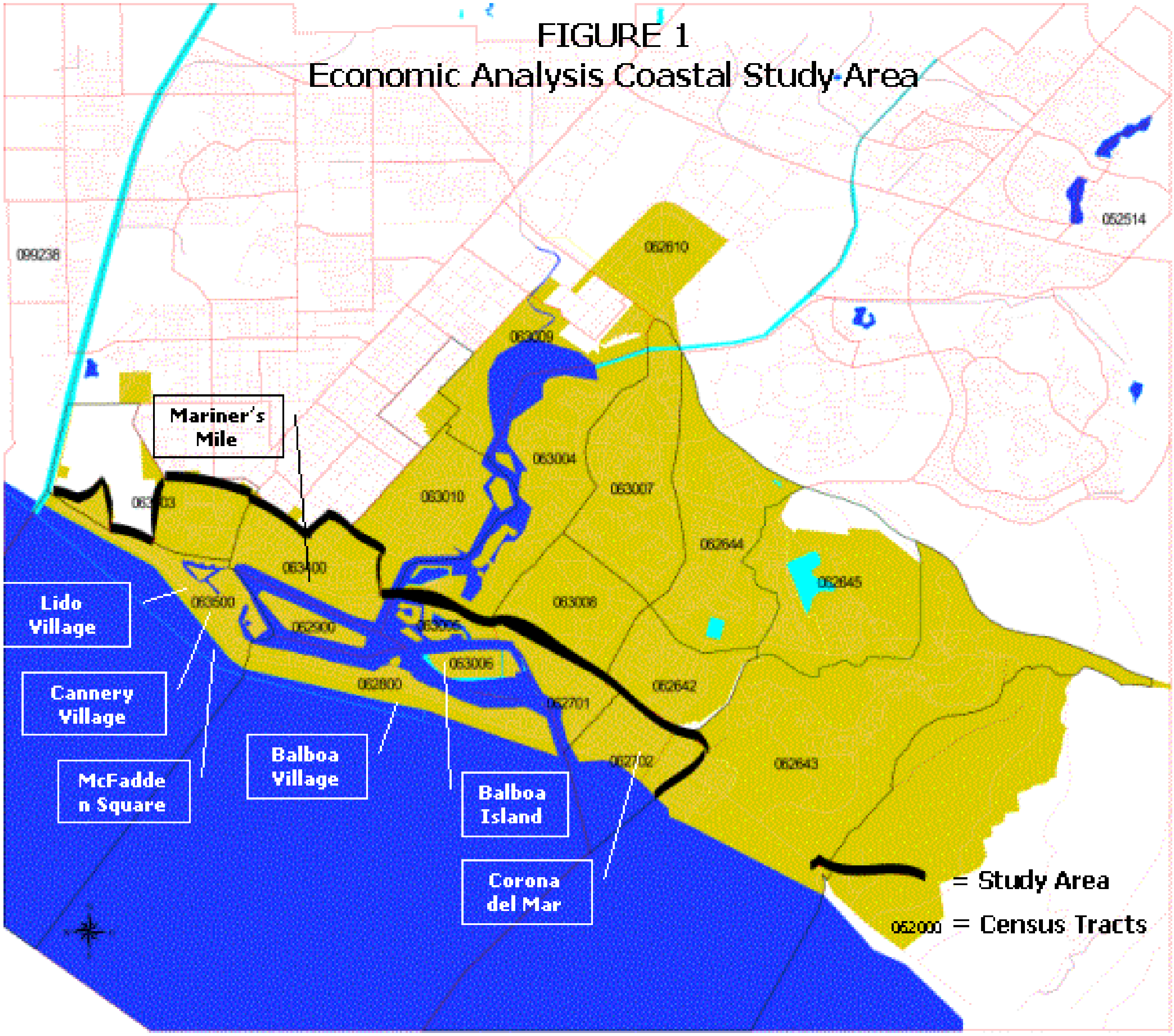


FIGURE 1
Economic Analysis Coastal Study Area

FIGURE 2
Citywide Retail Capture
($Million)

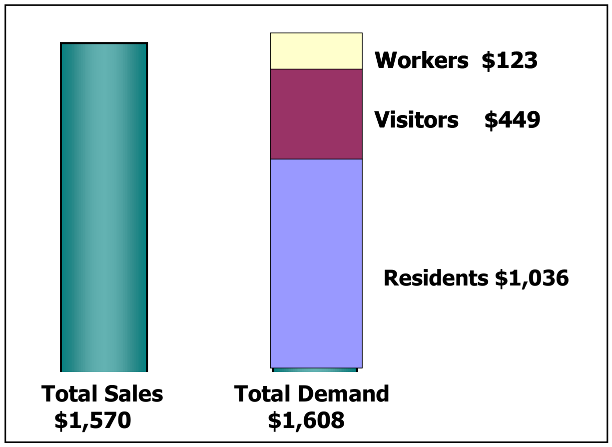


FIGURE 3
Citywide Sales Leakage and Regional Capture
($Million)

(Selected Retail Store Types)

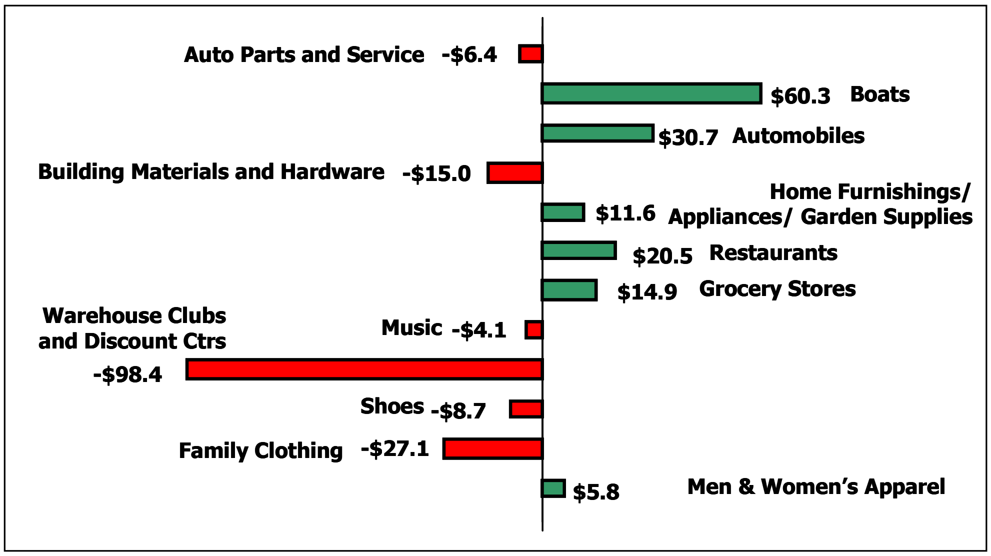
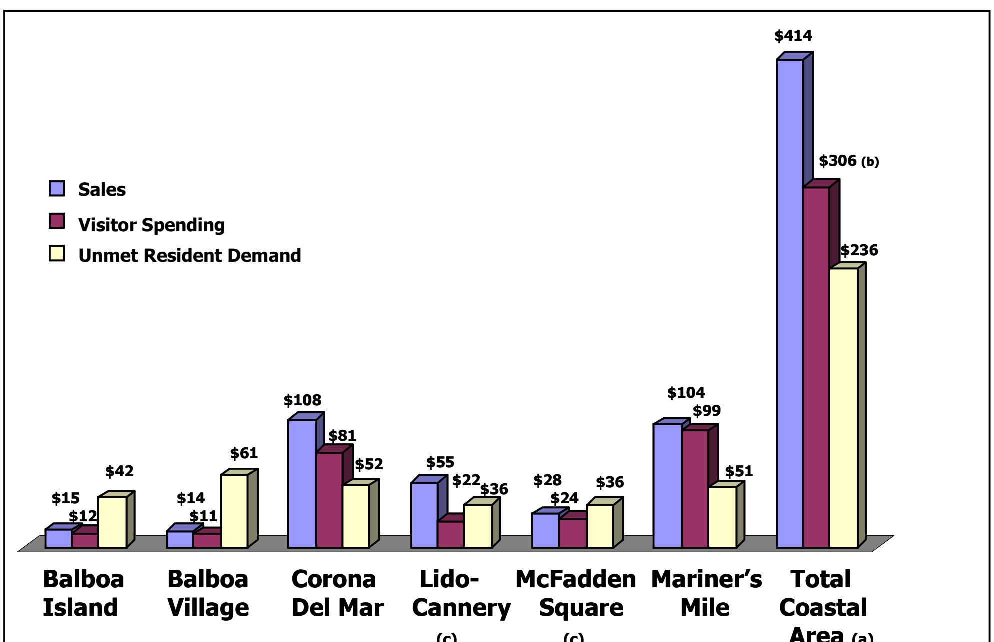


FIGURE 4
Coastal Centers Sales and Leakages



(a) Includes some sales not included in subareas
(b) Of this total, about $61 million is estimated served at Fashion Island
(c) Leakage has been adjusted from figures in the tables to avoid double-counting

SUMMARY OF FINDINGS

- Newport Beach's retail base benefits from a very strong local spending base, as well as a high level of spending attracted from non-residents. Overall, Newport Beach households (including Newport Coast) generate about $1.04 billion of retail spending annually (Table 1).
- In addition, Newport Beach attracts about $449 million of retail spending from visitors and another $123 million from employees not otherwise accounted for in the retail analysis.
- Overall, the largest spending categories are grocery stores, restaurants, automobile dealerships, gas stations, and department stores.
- In 2001, Newport Beach retail businesses generated about $1.57 billion in sales, resulting in a net leakage of $35 million in sales. The largest retail sales categories include restaurants/eating places, auto dealerships, grocery stores, department stores, miscellaneous specialty retail, gas stations, and boat/motorcycle dealers.
- Comparing the overall household and visitor demand with the retail sales shows that the totals are very similar with only a slight overall leakage of retail sales. However, closer examination of individual store categories finds that Newport Beach has been very successful at attracting spending from outside the city in some retail categories, while it remains very underrepresented in others.
- The largest net capture categories include boats/motorcycles, auto dealerships, restaurants/eating places, furniture, nursery products, men's and women's apparel, and miscellaneous specialty retail. In addition to drawing high levels of spending from local households, visitors, and workers, these store types also attract significant spending from neighboring communities. Although shopper surveys would be needed to know precisely the extent of this spending from non-Newport Beach residents, the net capture figures in Table 1 suggests that it is at least $152 million per year, including some $27 million accounted for by the department stores at Fashion Island.

- Newport Beach also has several categories where the local and visitor demand significantly exceed the existing retail sales, resulting in sales leakage to surrounding communities that have more retail offerings in these categories. The largest leakages are in other general merchandise, family clothing, discount department stores, and home improvement businesses. Most of these spending categories represent "big box" retail store categories, which often have compatibility issues with sensitive coastal areas and require large tracts of inexpensive land with visible highway access. Moreover, large-scale developments of this type are generally located in more central locations rather than in coastal areas.

- Other retail categories with at least $1 million of retail leakage in Newport Beach include shoe stores, music stores, office supplies, liquor stores (which will be partially addressed by the new Beverages & More store at Fashion Island), service stations and auto parts stores. These more specialized retail categories do not typically need large building footprints.

- Leakage in the coastal subareas represents unmet consumer demand that could be recaptured into retail potential for new businesses. However, because of Newport Beach's comprehensive retail base on a citywide basis, attracting new businesses into these coastal subareas that already have a citywide excess capture of sales could transfer sales away from existing businesses elsewhere in Newport Beach.

- In considering alternatives for providing new retail establishments in the coastal subareas, the first options would be retail categories that have retail leakage throughout all of Newport Beach. This would likely need to be limited to specialty retail categories such as music and bookstores, and other store types that do not need large building footprints.

TABLE I
NEWPORT BEACH RETAIL MARKET ANALYSIS

Retail Group	Newport Beach Household Spending	Employee and Visitor Spending	Total Consumer Demand	Retail Sales	Retail Sales Leakage/(Net Capture)
Total	**$1,035,772,702**	**$571,937,093**	**$1,607,709,794**	**$1,572,517,550**	**$35,192,244**
Apparel Store Group	$63,897,777	$52,274,160	$116,171,937	$86,139,500	$30,032,437
Women's Apparel	$14,623,970	$27,491,259	$42,115,229	$46,052,900	($3,937,671)
Men's Apparel	$5,631,796	$12,784,324	$18,416,120	$20,327,000	($1,910,880)
Family Clothing	$32,439,441	$7,849,251	$40,288,692	$13,134,800	$27,153,892
Shoe Stores	$11,202,570	$4,149,327	$15,351,897	$6,624,800	$8,727,097
General Merchandise Group	$181,563,394	$128,865,195	$310,428,589	$225,908,791	$84,519,797
Department & Dry Goods	$105,042,314	$120,164,804	$225,207,118	$189,946,965	$35,260,153
Discount Stores	$61,985,810				
Department Stores	$43,055,859				
Other General Merchandise	$49,254,426	$66,928	$49,321,354	$281,112	$49,040,241
Warehouse Clubs and Superstores	$36,394,079				
Misc. General Merchandise	$12,860,346				
Drug & Proprietary Stores	$27,266,654	$8,633,463	$35,900,117	$35,680,714	$219,403
Specialty Retail Group	$76,680,910	$86,932,638	$163,613,548	$162,013,277	$1,600,271
Gifts & Novelties	$5,823,324	$11,109,143	$16,932,467	$18,812,766	($1,880,299)
Sporting Goods	$8,978,055	$11,336,883	$20,314,938	$21,187,788	($872,849)
Florists	$2,001,735	$2,473,248	$4,474,983	$4,598,693	($123,710)
Photographic Equipment	$1,082,262	$981,279	$2,063,541	$1,631,600	$431,941
Records & Music	$4,830,280	$972,794	$5,803,075	$1,678,200	$4,124,875
Books & Stationery	$5,197,264	$6,574,969	$11,772,233	$11,086,300	$685,933
Office Supplies/Computer Equipment	$13,212,883	$0	$13,212,883	$11,909,900	$1,302,983
Jewelry	$8,460,886	$12,761,568	$21,222,454	$20,969,670	$252,785
Misc. Specialty Retail	$27,094,220	$40,722,753	$67,816,973	$70,138,360	($2,321,387)
Food, Eating and Drinking Group	$266,319,868	$289,205,647	$555,525,516	$589,540,295	($34,014,780)
Grocery Stores	$170,675,644	$21,936,363	$192,612,007	$207,549,011	($14,937,003)
Specialty Food Stores	$5,290,478	$1,422,861	$6,713,339	$7,911,157	($1,197,818)
Liquor Stores	$7,951,848	$2,456,364	$10,408,213	$7,784,639	$2,623,574
Eating Places	$82,401,898	$263,390,059	$345,791,957	$366,295,489	($20,503,532)
Building Materials And Home Furnishings Group	$116,985,295	$2,992,052	$119,977,347	$116,524,239	$3,453,108
Furniture & Home Furnishings	$54,730,766	$1,243,242	$55,974,008	$59,117,335	($3,143,326)
Household Appliances & Electronics	$18,791,361	$1,748,809	$20,540,170	$19,764,300	$775,870
Used Merchandise	$3,022,133	$0	$3,022,133	$2,965,500	$56,633
Nurseries & Garden Supply Stores	$9,490,015	$0	$9,490,015	$18,702,405	($9,212,390)
Lumber & Other Building Materials	$17,768,043	$0	$17,768,043	$6,803,000	$10,965,043
Home Centers and Hardware Stores	$12,314,135	$0	$12,314,135	$8,699,700	$3,614,435
Paint & Wallpaper	$868,843	$0	$868,843	$472,000	$396,843
Automotive Group	$330,325,457	$11,667,400	$341,992,858	$392,391,448	($50,398,590)
New Cars & RVs	$218,719,752	$0	$218,719,752	$249,448,200	($30,728,448)
Used Car Dealers	$15,978,023	$0	$15,978,023	$16,878,000	($899,977)
Gasoline Service Stations	$81,128,752	$11,580,124	$92,708,876	$56,769,048	$35,939,828
Mobile Homes & Trailers	$56,521	$87,277	$143,798	$948,900	($805,102)
Auto Parts & Accessories	$7,073,805	$0	$7,073,805	$643,700	$6,430,105
Boats & Motorcycles	$7,368,603	$0	$7,368,603	$67,703,600	($60,334,997)

Source: ADE, retail model developed from 1997 US Retail Census, and the 1998 Bureau of Labor Statistics Household Expenditure Surveys. Sales data comes from the State Board of Equalization, data audited by MBIA. Data adjusted for inflation using CPI. Household counts and aggregated income growth factors come from the 2000 US Census, and income estimates are derived from the 1990 US Census. Income for Newport Coast residents was calculated based on selling prices for housing units. Employee spending calculated from data provided by California EDD, and the City of Newport Beach. Visitor spending derived from CIC Research visitor survey data.

Notes: Spending and sales do not include non-store retail establishments, which include mail order, home shopping, and direct selling.

COASTAL SUBAREA RETAIL SUMMARIES

INTRODUCTION

The analysis of individual commercial subareas in the coastal area is intended to provide an indication of how they function in relation to the overall business mix in the city. A local market area is drawn for each subarea to help measure the neighborhood demand for retail products. In the Newport Beach coastal area, visitors comprise a significant segment of the retail market. In addition, residents of Newport Beach often visit the beach areas for the same reasons as do tourists. The analysis attempts to identify the amount of spending by non-neighborhood residents for each subarea, as well as residents living near the subareas.[3]

Neighborhood shopping districts typically provide convenience goods and are not intended to meet the full range of shopping needs of neighborhood residents. Therefore, the analysis, while it attempts to identify leakage from each subarea, does not recommend commercial development based on the neighborhood leakage. Rather, certain of the business development opportunities identified above in the citywide analysis are suggested for the coastal areas based on their suitability in terms of size and scale. In this way, new store development in the coastal area would add to the overall business mix in Newport Beach and not impact sales for existing stores elsewhere in the city. In addition, the stores are evaluated in terms of how well their sales compare to national averages for each type of store, to indicate where existing stores in the coastal area can improve their performance.

BALBOA ISLAND[4]

- Balboa Island's retail demand, which includes spending from local residents, visitors, and other non-residents, totals about $58 million annually (Table 2). Coupled with the Island's total retail sales of about $14.7 million, this results in an estimated sales leakage of $43 million.

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[3] It should be noted that, within the non-neighborhood resident group, there is no way to distinquish among tourists, Newport Beach residents, and residents of nearby cities, without shopper survey data which is not available.

[4] The Balboa market area includes all of Census Tract 630.06

- Individual categories with large sales leakages among local residents include general merchandise, grocery stores, and automotive related businesses (such as gas stations). Much of this leakage is accommodated by businesses in these categories elsewhere in Newport Beach.

- Balboa Island's retail sales are dominated by apparel stores, specialty retail stores, and restaurants. These stores generally sell to tourists and other non-residents.

- Shoppers not living on Balboa Island account for about $13.1 million of the $15.4 million in retail sales on Balboa Island, further reinforcing the perception of the area primarily catering to visitor-serving needs.

- The average retail sales per square foot on Balboa Island (for those businesses for which square footage data is available through the Orange County Assessor's database) is about $159, which is within a normal average range for a shopping area with mostly specialty retail stores (Table 3). Some retail categories appear to under perform compared to national benchmark averages, but on the whole Balboa Island does not have a particularly distressed business district.

- In recent years, Balboa Island has seen an escalation in retail rents. This has resulted in some turnover of long-time businesses and a few retail vacancies. The sales patterns in the area indicate that excessively high rents cannot be supported over the long term.

TABLE 2
BALBOA ISLAND SUBAREA ANALYSIS OF RETAIL DEMAND, RETAIL SALES, AND SALES LEAKAGE

Retail Group	Total Retail Demand	Retail Sales	Sales Leakage	Retail Businesses	Spending From Outside The Subarea
Total	**$58,048,477**	**$15,446,827**	**$42,760,737**	**56**	**$13,087,312**
Apparel Store Group	$6,399,833	$3,883,800	$2,516,033	17	$3,650,772
Women's & Men's Apparel*	$2,809,875	$2,071,000	$738,875	8	$1,946,740
Family Clothing/Shoe Stores*	$3,589,958	$1,812,800	$1,777,158	9	$1,704,032
Food Store and General Merchandise Group*	$24,205,158	$6,181,299	$18,023,859	16	$4,536,803
Department & Dry Goods	$4,502,813	$0	$4,502,813	0	$0
Drug Stores	$1,215,828	$0	$1,215,828	0	$0
Grocery/Specialty Food/Other General Merchandise Stores*	$10,556,682	$1,492,855	$9,063,827	5	$551,625
Liquor Stores	$347,289	$0	$347,289	0	$0
Eating Places	$7,582,547	$4,688,444	$2,894,103	11	$3,985,178
Specialty Retail/Home Furnishings/ Boats & Motorcycles Group*	$12,351,228	$4,645,473	$7,864,842	22	$4,207,657
Gifts/Home Furnishings*	$4,437,807	$2,070,035	$2,367,773	8	$1,945,833
Florists/Garden Supply/Sporting Goods/Books & Stationery*	$1,284,499	$384,750	$1,058,837	4	$202,577
Photographic Equipment	$44,899	$0	$44,899	0	$0
Records & Music	$200,621	$0	$200,621	0	$0
Office Supplies/Computer Equipment	$561,591	$0	$561,591	0	$0
Jewelry	$350,448	$0	$350,448	0	$0
Misc. Specialty Retail/Boats & Motorcycles*	$4,233,482	$2,926,944	$1,306,539	11	$2,751,327
Household Appliances & Electronics	$809,269	$0	$809,269	0	$0
Used Merchandise	$128,476	$0	$128,476	0	$0
Lumber & Other Building Materials	$747,268	$0	$747,268	0	$0
Home Centers and Hardware Stores	$517,026	$0	$517,026	0	$0
Paint & Wallpaper	$36,885	$0	$36,885	0	$0
Automotive Group	$14,091,214	$0	$14,091,214	0	$0
New Cars & RVs	$9,457,874	$0	$9,457,874	0	$0
Used Car Dealers	$689,762	$0	$689,762	0	$0
Gasoline Service Stations	$3,623,847	$0	$3,623,847	0	$0
Mobile Homes & Trailers	$2,479	$0	$2,479	0	$0
Auto Parts & Accessories	$317,251	$0	$317,251	0	$0

Source: ADE, retail model developed from 1997 US Retail Census, and the 1998 Bureau of Labor Statistics Household Expenditure Surveys. Sales data comes from the State Board of Equalization, data audited by MBIA. Data adjusted for inflation using CPI. Household counts and aggregated income growth factors come from the 2000 US Census, and income estimates are derived from the 1990 US Census. Data for calculating local spending capture and non-resident spending from Linda Congleton & Associates.

* Figures are aggregated due to confidentiality agreements

Notes: Spending and sales do not include non-store retail establishments, which include mail order, home shopping, and direct selling.

TABLE 3
BALBOA ISLAND SUBAREA SELECTED SALES PER SQUARE FOOT

Retail Group	Retail Sales Per Sq. Ft.	National Average Sales Per Sq.Ft.
Total	**$159.09**	
Apparel Store Group	$140.57	
Women's & Men's Apparel*	$117.77	$174 to $196
Family Clothing/Shoe Stores*	$182.95	$200 to $281
Food Store and General Merchandise Group*	$180.40	
Grocery/Specialty Food/Other General Merchandise Stores*	$180.51	$144 to $399
Eating Places	$180.36	$216.22
Specialty Retail/Home Furnishings Group*	$151.20	
Gifts/Home Furnishings*	$216.67	$136 to $220
Florists/Garden Supply/Sporting Goods/Books & Stationery*	$78.57	$153 to $201
Misc. Specialty Retail	$125.39	$171.82

Source: ADE, based on data from the Orange County Assessor and the Urban Land Institute. Refer to Methodology Appendix for details of the analysis.

* Figures are aggregated due to confidentiality agreements.

BALBOA VILLAGE[5]

- Balboa Village draws from a total spending base of about $78 million (Table 4).
- Balboa Village generates approximately $17.3 million of retail sales. The single most prominent category is restaurants and eating places, which alone account for $8.5 million of retail sales and exceed the spending from local households alone.
- Non-residents account for about $14 million of the retail sales in Balboa Village. Much of this is due to the very large base of eating places that are heavily supported by visitor spending.
- When accounting only for Balboa Peninsula residents, the subarea generates a sales leakage of about $61 million. Individual categories with large sales leakages among local residents include general merchandise, grocery stores, and automotive related businesses, including gast stations. In addition, several specialty retail categories generate large sales leakages. This is due to the shopping area's heavy orientation towards visitor-serving uses, and limited availability of local serving retail.
- Out of all the coastal subareas examined in the retail analysis, Balboa Village has by far the lowest average sales per square foot (Table 5). Nearly every retail category represented in the area underperforms compared to national retail averages. Not surprisingly, Balboa Village has a noticeably higher number of commercial property vacancies than other prominent retail districts in Newport Beach.
- Even though Balboa Village will continue to draw large numbers of beach visitors, the area's long-time function as a regional destination for general entertainment purposes has diminished in recent years as competing year-round entertainment options have emerged inland. This trend is clearly reflected in the under performing retail uses and comparatively high retail vacancies.

[5] The Balboa Village market area includes Census Tract 628.

TABLE 4
BALBOA VILLAGE SUBAREA ANALYSIS OF RETAIL DEMAND, RETAIL SALES, AND SALES LEAKAGE

Retail Group	Total Retail Demand	Retail Sales	Sales Leakage	Retail Businesses	Spending From Outside The Subarea
Total	**$78,484,642**	**$17,281,936**	**$61,202,706**	**54**	**$14,021,276**
Apparel Store Group	$4,999,572	$1,120,500	$3,879,072	8	$1,053,270
Women's Apparel/Shoe Stores*	$1,920,284	$323,100	$1,597,184	3	$303,714
Men's Apparel	$338,884	$0	$338,884	0	$0
Family Clothing	$2,740,403	$797,400	$1,943,003	5	$749,556
Food Store and General Merchandise Group*	$36,583,045	$11,137,815	$25,445,231	29	$8,302,826
Department & Dry Goods	$6,459,969	$0	$6,459,969	0	$0
Other General Merchandise	$3,095,799	$0	$3,095,799	0	$0
Grocery/Liquor/Drug Stores*	$14,194,076	$2,416,537	$11,777,539	3	$966,615
Specialty Food Stores	$408,059	$170,833	$237,225	6	$68,333
Eating Places	$12,425,142	$8,550,444	$3,874,698	20	$7,267,878
Specialty Retail Group	$5,854,101	$1,311,670	$4,542,432	13	$1,175,945
Gifts & Novelties	$600,031	$257,042	$342,989	3	$241,619
Sporting Goods	$849,177	$333,834	$515,344	3	$313,804
Florists	$121,092	$0	$121,092	0	$0
Photographic Equipment	$64,236	$0	$64,236	0	$0
Records & Music/Jewelry*	$934,215	$213,608	$720,607	3	$143,768
Books & Stationery	$320,401	$0	$320,401	0	$0
Office Supplies/Computer Equipment	$804,531	$0	$804,531	0	$0
Misc. Specialty Retail	$2,160,419	$507,186	$1,653,233	4	$476,755
Building Materials Home Furnishings Group	$7,003,103	$0	$7,003,103	0	$0
Furniture & Home Furnishings	$3,227,738	$0	$3,227,738	0	$0
Household Appliances & Electronics	$1,157,674	$0	$1,157,674	0	$0
Used Merchandise	$184,362	$0	$184,362	0	$0
Nurseries & Garden Supply Stores	$575,192	$0	$575,192	0	$0
Lumber & Other Building Materials	$1,065,322	$0	$1,065,322	0	$0
Home Centers and Hardware Stores	$740,059	$0	$740,059	0	$0
Paint & Wallpaper	$52,755	$0	$52,755	0	$0
Automotive Group	$20,555,586	$0	$20,555,586	0	$0
New Cars & RVs	$13,468,291	$0	$13,468,291	0	$0
Used Car Dealers	$982,256	$0	$982,256	0	$0
Gasoline Service Stations	$5,206,115	$0	$5,206,115	0	$0
Mobile Homes & Trailers	$3,535	$0	$3,535	0	$0
Auto Parts & Accessories	$454,645	$0	$454,645	0	$0
Boats & Motorcycles	$3,929,978	$3,711,952	$218,026	4	$3,489,235

Source: ADE, retail model developed from 1997 US Retail Census, and the 1998 Bureau of Labor Statistics Household Expenditure Surveys. Sales data comes from the State Board of Equalization, data audited by MBIA. Data adjusted for inflation using CPI. Household counts and aggregated income growth factors come from the 2000 US Census, and income estimates are derived from the 1990 US Census. Data for calculating local spending capture and non-resident spending from Linda Congleton & Associates.

* Figures are aggregated due to confidentiality agreements

Notes: Spending and sales do not include non-store retail establishments, which include mail order, home shopping, and direct selling.

TABLE 5
BALBOA VILLAGE SUBAREA SELECTED SALES PER SQUARE FOOT

Retail Group	Sales Per Sq.Ft.	National Average Sales Per Sq.Ft.
Total	**$128.80**	
Apparel Store Group	$83.47	
Women's Apparel/Shoe Stores*	$45.42	$162 to $262
Family Clothing	$125.26	$200.10
Food Store and General Merchandise Group*	$165.98	
Grocery/Liquor/Drug Stores*	$242.45	$265 to $399
Specialty Food Stores	$28.17	$174.42
Eating Places	$153.40	$216.22
Specialty Retail Group	$71.29	
Gifts & Novelties	$75.34	$135.94
Sporting Goods	$71.02	$200.56
Records & Music/Jewelry*	$90.01	$175 to $283
Misc. Specialty Retail	$68.64	$171.82
Automotive Group	$125.26	$200.10
New Cars & RVs	$165.98	
Mobile Homes & Trailers	$242.45	$265 to $399

Source: ADE, based on data from the Orange County Assessor and the Urban Land Institute. Refer to Methodology Appendix for details of the analysis.

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CORONA DEL MAR[6]

- Corona del Mar's households and visitors account for about $160 million in retail spending annually (Table 6).
- Corona del Mar retail businesses generate approximately $108 million in retail sales. About half of these sales come from grocery stores and restaurants. Compared to other coastal areas, Corona del Mar has a relatively diverse variety of retail businesses, many of which are primarily local serving. In addition, $14.4 million in sales are generated by furniture and home furnishings stores, while various home improvement businesses generate another $9.8 million in sales.
- Shoppers not residing in Corona del Mar account for about $82 million of the retail sales in the area. Although many retail categories capture high proportions of spending by shoppers outside of Corona del Mar, many of the categories represented in Corona del Mar are not necessarily tourist oriented, which indicates that much of this spending likely comes from other Newport Beach residents and customers from neighboring communities.
- Individual categories with large sales leakages among local residents include general merchandise and automotive related businesses. Because many local serving businesses are already represented among Corona del Mar's retailers, the leakage from local households is not as widespread as in some other coastal subareas.
- Corona del Mar's retail district is generally in the best condition among the coastal subareas. It has a very diverse range of retail stores that both serve local residents and attract significant spending from outside of CdM. The sales per square foot data finds that CdM retail stores generally fall within or exceed national averages for these retail categories (Table 7). The major retail category in Corona del Mar that under performs is the furniture and home furnishings category. However, it should be noted that some key businesses in this category did not have accurate square footage counts available, and their inclusion could change this conclusion.
- Although Corona del Mar's retail uses may face some market pressure for conversion to residential uses similar to other coastal areas in Newport Beach, the district's existing retail market is very strong and there are no clear indications that the area is oversupplied for commercial uses.

[6] The Corona del Mar market area includes Census Tract 627.02 and Block Group 627.01 BG5.

TABLE 6
CORONA DEL MAR SUBAREA ANALYSIS OF RETAIL DEMAND, RETAIL SALES, AND SALES LEAKAGE

Retail Group	Total Retail Demand	Retail Sales	Sales Leakage	Retail Businesses	Spending From Outside The Subarea
Total	$159,927,256	$108,067,016	$51,860,241	106	$81,809,592
General Merchandise and Food Store Group*	$74,907,264	$59,280,606	$15,626,658	46	$40,961,060
Department & Dry Goods	$7,874,118	$0	$7,874,118	0	$0
Other General Merchandise	$3,727,012	$0	$3,727,012	0	$0
Grocery/Drug Stores*	$23,613,746	$20,581,431	$3,032,315	3	$8,500,453
Specialty Food Stores	$1,867,889	$1,867,889	$0	10	$1,464,057
Liquor Stores	$1,939,064	$1,939,064	$0	5	$1,338,161
Eating Places	$35,885,435	$34,892,222	$993,213	28	$29,658,389
Specialty Retail and Apparel Group*	$20,108,164	$10,191,047	$9,917,117	27	$9,579,584
Gifts/Women's & Family Apparel*	$5,334,535	$1,459,749	$3,874,786	5	$1,372,164
Men's Apparel	$419,052	$0	$419,052	0	$0
Shoe Stores	$853,111	$0	$853,111	0	$0
Sporting Goods/Photo Eq./ Stationery*	$4,404,022	$3,478,468	$925,554	5	$3,269,760
Florists	$1,855,256	$1,814,874	$40,382	5	$1,705,982
Records & Music	$356,888	$0	$356,888	0	$0
Office Supplies/Computer Equipment	$988,364	$0	$988,364	0	$0
Jewelry	$624,095	$0	$624,095	0	$0
Misc. Specialty Retail	$5,272,840	$3,437,955	$1,834,885	12	$3,231,678
Building Materials and Home furnishings Group	$26,400,179	$24,200,327	$2,199,852	28	$17,737,613
Furniture & Home Furnishings	$14,433,768	$14,433,768	$0	18	$10,419,504
Household Appliances & Electronics/ Used Merchandise*	$4,481,318	$3,026,000	$1,455,318	5	$2,844,440
Garden Supply/Building Materials/ Hardware*	$7,420,299	$6,740,559	$679,740	5	$4,473,669
Paint & Wallpaper	$64,795	$0	$64,795	0	$0
Automotive Group	$38,511,650	$14,395,036	$24,116,613	5	$13,531,334
New Cars & RVs	$16,484,040	$0	$16,484,040	0	$0
Used Car Dealers	$1,203,223	$0	$1,203,223	0	$0
Gasoline Service Stations/Auto Parts*	$20,272,089	$14,395,036	$5,877,052	5	$13,531,334
Mobile Homes & Trailers	$4,281	$0	$4,281	0	$0
Boats & Motorcycles	$548,017	$0	$548,017	0	$0

Source: ADE, retail model developed from 1997 US Retail Census, and the 1998 Bureau of Labor Statistics Household Expenditure Surveys. Sales data comes from the State Board of Equalization, data audited by MBIA. Data adjusted for inflation using CPI. Household counts and aggregated income growth factors come from the 2000 US Census, and income estimates are derived from the 1990 US Census. Data for calculating local spending capture and non-resident spending from Linda Congleton & Associates.

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Notes: Spending and sales do not include non-store retail establishments, which include mail order, home shopping, and direct selling.

TABLE 7
CORONA DEL MAR SUBAREA SELECTED SALES PER SQUARE FOOT

Retail Group	Retail Sales Per Sq.Ft.	National Average Sales Per Sq.Ft.
Total	**$345.38**	
General Merchandise and Food Store Group*	$450.53	
Grocery/Drug Stores*	$1,082.34	$265 to $399
Specialty Food Stores	$93.98	$174.42
Liquor Stores	$104.09	$267.87
Eating Places	$433.86	$216.22
Specialty Retail and Apparel Group*	$147.53	
Gifts/Women's & Family Apparel*	$175.23	$136 to $201
Sporting Goods/Photo Eq./ Stationery*	$252.04	$173 to $582
Misc. Specialty Retail	$32.76	$171.82
Building Materials and Home furnishings Group	$240.53	
Furniture & Home Furnishings	$151.33	$220.02
Household Appliances & Electronics/Used Merchandise*	$293.39	$175 to $230
Garden Supply/Building Materials/ Hardware*	$351.21	$130 to $153

Source: ADE, based on data from the Orange County Assessor and the Urban Land Institute. Refer to Methodology Appendix for details of the analysis.

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LIDO-CANNERY[7]

- Households near the Lido-Cannery business district and visitors to Lido-Cannery account for about $199 million in retail spending annually (Table 8). The household base includes the Balboa Peninsula, Lido Isle, and West Newport. It should be noted that this market area definition overlaps with McFadden Square and Balboa Village.

- Lido-Cannery retail businesses generate approximately $65 million in retail sales. About $49 million of these sales come from grocery stores and restaurants, while $10 million comes from marine-related businesses. In addition, nearly $2 million in retail sales come from jewelry stores.

- Spending from shoppers not living around the Lido-Cannery area account for about $31 million of the retail sales in the Lido-Cannery area. Compared to other coastal areas, this district captures a relatively high proportion of its retail sales from local residents.

- Residents around Lido-Cannery generate a sales leakage of about $134 million, which includes some of the leakage also shown for Balboa Village and McFadden Square. Individual categories with large sales leakages among local residents include general merchandise and automotive related businesses. In addition, the sales leakages from some specialty retail and home furnishings categories could be sufficient to support additional businesses of this type.

- Lido-Cannery area food/drug stores, restaurants, and jewelry stores generate high sales per square foot, compared to the national benchmarks. Those categories alone represent 79 percent of the sales in Lido-Cannery, but less than half of the establishments. The other businesses in the Lido-Cannery area generally produce sales per square foot below the expected sales per square foot for specific retail store types (Table 9). This indicates that the area has some core strengths in specific retail categories, but a lot of other underperforming businesses as well.

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[7] The Lido-Cannery area draws from a larger market than some of the other coastal commercial subareas. The market area includes Census tracts 628 ,629, and 635, which overlaps with Balboa Village and McFadden Square.

TABLE 8
LIDO-CANNERY SUBAREA ANALYSIS OF RETAIL DEMAND, RETAIL SALES, AND SALES LEAKAGE

Retail Group	Total Retail Demand	Retail Sales	Sales Leakage	Retail Businesses	Spending From Outside The Subarea
Total	$198,887,264	$65,019,966	$133,867,297	71	$31,239,346
Apparel Store Group	$10,703,521	$436,700	$10,266,821	4	$410,498
Men's and Women's Apparel*	$3,653,565	$436,700	$3,216,865	4	$410,498
Family Clothing	$5,206,026	$0	$5,206,026	0	$0
Shoe Stores	$1,843,930	$0	$1,843,930	0	$0
General Merchandise and Food Store Group*	$89,442,002	$49,150,158	$40,291,844	29	$16,321,726
Grocery Stores/Drug Stores*	$37,135,408	$34,174,047	$2,961,360	6	$3,592,032
Department & Dry Goods	$16,876,844	$0	$16,876,844	0	$0
Other General Merchandise	$8,019,142	$0	$8,019,142	0	$0
Liquor Stores	$1,293,521	$0	$1,293,521	0	$0
Eating Places	$26,117,088	$14,976,111	$11,140,977	23	$12,729,694
Specialty Retail Group	$15,655,781	$3,611,936	$12,043,845	18	$3,395,220
Gifts/Sporting Goods/Stationery*	$4,171,867	$1,046,802	$3,125,065	6	$983,993
Florists	$318,592	$0	$318,592	0	$0
Photographic Equipment	$170,341	$0	$170,341	0	$0
Records & Music	$760,521	$0	$760,521	0	$0
Office Supplies/Computer Equipment	$2,111,295	$0	$2,111,295	0	$0
Jewelry	$3,138,645	$1,922,422	$1,216,222	4	$1,807,077
Misc. Specialty Retail	$4,984,519	$642,713	$4,341,807	8	$604,150
Building Materials, Home Furnishings, and Automotive Group*	$83,085,959	$11,821,171	$71,264,788	20	$11,111,901
Furniture & Home Furnishings	$9,435,049	$935,671	$8,499,377	4	$879,531
Household Appliances & Electronics	$3,024,336	$0	$3,024,336	0	$0
Used Merchandise	$582,527	$105,800	$476,727	3	$99,452
Nurseries & Garden Supply Stores	$1,512,182	$0	$1,512,182	0	$0
Building Materials/Paint & Wallpaper/ Used Cars*	$6,202,399	$723,700	$5,478,699	4	$680,278
Home Centers and Hardware Stores	$1,951,512	$0	$1,951,512	0	$0
New Cars & RVs	$35,201,308	$0	$35,201,308	0	$0
Gasoline Service Stations	$13,381,608	$0	$13,381,608	0	$0
Mobile Homes & Trailers	$9,185	$0	$9,185	0	$0
Auto Parts & Accessories	$1,167,663	$0	$1,167,663	0	$0
Boats & Motorcycles	$10,618,191	$10,056,000	$562,191	9	$9,452,640

Source: ADE, retail model developed from 1997 US Retail Census, and the 1998 Bureau of Labor Statistics Household Expenditure Surveys. Sales data comes from the State Board of Equalization, data audited by MBIA. Data adjusted for inflation using CPI. Household counts and aggregated income growth factors come from the 2000 US Census, and income estimates are derived from the 1990 US Census. Data for calculating local spending capture and non-resident spending from Linda Congleton & Associates.

* Figures are aggregated due to confidentiality agreements.

Notes: Spending and sales do not include non-store retail establishments, which include mail order, home shopping, and direct selling. The market area is the same as McFadden Square. Differences in the total consumer spending may differ due to different capture rates of visitor spending between the two subareas.

TABLE 9
LIDO-CANNERY SUBAREA SELECTED SALES PER SQUARE FOOT

Retail Group	Sales Per Sq.Ft.	National Average Sales Per Sq.Ft.
Total	**$406.90**	
Apparel Store Group	$112.52	
Men's and Women's Apparel*	$112.52	$174 to $196
General Merchandise and Food Store Group*	$528.33	
Grocery Stores/Drug Stores*	$587.76	$265 to $399
Eating Places	$378.25	$216.22
Specialty Retail Group	$160.85	
Gifts/Sporting Goods/Stationery*	$116.38	$136 to $201
Jewelry	$357.26	$283.16
Misc. Specialty Retail	$71.60	$171.82
Building Materials, Home Furnishings, and Automotive Group*	$165.08	
Furniture & Home Furnishings	$231.24	$220.02
Used Merchandise	$21.67	$174.98
Building Materials/Paint & Wallpaper/ Used Cars*	$126.42	$153 to $177

Source: ADE, based on data from the Orange County Assessor and the Urban Land Institute. Refer to Methodology Appendix for details of the analysis.

* Figures are aggregated due to confidentiality agreements.

MC FADDEN SQUARE[8]

- The market area for McFadden Square/Newport Pier retailers includes the Balboa Peninsula, Lido Isle, and West Newport. Residents and visitors to the McFadden Square/Newport Pier area account for about $194 million in retail spending annually (Table 10).
- McFadden Square retail businesses generate approximately $30.8 million in annual retail sales. About $22.7 million of these sales come from restaurants. The other prominent retail categories such as apparel stores and sporting goods primarily cater to visitors. Non-residents account for about $26.5 million of the retail sales in the McFadden Square area. Compared to other coastal areas, this district captures a lower proportion of its retail sales from local residents.
- Except for restaurants, most of the retail businesses in McFadden Square are under performing in terms of their sales per square foot compared to national averages for comparable businesses (Table 11).

[8] The market area is the same as that for the Lido-Cannery area – Census Tracts 628, 629, and 535.

TABLE 10
MC FADDEN SQUARE SUBAREA ANALYSIS OF
RETAIL DEMAND, RETAIL SALES, AND SALES LEAKAGE

Retail Group	Total Retail Demand	Retail Sales	Sales Leakage	Retail Businesses	Spending From Outside The Subarea
Total	$194,135,714	$30,764,786	$163,370,928	42	$26,487,797
Apparel Store Group	$11,696,255	$1,492,800	$10,203,455	5	$1,403,232
Apparel Stores*	$9,852,325	$1,492,800	$8,359,525	5	$1,403,232
Shoe Stores	$1,843,930	$0	$1,843,930	0	$0
General Merchandise Group	$29,407,266	$0	$29,407,266	0	$0
Department & Dry Goods	$16,876,844	$0	$16,876,844	0	$0
Other General Merchandise	$8,019,142	$0	$8,019,142	0	$0
Drug & Proprietary Stores	$4,511,281	$0	$4,511,281	0	$0
Specialty Retail Group	$14,889,320	$2,796,552	$12,092,768	7	$2,628,759
Sporting Goods	$3,698,333	$2,426,727	$1,271,607	4	$2,281,123
Florists	$318,592	$0	$318,592	0	$0
Photographic Equipment	$170,341	$0	$170,341	0	$0
Records & Music	$760,521	$0	$760,521	0	$0
Books & Stationery	$834,269	$0	$834,269	0	$0
Office Supplies/Computer Equipment	$2,111,295	$0	$2,111,295	0	$0
Jewelry	$1,331,568	$0	$1,331,568	0	$0
Misc. Specialty Retail/Gifts*	$5,664,399	$369,825	$5,294,574	3	$347,636
Food, Eating and Drinking Group	$63,275,213	$23,397,134	$39,878,079	27	$19,562,204
Grocery/Liquor Stores *	$30,614,826	$723,023	$29,891,802	4	$289,209
Eating Places	$32,660,388	$22,674,111	$9,986,277	23	$19,272,994
Building Materials And Home furnishings Group	$18,479,756	$0	$18,479,756	0	$0
Furniture & Home Furnishings	$8,555,518	$0	$8,555,518	0	$0
Household Appliances & Electronics	$3,024,336	$0	$3,024,336	0	$0
Used Merchandise	$483,075	$0	$483,075	0	$0
Nurseries & Garden Supply Stores	$1,512,182	$0	$1,512,182	0	$0
Lumber & Other Building Materials	$2,814,594	$0	$2,814,594	0	$0
Home Centers and Hardware Stores	$1,951,512	$0	$1,951,512	0	$0
Paint & Wallpaper	$138,540	$0	$138,540	0	$0
Automotive Group	$56,387,904	$3,078,300	$53,309,604	3	$2,893,602
New Cars & RVs	$35,201,308	$0	$35,201,308	0	$0
Used Car Dealers	$2,568,987	$0	$2,568,987	0	$0
Gasoline Service Stations	$13,381,608	$0	$13,381,608	0	$0
Mobile Homes & Trailers	$9,185	$0	$9,185	0	$0
Auto Parts & Accessories	$1,167,663	$0	$1,167,663	0	$0
Boats & Motorcycles	$4,059,153	$3,078,300	$980,853	3	$2,893,602

Source: ADE, retail model developed from 1997 US Retail Census, and the 1998 Bureau of Labor Statistics Household Expenditure Surveys. Sales data comes from the State Board of Equalization, data audited by MBIA. Data adjusted for inflation using CPI. Household counts and aggregated income growth factors come from the 2000 US Census, and income estimates are derived from the 1990 US Census. Data for calculating local spending capture and non-resident spending from Linda Congleton & Associates.

* Figures are aggregated due to confidentiality agreements.

Notes: Spending and sales do not include non-store retail establishments, which include mail order, home shopping, and direct selling. The market area is the same as Lido-Cannery. Differences in the total consumer spending may differ due to different capture rates of visitor spending between the two subareas.

TABLE II
MC FADDEN SQUARE SUBAREA SELECTED SALES PER SQUARE FOOT

Retail Group	Sales Per Sq.Ft.	National Average Sales Per Sq.Ft.
Total	$189.80	
Apparel Store Group	$68.38	
Apparel Stores*	$68.38	$174 to $280
Specialty Retail Group	$125.49	
Sporting Goods	$132.65	$200.56
Misc. Specialty Retail/Gifts*	$119.91	$136 to $172
Food, Eating and Drinking Group	$223.71	
Grocery/Liquor Stores *	$78.45	$174 to $399
Eating Places	$269.54	$216.22

Source: ADE, based on data from the Orange County Assessor and the Urban Land Institute. Refer to Methodology Appendix for details of the analysis.

* Figures are aggregated due to confidentiality agreements.

MARINER'S MILE[9]

- Households near Mariner's Mile and visitors to the area account for about $199 million in retail spending annually (Table 12).
- Mariner's Mile retail businesses generate approximately $199 million in retail sales. Most of these sales came from restaurants and auto dealerships that rely heavily on spending from households in non-adjacent areas. Boat dealers and other marine sales generate another $44.7 million in sales.
- Consumers not living immediately adjacent to Mariner's Mile account for about $98.7 million of the retail sales along Mariner's Mile. Compared to other coastal areas, this district captures a relatively low proportion of its retail sales from local residents.
- Mariner's Mile generated the highest retail sales per square foot out of all the coastal subareas (Table 13). This is almost solely because of the exceptional performance of the area's restaurants and other eating places. With restaurants generating over $2 million each on average per year, and accounting for over $600 per square foot in sales, this sector performs very well.
- Even though Mariner's Mile has a very strong existing retail base, the area has seen several high profile business closures in recent years, including some large restaurants and marine businesses. In addition, some buildings along Mariner's Mile exhibit high vacancy rates for office and local service uses as well. However, it also appears that even though several businesses have folded, the spaces continue to lease out and at least three properties have recently been sold. This indicates that interest in the area remains high for commercial and office activities. The retail mix in Mariner's Mile is citywide and regional in focus, with the almost complete absence of local serving retail businesses.

[9] The market area includes Census Tract 634.

TABLE 12
MARINER'S MILE SUBAREA ANALYSIS OF RETAIL DEMAND, RETAIL SALES, AND SALES LEAKAGE

Retail Group	Total Retail Demand	Retail Sales	Sales Leakage	Retail Businesses	Spending From Outside The Subarea
Total	$198,994,514	$148,315,959	$50,678,555	57	$143,164,542
Apparel Store Group	$3,422,697	$0	$3,422,697	0	$0
Women's Apparel	$781,744	$0	$781,744	0	$0
Men's Apparel	$297,151	$0	$297,151	0	$0
Family Clothing	$1,732,399	$0	$1,732,399	0	$0
Shoe Stores	$611,403	$0	$611,403	0	$0
General Merchandise Group	$9,798,273	$0	$9,798,273	0	$0
Department & Dry Goods	$5,623,616	$0	$5,623,616	0	$0
Other General Merchandise	$2,669,716	$0	$2,669,716	0	$0
Drug & Proprietary Stores	$1,504,940	$0	$1,504,940	0	$0
Specialty Retail Group	$8,010,208	$4,173,787	$3,836,420	11	$3,923,360
Gifts/Sporting Goods/Florists*	$3,873,000	$3,174,190	$698,809	4	$2,983,739
Photographic Equipment	$56,817	$0	$56,817	0	$0
Records & Music	$254,344	$0	$254,344	0	$0
Books & Stationery	$280,243	$0	$280,243	0	$0
Office Supplies/Computer Equipment	$701,345	$0	$701,345	0	$0
Jewelry	$538,445	$99,800	$438,645	0	$93,812
Misc. Specialty Retail	$2,306,015	$899,798	$1,406,217	7	$845,810
Food, Eating and Drinking Group	$56,918,326	$43,576,652	$13,341,674	22	$42,372,292
Grocery Stores	$9,370,736	$0	$9,370,736	0	$0
Specialty Food/Liquor Stores*	$1,772,599	$1,587,208	$185,391	3	$1,050,885
Eating Places	$45,774,991	$41,989,444	$3,785,546	19	$41,321,407
Building Materials And					$0
Home furnishings Group	$9,346,590	$3,371,519	$5,975,071	6	$3,169,228
Furniture & Home Furnishings	$4,762,548	$2,009,519	$2,753,029	3	$1,888,948
Household Appliances/Used Merchandise/Building Materials*	$3,384,328	$1,362,000	$2,022,328	3	$1,280,280
Nurseries & Garden Supply Stores	$503,130	$0	$503,130	0	$0
Home Centers and Hardware Stores	$650,252	$0	$650,252	0	$0
Paint & Wallpaper	$46,332	$0	$46,332	0	$0
Automotive Group	$111,498,420	$97,194,000	$14,304,420	18	$93,699,662
Auto Dealerships*	$61,852,810	$52,421,100	$9,431,710	3	$49,275,834
Gasoline Service Stations	$4,443,330	$0	$4,443,330	0	$0
Mobile Homes & Trailers	$3,055	$0	$3,055	0	$0
Auto Parts & Accessories	$387,539	$0	$387,539	0	$0
Boats & Motorcycles	$44,811,686	$44,772,900	$38,786	15	$44,423,828

Source: ADE, retail model developed from 1997 US Retail Census, and the 1998 Bureau of Labor Statistics Household Expenditure Surveys. Sales data comes from the State Board of Equalization, data audited by MBIA. Data adjusted for inflation using CPI. Household counts and aggregated income growth factors come from the 2000 US Census, and income estimates are derived from the 1990 US Census. Data for calculating local spending capture and non-resident spending from Linda Congleton & Associates.

* Figures are aggregated due to confidentiality agreements.

Notes: Spending and sales do not include non-store retail establishments, which include mail order, home shopping, and direct selling.

TABLE 13
MARINER'S MILE SUBAREA SELECTED SALES PER SQUARE FOOT

Retail Group	Retail Sales Per Sq.Ft.	National Average Sales Per Sq.Ft.
Total	$455.38	
Specialty Retail Group	$199.65	
Gifts/Sporting Goods/Florists*	$269.13	$136 to $201
Misc. Specialty Retail	$47.29	$171.82
Food, Eating and Drinking Group	$551.57	
Specialty Food/Liquor Stores*	$41.58	$174 to $268
Eating Places	$609.99	$216.22

Source: ADE, based on data from the Orange County Assessor and the Urban Land Institute. Refer to Methodology Appendix for details of the analysis.

* Figures are aggregated due to confidentiality agreements.

COASTAL AREA TOTAL

- As a whole, the coastal area of Newport Beach generates approximately $769 million of retail demand annually (Table 14), about $363 million of which comes from customers that do not live in the coastal area.
- Altogether, the coastal area generates about $476 million in retail sales. The largest share of the total sales come from food stores and restaurants, with boat and auto dealerships also accounting for sizable shares of the total retail sales.
- Altogether, the coastal area generates about $293 million of retail leakage from household spending. About $62 million of the leakage is recovered by businesses in Fashion Island (Table 15). The remaining $234 million of retail leakage is largely in retail categories typically dominated by "big box" retail stores. These large-scale retailers are generally absent from Newport Beach's retail mix outside of Fashion Island. Some other spending is likely recovered by businesses located elsewhere in Newport Beach.

TABLE 14
ANALYSIS OF RETAIL DEMAND, RETAIL SALES, AND SALES LEAKAGE FOR THE NEWPORT BEACH COASTAL AREA

Retail Group	Total Consumer Demand	Retail Sales	Retail Leakage	Retail Businesses	Spending From Outside Coastal Area
Total	$772,044,553	$476,324,921	$295,719,632	418	$363,619,520
Apparel Store Group	$32,227,443	$8,154,200	$24,073,243	39	$7,284,180
Women's Apparel	$8,851,940	$3,567,800	$5,284,140	17	$3,154,114
Men's Apparel/Shoe Stores*	$7,953,387	$1,428,100	$6,525,287	6	$1,339,170
Family Clothing	$15,422,117	$3,158,300	$12,263,817	16	$2,790,895
General Merchandise Group	$79,219,462	$15,428,608	$63,790,854	6	$8,069,129
Department & Dry Goods	$40,938,846	$0	$40,938,846	0	$0
Other General Merchandise/Drug Stores*	$38,280,616	$15,428,608	$22,852,008	6	$8,069,129
Specialty Retail Group	$54,564,870	$27,852,482	$26,712,388	99	$24,778,289
Gifts & Novelties	$5,996,841	$4,204,762	$1,792,079	20	$3,725,576
Sporting Goods	$10,833,135	$8,348,849	$2,484,286	13	$7,377,043
Florists	$2,916,103	$2,356,583	$559,520	8	$2,141,003
Photographic Equipment/Music Stores*	$2,759,834	$612,100	$2,147,734	3	$487,249
Books & Stationery	$3,022,531	$1,129,400	$1,893,131	3	$997,938
Office Supplies/Computer Equipment	$5,129,797	$0	$5,129,797	0	$0
Jewelry	$6,431,047	$3,429,229	$3,001,818	8	$3,181,270
Misc. Specialty Retail	$17,475,582	$7,771,559	$9,704,023	44	$6,868,210
Food, Eating and Drinking Group	$241,802,827	$211,536,362	$30,266,465	179	$136,466,159
Grocery Stores	$82,658,987	$60,055,686	$22,603,301	7	$14,910,592
Specialty Food Stores	$3,576,495	$3,576,495	$0	26	$1,476,989
Liquor Stores	$4,639,219	$4,379,959	$259,260	10	$1,513,148
Eating Places	$150,928,126	$143,524,222	$7,403,904	136	$118,565,431
Building Materials And Home furnishings Group	$69,478,711	$32,550,429	$36,928,282	48	$24,405,366
Furniture & Home Furnishings	$33,623,478	$17,687,475	$15,936,004	26	$12,686,432
Furniture Stores	$0	$0	$0	0	$0
Other Home Furnishings Stores	$0	$0	$0	0	$0
Household Appliances & Electronics	$9,396,977	$2,335,100	$7,061,877	2	$2,063,294
Used Merchandise	$3,048,681	$2,122,000	$926,681	8	$1,874,999
Garden Supply/Hardware/Paint Stores*	$14,036,328	$6,393,454	$7,642,874	7	$5,267,000
Lumber & Other Building Materials	$9,373,247	$4,012,400	$5,360,847	5	$2,513,640
Automotive Group	$294,751,240	$180,802,840	$113,948,400	47	$165,204,528
Auto Dealerships*	$176,785,339	$96,326,200	$80,459,139	5	$85,113,830
Service Stations/Auto Parts*	$53,417,324	$20,081,833	$33,335,491	7	$18,406,251
Mobile Homes & Trailers	$22,217	$0	$22,217	0	$0
Boats & Motorcycles	$64,526,360	$64,394,807	$131,553	35	$61,684,447

Source: ADE, retail model developed from 1997 US Retail Census, and the 1998 Bureau of Labor Statistics Household Expenditure Surveys. Sales data comes from the State Board of Equalization, data audited by MBIA. Data adjusted for inflation using CPI. Household counts and aggregated income growth factors come from the 2000 US Census, and income estimates are derived from the 1990 US Census. Data for calculating local spending capture and non-resident spending from Linda Congleton & Associates.

* Figures are aggregated due to confidentiality agreements.

Notes: Spending and sales do not include non-store retail establishments, which include mail order, home shopping, and direct selling. Non-local resident spending can include visitors, business-to-business transactions, residents of neighboring communities, employees, and residents living in other parts of Newport Beach.

TABLE I5
ANALYSIS OF LEAKAGE
FROM LOCAL HOUSEHOLD DEMAND
FOR THE NEWPORT BEACH COASTAL AREA

Retail Group	Retail Leakage	Coastal Area Resident Spending at Fashion Island	Net Retail Leakage
Total	$295,719,632	$61,507,453	$234,212,180
Apparel Store Group	$24,073,243	$10,023,470	$14,049,772
Women's Apparel	$5,284,140	$4,755,726	$528,414
Men's Apparel/Shoe Stores*	$6,525,287	$3,100,419	$3,424,868
Family Clothing	$12,263,817	$2,167,326	$10,096,490
General Merchandise Group	$63,790,854	$23,964,302	$39,826,552
Department & Dry Goods	$40,938,846	$21,763,858	$19,174,988
Other General Merchandise/Drug Stores*	$22,852,008	$2,200,444	$20,651,564
Specialty Retail Group	$26,712,388	$6,555,173	$20,157,215
Gifts & Novelties	$1,792,079	$1,627,522	$164,557
Sporting Goods	$2,484,286	$10,543	$2,473,743
Florists	$559,520	$5,072	$554,449
Photographic Equipment/Music Stores*	$2,147,734	$212,567	$1,935,166
Books & Stationery	$1,893,131	$1,382,562	$510,569
Office Supplies/Computer Equipment	$5,129,797	$0	$5,129,797
Jewelry	$3,001,818	$2,704,594	$297,224
Misc. Specialty Retail	$9,704,023	$612,314	$9,091,709
Food, Eating and Drinking Group	$30,266,465	$9,634,775	$20,631,690
Grocery Stores	$22,603,301	$2,971,262	$19,632,040
Specialty Food Stores	$0	$0	$0
Liquor Stores	$259,260	$0	$259,260
Eating Places	$7,403,904	$6,663,513	$740,390
Building Materials And Home furnishings Group	$36,928,282	$10,923,317	$26,004,966
Furniture & Home Furnishings	$15,936,004	$4,485,872	$11,450,132
Furniture Stores	$0	$0	$0
Other Home Furnishings Stores	$0	$0	$0
Household Appliances & Electronics	$7,061,877	$6,437,445	$624,431
Used Merchandise	$926,681	$0	$926,681
Garden Supply/Hardware/Paint Stores*	$7,642,874	$0	$7,642,874
Lumber & Other Building Materials	$5,360,847	$0	$5,360,847
Automotive Group	$113,948,400	$406,415	$113,541,984
New Cars & RVs	$75,463,694	$0	$75,463,694
Used Car Dealers	$4,995,445	$0	$4,995,445
Service Stations/Auto Parts*	$33,335,491	$386,420	$32,949,071
Mobile Homes & Trailers	$22,217	$19,995	$2,222
Boats & Motorcycles	$131,553	$0	$131,553

Source: ADE, retail model developed from 1997 US Retail Census, and the 1998 Bureau of Labor Statistics Household Expenditure Surveys. Sales data comes from the State Board of Equalization, data audited by MBIA. Data adjusted for inflation using CPI. Household counts and aggregated income growth factors come from the 2000 US Census, and income estimates are derived from the 1990 US Census. Data for calculating local spending capture and non-resident spending from Linda Congleton & Associates.

* Figures are aggregated due to confidentiality agreements.

Notes: Spending and sales do not include non-store retail establishments, which include mail order, home shopping, and direct selling. Non-local resident spending can include visitors, business-to-business transactions, residents of neighboring communities, employees, and residents living in other parts of Newport Beach.

APPENDIX A: RETAIL ANALYSIS METHODOLOGY

Market Area Definition

The area defined as primary market area includes the City of Newport Beach. Because Newport Coast households were annexed into the city limits after the 2000 Census, the analysis used data from those tracts formerly in the unincorporated area.

The retail subareas are geocoded according to the definitions used by the City of Newport Beach for its sales tax reporting. The market areas defined for these retail subareas are as follows: Balboa Island (Census Tract 630.06), Balboa Village (Tract 628), Corona Del Mar (Tract 627.02 and Block Group 627.01 BG5), Lido-Cannery (Tracts 628, 629, and 635), and Mariner's Mile (Tract 634). For the entire coastal area, the analysis included these tracts and added the households along Bayside Drive and the remainder of Census Tract 627.01.

Household Growth and Income Assumptions

The household counts used in the analysis came directly from the 2000 US Census of Population. The household income distribution for the primary and secondary market areas comes from the 1990 Census, and the calculations hold this distribution constant. To estimate 2000 incomes, the income ranges were inflated using the Consumer Price Index (CPI), and real income increase was estimated by using the preliminary Summary File 3 data from the 2000 Census for Orange County (minus Anaheim and Santa Ana).[10] In order to calculate total household income, the midpoint for each income range was multiplied by the number of households within that range.

Data Sources Used In The Retail Analysis

The taxable sales figures in the analysis come directly from the California State Board of Equalization (SBE) sales tax allocation records, audited by MBIA. This data covers all establishments for the City of Newport Beach for the 2001 calendar year. Due to confidentiality requirements, any retail category with fewer than three establishments must be aggregated together with other retail categories before data can be reported. The data for the subarea retail studies come directly from the MBIA sales tax audit reports, which use geographic definitions provided by the City of Newport Beach. During the process of conducting the subarea analyses, some missing data along Bayside Drive and around McFadden Square was detected. The

[10] At the time of the retail market analysis, the Summary File 3 data from the U.S. Census for the Newport Beach CDP was not available.

sales tax data for these areas reflect aggregated totals with no detail by store type. This will be added in the final report.

ADE's retail model estimates household retail demand by store type and product type. The variables that go into the model are average household income, the number of households in the study area, and any necessary inflation factors. The source of data for the household product type demand is the 1998 Bureau of Labor Statistics Consumer Expenditure Survey, which the agency uses to compute the Consumer Price Index. These surveys stratify the sample based on type of location, income, and region. For purposes of analyzing the household spending in Newport Beach, data for analyzing the household demand by store type came from the 1997 US Census of Retail Trade.

Additional Assumptions Made In The Retail Model

Because the data from the State Board of Equalization only reflects taxable sales, the retail model makes an adjustment to account for nontaxable retail items. These items include food and prescription drugs. The adjustment inflates the taxable sales by the average ratio of nontaxable to taxable products for an individual store type. This distribution of sales by product type comes from the 1997 Census of Retail Trade. Information regarding the taxability of different retail products comes from the California Tax Code.

The household capture assumptions for different retail store categories in the coastal subareas came from the Linda Congleton & Associates market studies of the Balboa Peninsula. In store categories where the household capture assumption exceeded the available demand, the analysis assumed that the household demand would equal the local spending component. In the subarea studies, the non-resident spending includes visitors, business-to-business transactions, spending from households living in the surrounding communities, **and** residents living in other parts of Newport Beach.

The capture assumptions for the entire coastal area aggregated the household spending for each individual subarea, and reapplied the household capture assumptions to the remaining leakage in order to differentiate between resident and non-resident spending for the entire coastal area.

For the citywide totals, the visitor spending estimates are calculated from CIC Research visitor survey data. Because the visitor spending data was reported at a more aggregated level than the retail sales figures, ADE took the visitor spending data and proportionally distributed it to the most appropriately matched retail category. The citywide analysis does not make any assumptions regarding capture of spending from residents living in the surrounding communities, such as Irvine, Costa Mesa, Laguna Beach, and Huntington Beach. For categories that have large excess capture of spending, it can be assumed that the regional capture of spending is **at least** this amount. The CIC visitor survey sample had less than 1.5 percent of the respondents from Orange County, therefore the analysis assumes that visitor spending does not include recurring shopping trips into Newport Beach by residents in the surrounding communities.

Employee spending used several data sources to come up with an overall estimate. The analysis assumed an employed total of approximately 59,400 jobs. This job estimate comes from California Employment Development Department statistics, and excludes self-employment and residential employment. Based on typical employee spending patterns identified through surveys in other communities, the analysis assumed a daily spending amount of $6 per workday, most of which applies to eating establishments.

The employee spending analysis also assumed 15,000 total jobs at Newport Center, based on a 2000 Irvine Company survey. This data estimated that approximately 18 percent of Fashion Island sales come from Newport Center employees. To account for the presence of Fashion Island, the employee spending analysis assumed that Newport Center workers had an average daily spending amount of $21 per workday. This spending was proportionally distributed based on the sales patterns at Fashion Island. Because the retail market analysis already accounted for most retail spending by Newport Beach residents, the amount allocated to employee spending at Fashion Island only includes retail spending by commuters. The commute pattern data came from the 2000 U.S. Census.

Data for the average sales per square foot comes from the sales tax records and the Orange County Assessor's database. The averages calculated for the retail analysis reflect the available data. In many cases, the square footage data in the Assessor's records was either missing or mixed together with several uses. In most cases where the square footage total included several uses sharing a single address, the analysis totaled the number of businesses at that address and assigned an equal square footage total to each business. Balboa Island had the most comprehensive and complete square footage data of all the subareas analyzed. Lido-Cannery had several properties with missing addresses. In addition, the data records for Corona del Mar had problems because most of the properties were improperly entered as "W Coast Hwy."

The national benchmark data comes from the Urban Land Institute's Dollars and Cents of Shopping Centers publication. ADE's analysis used the community shopping center median sales per square foot for each retail category.

Chapter 3

INFRASTRUCTURE

Section 3.1 Circulation

DRAFT
TRAFFIC MODEL EXECUTIVE SUMMARY
NEWPORT BEACH GENERAL PLAN UPDATE
EXISTING CONDITIONS AND CURRENTLY ADOPTED GENERAL PLAN BUILDOUT FORECASTS

Prepared For:
Mr. Rich Edmonston
CITY OF NEWPORT BEACH
3300 Newport Boulevard
Newport Beach, CA 92663

Prepared By:
URBAN CROSSROADS, INC.
41 Corporate Park, Suite 300
Irvine, CA 92606

John Kain, AICP
Carleton Waters, P.E.
Marlie Whiteman, P.E.

March 26, 2003
December 8, 2003 (Revised)

JK:CW:MW:pr
JN:01232-03

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TRAFFIC MODEL EXECUTIVE SUMMARY

NEWPORT BEACH GENERAL PLAN UPDATE

EXISTING CONDITIONS AND CURRENTLY ADOPTED

GENERAL PLAN BUILDOUT FORECASTS

1.0 INTRODUCTION

This executive summary has been prepared to provide an overview of existing traffic conditions and forecasts of future conditions, based on the currently adopted General Plan of the City of Newport Beach. The General Plan forecasts have been prepared using the Newport Beach Traffic Model, version 3.1 (NBTM 3.1). The NBTM 3.1 travel demand forecasting tool has been developed for the City of Newport Beach to address traffic and circulation issues in and around the City. The NBTM 3.1 tool has been developed in accordance with the requirements and recommendations of the Orange County Subarea Modeling Guidelines Manual (August, 1998). The NBTM 3.1 is intended to be used for roadway planning and traffic impact analysis, such as:

- General Plan/Land Use analysis required by the City of Newport Beach.
- Amendments to the Orange County Master Plan of Arterial Highways (MPAH).
- Orange County Congestion Management Program (CMP) analysis.

The NBTM 3.1 is a vehicle trip based modeling tool, and it is intended for evaluating general roadway system supply and demand problems and issues. The NBTM 3.1 has been specifically calibrated to provide the most representative conditions in the City of Newport Beach. This is sometimes described as “shoulder season” conditions, which are experienced in the spring and fall seasons.

NBTM 3.1 differs from previous Newport Beach Traffic Models in several key ways. First, NBTM 3.1 is a traffic model that includes most of Southern California, although the level of detail is much less for areas further away from Newport Beach. Previous versions were “windowed” models, that ended a short distant beyond the City’s primary modeling area. NBTM 3.1 also includes an additional step, which is a conversion of the City’s land use data into socioeconomic data. The socioeconomic data is then used to calculate trip generation. Both of these changes are required by regional modeling consistency guidelines, and the Orange County Transportation Authority (OCTA) is responsible for certifying the consistency of local models. Additionally, this updated model also includes greater level Traffic Analysis Zone (TAZ) detail in key areas of the City where the question of future development levels is in question, particularly the area adjacent to John Wayne Airport. Greater detail has also been added in the Newport Coast/ Newport Ridge area, due to its annexation into the City. Another difference in this traffic model from prior versions is an improved methodology to conduct intersection analysis, which insures that the traffic flow between related intersections is reconciled.

The December revision of this document contains more current data for areas just outside Newport Beach, specifically: John Wayne Airport (SNA) and the University of California at Irvine (UCI). Expansion of John Wayne airport has recently been approved to include 10.8 million air passengers (MAP) for future conditions. Previously, the forecast capacity was 8.4MAP (7.8 of which are included in the existing conditions). Recent discussions with UCI have resulted in a modified representation of buildout conditions for the campus that explicitly reflect a trip cap of approximately 150,000 trip-ends per day for General Plan Buildout conditions.

1.1 Basic Methodology and Assumptions

The NBTM follows the model structure recommended in the subarea modeling guidelines, which is a "focused" modeling approach. The concept of a focused model is to provide the greatest level of detail within the primary modeling or study area, with the least detail for those parts of the model which are geographically distant from the primary study area. The guidelines refine this concept into a three-tier system, with tier 1 being the least detailed component (used to account for regional traffic), tier 2 being the previous regional framework (County; sub-regional traffic). And tier 3 being the primary study area (local traffic).

The primary study area of the NBTM is shown on Exhibit A. The primary study area of the NBTM is generally bounded by the Brookhurst Street/Santa Ana River

EXHIBIT A

NEWPORT BEACH TRAFFIC MODEL (NBTM) PRIMARY STUDY AREA

URBAN CROSSROADS

NEWPORT BEACH GENERAL PLAN UPDATE TRAFFIC STUDY, Newport Beach, California - 01232:55

on the west, Adams Avenue/Baker Street/Campus Drive/SR-73 on the north, Crystal Cove State Park on the east, and the Pacific Ocean on the south. The primary model area includes the City as well as portion of Costa Mesa and Irvine. The areas outside NB are included in the primary modeling area due to the proximity of adjoining land uses and their interrelationship with Newport Beach development resulting from the structure of the road system.

NBTM 3.1 is highly dependent on the Orange County Transportation Analysis Model, Version 3.1 (OCTAM3.1). The primary modeling steps or processes used in the development of NBTM 3.1 are:

- Land use to socioeconomic data (SED) conversion
- Trip generation and mode choice
- Trip distribution
- Time of day factoring
- Traffic assignment
- Post-assignment data refinement processing (validation)

NBTM relies on regional model estimates of trip generation, trip distribution, and mode choice. The model accommodates changes in land use/socioeconomic and roadway network characteristics in the following manner:

Trip Generation - Trip generation estimates are based on socioeconomic data driven by the City's land use data. The number of trips calculated from this source is then used to adjust the regional projections to reflect local conditions.

Trip Distribution - Trip distribution estimates are based on distribution patterns estimated by the regional travel demand model and incorporated into NBTM. The regional trip distribution is adjusted to match local trip generation using an industry-accepted approach known as the Fratar model.

Mode Choice - Mode choice is the method of transportation selected by individuals traversing the region. These modes include single and multi-occupant automobiles, buses, trains, bicycles, pedestrian, etc. Mode Choice is estimated by using regional model mode share projections, which are incorporated into the subarea model.

Traffic Assignment - Traffic is assigned to the roadway system on the basis of travel time and cost. Tolls are explicitly included in the traffic assignment process using the procedures obtained from the regional travel demand model. Traffic is assigned separately for the AM, mid-day, PM and nighttime periods of the day, to allow to more accurate representation of the effects of the congestion on the choice of travel routes by drivers.

Post Model Refinements - The goal of volume forecast or post model refinement is to utilize all available information to assure the model is able to predict future traffic conditions. The NBTM refinement procedure incorporates 2002 traffic count data, 2002 model validation data, and future model forecasts as inputs to this process.

2.0 EXISTING CONDITIONS

This chapter of the executive summary describes existing 2002 shoulder (fall/spring) season conditions the City of Newport Beach. Traffic Analysis Districts have been established that group areas with similar characteristics. These districts help to refine estimates of where traffic originates, identify trip generation/distribution adjustments, and make land use occupancy adjustments, all to reflect the characteristics of a geographic area. The Traffic Analysis Districts are shown on Exhibit B.

2.1 Existing Land Use Data

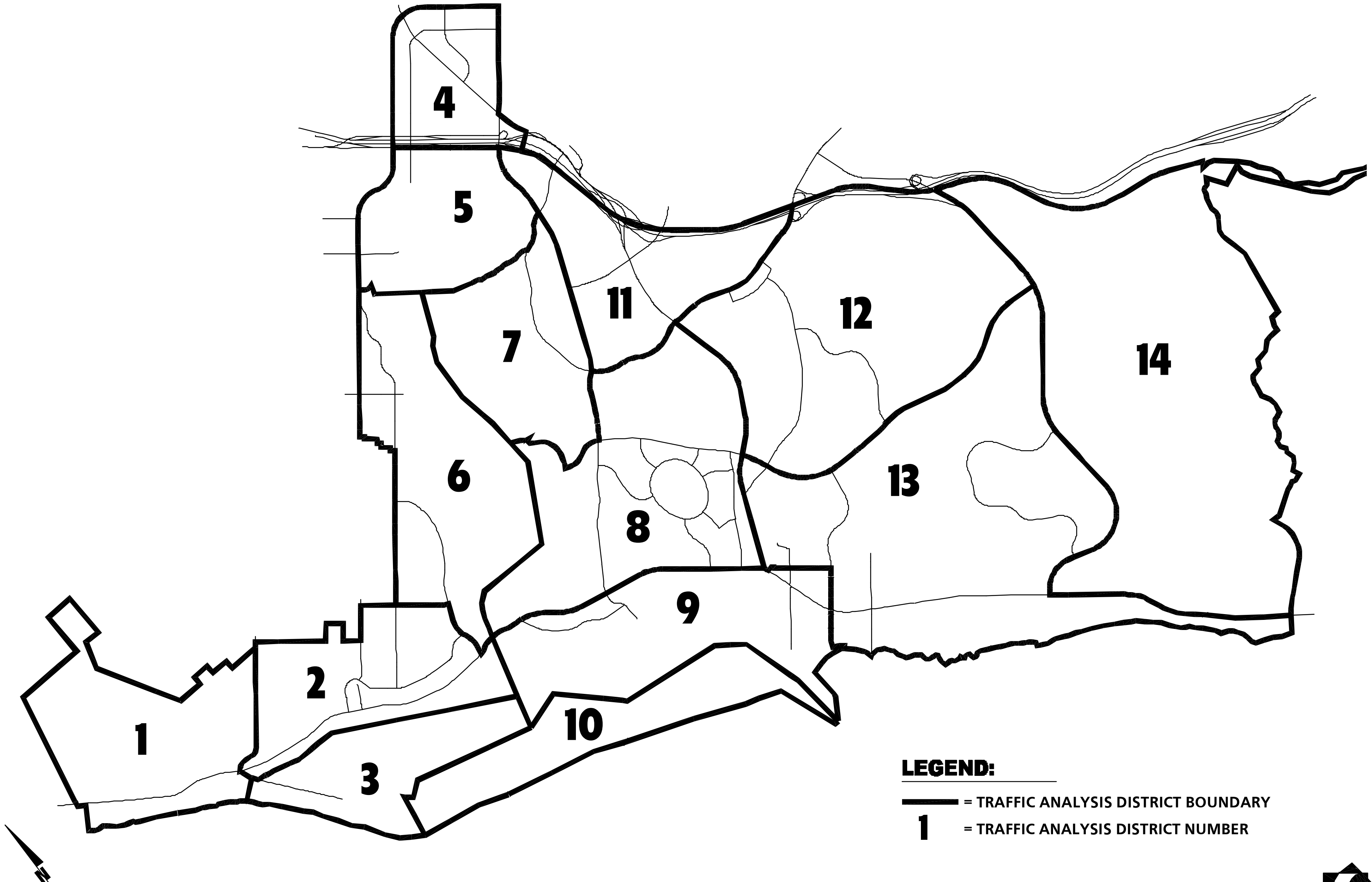
Land use data within the primary study area is a key input to the modeling process. The initial land use data was provided to Urban Crossroads, Inc. staff by the City of Newport Beach. Table 1 summarizes the existing 2002 land uses for the City of Newport Beach, by land use type. These land uses were then converted to socioeconomic data as part of the initial modeling process.

2.2 2002 Socioeconomic Data (SED)

City of Newport Beach SED that has been converted from the land use data in Table 1 is summarized in Table 2. Conversion factors were established using those from previous conversion efforts in the County. These were then refined to more closely match citywide summary data. Occupancy factors and SED conversion factors have been differentiated for the "Balboa" area (districts 3, 9, and 10 on Exhibit B). This differentiation was necessary because of inaccurate initial model predictions compared to existing street counts. These differences can be related to unique spring and fall trip generation, which is different from other seasons. For instance, lower retail occupancy is experienced during the "shoulder" (spring/fall) seasons represented by the NBTM.

EXHIBIT B

TRAFFIC ANALYSIS DISTRICTS



LEGEND:

━━ = TRAFFIC ANALYSIS DISTRICT BOUNDARY

1 = TRAFFIC ANALYSIS DISTRICT NUMBER

URBAN CROSSROADS

TABLE 1

CITY OF NEWPORT BEACH 2002 LAND USE SUMMARY[1]

NBTM CODE[2]	DESCRIPTION	QUANTITY	UNITS [3]
1	Low Density Residential	14,841	DU
2	Medium Density Residential	12,939	DU
3	Apartment	7,622	DU
4	Elderly Residential	348	DU
5	Mobile Home	894	DU
	TOTAL DWELLING UNITS	**36,644**	**DU**
6	Motel	210	ROOM
7	Hotel	2,745	ROOM
9	Regional Commercial	1,259.000	TSF
10	General Commercial	2,926.160	TSF
11	Commercial/Recreation	5.100	ACRE
13	Restaurant	640.520	TSF
15	Fast Food Restaurant	78.031	TSF
16	Auto Dealer/Sales	288.320	TSF
17	Yacht Club	54.580	TSF
18	Health Club	63.500	TSF
19	Tennis Club	60	CRT
20	Marina	1,055	SLIP
21	Theater	5,489	SEAT
22	Newport Dunes	64.00	ACRE
23	General Office	10,900.190	TSF
24	Medical Office	761.459	TSF
25	Research & Development	327.409	TSF
26	Industrial	1,042.070	TSF
27	Mini-Storage/Warehouse	199.750	TSF
28	Pre-school/Day Care	55.820	TSF
29	Elementary/Private School	4,399	STU
30	Junior/High School	4,765	STU
31	Cultural/Learning Center	35.000	TSF
32	Library	78.840	TSF
33	Post Office	53.700	TSF
34	Hospital	351	BED
35	Nursing/Conv. Home	661	BEDS
36	Church	377.760	TSF
37	Youth Ctr./Service	149.560	TSF
38	Park	113.970	ACRE
40	Golf Course	305.330	ACRE

[1] Excludes Newport Coast and other recently annexed areas.

[2] Uses 8, 12, and 14 are part of the old NBTAM model structure and are not currently utilized in the City land use datasets.

[3] Units Abbreviations:
DU = Dwelling Units
TSF = Thousand Square Feet
CRT = Court
STU = Students

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TABLE 2

**CITY OF NEWPORT BEACH[1] LAND USE BASED 2002
SOCIOECONOMIC DATA SUMMARY**

VARIABLE	QUANTITY
Occupied Single Family Dwelling Units	13,842
Occupied Multi-Family Dwelling Units	20,409
TOTAL OCCUPIED DWELLING UNITS	**34,251**
Group Quarters Population	661
Population	75,817
Employed Residents	44,379
Retail Employee	11,211
Service Employees	17,150
Other Employees	37,077
TOTAL EMPLOYMENT	**65,438**
Elem/High School Students	9,164

[1] Includes data converted from land use only. Excludes Newport Coast and recent annexation areas.

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2.3 2002 Trip Generation

Trip generation has been estimated from socioeconomic data in the NBTM model area. The trip generation factors have been derived from regional trip generation estimates from the regional model (OCTAM 3.1). This methodology breaks down traffic into trips produced (productions) and trips attracted (attractions). Table 3 summarizes the overall trip generation for 2002 conditions for the City of Newport Beach. The overall trip generation for the City of Newport Beach is an estimated 689,850 daily vehicle trips.

2.3.1 Trip Purpose

NBTM trip generation data has been developed for the following 7 trip purposes:

- Home-Work
- Home-Shop
- Home-Other
- Home-Elementary/High School
- Home-University
- Other-Other
- Other-Work

The "Other" category includes social or entertainment related trips and recreational trips.

2.4 2002 Mode Choice

Most mode choice (e.g., transit, etc.) issues are regional in nature, superseding cities' boundaries. For this reason, the NBTM approach is to incorporate mode choice through data obtained from the regional mode choice model. This data may be used directly for minor adjustments to account for future system refinements, which would then be reflected in zonal vehicle trip generation adjustments. Regional mode choice survey data directly relevant to Newport

TABLE 3

CITY OF NEWPORT BEACH 2002 TRIP GENERATION

TRIP PURPOSE	PRODUCTIONS	ATTRACTIONS	PRODUCTIONS - ATTRACTIONS	PRODUCTIONS / ATTRACTIONS
Home Based Work[1]	57,568	82,177	-24,609	0.70
Home Based School	11,424	8,730	2,694	1.31
Home Based Other[2]	125,826	111,273	14,553	1.13
Work Based Other	52,483	57,381	-4,898	0.91
Other - Other	92,237	90,749	1,488	1.02
TOTAL	339,538	350,310	-10,772	0.97
OVERALL TOTAL		689,850		

[1] Home-Work includes Home-Work and Home-University trips, consistent with OCTAM mode choice output.

[2] Home-Other includes Home-Shop and Home-Other trips, consistent with OCTAM mode choice output.

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Beach is presented to facilitate such minor adjustments and to inform the decision-makers regarding the role of various modes of transportation to/from and within the City of Newport Beach.

2.4.1 Home-Work Trip Mode Choice Data

The home-work trip mode choice data provided by the Southern California Association of Governments (SCAG) to Urban Crossroads, Inc. included mode choice data (travel method used) for home-work (either end in Newport Beach) trips. The main mode choices fall into the following categories:

- Drive alone
- Carpool
- Bus
- Railroad
- Ferry
- Taxi
- Motorcycle
- Bike
- Walked

The mode choice data has been grouped into geographic areas. Within Orange County, cities have been identified as adjacent to Newport Beach, or generally located north of (North County) or south of (South County) the City of Newport Beach. Adjacent cities include Costa Mesa, Huntington Beach, Irvine, and Laguna Beach. The division between North County and South County cities used for this analysis is the SR-55 Freeway. Outside Orange County, cities/geographic areas have been grouped by County.

Exhibits C and D depict the results of this analysis for Newport Beach origin trips (residents) and Newport Beach destination trips (persons that

EXHIBIT C

MODE CHOICE FOR WORK TRIPS OF NEWPORT BEACH RESIDENTS

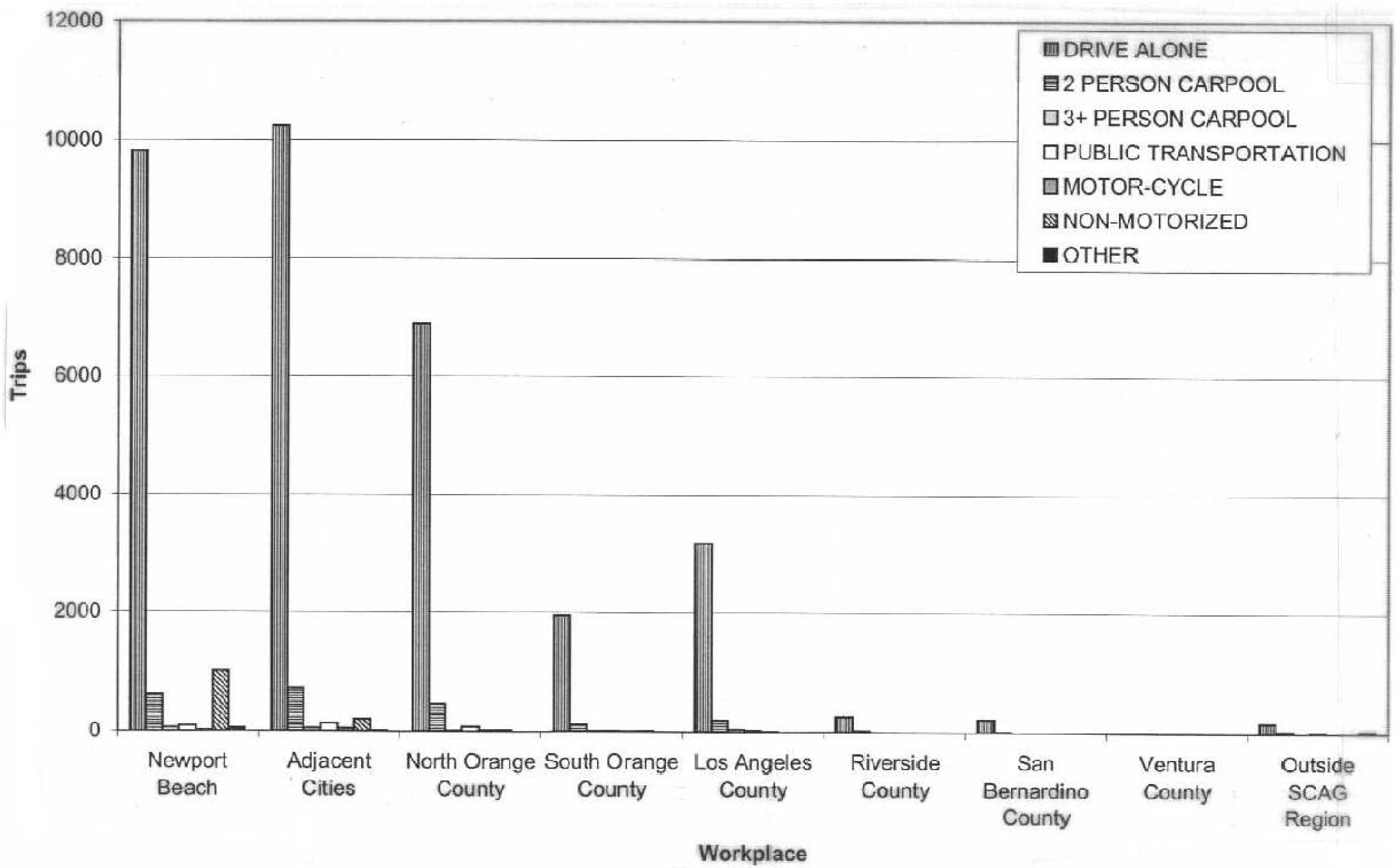
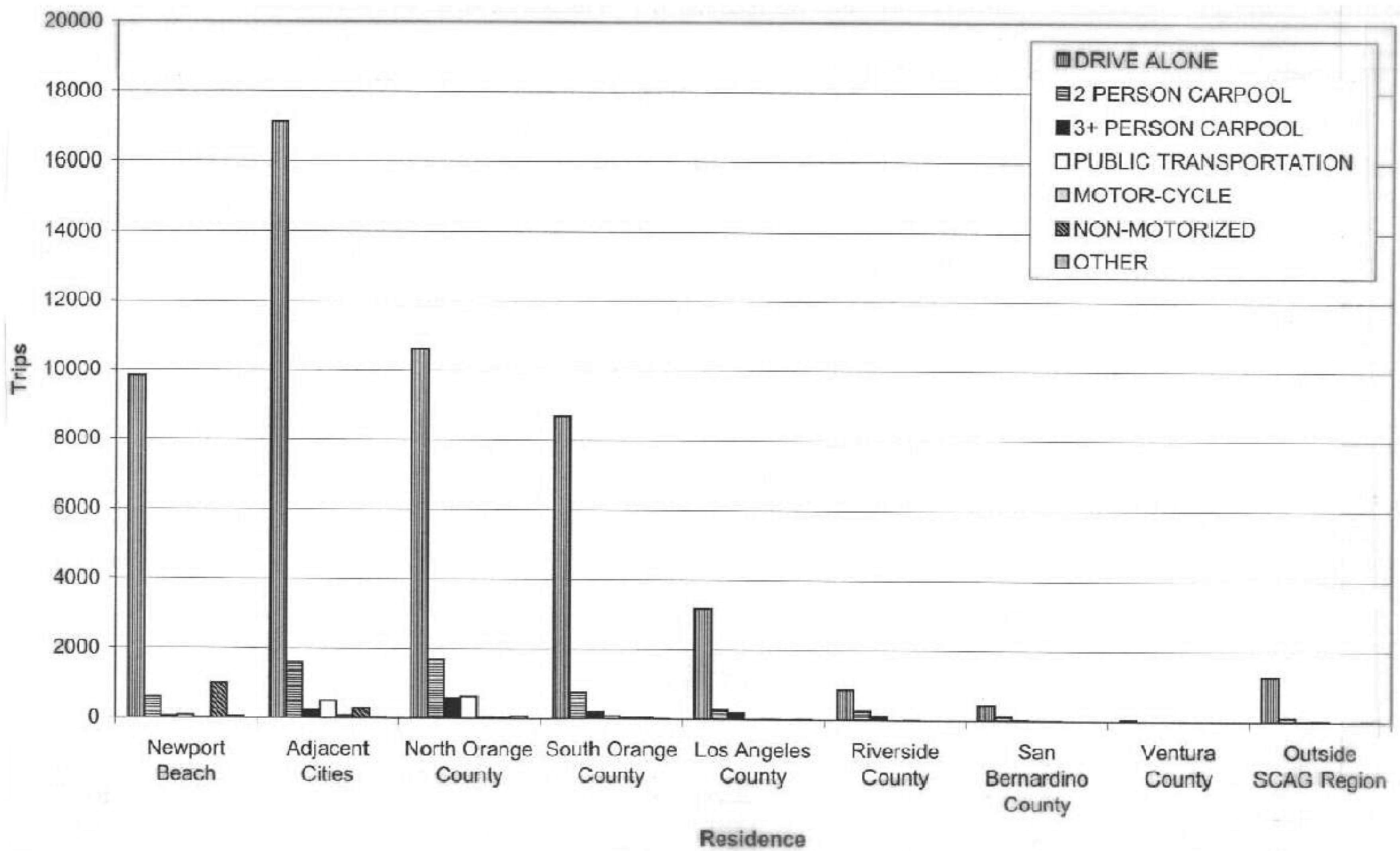


EXHIBIT D

MODE CHOICE FOR HOME-WORK TRIPS OF NEWPORT BEACH WORKERS



work in Newport Beach), respectively. The majority of trips that have one or both trip ends in Newport Beach are drive-alone automobile trips. The second-most used mode for trips with only one end in Newport Beach is 2-person carpool, while the second-most popular mode for Home-Work trips with both ends in the City is non-motorized. Generally, travel to the City of Newport Beach via transit is most often by North Orange County residents who work in the City of Newport Beach. The second highest percentage of workers that utilize transit to travel to the City of Newport Beach is from adjacent cities. Public transportation accounts for less than 2% of all home-work travel to and from the City of Newport Beach from all other geographic areas within the SCAG region. The percentage is actually higher for locations outside the SCAG region, most likely associated with the use of John Wayne Airport to travel to and from the City of Newport Beach for more distant destinations.

2.5 2002 Trip Distribution

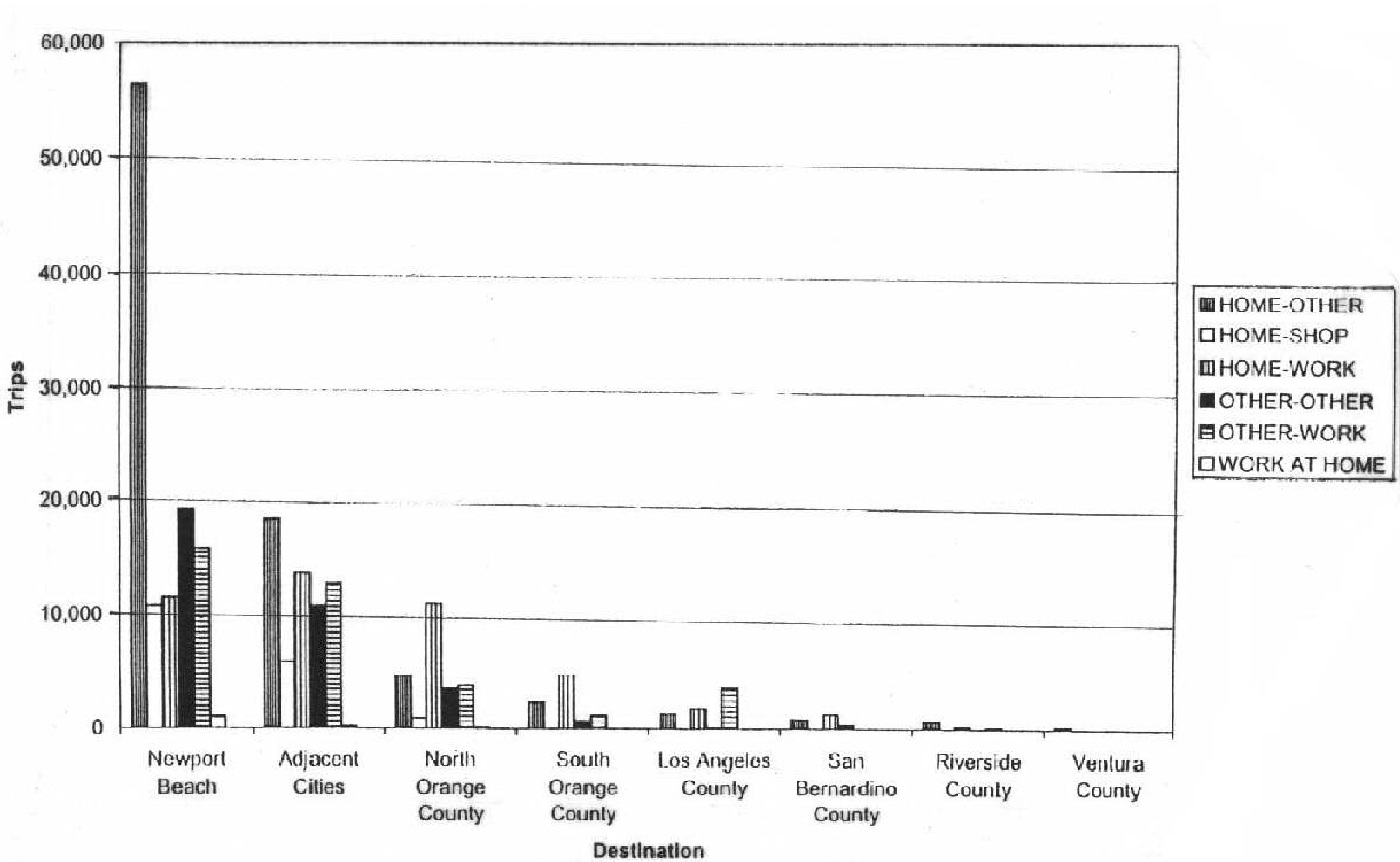
Survey data was provided by SCAG related to the origins and destinations of trips made to and from the City of Newport Beach. The trip distribution data was collected in the form of trip diaries in 1991. These trip diaries are an actual log complied by individual motorists of their daily trip activities. The trip distribution data was organized into six (6) trip purposes for trips ending or beginning in Newport Beach and summarized by geographic area at the other end of the trip.

Exhibit E summarizes the geographic data by adjacent cities, north Orange County, south Orange County, and each other county in Southern California represented in the dataset for trips originating in Newport Beach. As might be expected, the highest totals are for trips with both ends within the City of Newport Beach, followed by trips with one end in an adjacent city.

As shown on Exhibit E, 52% of the trips surveyed are contained within Newport Beach and 80% of the trips originating in Newport Beach are contained entirely in

EXHIBIT E

PURPOSE FOR TRIPS ORIGINATING IN NEWPORT BEACH BY DESTINATION



Newport Beach and the adjacent cities. Exhibit F depicts the overall trip purposes summary for trips beginning in Newport Beach. Most trips are Home-Other (38%), with a high number of Home-Work (20%). The categories with the fewest trips are Work at Home and Home-Shop. Exhibit G shows the City or County at the other end of the trip for trips originating in Newport Beach. Areas closest to Newport Beach have the most interactions with the City.

Exhibit H summarizes the geographic data by County (outside Orange County) or portion of Orange County for trips destined for Newport Beach. The highest totals are for trips with both ends in the City of Newport Beach (52%), followed by trips from an adjacent city (28%). Exhibit I depicts the overall purposes for trips ending in Newport Beach. Most trips are Home-Other (38%), followed by Home-Work (22%). The fewest trips are Work at Home and Home-Shop. Exhibit J shows the origin City or County for trips destined for Newport Beach. Areas closest to Newport Beach have the most interactions with the City.

2.6 <u>2002 Daily Traffic Conditions</u>

The existing number of through lanes (lanes not designed to accommodate turning movements only) within the primary study area are depicted on Exhibit K. Daily traffic volume data for locations counted as part of this study effort were collected in Spring/Fall of 2001/2002. Freeway data comes from the Caltrans Publication, <u>Traffic Volumes on State Highways.</u> Exhibit L presents the daily traffic volumes, which have been used to validate the NBTM. Daily volume is the first level of check/verification to insure that the model is predicting traffic accurately. Daily traffic count data has been collected and/or compiled for 64 locations in the City of Newport Beach. Additional daily volume data reported by the California Department of Transportation has been incorporated into the NBTM update work effort. The SR-55 Freeway north of the SR-73 Freeway carries the highest daily traffic volume (approximately 155,000 vehicles per day) in the NBTM primary modeling area. The arterial roadways carrying the highest traffic volume in the NBTM primary modeling area are Coast Highway and

EXHIBIT F

PURPOSE OF TRIPS ORIGINATING IN NEWPORT BEACH

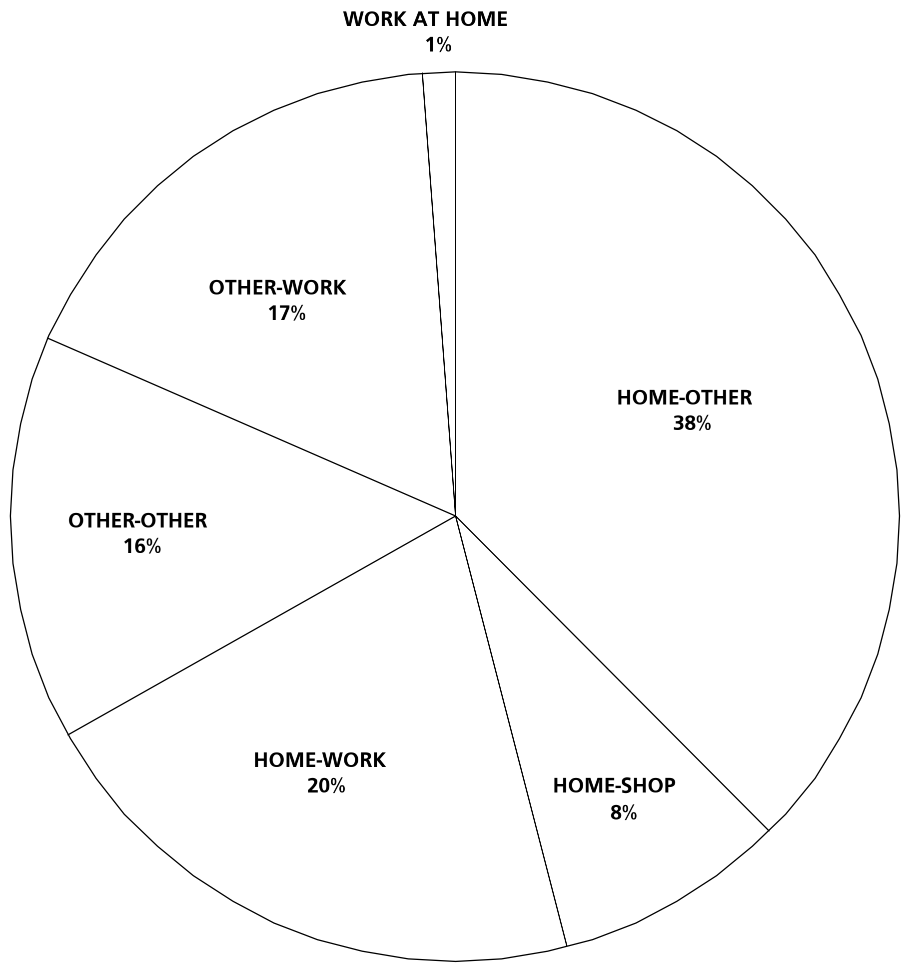


EXHIBIT G

DESTINATIONS OF TRIPS ORIGINATING IN NEWPORT BEACH

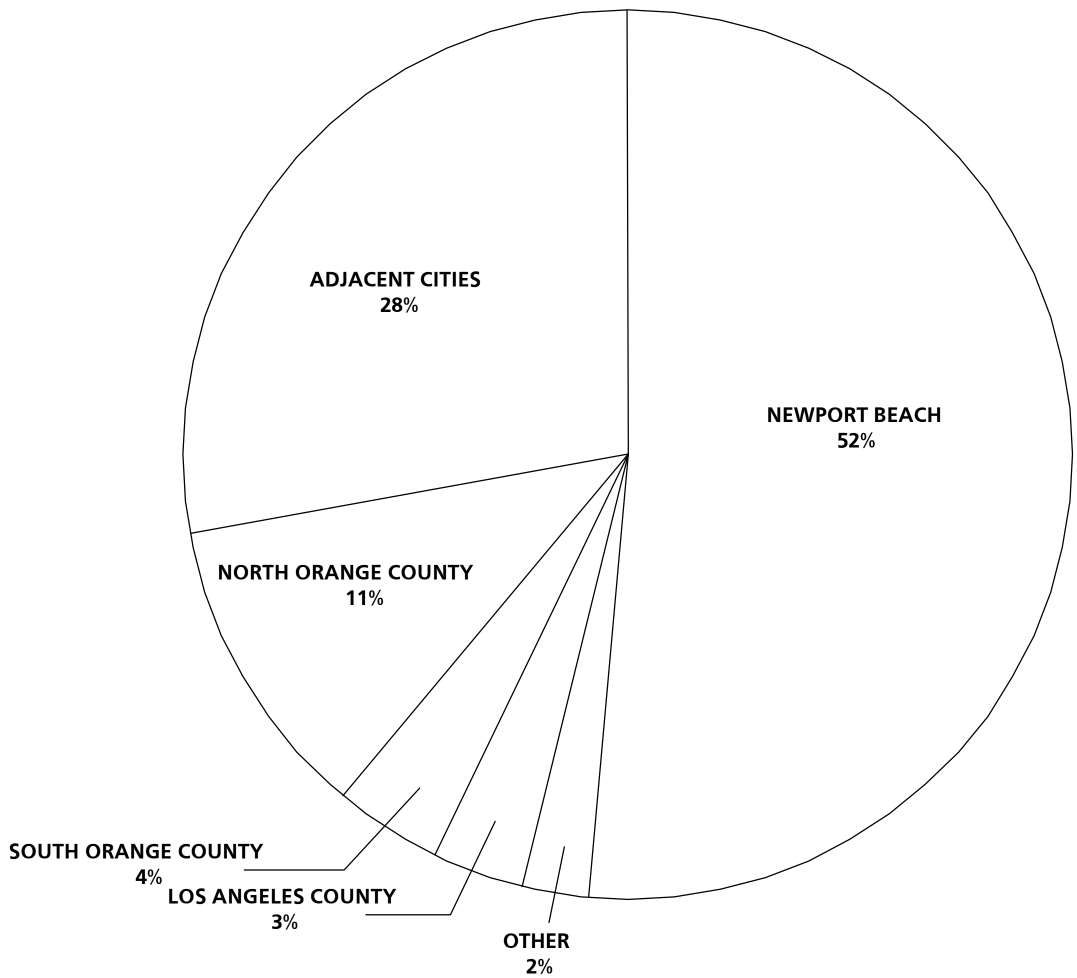


EXHIBIT H

PURPOSE OF TRIPS DESTINED FOR NEWPORT BEACH BY ORIGIN

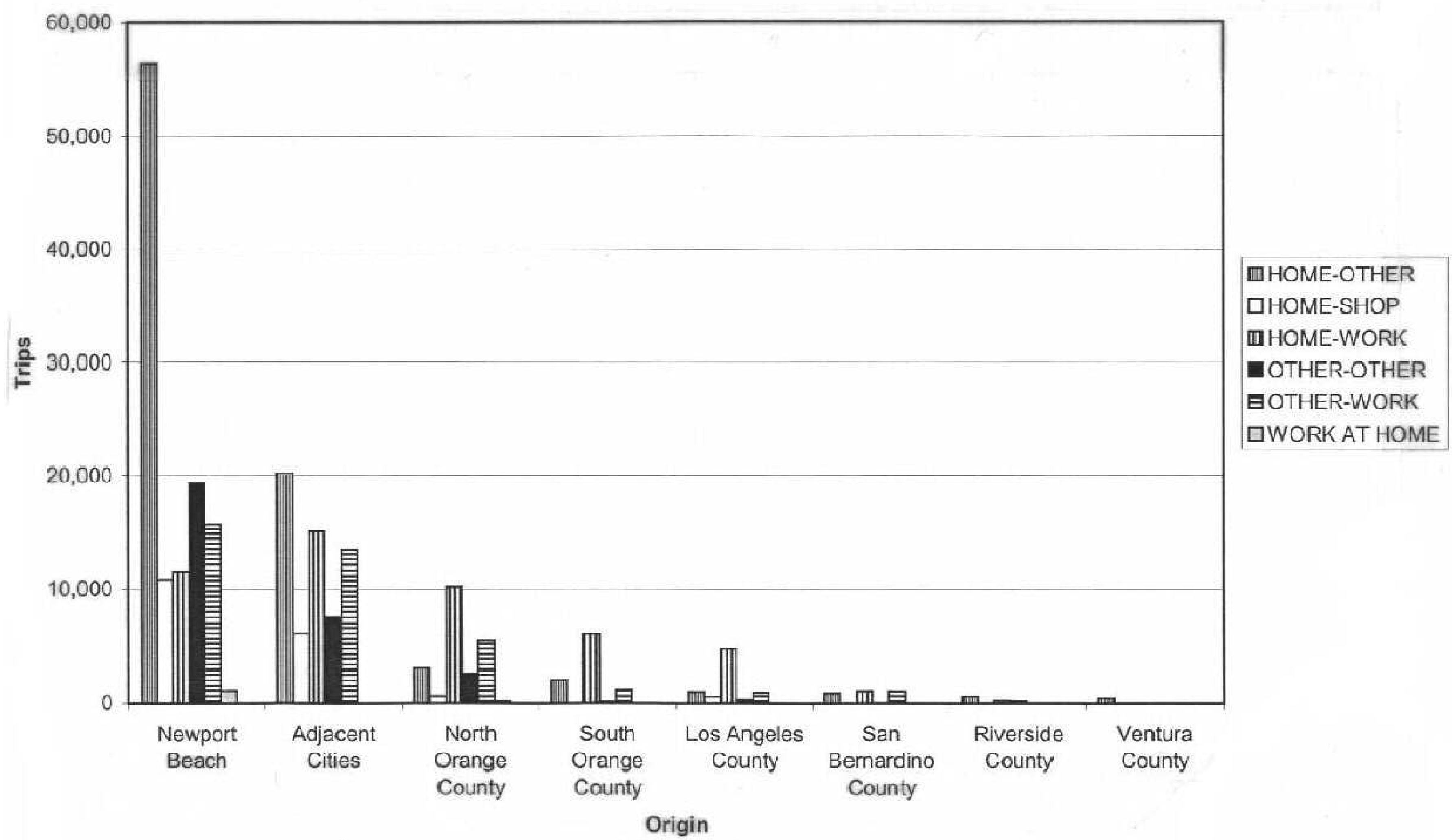


EXHIBIT I

PURPOSES OF TRIPS DESTINED FOR NEWPORT BEACH

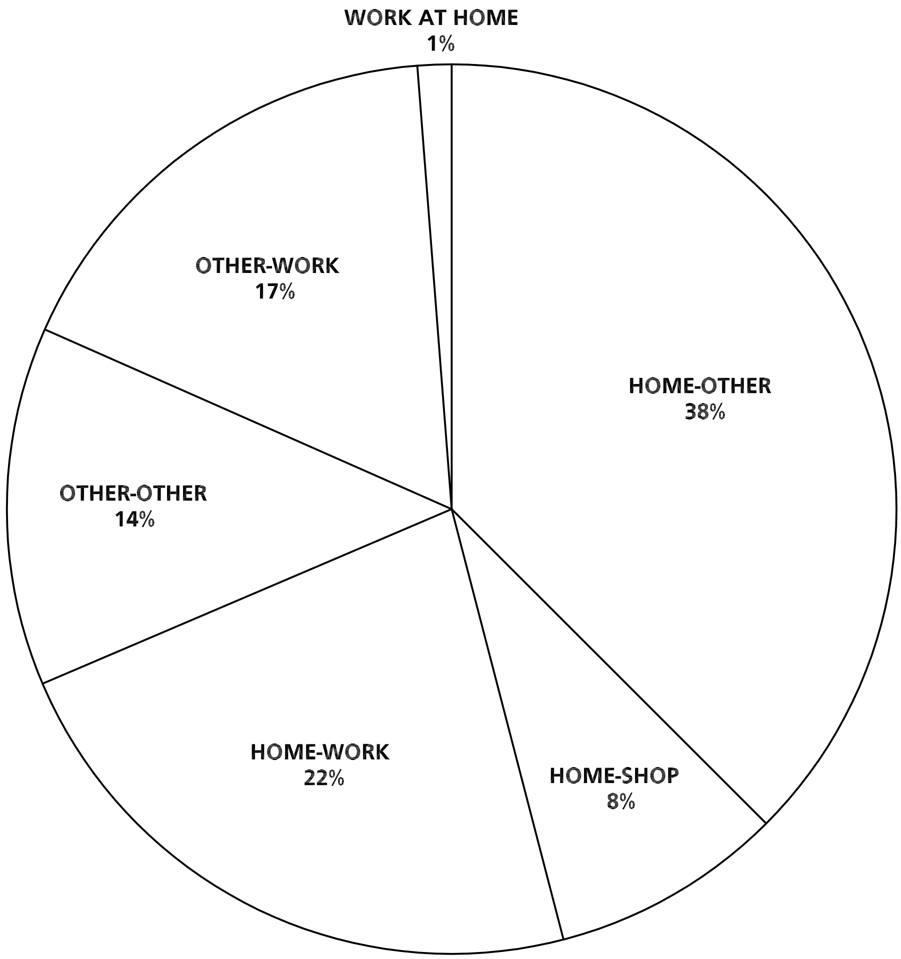


EXHIBIT J

ORIGINS OF TRIPS DESTINED FOR NEWPORT BEACH

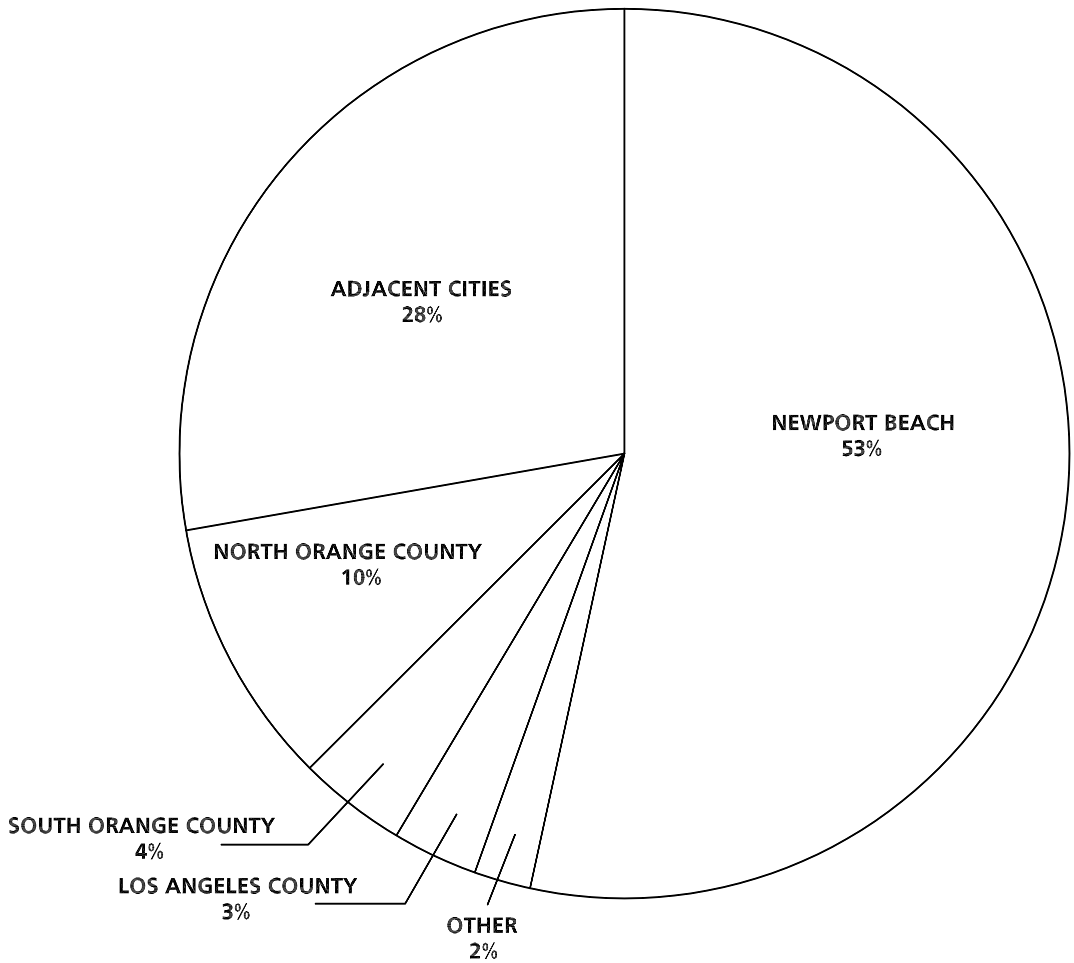
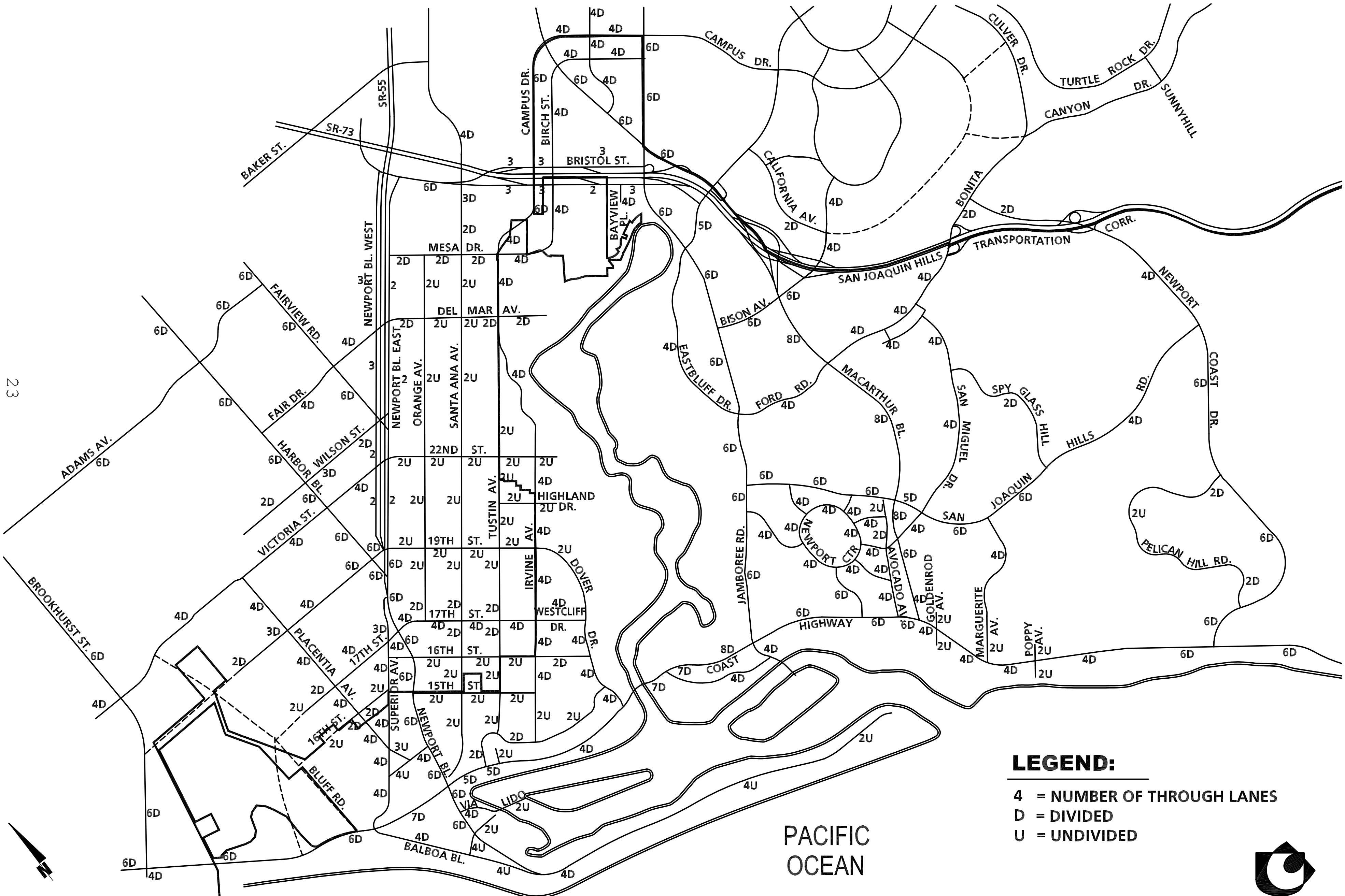


EXHIBIT K

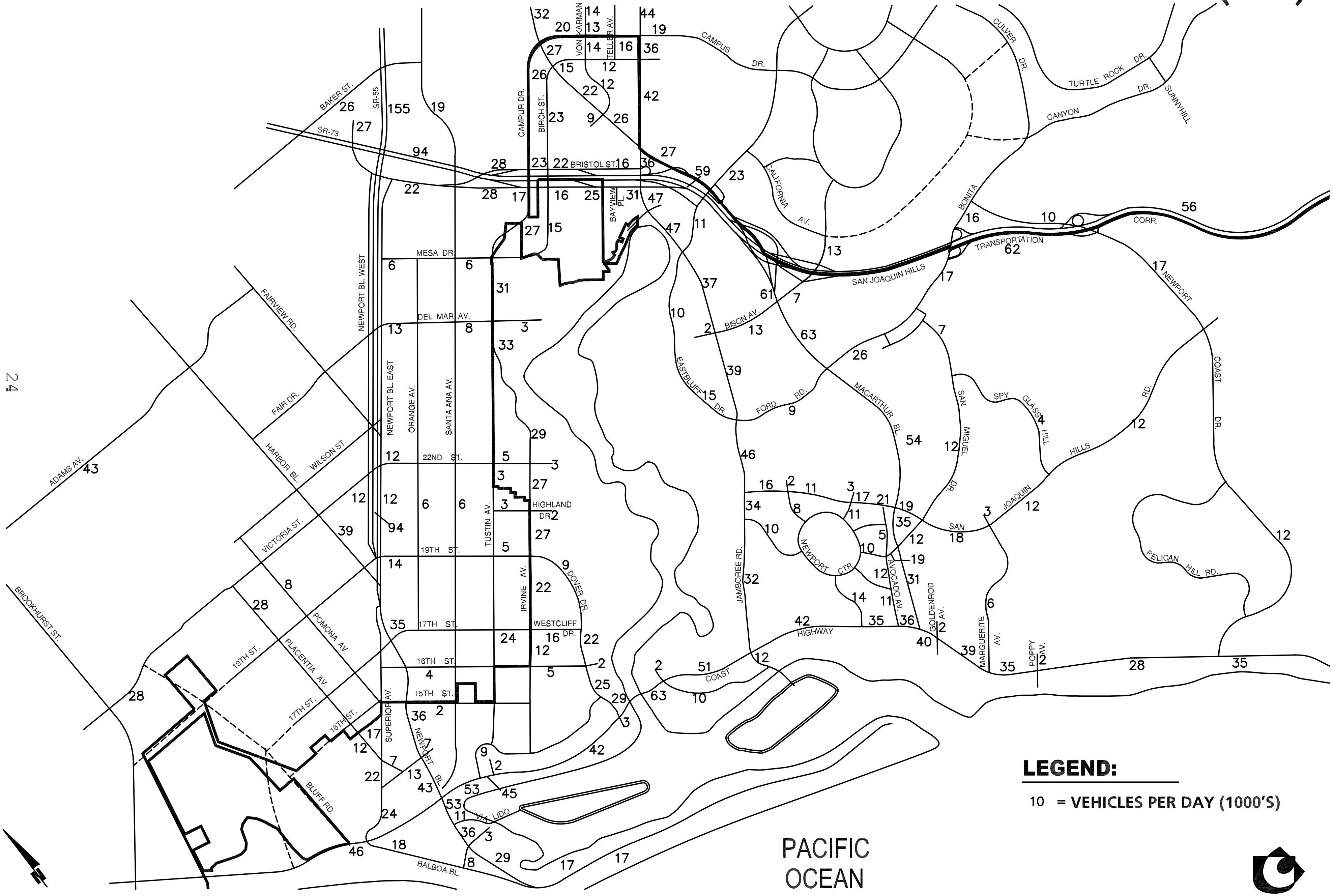
NEWPORT BEACH EXISTING THROUGH LANES



NEWPORT BEACH GENERAL PLAN UPDATE TRAFFIC STUDY, Newport Beach, California - 01232:65

EXHIBIT L

EXISTING COUNT SHOULDER SEASON AVERAGE DAILY TRAFFIC (ADT)



LEGEND:

10 = VEHICLES PER DAY (1000'S)

URBAN CROSSROADS

NEWPORT BEACH GENERAL PLAN UPDATE TRAFFIC STUDY, Newport Beach, California - 01232:66

MacArthur Boulevard. A daily traffic count of approximately 63,000 vehicles per day was estimated on Coast Highway between Dover Drive and Bayside Drive and on MacArthur Boulevard between Bison Avenue and Ford Road. Other roadways carrying traffic volumes in excess of 50,000 vehicles per day (VPD) include:

- Newport Boulevard (maximum volume of 53,000 VPD south of Coast Highway).
- Coast Highway (53,000 VPD east of Newport Boulevard).

These links are highlighted because they represent the highest volume roadways in Newport Beach. This does not automatically lead to deficiencies, but it will help to identify areas where intersection deficiencies could lead to significant capacity deficiencies.

Daily traffic counts (24 hour counts) were collected at 55 locations on the City's roadway system. This data was collected in 15 minute intervals. The areawide volumes were then analyzed to determine the peak characteristics for the study area. The results of this analysis show that 8.67% of daily traffic occurs during the AM peak hour, and 10.63% of daily traffic occurs in the PM peak hour. The peak hour (time of highest relative volume) was determined within typical peak periods (6-9 AM and 3-7 PM). For the entire primary study area, the AM peak hour begins at 7:30 AM, and the PM peak hour begins at 4:45 PM.

Individual locations have various peak hour start times. Within Newport Beach, the total trips in the peak traffic hours is approximately 19% of total daily trips. This is higher than the typical value of 16 percent that Urban Crossroads staff has observed in other studies in Orange.

2.7 Peak Season Daily Traffic Volume Data

Peak season daily traffic volumes have been collected for select locations (primarily in coastal areas) of the City of Newport Beach. Daily traffic volume counts were collected over a one week period in August of 2003 for each selected roadway segment. For each roadway segment selected for summertime counts, the highest typical weekday (Tuesday through Thursday) volume has been compared to the shoulder season count volume at the same location. Table 4 contains the results of this analysis. The only decrease in peak season volume from shoulder season conditions occurs on MacArthur Boulevard north of San Joaquin Hills Road. All other segments increase for summer conditions by at least 5% and as much as 75%. The locations with volume increases of more than thirty (30) percent are on Newport Boulevard south of Coast Highway and Balboa Boulevard east of 20th Street on the Peninsula.

Review of the data clearly indicates that Newport Boulevard is the most popular and heavily impacted access route to the beach for summertime traffic. Jamboree Road and MacArthur Boulevard appear to be the least affected routes, with increases in traffic of between 5 and 10 percent. Newport Coast Drive experiences a higher percentage increase in summertime traffic, but the magnitude of the increase (approximately 3,400 vehicles per day) is very similar to the increase on MacArthur Boulevard north of Coast Highway. The traffic increases along Coast Highway itself are also less than the increases on routes leading to the beach, suggesting that people are oriented towards traveling to the beach/coast, rather than along it.

For one special case (Newport Boulevard in front of City Hall), daily traffic volume data was collected every day for three weeks. Although the count collection instrument was on the street for three weeks, a few days had to be removed from the sample for various reasons (e.g. count tube was displaced). Daily volumes range from approximately 35,000 to 50,000 with definite peaking trends on weekend days.

Table 5 provides analysis of daily traffic volume patterns over the three weeks collected on Newport Boulevard in front of City Hall. Exhibit M summarizes the same information graphically. The average typical weekday volume is

TABLE 4

SUMMER TIME ADT COMPARISON

ID	ROAD NAME	ROAD SEGMENT	COUNTS		DELTA (Δ)	DIFFERENCE (%)
			SHOULDER SEASON	SUMMER TIME		
3	Superior Av.	n/o Coast Hw.	23,535	30,533	6,998	29.73%
5	Newport Bl.	s/o Coast Hw.	31,820	55,582	23,762	74.68%
39	Jamboree Rd.	n/o Coast Hw.	31,264	33,028	1,764	5.64%
50	MacArthur Bl.	n/o San Joaquin Hills Rd.	54,320	41,820	-12,500	-23.01%
52	MacArthur Bl.	n/o Coast Hw.	30,904	34,266	3,362	10.88%
65	Newport Coast Dr.	n/o Coast Hw.	12,223	15,638	3,415	27.94%
68	Balboa Bl.	s/o Coast Hw.	19,227	21,906	2,679	13.93%
157	Coast Hw.	e/o Dover Dr.	62,526	70,303	7,777	12.44%
195	Coast Hw.	e/o Newport Coast Dr	35,375	41,917	6,542	18.49%
223	Coast Hw.	e/o Santa Ana River	46,000	48,513	2,513	5.46%
261	Balboa Bl.	e/o 20th St.	17,451	30,427	12,976	74.36%
TOTAL			**364,645**	**423,933**	**59,288**	**16.26%**

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TABLE 5

DAILY VOLUME VARIATION OVER THREE WEEKS

DAY	WEEK 1	WEEK 2	WEEK 3	WEEK 4	AVERAGE
Sunday		45,099	42,982	41,796	43,292
Monday		40,779			40,779
Tuesday		43,708	39,542	36,999	40,083
Wednesday		42,412	40,487	36,994	39,964
Thursday		43,248	40,301		41,775
Friday	47,683	45,437	44,077		45,732
Saturday	49,611	47,768	47,052		48,144
Average of Monday and Friday			44,494		
Average Typical Weekday (Tu-Th)			40,461		
Average Weekend Day			45,718		

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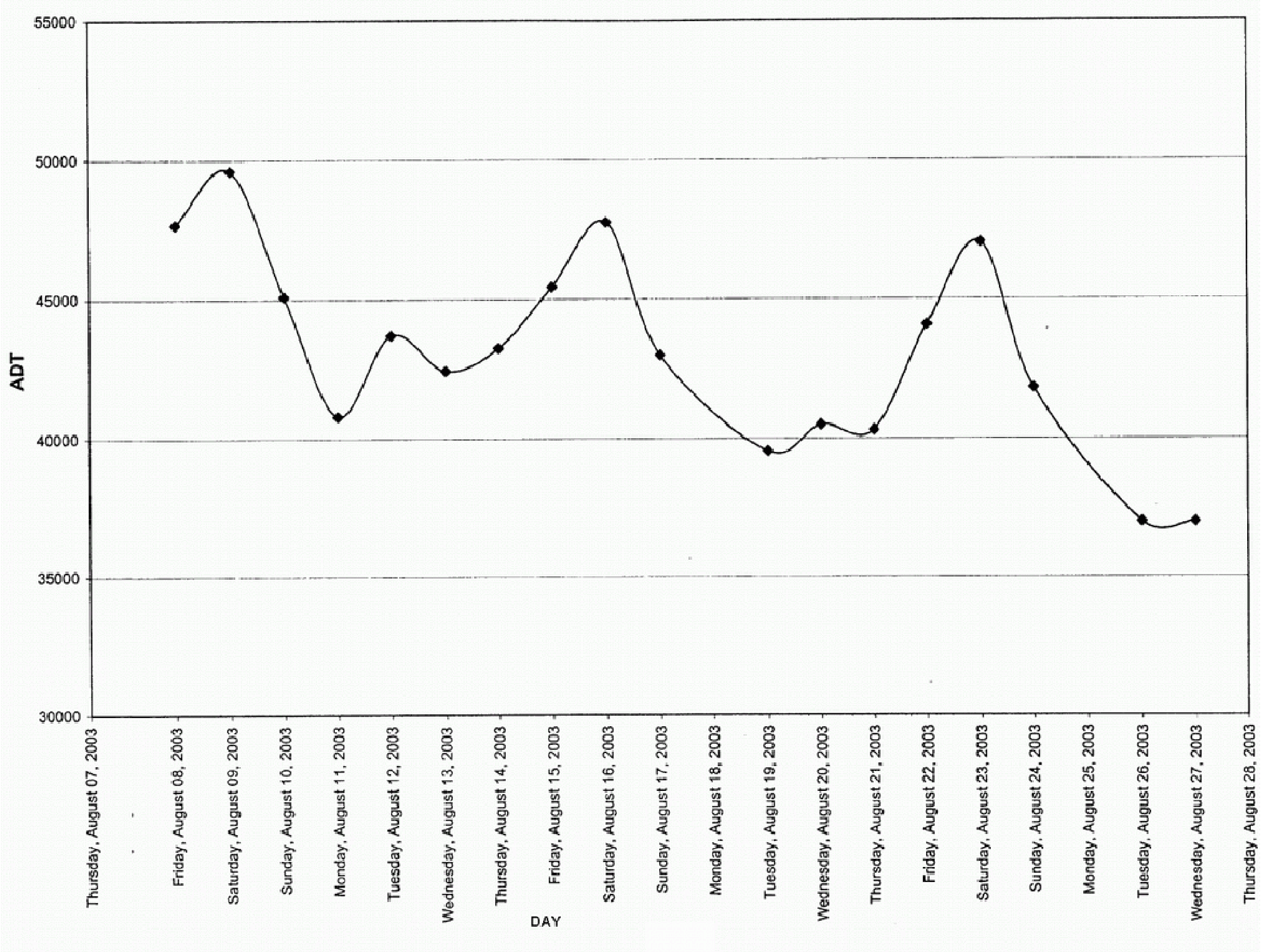
EXHIBIT M

SUMMER DAILY TRAFFIC VARIATION FOR NEWPORT BOULEVARD BETWEEN 32ND AND FINLEY



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approximately 40,500 vehicles per day (vpd). The Monday volume is very near this same volume, but traffic is more evenly spread throughout the day. Saturday has the highest average volume with 48,144 vpd. The average Friday volume is approximately 2,500 vpd greater than the average Sunday volume.

2.8 Daily Roadway Segment Analysis

Daily roadway segment capacities are included in Table 6. The ratio of daily roadway segment volumes to daily planning level capacities provides a measure of the roadway segment level of service. Although the City of Newport Beach does not control conditions on local area freeways, freeway mainline and ramp v/c ratios are presented for informational purposes. Volume/Capacity (v/c) Ratios for existing conditions are shown on Exhibit N. Roadway segments with v/c ratios greater than 0.90 are:

- Newport Boulevard north of Via Lido
- Irvine Avenue north of University Drive
- Jamboree Road north of Bayview Way
- Jamboree Road north of University Drive
- MacArthur Boulevard north of Ford Road
- MacArthur Boulevard north of Coast Highway
- Irvine Avenue south of University Drive
- Bristol Street South east of Birch Street
- Coast Highway east of Dover Drive
- Coast Highway east of MacArthur Boulevard
- Coast Highway east of Goldenrod Avenue
- Coast Highway east of Marguerite Avenue
- Coast Highway west of Riverside Drive
- Bristol Street North west of Campus Drive
- Bristol Street South west of Campus Drive
- Bristol Street South west of Jamboree Road

2.9 2002 Traffic Source Analysis

The General Plan Update Committee (GPUC) requested that the traffic study provide specific study of individual trip patterns to answer the question of how

TABLE 6

ROADWAY SEGMENT CAPACITIES

CLASSIFICATION	RIGHT-OF-WAY	CURB TO CURB WIDTH	# OF LANES	MEDIAN WIDTH	APPROXIMATE DAILY CAPACITY
8 Lane Divided	158	Variable	8	14-18	60-68,000
Major Augmented	Variable	Variable	6-8	Variable	52-58,000
Major	128-134	106-114	6	14-18	45-51,000
Primary Augmented	Variable	Variable	4-6	Variable	35-40,000
Primary	104-108	84	4	16-20	30-34,000
Secondary	84	64	4	0	20-23,000
Commuter	60-70	40-50	2	0	7-10,000

Couplets:
Secondary couplet - 2 lanes for each leg
Primary couplet - 3 lanes for each leg
Major couplet - 4 lanes for each leg

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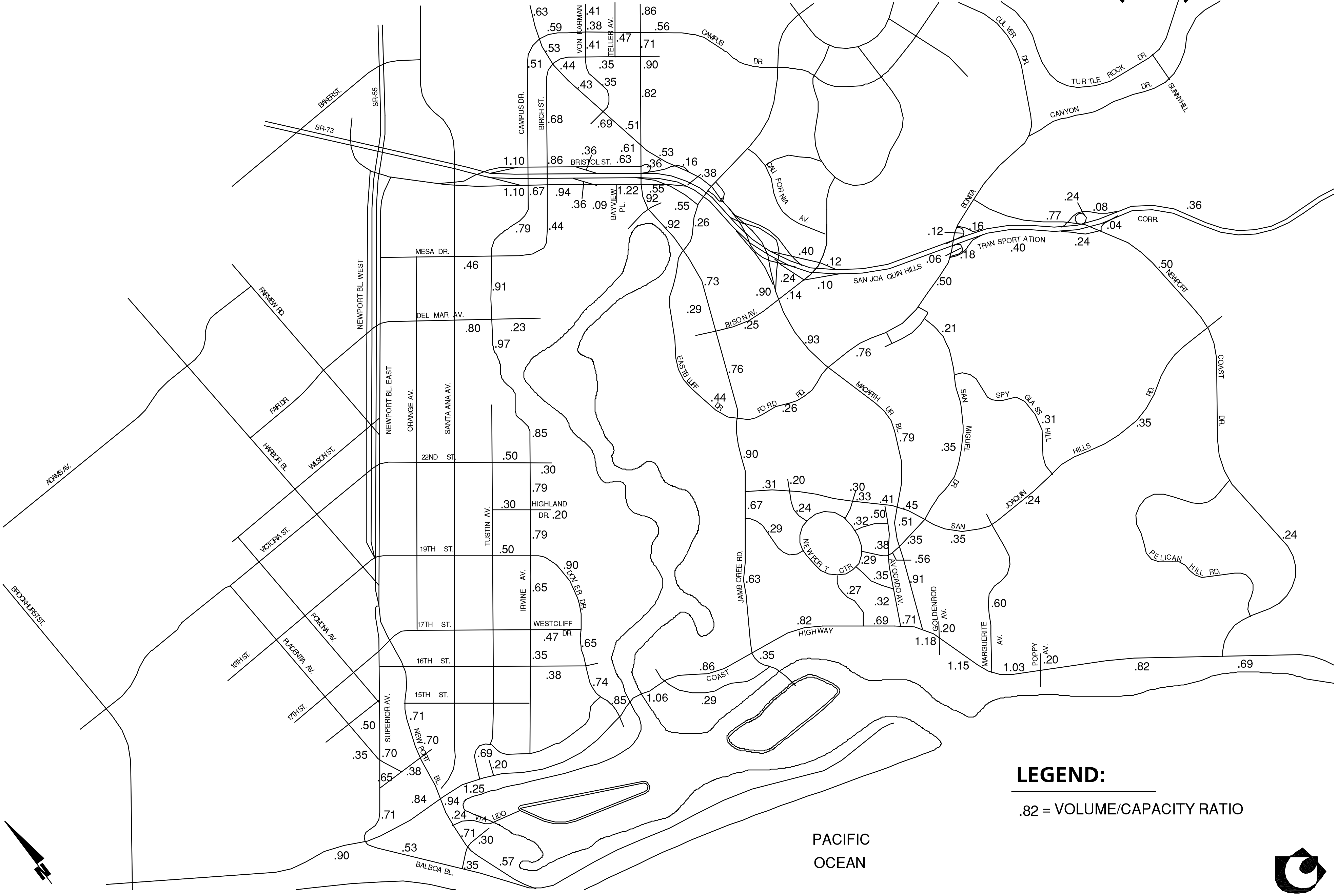
EXHIBIT N

EXISTING VOLUME/CAPACITY (V/C) RATIOS



LEGEND:

.82 = VOLUME/CAPACITY RATIO

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many trips are going through Newport Beach, without starting or stopping inside the City. This was done in a study that is characterized as “Traffic Source Analysis.” For this study the consultant essentially followed cars as they journeyed through the City. Traffic destinations for three locations were studied:

- Northbound Coast Highway, south of Newport Coast Drive
- Southbound Coast Highway, south of the Santa Ana River
- Southbound MacArthur Boulevard, north of Bonita Canyon Drive

Beginning at each of the three locations, 100 cars were followed until they left the arterial system or the City of Newport Beach. This sample size provides a confidence interval of +/- 10%. For each vehicle followed, the data includes start time (when the vehicle was at one of the above destinations), end time (when the vehicle left the City or the arterial system), destination (termination of trip or crossing a cordon location), vehicle type (brief description of the vehicle), and date. Analysts were directed to select vehicles from each lane, and a variety of vehicle types.

As requested by City of Newport Beach staff, data was primarily collected during the peak periods (from 7:00 to 9:00 AM and from 4:30 to 6:30 PM). At least 30% of samples were taken within each of the AM and PM peak periods for each of the three (3) traffic source locations.

The City of Newport Beach has been divided into fourteen (14) traffic analysis districts, as previously shown on Exhibit B. For the purpose of this analysis, districts 3 and 10 have been combined. Exhibit O shows through trip destinations (cordon locations, depicted as letters on roadways exiting the City). Once a vehicle has left the City of Newport Beach, it is considered an external trip and is not further studied.

Exhibit P graphically depicts generalized trip distribution patterns for vehicles traveling northbound on Coast Highway south of Newport Coast Drive. Internal traffic (with destinations in the City of Newport Beach) accounts for 64% of the vehicles studied. This percentage is slightly lower in the AM peak (60%) and

EXHIBIT O

NEWPORT BEACH TRAFFIC SURVEY CORDON LOCATIONS

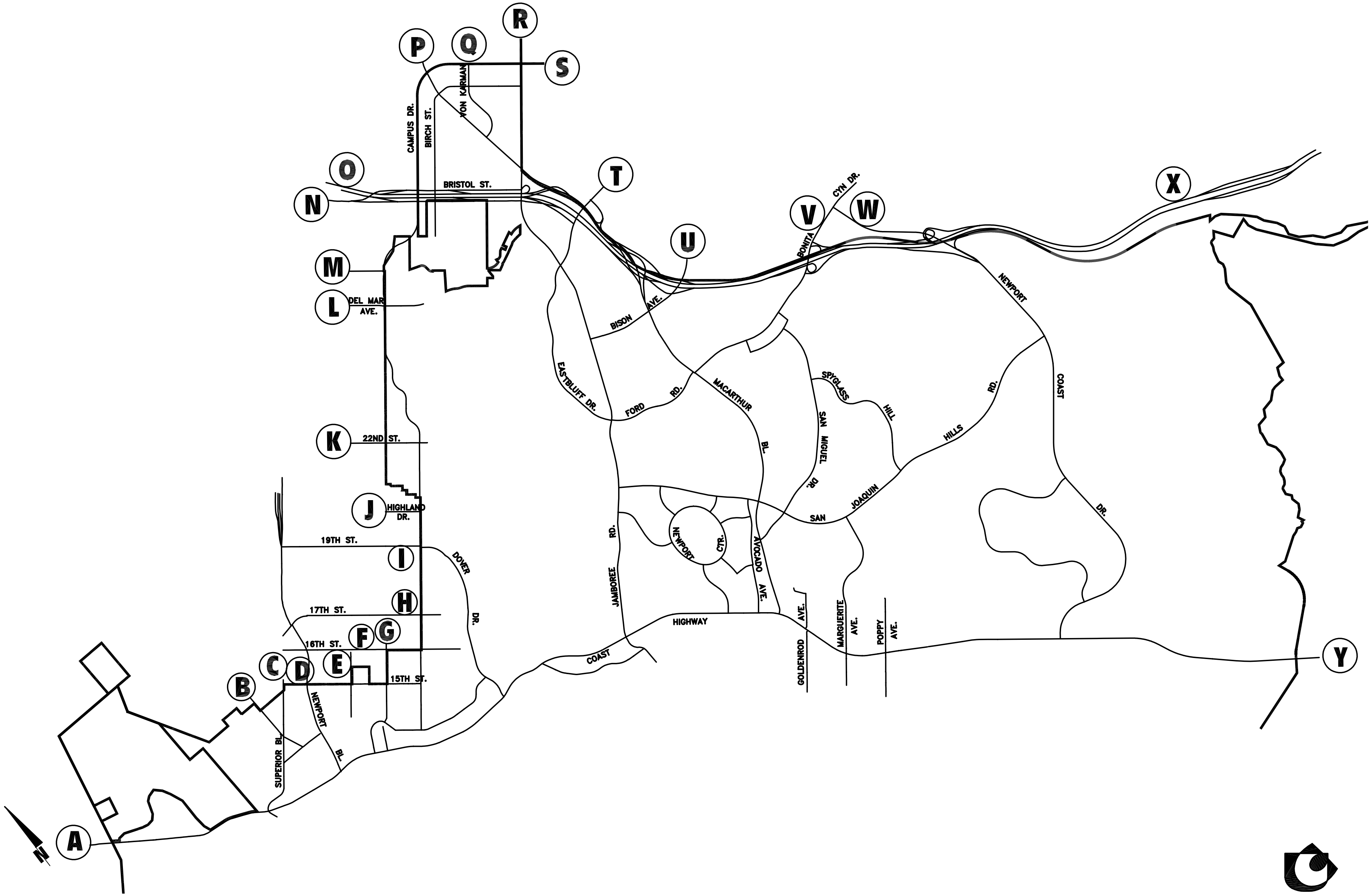
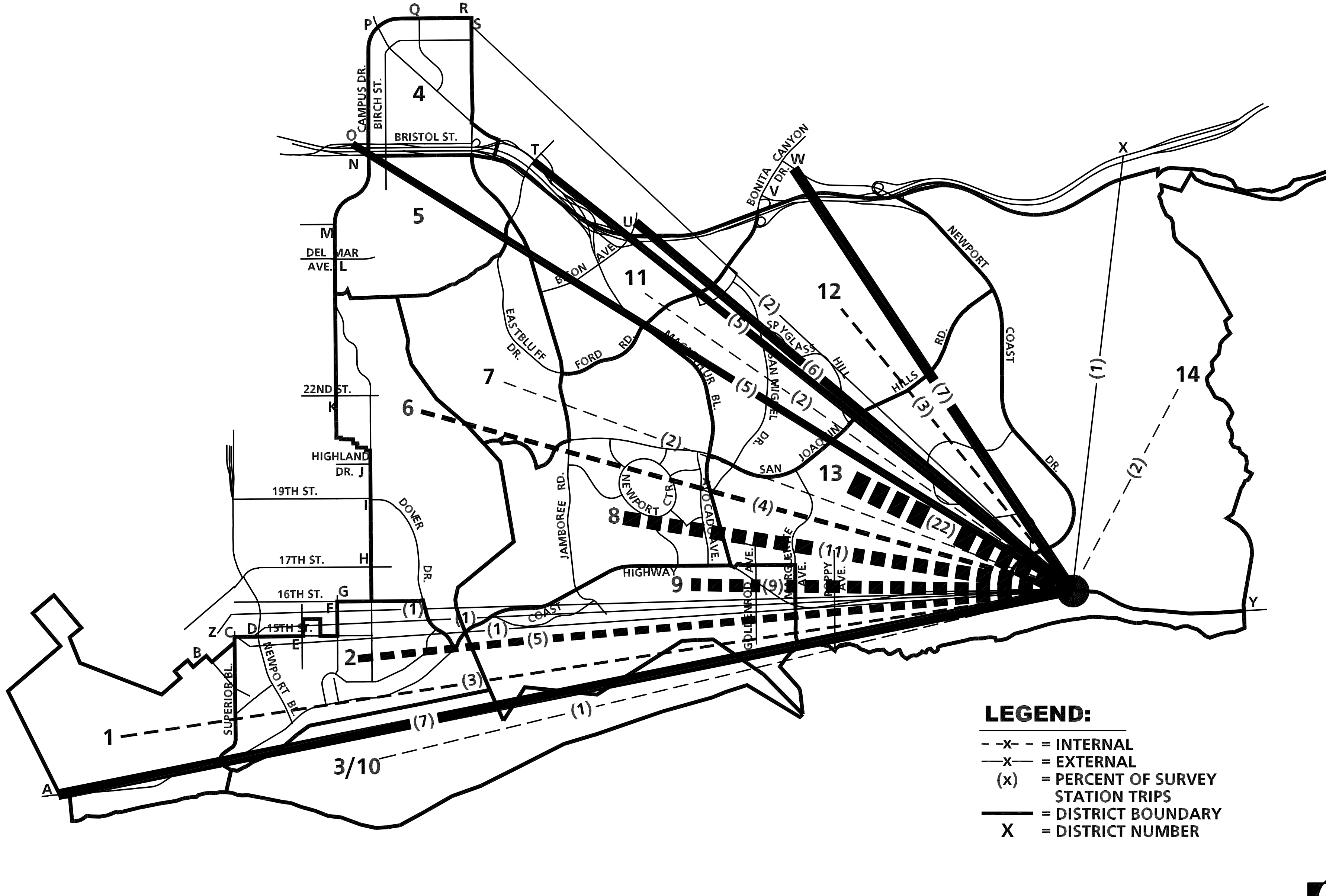


EXHIBIT P

TRAFFIC SURVEY RESULTS FOR NB COAST HIGHWAY SOUTH OF NEWPORT COAST DR.



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higher in both the PM peak and off peak time frames. The top three traffic districts attracting vehicles from this location are 13, 8, and 9. District 13 roughly corresponds to Newport Coast West/ Corona Del Mar. District 8 is approximately Newport Center. District 9 is Bayside/Balboa Island.

Through traffic from northbound Coast Highway south of Newport Coast Drive travels primarily to cordons A, W, and U. Each of these cordons was the destination of more than 5 of the 100 vehicles followed. Cordon A is Coast Highway at the Santa Ana River and received seven percent (7%) of the vehicles studied. Cordon W is Newport Coast Drive northeast of the SR-73 freeway and was the destination of seven percent (7%) of vehicles involved. Cordon U (the destination of six percent (6%) of the vehicles followed) is Bison Avenue northeast of the SR-73 freeway (towards University of California, Irvine).

Survey results for southbound Coast Highway south of the Santa Ana River are summarized on Exhibit Q. Internal (City of Newport Beach) traffic comprises 66% of the 100 trips analyzed. In the off-peak time frame, this percentage is much lower, but the off-peak sample size is small (8 vehicles). Primary destinations include traffic analysis districts 2, 8, 3/10, and 9. District 2 is Mariner's Mile/Newport Heights. Newport Center is district 8. District 3/10 is Newport Bay and the Balboa Peninsula, and district 9 is Bayside/Balboa Island.

Through traffic from the starting point on Coast Highway south of the Santa Ana River primarily exits the City of Newport Beach either at cordon C (Superior Boulevard north of 15th Street), or at cordon Y (Coast Highway south of Newport Coast Drive). Cordon C captured eleven percent (11%) of traffic studied, while cordon Y was the destination of seven percent (7%) of vehicles followed. All other cordons had fewer than 5 of the 100 vehicles studied leaving.

Exhibit R shows generalized trip distribution patterns for vehicles studied on southbound MacArthur Boulevard north of Bonita Canyon Drive. Almost 90% of traffic on this segment remains in the City of Newport Beach. Major destinations

EXHIBIT Q

TRAFFIC SURVEY RESULTS FOR SB COAST HIGHWAY SOUTH OF SANTA ANA RIVER

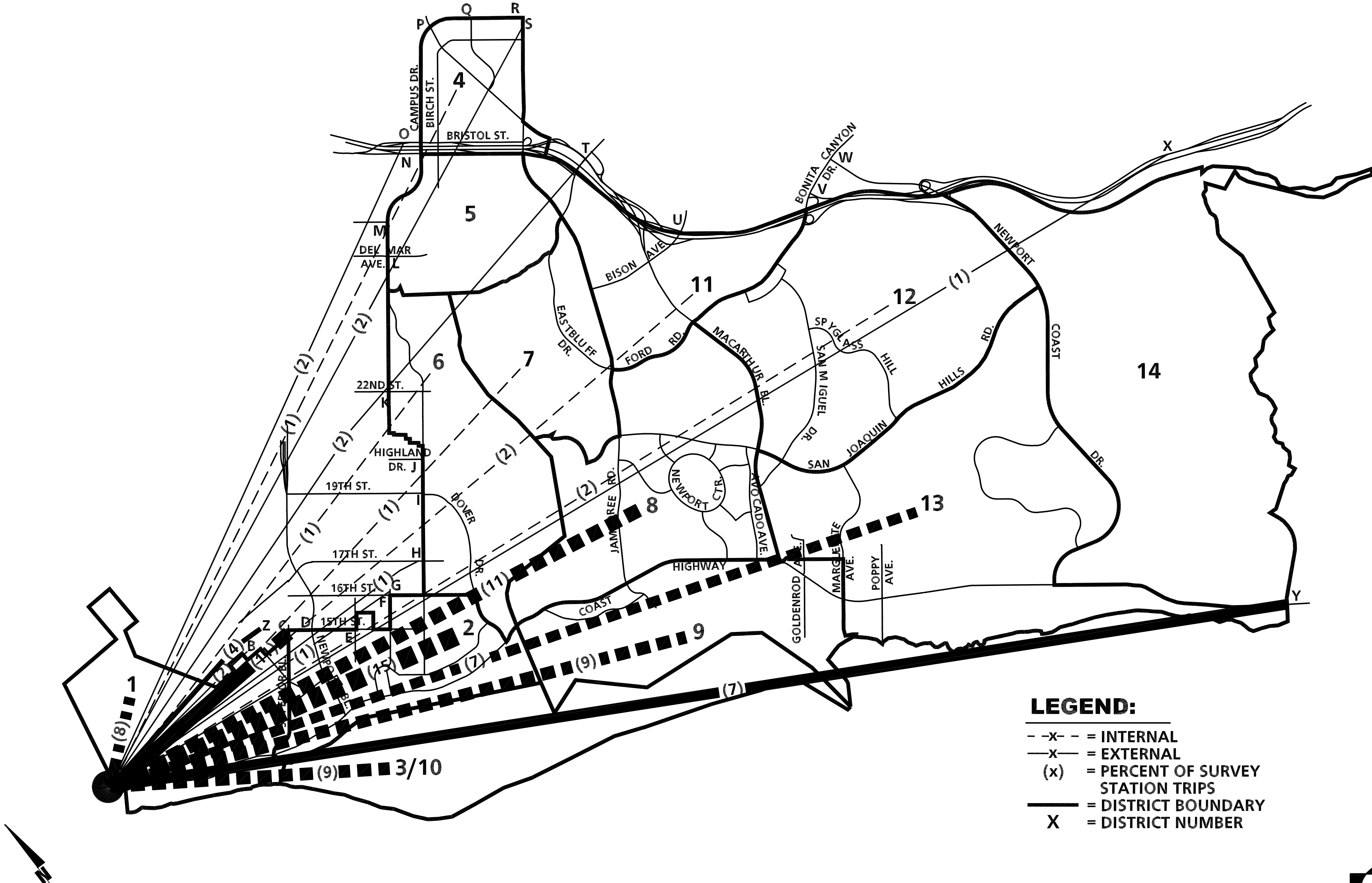
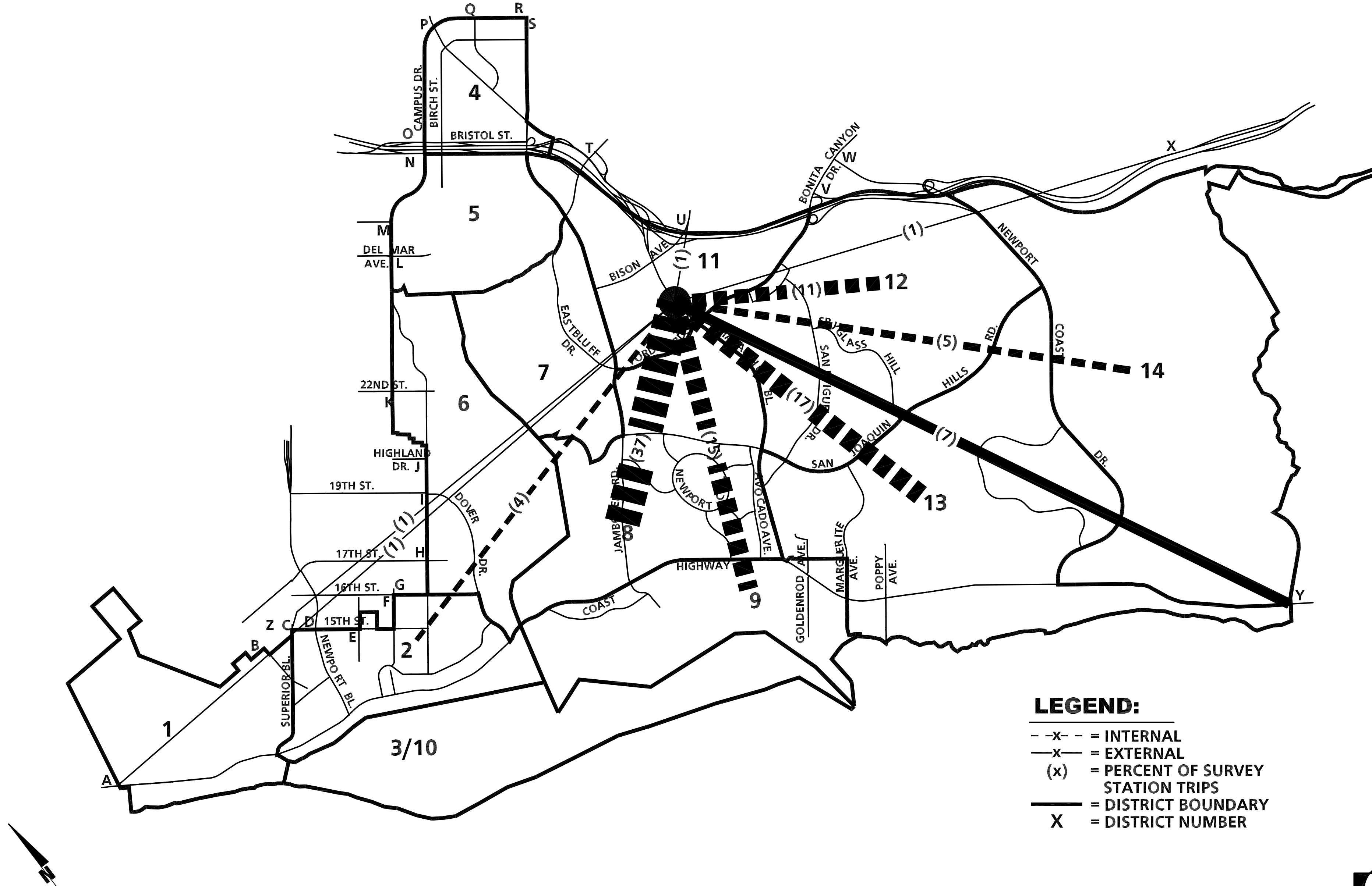


EXHIBIT R

TRAFFIC SURVEY RESULTS FOR SB MACARTHUR BLVD. NORTH OF BONITA CANYON DR.



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include districts 8, 13, 9, and 12. District 8 (Newport Center) was the destination of 37 vehicles. 32 total vehicles ended their trips in districts 13 and 9 (Newport Coast West/Corona Del Mar and Bayside/Balboa Island, respectively). District 12 is Harbor View Hills/Newport Ridge (the destination of 11 vehicles).

During the peak hours, 11 of the 100 vehicles did travel through the City. Their primary cordon destination was Y (Coast Highway south of Newport Coast Drive) to which seven percent (7%) of vehicles traveled.

None of the through-corridors studied are unusually impacted by through traffic. The survey results indicate that less than 10% of the traffic on the corridors surveyed is regional through-traffic. However, as might be expected, through-traffic is greater on east-west corridors such as Coast Highway, than on north-south routes, because the Pacific Ocean is a barrier to further through traffic movement.

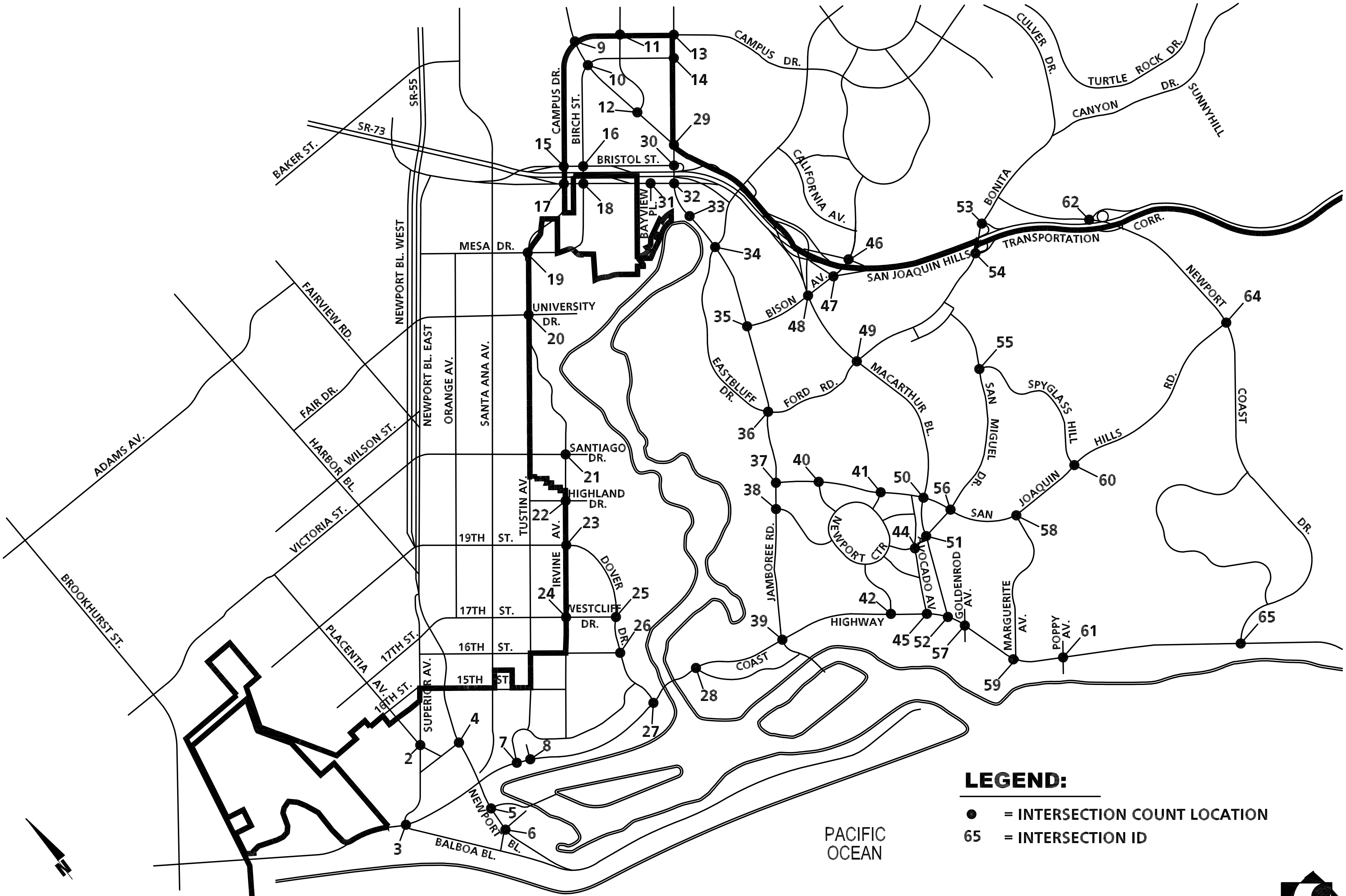
2.10 2002 Peak Hour Intersection Operations

Peak period and hour traffic count data has been obtained from a variety of sources. Obtaining 2001/2002 data has been an emphasis of the existing conditions effort. Peak period and hour turning movement traffic volume data have been compiled or counted at a total of 62 intersections throughout the City of Newport Beach, as shown on Exhibit S. These locations were selected for analysis by City staff because of their locations along key travel corridors within the community. Additionally, it is important to note that while the overall daily volume as compared to capacity is an important indicator of transportation system function, intersection capacity can sometimes play a greater role when it comes to constraints on the system.

Level of Service (LOS) is defined and described as follows:

EXHIBIT S

INTERSECTION COUNT LOCATIONS



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LOS A = 0.00 - 0.60 ICU:	Low volumes, high speeds; speed not restricted by other vehicles; all signal cycles clear with no vehicles waiting through more than one cycle.
LOS B = 0.61 – 0.70 ICU:	Operating speeds beginning to be affected by other traffic; between one and ten percent of signal cycles have one or more vehicles which wait through more than one signal cycle during peak traffic periods.
LOS C = 0.71 – 0.80:	Operating speeds and maneuverability closely controlled by other traffic; between 11 and 30 percent of the signal cycles have one or more vehicles which wait through more than one signal cycle during peak traffic periods; recommended ideal design standard.
LOS D = 0.81 – 0.90:	Tolerable operation speeds; between 31 and 70 percent of the signal cycles have one or more vehicles which wait through more than one signal cycle during peak traffic periods; often used as design standard in urban areas.
LOS E = 0.91 – 1.00:	Capacity; the maximum traffic volumes an intersection can accommodate; restricted speeds; between 71 and 100 percent of the signal cycles have one or more vehicles which wait through more than one signal cycle during peak traffic periods.

The data collected/compiled was input into a turning movement analysis database. For each location, inbound and outbound volumes were calculated, by each "leg" or intersection approach.

The number of lanes and their configuration has been collected at all 62 existing intersections and is used to calculate existing (2002) intersection capacity utilization values (ICUs). Table 6 summarizes the 2002 ICUs based on the AM and PM peak hour intersection turning movement volumes and the intersection configuration.

The following 6 intersections currently experience deficient (LOS "E" or worse) peak hour operations under existing (2002) conditions:

- Riverside Avenue (NS)/Coast Highway (EW)
- Campus Drive (NS)/Bristol Street (N) (EW)
- Irvine Avenue (NS)/Mesa Drive (EW)
- MacArthur Boulevard (NS)/Jamboree Road (EW)
- MacArthur Boulevard (NS)/San Joaquin Hills Road (EW)
- Goldenrod Avenue (NS)/Coast Highway (EW)

Exhibit T depicts the existing deficiencies graphically.

TABLE 7

NBTM EXISTING COUNT INTERSECTION ANALYSIS SUMMARY

INTERSECTION (NS & EW)	AM PEAK HOUR		PM PEAK HOUR	
	ICU	LOS	ICU	LOS
2. Superior Av. & Placentia Av.	0.66	B	0.67	B
3. Superior Av. & Coast Hw.	0.84	D	0.90	D
4. Newport Bl. & Hospital Rd.	0.54	A	0.70	B
5. Newport Bl. & Via Lido	0.41	A	0.37	A
6. Newport Bl. & 32nd St.	0.73	C	0.78	C
7. Riverside Av. & Coast Hw.	0.84	D	0.93	E
8. Tustin Av. & Coast Hw.	0.80	C	0.67	B
9. MacArthur Bl. & Campus Dr.	0.61	B	0.85	D
10. MacArthur Bl. & Birch St.	0.49	A	0.66	B
11. Von Karman Av. & Campus Dr.	0.55	A	0.79	C
12. MacArthur Bl. & Von Karman Av.	0.46	A	0.53	A
13. Jamboree Rd. & Campus Dr.	0.74	C	0.85	D
14. Jamboree Rd. & Birch St.	0.55	A	0.60	A
15. Campus Dr. & Bristol St. (N)	0.77	C	0.94	E
16. Birch St. & Bristol St. (N)	0.66	B	0.61	B
17. Campus Dr./Irvine Av. & Bristol St. (S)	0.72	C	0.58	A
18. Birch St. & Bristol St. (S)	0.46	A	0.44	A
19. Irvine Av. & Mesa Dr.	0.70	B	0.94	E
20. Irvine Av. & University Dr.	0.82	D	0.89	D
21. Irvine Av. & Santiago Dr.	0.66	B	0.72	C
22. Irvine Av. & Highland Dr.	0.57	A	0.60	A
23. Irvine Av. & Dover Dr.	0.72	C	0.64	B
24. Irvine Av. & Westcliff Dr.	0.57	A	0.77	C
25. Dover Dr. & Westcliff Dr.	0.38	A	0.48	A
26. Dover Dr. & 16th St.	0.55	A	0.57	A
27. Dover Dr. & Coast Hw.	0.70	B	0.74	C
28. Bayside Dr. & Coast Hw.	0.69	B	0.70	B
29. MacArthur Bl. & Jamboree Rd.	0.88	D	0.91	E
30. Jamboree Rd. & Bristol St. (N)	0.55	A	0.59	A
31. Bayview Pl. & Bristol St. (S)	0.48	A	0.56	A
32. Jamboree Rd. & Bristol St. (S)	0.75	C	0.72	C
33. Jamboree Rd. & Bayview Wy.	0.41	A	0.57	A
34. Jamboree Rd. & Eastbluff Dr. /University Dr.	0.60	A	0.64	B
35. Jamboree Rd. & Bison Av.	0.45	A	0.51	A
36. Jamboree Rd. & Eastbluff Dr./Ford Rd.	0.69	B	0.65	B
37. Jamboree Rd. & San Joaquin Hills Rd.	0.56	A	0.57	A

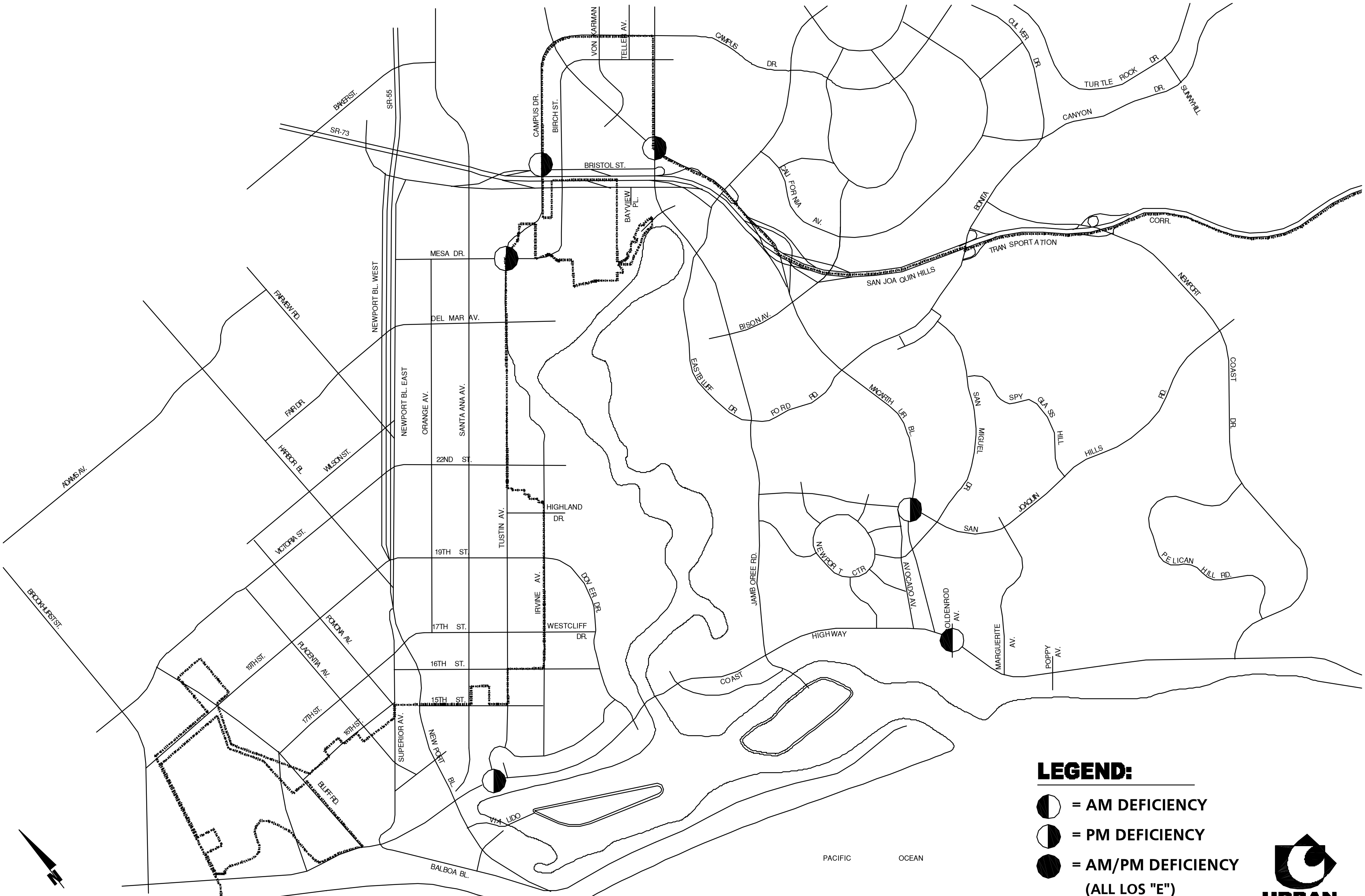
TABLE 7

NBTM EXISTING COUNT INTERSECTION ANALYSIS SUMMARY

INTERSECTION (NS & EW)	AM PEAK HOUR		PM PEAK HOUR	
	ICU	LOS	ICU	LOS
38. Jamboree Rd. & Santa Barbara Dr.	0.47	A	0.63	B
39. Jamboree Rd. & Coast Hw.	0.68	B	0.74	C
40. Santa Cruz Dr. & San Joaquin Hills Rd.	0.36	A	0.36	A
41. Santa Rosa Dr. & San Joaquin Hills Rd.	0.32	A	0.52	A
42. Newport Center Dr. & Coast Hw.	0.40	A	0.52	A
44. Avocado Av. & San Miguel Dr.	0.33	A	0.72	C
45. Avocado Av. & Coast Hw.	0.58	A	0.66	B
46. SR-73 NB Ramps & Bison Av.	0.31	A	0.37	A
47. SR-73 SB Ramps & Bison Av.	0.26	A	0.17	A
48. MacArthur Bl. & Bison Av.	0.63	B	0.60	A
49. MacArthur Bl. & Ford Rd./Bonita Canyon Dr.	0.71	C	0.90	D
50. MacArthur Bl. & San Joaquin Hills Rd.	0.64	B	0.93	E
51. MacArthur Bl. & San Miguel Dr.	0.56	A	0.65	B
52. MacArthur Bl. & Coast Hw.	0.60	A	0.71	C
53. SR-73 NB Ramps & Bonita Canyon Dr.	0.55	A	0.43	A
54. SR-73 SB Ramps & Bonita Canyon Dr.	0.30	A	0.41	A
55. Spyglass Hill Rd. & San Miguel Dr.	0.28	A	0.31	A
56. San Miguel Dr. & San Joaquin Hills Rd.	0.44	A	0.54	A
57. Goldenrod Av. & Coast Hw.	0.99	E	0.69	B
58. Marguerite Av. & San Joaquin Hills Rd.	0.31	A	0.35	A
59. Marguerite Av. & Coast Hw.	0.83	D	0.82	D
60. Spyglass Hill Rd. & San Joaquin Hills Rd.	0.44	A	0.30	A
61. Poppy Av. & Coast Hw.	0.61	B	0.65	B
62. Newport Coast Dr. & SR-73 NB Ramps	0.45	A	0.31	A
64. Newport Coast Dr. & San Joaquin Hills Rd.	0.37	A	0.29	A
65. Newport Coast Dr. & Coast Hw.	0.47	A	0.50	A
Average (All Locations)	0.58	A	0.63	B

EXHIBIT T

EXISTING INTERSECTION DEFICIENCIES



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3.0 CURRENTLY ADOPTED GENERAL PLAN BUILDOUT TRAFFIC CONDITIONS

This chapter presents currently adopted General Plan Buildout Traffic Conditions. This represents the amount of traffic which can be predicted if all entitlement expressed in the current Land Use Element, and all the improvements identified in the Circulation Element, were fully constructed. It also includes regional growth through the year 2025. Data are compared to existing conditions to quantify growth.

3.1 General Plan Buildout Land Use Data

The General Plan Buildout land use data was provided to Urban Crossroads, Inc. staff by the City of Newport Beach. Table 8 summarizes the overall General Plan Buildout land uses for the City of Newport Beach. An overall comparison to existing (2002) land use is also shown in Table 8. Land uses generally increase for the City General Plan Buildout Scenario. Areas where the most anticipated intensification in development are in the older, on-street commercial districts, such as Mariners' Mile, Old Newport Boulevard, the Campus/Birch tract (near John Wayne Airport), etc. The single most significant residential growth area is Newport Coast/Ridge, although there are notable residential increases predicted for older residential neighborhoods like Corona del Mar, Lido Isle, and the Balboa Peninsula. There is only one significant undeveloped property in the City's planning area, Banning Ranch in western Newport Beach. Reductions in specific uses (e.g., mobile homes, movie theaters) are caused by redevelopment in the City.

3.2 General Plan Buildout Socioeconomic Data (SED)

General Plan buildout SED that has been converted from land use is summarized in Table 9. Table 9 also contains a comparison of General Plan Buildout SED to existing (2002) SED for the City of Newport Beach.

The total number of dwelling units are projected to increase by 5,452 units (16%) per the currently adopted General Plan. For total employment, an increase of 13,578 employees (21%) is included in the currently adopted General Plan.

TABLE 8

CITY OF NEWPORT BEACH GENERAL PLAN BUILDOUT
LAND USE SUMMARY

NBTM CODE[1]	DESCRIPTION	UNITS [2]	2002 QUANTITY	BUILDOUT QUANTITY	GROWTH	% GROWTH
1	Low Density Residential	DU	14,841	15,213	372	2.51%
2	Medium Density Residential	DU	12,939	17,723	4,784	36.97%
3	Apartment	DU	7,622	8,468	846	11.10%
4	Elderly Residential	DU	348	348	-	0.00%
5	Mobile Home	DU	894	749	-145	-16.22%
	TOTAL DWELLING UNITS	**DU**	**36,644**	**42,501**	**5,857**	**15.98%**
6	Motel	ROOM	210	256	46	21.90%
7	Hotel	ROOM	2,745	3,270	525	19.13%
9	Regional Commercial	TSF	1,259.000	1,633.850	374.850	29.77%
10	General Commercial	TSF	2,926.160	3,692.980	766.820	26.21%
11	Commercial/Recreation	ACRE	5.100	5.100	-	0.00%
13	Restaurant	TSF	640.520	859.800	219.280	34.23%
15	Fast Food Restaurant	TSF	78.031	94.540	16.509	21.16%
16	Auto Dealer/Sales	TSF	288.320	323.290	34.970	12.13%
17	Yacht Club	TSF	54.580	73.060	18.480	33.86%
18	Health Club	TSF	63.500	108.070	44.570	70.19%
19	Tennis Club	CRT	60	60	-	0.00%
20	Marina	SLIP	1,055	1,055	-	0.00%
21	Theater	SEAT	5,489	5,475	-14	-0.26%
22	Newport Dunes	ACRE	64.00	64.00	-	0.00%
23	General Office	TSF	10,900.190	12,153.473	1,253.283	11.50%
24	Medical Office	TSF	761.459	895.420	133.961	17.59%
25	Research & Development	TSF	327.409	809.330	481.921	147.19%
26	Industrial	TSF	1,042.070	1,060.762	18.692	1.79%
27	Mini-Storage/Warehouse	TSF	199.750	199.750	-	0.00%
28	Pre-school/Day Care	TSF	55.820	56.770	0.950	1.70%
29	Elementary/Private School	STU	4,399	4,455	56	1.27%
30	Junior/High School	STU	4,765	4,765	-	0.00%
31	Cultural/Learning Center	TSF	35.000	40.000	5.000	14.29%
32	Library	TSF	78.840	78.840	-	0.00%
33	Post Office	TSF	53.700	73.700	20.000	37.24%
34	Hospital	BED	351	1,265	914	260.40%
35	Nursing/Conv. Home	BEDS	661	661	-	0.00%
36	Church	TSF	377.760	467.210	89.450	23.68%
37	Youth Ctr./Service	TSF	149.560	166.310	16.750	11.20%
38	Park	ACRE	113.970	94.910	-19.060	-16.72%
39	Regional Park	ACRE	-	45.910	45.910	N/A
40	Golf Course	ACRE	305.330	298.330	-7.000	-2.29%

[1] Uses 8, 12, and 14 are part of the old NBTAM model structure and are not currently utilized in the City land use datasets.

[2] Units Abbreviations:
DU = Dwelling Units
TSF = Thousand Square Feet
CRT = Court
STU = Students

TABLE 9

CITY OF NEWPORT BEACH[1] LAND USE BASED SOCIOECONOMIC DATA SUMMARY/COMPARISON

VARIABLE	2002 QUANTITY	BUILDOUT QUANTITY	GROWTH	% GROWTH
Occupied Single Family Dwelling Units	13,842	14,250	408	3%
Occupied Multi-Family Dwelling Units	20,409	25,453	5,044	25%
TOTAL OCCUPIED DWELLING UNITS	**34,251**	**39,703**	**5,452**	**16%**
Group Quarters Population	661	661	0	0%
Population	75,817	87,886	12,069	16%
Employed Residents	44,379	51,268	6,889	16%
Retail Employees	11,211	13,552	2,341	21%
Service Employees	17,150	21,137	3,987	23%
Other Employees	37,077	44,327	7,250	20%
TOTAL EMPLOYEES	**65,438**	**79,016**	**13,578**	**21%**
Elem/High School Students	9,164	9,220	56	1%

[1] Includes data converted from land use only. Excludes Newport Coast and recent annexation areas.

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3.3 Buildout Trip Generation

Table 10 summarizes the overall trip generation for General Plan Buildout conditions for the City of Newport Beach. The overall trip generation for the City of Newport Beach is an estimated 860,258 daily vehicle trips. Table 11 compares General Plan Buildout trip generation to existing. Total trip generation increases by approximately 170,000 daily trips over existing (or 25%). Regionally, total trip generation (Post 2025) is projected to increase by 33%.

3.4 Buildout Daily Traffic Conditions

Exhibit U shows General Plan Buildout through lanes on Newport Beach roadways. This exhibit is based on information provided by City of Newport Beach staff and the City of Newport Beach Circulation Element. The extension of the SR-55 Freeway south of 17th Street is part of the assumed circulation system as is the widening of Coast Highway through Mariners' Mile, the 19th Street Bridge over the Santa Ana River, and the circulation system Master Plan for the Banning Ranch area. Additionally, tolls have been retained on toll roads to provide a conservative worst-case scenario. Regionally, total vehicle miles of travel are projected to increase by 45%, reflecting the tendency for growth to occur in outlying areas of the region.

Exhibit V summarizes the NBTM 3.1 refined General Plan Buildout daily traffic volumes throughout the City of Newport Beach. The highest daily traffic volume increase occurs on Coast Highway. Between Bayside Drive and Newport Boulevard, traffic increases by 15,000 or more vehicles per day (VPD). This increase is caused partly by land use increases in the Balboa area. The capacity increase of 50% (4 lanes to 6 lanes) on Coast Highway west of Dover Drive makes the route more desirable and also contributes to the volume increase. Finally, the SR-55 Freeway extension makes this section of Coast Highway more desirable to through traffic. This is reflected by the less substantial increase in volume on Coast Highway west of Newport Boulevard (9,000 VPD increase). Volumes on Coast

TABLE 10

CITY OF NEWPORT BEACH GENERAL PLAN BUILDOUT TRIP GENERATION

TRIP PURPOSE	PRODUCTIONS	ATTRACTIONS	PRODUCTIONS - ATTRACTIONS	PRODUCTIONS / ATTRACTIONS
Home Based Work[1]	70,469	100,684	-30,215	0.70
Home Based School	14,125	8,845	5,280	1.60
Home Based Other[2]	167,202	136,553	30,649	1.22
Work Based Other	64,755	70,186	-5,431	0.92
Other - Other	114,557	112,882	1,675	1.01
TOTAL	**431,108**	**429,150**	**1,958**	**1.00**
OVERALL TOTAL		**860,258**		

[1] Home-Work includes Home-Work and Home-University trips, consistent with OCTAM mode choice output.

[2] Home-Other includes Home-Shop and Home-Other trips, consistent with OCTAM mode choice output.

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TABLE 11

CITY OF NEWPORT BEACH TRIP GENERATION COMPARISON

TRIP PURPOSE	DAILY TRIP ENDS EXISTING	DAILY TRIP ENDS GENERAL PLAN BUILDOUT	GROWTH	PERCENT GROWTH
Home Based Work Productions[1]	57,568	70,469	12,901	22.41%
Home Based Work Attractions	82,177	100,684	18,507	22.52%
Home Based School Productions	11,424	14,125	2,701	23.64%
Home Based School Attractions	8,730	8,845	115	1.32%
Home Based Other Productions[2]	125,826	167,202	41,376	32.88%
Home Based Other Attractions	111,273	136,553	25,280	22.72%
Work Based Other Productions	52,483	64,755	12,272	23.38%
Work Based Other Attractions	57,381	70,186	12,805	22.32%
Other - Other Productions	92,237	114,557	22,320	24.20%
Other - Other Attractions	90,749	112,882	22,133	24.39%
TOTAL PRODUCTIONS	339,538	431,108	91,570	26.97%
TOTAL ATTRACTIONS	350,310	429,150	78,840	22.51%
OVERALL TOTAL	**689,848**	**860,258**	**170,410**	**24.70%**

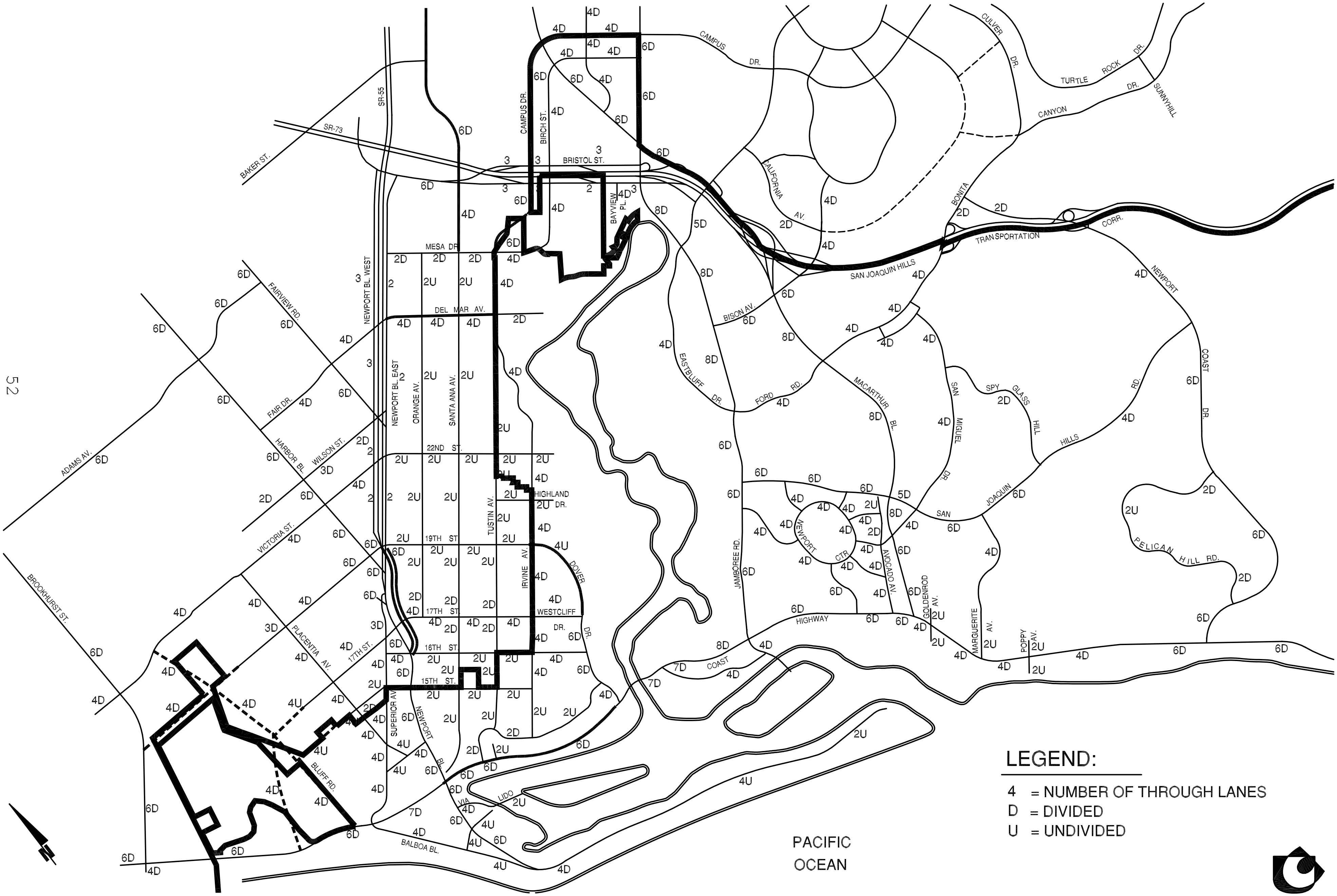
[1] Home-Work includes Home-Work and Home-University trips, consistent with OCTAM mode choice output.

[2] Home-Other includes Home-Shop and Home-Other trips, consistent with OCTAM mode choice output.

P:\Projects - All Users\10400-00+\10579-01 Newport Bch GPU Ph 2\STUDIES\Transportation Summary Report\[01232-03a.xls]T 11

EXHIBIT U

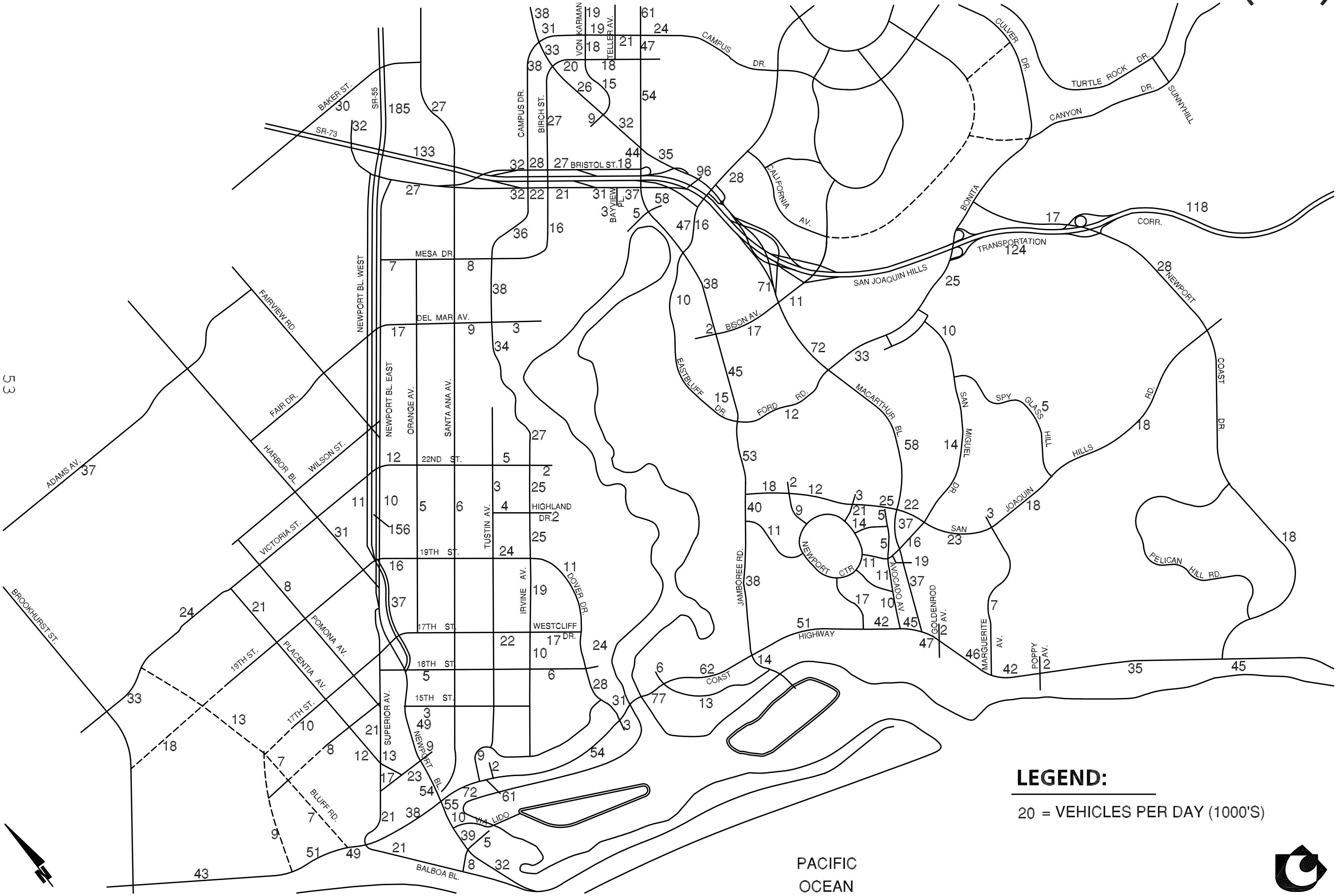
NEWPORT BEACH GENERAL PLAN BUILDOUT THROUGH LANES



NEWPORT BEACH GENERAL PLAN UPDATE TRAFFIC STUDY, Newport Beach, California - 01232:72 rev. 12/02/03

EXHIBIT V

GENERAL PLAN BUILDOUT AVERAGE DAILY TRAFFIC (ADT)



Highway throughout the study area generally increase, with the one exception being west of 15th Street. The new Santa Ana River crossing of 19th Street draws traffic away from Coast Highway. Volumes on Coast Highway in other areas generally increase by 7,000-11,000 VPD.

Traffic volumes on Newport Boulevard increase substantially in General Plan buildout conditions. Land use increases in the coastal areas account for some of the increase. Traffic is also drawn to Newport Boulevard in the City of Newport Beach because of the SR-55 freeway extension. However, changes to the planned circulation system Master Plan and/or the permitted level of intensification of land uses could lead to different results in the long term.

Land use increases in the Newport Coast area cause Newport Coast Drive to have large volume increases that grow approaching the SR-73 tollway. Increased traffic from Bonita Canyon and Harbor View Hills/Newport Ridge cause volumes on Jamboree Road, MacArthur Boulevard, and Bonita Canyon Drive to go up. Increased capacity on Irvine Avenue south of Bristol Street draws traffic to Campus Drive/Irvine Avenue.

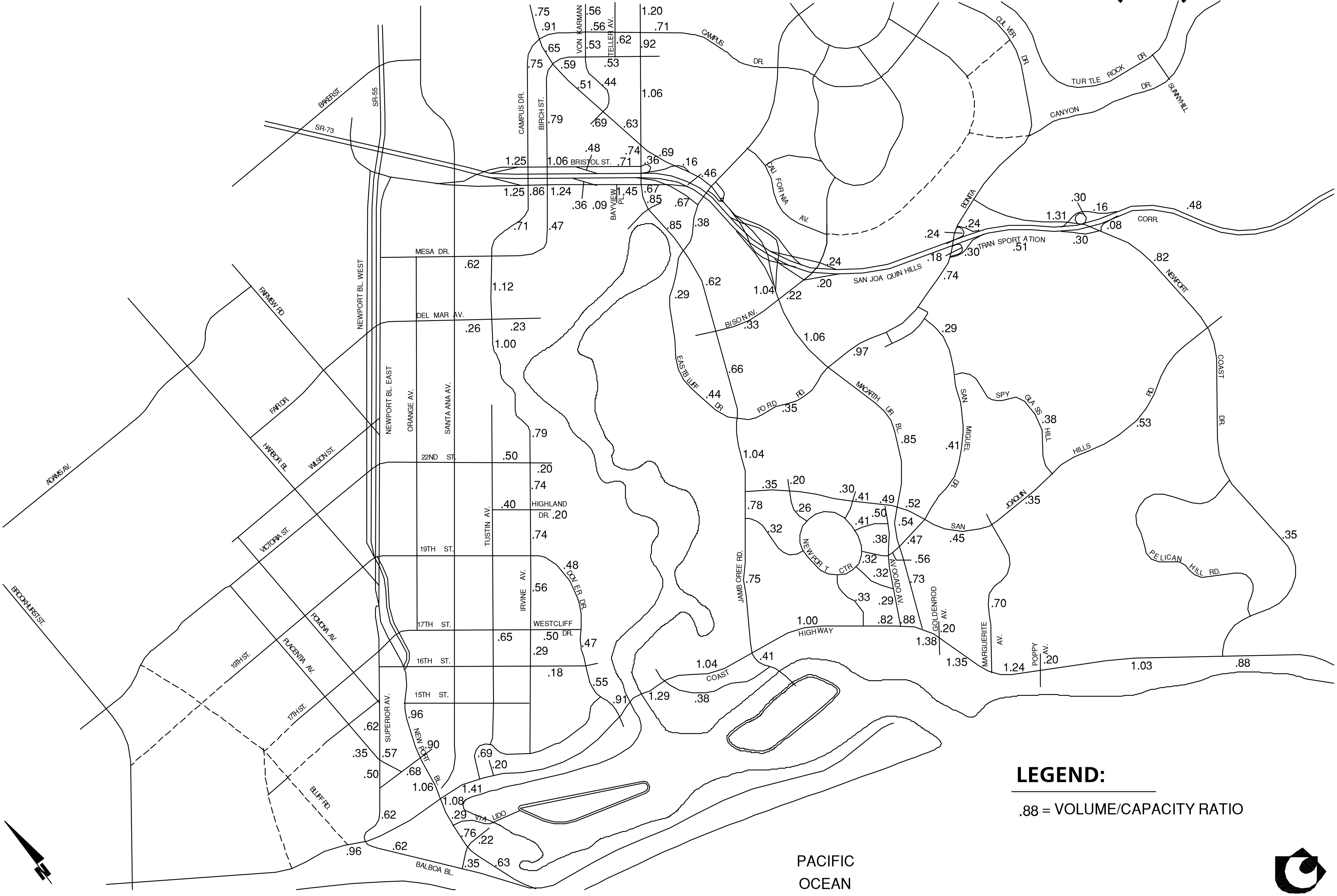
3.5 Daily Roadway Segment Analysis

The ratio of daily roadway segment volumes to daily planning level capacities provides a measure of the roadway segment service. Volume/Capacity (v/c) Ratios for existing conditions are shown on Exhibit W (to be provided). Roadway segments with v/c ratios greater than 0.90 are:

- Newport Boulevard north of Hospital Road
- Newport Boulevard north of Via Lido
- Jamboree Road north of Campus Drive
- Jamboree Road north of Birch Street
- Irvine Avenue north of University Drive
- Dover Drive north of Coast Highway

EXHIBIT W

GENERAL PLAN BUILDOUT VOLUME/CAPACITY (V/C) RATIOS



- Jamboree Road north of San Joaquin Hills Road
- MacArthur Boulevard north of Bison Avenue
- MacArthur Boulevard north of Ford Road
- Newport Coast Drive north of SR-73 NB Ramps
- Newport Boulevard south of Hospital Road
- Jamboree Road south of Birch Street
- Irvine Avenue south of University Drive
- Campus Drive east of MacArthur Boulevard
- Bristol Street North east of Birch Street
- Bristol Street South east of Birch Street
- Coast Highway east of Dover Drive
- Coast Highway east of Bayside Drive
- Coast Highway east of Jamboree Road
- Ford Road east of MacArthur Boulevard
- Coast Highway east of MacArthur Boulevard
- Coast Highway east of Goldenrod Avenue
- Coast Highway east of Marguerite Avenue
- Coast Highway east of Poppy Avenue
- Coast Highway west of Superior Avenue/Balboa Boulevard
- Coast Highway west of Riverside Drive
- Bristol Street North west of Campus Drive
- Bristol Street South west of Campus Drive
- Bristol Street South west of Jamboree Road

3.6 Buildout Peak Hour Intersection Operations

The final data required to support the Buildout Scenario of the NBTM update process was the intersection configuration of the 63 intersections selected for analysis. This data was provided by City staff and was used to calculate currently adopted General Plan Buildout intersection capacity utilization values (ICUs) at all 63 analysis intersections. Table 12 summarizes the General Plan Buildout ICUs

TABLE 12

NBTM BUILDOUT INTERSECTION CAPACITY UTILIZATION (ICU) SUMMARY

INTERSECTION (NS/EW)	AM PEAK HOUR			PM PEAK HOUR		
	EXISTING COUNT	FUTURE FORECAST	DELTA	EXISTING COUNT	FUTURE FORECAST	DELTA
1. Bluff Rd. & Coast Hw.	DNE[1]	1.01	1.01	DNE	0.76	0.76
2. Superior Av. & Placentia Av.	0.66	0.65	-0.01	0.67	0.55	-0.12
3. Superior Av. & Coast Hw.	0.84	1.01	0.17	0.90	0.80	-0.10
4. Newport Bl. & Hospital Rd.	0.54	0.87	0.33	0.70	0.93	0.23
5. Newport Bl. & Via Lido	0.41	0.52	0.11	0.37	0.44	0.07
6. Newport Bl. & 32nd St.	0.73	0.67	-0.06	0.78	0.76	-0.02
7. Riverside Av. & Coast Hw.	0.84	0.83	-0.01	0.93	1.12	0.19
8. Tustin Av. & Coast Hw.	0.80	0.76	-0.04	0.67	0.87	0.20
9. MacArthur Bl. & Campus Dr.	0.61	0.72	0.11	0.85	1.21	0.36
10. MacArthur Bl. & Birch St.	0.49	0.71	0.22	0.66	0.80	0.14
11. Von Karman Av. & Campus Dr.	0.55	0.67	0.12	0.79	0.94	0.15
12. MacArthur Bl. & Von Karman Av.	0.46	0.54	0.08	0.53	0.64	0.11
13. Jamboree Rd. & Campus Dr.	0.74	0.93	0.19	0.85	1.23	0.38
14. Jamboree Rd. & Birch St.	0.55	0.90	0.35	0.60	0.89	0.29
15. Campus Dr. & Bristol St. (N)	0.77	0.97	0.20	0.94	1.09	0.15
16. Birch St. & Bristol St. (N)	0.66	0.93	0.27	0.61	0.71	0.10
17. Campus Dr./Irvine Av. & Bristol St. (S)	0.72	0.91	0.19	0.58	0.76	0.18
18. Birch St. & Bristol St. (S)	0.46	0.52	0.06	0.44	0.53	0.09
19. Irvine Av. & Mesa Dr.	0.70	0.68	-0.02	0.94	0.90	-0.04
20. Irvine Av. & University Dr.	0.82	1.15	0.33	0.89	1.06	0.17
21. Irvine Av. & Santiago Dr.	0.66	0.58	-0.08	0.72	0.62	-0.10
22. Irvine Av. & Highland Dr.	0.57	0.51	-0.06	0.60	0.55	-0.05
23. Irvine Av. & Dover Dr.	0.72	0.75	0.03	0.64	0.65	0.01
24. Irvine Av. & Westcliff Dr.	0.57	0.49	-0.08	0.77	0.74	-0.03
25. Dover Dr. & Westcliff Dr.	0.38	0.26	-0.12	0.48	0.48	0.00
26. Dover Dr. & 16th St.	0.55	0.47	-0.08	0.57	0.55	-0.02
27. Dover Dr. & Coast Hw.	0.70	0.71	0.01	0.74	0.74	0.00
28. Bayside Dr. & Coast Hw.	0.69	0.85	0.16	0.70	0.94	0.24
29. MacArthur Bl. & Jamboree Rd.	0.88	0.97	0.09	0.91	0.98	0.07
30. Jamboree Rd. & Bristol St. (N)	0.55	0.07	-0.48	0.59	0.02	-0.57
31. Bayview Pl. & Bristol St. (S)	0.48	0.61	0.13	0.56	0.63	0.07
32. Jamboree Rd. & Bristol St. (S)	0.75	0.95	0.20	0.72	0.83	0.11
33. Jamboree Rd. & Bayview Wy.	0.41	0.45	0.04	0.57	0.68	0.11
34. Jamboree Rd. & Eastbluff Dr. /University Dr.	0.60	0.58	-0.02	0.64	0.61	-0.03
35. Jamboree Rd. & Bison Av.	0.45	0.46	0.01	0.51	0.54	0.03
36. Jamboree Rd. & Eastbluff Dr./Ford Rd.	0.69	0.74	0.05	0.65	0.70	0.05
37. Jamboree Rd. & San Joaquin Hills Rd.	0.56	0.64	0.08	0.57	0.65	0.08

TABLE 12

NBTM BUILDOUT INTERSECTION CAPACITY UTILIZATION (ICU) SUMMARY

	AM PEAK HOUR			PM PEAK HOUR		
INTERSECTION (NS/EW)	EXISTING COUNT	FUTURE FORECAST	DELTA	EXISTING COUNT	FUTURE FORECAST	DELTA
38. Jamboree Rd. & Santa Barbara Dr.	0.47	0.52	0.05	0.63	0.69	0.06
39. Jamboree Rd. & Coast Hw.	0.68	0.84	0.16	0.74	0.87	0.13
40. Santa Cruz Dr. & San Joaquin Hills Rd.	0.36	0.40	0.04	0.36	0.38	0.02
41. Santa Rosa Dr. & San Joaquin Hills Rd.	0.32	0.34	0.02	0.52	0.66	0.14
42. Newport Center Dr. & Coast Hw.	0.40	0.51	0.11	0.52	0.62	0.10
44. Avocado Av. & San Miguel Dr.	0.33	0.35	0.02	0.72	0.77	0.05
45. Avocado Av. & Coast Hw.	0.58	0.76	0.18	0.66	0.77	0.11
46. SR-73 NB Ramps & Bison Av.	0.31	0.46	0.15	0.37	0.56	0.19
47. SR-73 SB Ramps & Bison Av.	0.26	0.40	0.14	0.17	0.29	0.12
48. MacArthur Bl. & Bison Av.	0.63	0.77	0.14	0.60	0.77	0.17
49. MacArhtur Bl. & Ford Rd./Bonita Canyon Dr.	0.71	0.76	0.05	0.90	1.07	0.17
50. MacArthur Bl. & San Joaquin Hills Rd.	0.64	0.71	0.07	0.93	0.96	0.03
51. MacArthur Bl. & San Miguel Dr.	0.56	0.55	-0.01	0.65	0.70	0.05
52. MacArthur Bl. & Coast Hw.	0.60	0.72	0.12	0.71	0.81	0.10
53. SR-73 NB Ramps & Bonita Canyon Dr.	0.55	0.62	0.07	0.43	0.47	0.04
54. SR-73 SB Ramps & Bonita Canyon Dr.	0.30	0.44	0.14	0.41	0.56	0.15
55. San Miguel Dr. & Spyglass Hill Rd.	0.28	0.31	0.03	0.31	0.39	0.08
56. San Joaquin Hills Rd. & San Miguel Dr.	0.44	0.50	0.06	0.54	0.65	0.11
57. Goldenrod Av. & Coast Hw.	0.99	1.08	0.09	0.69	0.76	0.07
58. Marguerite Av. & San Joaquin Hills Rd.	0.31	0.37	0.06	0.35	0.50	0.15
59.Marguerite Av. & Coast Hw.	0.83	0.92	0.09	0.82	0.95	0.13
60. Spyglass Hill Rd. & San Joaquin Hills Rd.	0.44	0.57	0.13	0.30	0.44	0.14
61. Poppy Av. & Coast Hw.	0.61	0.71	0.10	0.65	0.75	0.10
62. Newport Coast Dr. & SR-73 NB Ramps	0.45	0.52	0.07	0.31	0.36	0.05
64. Newport Coast Dr. & San Joaquin Hills Rd.	0.37	0.60	0.23	0.29	0.46	0.17
65. Newport Coast Dr. & Coast Hw.	0.47	0.59	0.12	0.50	0.61	0.11

[1] DNE = Does Not Exist

based on the AM and PM peak hour intersection turning movement volumes and the intersection geometric data.

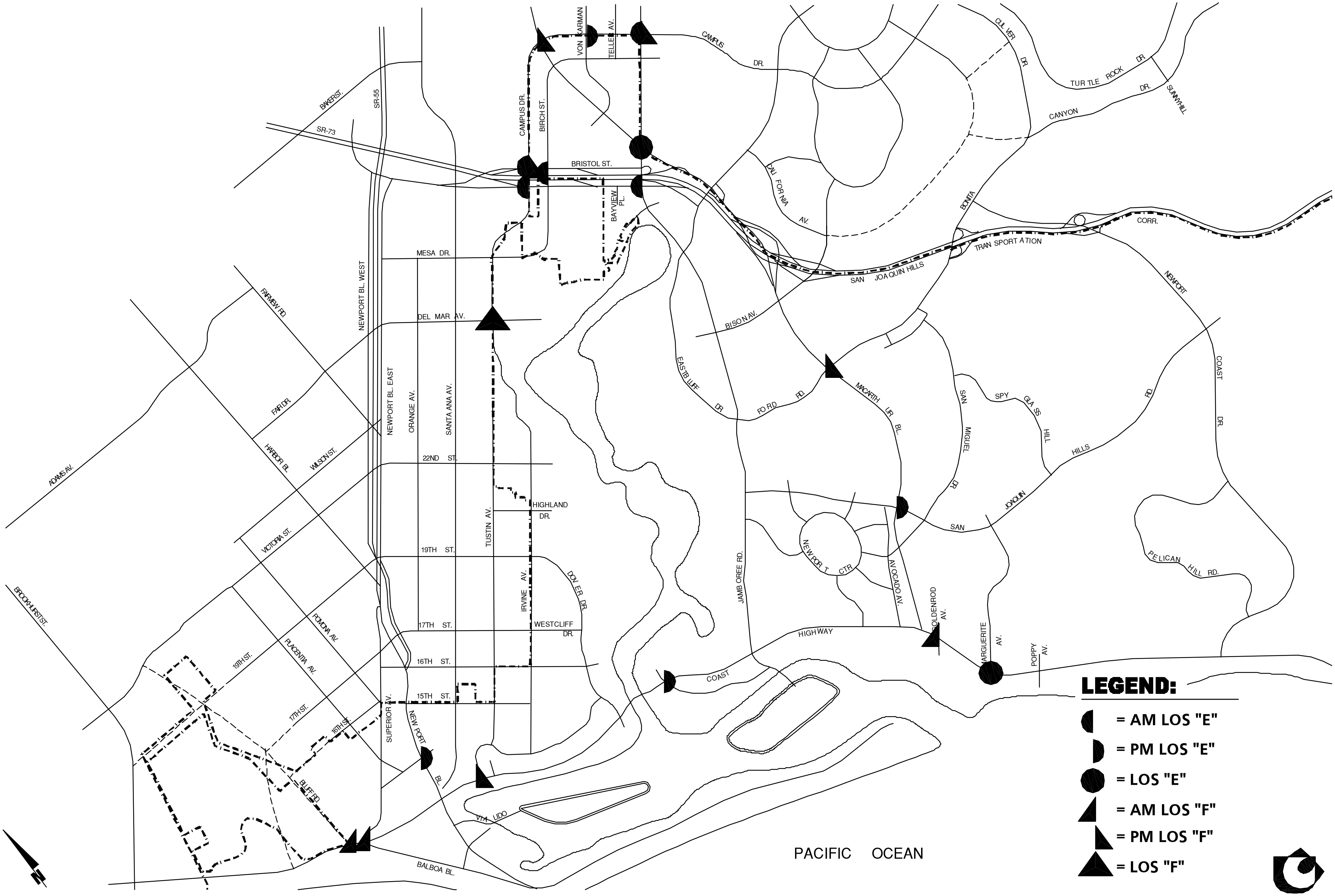
As shown in Table 12, ICU values generally increase in the General Plan buildout conditions. The exceptions occur where new parallel facilities are available, or where an increase in lanes results in increased capacity. The 18 intersections with ICU values greater than 0.90 (LOS “E” or worse) in either peak period are:

- Bluff Road (NS)/Coast Highway (EW) (AM)
- Superior Avenue (NS)/Coast Highway (EW) (AM)
- Newport Boulevard (NS)/Hospital Road (EW) (PM)
- Riverside Drive (NS)/Coast Highway (EW) (PM)
- MacArthur Boulevard (NS)/Campus Drive (EW) (PM)
- Von Karman Avenue (NS)/Campus Drive (EW) (PM)
- Jamboree Road (NS)/Campus Drive (EW) (AM/PM)
- Campus Drive (NS)/Bristol Street North (EW) (AM/PM)
- Birch Street (NS)/Bristol Street North (EW) (AM)
- Campus Drive/Irvine Avenue (NS)/Bristol Street South (EW) (AM)
- Irvine Avenue (NS)/University Avenue (EW) (AM/PM)
- Bayside Drive (NS)/Coast Highway (EW) (PM)
- MacArthur Boulevard (NS)/Jamboree Road (EW) (AM/PM)
- Jamboree Road (NS)/Bristol Street South (EW) (AM)
- MacArthur Boulevard (NS)/Ford Road/Bonita Canyon Drive (EW) (PM)
- MacArthur Boulevard (NS)/San Joaquin Hills Road (EW) (PM)
- Goldenrod (NS)/Coast Highway (EW) (AM)
- Marguerite (NS)/Coast Highway (EW) (AM/PM)

The intersections with future buildout (Currently Adopted General Plan) ICU values that exceed 0.90 are depicted graphically on Exhibit X. It is important to note that for both existing and build-out conditions, Intersection Capacity Utilization ratio calculations reflect the function of intersections for a very limited amount of time throughout the day

EXHIBIT X

CURRENTLY ADOPTED GENERAL PLAN DEFICIENCIES



LEGEND:

- = AM LOS "E"
- = PM LOS "E"
- = LOS "E"
- = AM LOS "F"
- = PM LOS "F"
- = LOS "F"

URBAN CROSSROADS

(the AM and PM peak hours, or 2 of the 24 hour time period, and only for weekdays). Within the current data limitations, we are unable to provide ICU calculations either as an average ICU, or for other, non-peak hours.

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Section 3.2 Water System

3.2 WATER SYSTEM

This section discusses the existing potable water system in the Planning Area and provides information on recycled water. Additionally, applicable local and regional policies are described. Information for this section is based on the City's 1999 Water Master Plan, the City's 2000 Urban Water Management Plan, Irvine Ranch Water District's 2000 Water Resources Master Plan, and conversations with the service providers.

EXISTING CONDITIONS

Water service within the Planning Area is provided by the City, Irvine Ranch Water District (IRWD), and Mesa Consolidated Water District (Mesa). Figure 3.2-1 illustrates the service boundaries of each provider in the Planning Area.

Water Infrastructure

City of Newport Beach

Generally, the City provides water service to the northwestern portion of the Planning Area encompassing approximately 13.5 square miles, as shown in Figure 3.2-1.[1] If the Banning Ranch area is annexed to the City, the City intends to provide service to this area.

The City provides water service to nearly 75,600 people and various land uses. Through the existing infrastructure totaling over 210 miles within the City's service area, water is delivered via transmission mains and distribution lines. Existing water lines range from 1 to 36 inches, with the majority of the pipelines ranging from 8 to 12 inches in diameter. Transmission mains convey water to various sections of the distribution system and the distribution lines deliver water to local areas. In addition, the City's waster infrastructure includes five pump stations and 43 pressure reducing stations. The water distribution system is divided into five major pressure zones that serve elevations from sea level to 725 feet above sea level.[2]

The City operates four groundwater wells in Fountain Valley that have been in operation since 1997. Located in two areas known as the Dolphin Avenue and Tamura School sites, each site contains one shallow well and one deep well. Upon extraction, the water travels over 6 miles in 30-inch transmission mains, through the cities of Fountain Valley, Huntington Beach, Costa Mesa, and eventually into Newport Beach.[3] From the wells, the groundwater is conveyed to the 16th Street Reservoir at the City's utilities yard, and then to different areas within the City's service boundaries.[4]

Water Storage

The City uses three water system storage reservoirs: Big Canyon Reservoir, Zone 4 Reservoir, and 16th Street Reservoir. The Big Canyon Reservoir, which is located in Corona del Mar and shown in Figure 3.2-1, is a distribution and storage concrete earthen dam reservoir that has a capacity of approximately 196 million gallons (MG) and a maximum water surface elevation of 302 feet.

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[1] Newport Beach, City of. 1999. *Water Master Plan*.

[2] Newport Beach, City of. 1999. *Water Master Plan*.

[3] Newport Beach, City of. 2000. *Urban Water Management Plan.*

[4] Newport Beach, City of. 1999. *Water Master Plan*.

However, the City maintains this reservoir at an average level of about 286 feet, providing approximately 300 acre-feet (AF) (98 MG) of storage.[5] This reservoir is scheduled to receive a cover sometime in 2004. The Zone 4 Reservoir is a circular 1.5 MG below grade concrete tank that has a maximum elevation of 663 feet, located on Muir Beach Circle. The 16th Street Reservoir is a buried cast-in-place concrete tank that has a capacity of 1 MG, located at 951 West 16th Street. As discussed above, this reservoir serves as a holding tank for well water. In addition, the 3,000 AF San Joaquin Reservoir that is owned by the IRWD is located within Newport Beach. This reservoir was once an emergency storage tank for potable water, but is currently empty. The reservoir is to be converted for use as a reclaimed water storage facility in the near future[6,7] The City's capacity allocation in the San Joaquin Reservoir is 84.6 AF (27.6 MG).

Fire Flows

As discussed in further detail in Section 4.1 (Fire Protection) of this TBR, the Newport Beach Fire Department is responsible for fire suppression within the City. However, the Fire Department relies on the area's infrastructure, including the adequacy of nearby water supplies to suppress fire. Thus, the City has adopted the section of the 2001 California Fire Code that lists the minimum required fire flow and flow duration for buildings of different floor areas and construction types (Appendix III-A of the Fire Code.) Fire flow is the flow rate of water supply (measured in gallons per minute) available for fire fighting measured at 20 pounds per square inch (psi) residual pressure. Available fire flow is the total water flow available at the fire hydrants, also measured in gpm. Consistent with the California Fire Code, the Section 9.04.450 of the City's Municipal Code indicates that in buildings fitted with approved internal automatic sprinkler systems, the minimum required fire flow for that structure may be reduced by up to 50 percent, as approved by the Fire Chief, but the resulting fire flow cannot be less than 1,500 gpm.[8]

Irvine Ranch Water District

The service area covered by IRWD is approximately 85,019 acres, or 133 square miles, in southern-central Orange County, which includes a portion of Newport Beach. IRWD is responsible for serving the southeastern portion of the Planning Area, which includes the Newport Coast and Newport Ridge areas, as shown in Figure 3.2-1. In addition, IRWD serves small portions along the northern boundary of the Planning Area, including the areas of Santa Ana Heights, Bonita Canyon, Bay Knolls, and Emerson. In total, IRWD serves approximately 9 square miles within the Planning Area, which accounts for approximately 7 percent of IRWD's total service boundaries.

IRWD is a multiservice agency that provides potable and nonpotable water and wastewater services (as further discussed in Section 3.3 of this document) to a population of approximately 266,000. Sixteen operational wells in the Dyer Road Well Field (DRWF), located in the City of Santa Ana, provide the only source of potable groundwater for IRWD. These wells, ranging from 400 to 1,200 feet in depth, extract water from the Orange County Groundwater Basin. The DRWF supply is conveyed to the IRWD distribution system via a 54-inch-diameter transmission main located in Dyer Road (Barranca Parkway in the City of Irvine). The additional IRWD water supply is provided by imported treated water, primarily from Metropolitan Water District of Southern California (MWD), through two major transmission pipelines. The existing nonpotable water system consists

[5] Newport Beach, City of. 1999. *Water Master Plan*.

[6] Deutsch, Tim. 2003. Personal communication with Utilities Department, City of Newport Beach, 3 December.

[7] Irvine Ranch Water District. 2004. Personal communication with Public Affairs Office, 8 March.

[8] Irvine Ranch Water District. 2003. *Water Resources Management Plan*. Adopted 2000, most recently updated in 2003.

Figure 3.2-1 Water Infrastructure and Service Areas

Fig p.2 (11x17)

of two subsystems: (1) a reclaimed water system that delivers reclaimed water, supplemental and untreated water, and limited nonpotable groundwater and (2) an untreated water system that delivers imported untreated water and local runoff via the Irvine Lake Pipeline to supplement the reclaimed water system. Existing water mains throughout the Planning Area range in size from 8 to 24 inches in diameter.[9]

Water Storage

IRWD divides potable water system storage into four categories: operational storage, fire flow storage, seasonal storage, and emergency storage. Operational and fire storage, and in some cases emergency storage are typically provided in local storage facilities (tanks). Seasonal and emergency storage are closely aligned with source of supply issues and are provided through seasonal use of the groundwater basin. Nonpotable storage includes the operational and seasonal storage categories, with operational storage typically being provided in tanks and seasonal storage in large open reservoirs.[10]

Within the IRWD service boundaries, three existing tanks provide potable water storage to the Planning Area in three water pressure service zones with the following existing capacities: (1) Coastal Zone 2 (2 MG); (2) Coastal Zone 4 (6.5 MG); and (3) Coastal Zone 6 (2.6 MG). In addition, IRWD has three existing tanks that provide nonpotable water storage within the Planning Area including the San Joaquin Reservoir as shown in Figure 3.2-1, Coastal Zone D, and Coastal Zone G. Operated by MWD, the total existing capacity of the San Joaquin Reservoir is approximately 3,000 AF. Coastal Zone D has an existing capacity of 5 MG and Coastal Zone G has an existing capacity of 2.5 MG.

Fire Protection Water

Currently, in the IRWD, public fire protection water is provided through unmetered connections to the potable water system (i.e., fire hydrants and fire line connections). Although previously requested by the Orange County Fire Authority (OCFA), public fire protection connections to the nonpotable water system as secondary sources have not been approved by the California Department of Health Services (CDHS). IRWD provides water for private fire protection via on-site or on-property water lines, which typically serve private fire hydrants and automatic building fire sprinkler systems.[11]

Mesa Consolidated Water District

Mesa serves a small portion of the western boundary of the Planning Area, which includes the area directly north of Banning Ranch as well as the area east of Newport Shores to Superior Avenue for a service area of approximately less than one-half square mile. The total service area covered by Mesa includes approximately 18 square miles, which includes Costa Mesa, part of Newport Beach, and the John Wayne Airport. The area served by Mesa within the Planning Area accounts for approximately one percent of Mesa's total service boundaries.

[9] Irvine Ranch Water District. 2003. *Water Resources Management Plan*. Adopted 2000, most recently updated in 2003.

[10] Irvine Ranch Water District. 2003. *Water Resources Management Plan*. Adopted 2000, most recently updated in 2003.

[11] Irvine Ranch Water District. 2003. *Water Resources Management Plan*. Adopted 2000, most recently updated in 2003.

Water Treatment and Drinking Water Quality

City of Newport Beach

The drinking water supply for the City is a blend of mostly groundwater from the Orange County groundwater basin and also surface water imported by MWD. MWD imported water source is mostly the Colorado River, with augmentation by the State Water Project from Northern California. The groundwater comes from a natural underground reservoir managed by the Orange County Water District that generally stretches from the Prado Dam and fans across the northwestern portion of Orange County.

The City's imported surface water supply is treated at either one of two treatment plants: (1) the MWD Diemer Filtration Plant, located in Yorba Linda; or (2) MWD's Weymouth Filtration Plant, which is located in the San Gabriel Valley. Typically, the Diemer Filtration Plant receives a blend of Colorado River water from Lake Matthews through the MWD lower feeder and State Water Project water through the Yorba Linda Feeder. The blend ratio between the two sources varies from year to year.[12] Treatment capacity at the Diemer Filtration Plant is approximately 520 MGD, with existing average winter flows at approximately 140 MGD, increasing to approximately 375 MGD in the summer. Thus, during the winter the plant operates at approximately 27 percent capacity, during the summer at approximately 72 percent capacity.[13]

Similar to the Diemer Plant, the treatment capacity at the Weymouth Filtration Plant is approximately 520 MGD. Existing average winter flows are approximately 220 MGD, and existing summer flows are approximately 340 MGD. Therefore, the Weymouth Filtration Plant operates at approximately 42 percent during the winter, and at approximately 65 percent during the summer.[14]

Currently, the City's groundwater supply is treated at the City's Utility Yard, located at 949 W. 16th Street, and consists of five pumps and two chamber reservoirs that can accommodate up to 1.5 MG each. The groundwater is blended with surface water and treated with sodium hypochlorite (the equivalent of household bleach), which is a typical application to achieve a potable water supply, before eventually being pumped through the water distribution system. In addition, the City is currently in the process of building an additional water treatment facility, located at 3300 Pacific View Drive, which would have the same treatment capacity as the existing facility. This new treatment facility is anticipated to be functioning by 2005.[15]

According to the City's 2003 Water Quality Report, typical sources for contaminants that are found in MWD treated surface water include the erosion of natural deposits, agricultural runoff and sewage, runoff or leaching from natural deposits, decay of man-made or natural deposits, and rocket fuel that had been discharged into the Colorado River.

In addition, according to the City's 2003 Water Quality Report, drinking water may be reasonably expected to contain at least small amounts of some contaminants. This occurs because water traveling over the land surface or through the layers of the ground may dissolve naturally occurring minerals and, in some cases, radioactive material, and could pick up substances resulting from the

[12] Irvine Ranch Water District. 2003. *Water Resources Management Plan*, 4-8. Adopted 2000, most recently updated in 2003.

[13] Trask, Willy. 2004. Personal communication with Metropolitan Water District, Water Quality Division, 9 January.

[14] Trask, Willy. 2004. Personal communication with Metropolitan Water District, Water Quality Division, 9 January.

[15] Deutsch, Tim. 2004. Personal communication with Public Works Department, City of Newport Beach, 14 January.

presence of human or animal activity. Contaminants that may be present in source water include the following:

- Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife,
- Inorganic contaminants, such as salts and metals, which can be naturally occurring or result from urban storm runoff, industrial or domestic wastewater discharges, oil and gas production, mining and farming,
- Radioactive contaminants, which can be naturally occurring or be the result of oil and gas production or mining activities,
- Pesticides and herbicides, which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses,
- Organic chemical contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, can also come from gasoline stations, urban stormwater runoff, and septic systems.

The presence of contaminants, however, does not necessarily mean that the water would be a health risk for most people,[16] as their concentrations may fall below their respective maximum contaminant level (MCL) that is allowed by the EPA. Some of the potential microbial and chemical contaminants are described below.

Cryptosporidium

Cryptosporidium is a microscopic organism that, when ingested, can cause diarrhea, fever, and other gastrointestinal symptoms. The organism comes from animal and/or human wastes and may be in surface water. MWD did not detect Cryptosporidium in its water. If Cryptosporidium is ever detected in the City's surface waters, it would be eliminated by an effective treatment combination including sedimentation, filtration, and disinfection.

Trihalomethanes (THMs)

Trihalomethanes (THMs) are chemical byproducts of disinfecting drinking water. THMs are a group of four chemicals that are formed when chlorine reacts with naturally occurring organic and inorganic matter in water. The trihalomethanes are chloroform, bromodichloromethane, dibromochloromethane, and bromoform. The maximum amount of total THMs allowed in drinking water is regulated by the U.S. EPA, which set a maximum annual average limit in drinking water of 100 parts per billion in 1979. Effective in January 2002, the Stage 1 Disinfectants / Disinfection Byproducts Rule revises the total THM maximum annual average level at 80 parts per billion. The City's drinking water complies with the Stage 1 Disinfectants / Disinfection Byproducts Rule. EPA is currently crafting a Stage 2 regulation that will further reduce allowable levels in drinking water.

[16] Newport Beach, City of. 2003. *Water Quality Report*.

1,4-Dioxane

1,4-dioxane is a new chemical contaminant primarily used as an industrial stabilizer to enhance performance of solvents in many manufacturing processes. It is found in foods (shrimp, chicken, tomatoes, etc) and food additives and ordinary household products (cosmetics, deodorants, and shampoos). The EPA has classified 1,4-dioxane as a probable human carcinogen. Due to limited data on health effects, there is no Federal or State drinking water standard or maximum contaminant level (MCL). CDHS has established an Action Level of 3 parts per billion (3 ppb) for 1,4-dioxane. CDHS also recommends that drinking water sources with 1,4-dioxane in excess of 300 ppb be removed from service. The City of Newport Beach's wells have been tested for 1,4-dioxane. Concentrations found in four wells ranged from nondetect to 12.7 ppb. All levels were well below the DHS's recommended level of 300 ppb to remove from service. CDHS does not recommend treatment or removal of wells from service at these levels. The presence of 1,4-dioxane in the groundwater may have originated from the seawater injection barrier, which uses recycled water. An industrial discharger was identified as the principal source in the recycled water. This source was eliminated and an additional advanced oxidation treatment step was added to remove 1,4-dioxane from future injection water.

Lead

Infants and young children typically are more vulnerable to lead in drinking water than the general population. Depending on the materials used in plumbing, the lead levels may vary at different homes.

Chlorine

Chlorine, a product most often used as a disinfectant by swimming pools, drinking water, and wastewater facilities, is considered to be a prevalent hazardous substance.[17] Chlorine is typically found in the form of a colorless to amber-colored liquid, or as a greenish-yellow gas with a characteristic odor. In terms of chlorine gas, it is heavier than air and therefore stays close to the ground, where it can impact individuals. Exposure to chlorine gas generally impacts the respiratory system, with cough, shortness of breath, chest pain, and burning sensation in the throat.[18] Respiratory distress from chlorine can occur at even low concentrations of less than 20 parts per million (ppm). At high concentrations (> 800 ppm), chlorine gas is lethal.

Irvine Ranch Water District

Similar to the City's surface water treatment process, the majority of IRWD's imported potable water is supplied from a single source, the MWD Diemer Filtration Plant, located north of Yorba Linda. In addition to Diemer-treated imported water, IRWD also receives potable water from MWD's Weymouth Filtration Plant via the Orange County Feeder.[19] As discussed previously, the Diemer Filtration Plant currently operates at approximately 27 percent capacity during the winter and at approximately 72 percent capacity during the summer, while the Weymouth Filtration Plant operates at approximately 42 percent during the winter and at approximately 65 percent during the summer.[20]

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[17] Newport Beach, City of. 2003. *Hazards Assessment Study*.

[18] Newport Beach, City of. 2003. *Hazards Assessment Study*.

[19] Irvine Ranch Water District. 2003. *Water Resources Management Plan*, 4-8. Adopted 2000, most recently updated in 2003.

[20] Trask, Willy. 2004. Personal communication with Metropolitan Water District, Water Quality Division, 9 January.

Local groundwater undergoes disinfection at IRWD purification facilities before it is provided to customers. An Annual Water Quality Report is distributed by IRWD to customers each April, providing water testing results and information about water quality. Currently, the drinking water provided by IRWD meets and exceeds all quality standards set by both the State and Federal government.[21]

Mesa Consolidated Water District

For purposes of this analysis, since Mesa provides potable water service to a nominal portion of the Planning Area, water treatment and drinking water quality information was not obtained from the service provider.

Water Supply and Demand

City of Newport Beach

Domestic water for the Planning Area is supplied by both groundwater and imported surface water sources, as previously discussed. Currently, 75 percent of the water supplied by the City's service area is supplied by groundwater from the Orange County Groundwater Basin, and the remaining 25 percent of water supply is provided by MWD, which delivers water imported from the Colorado River and State Water Project. The groundwater supply for the City's water system is extracted from two well sites, as discussed above, established in Fountain Valley.[22]

The historic water demand in the City's service area is shown in Table 3.2-1, which is obtained from the City's 2000 Urban Water Management Plan.

Table 3.2-1 Historic Water Use in the City of Newport Beach Service Area1990–99

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000–2001	2001–2002	2002–2003
Demand (AF)	19,012	16,901	17,245	17,522	17,254	17,842	19,139	16,429	18,157	19,405	18,540	18,136	18,049

SOURCE: City of Newport Beach, Urban Water Management Plan, 2000, Table 2-2

Projected water supply and demand for the City of Newport Beach are provided in Table 3.2-2. The City's 2000 Urban Water Management Plan projects water demands in five-year increments up to the year 2020.

The future supply projection assumes that the City will continue to produce groundwater and purchase local water. Currently, the City purchases imported water from the Municipal Water District of Orange County (MWDOC) through MWD. According to MWDOC and MWD's 2000 Regional Urban Water Management Plans, MWD can meet 100 percent of the City's imported water needs until the year 2010. Beyond that, improvements associated with the State Water Project supply, additional local projects, conservation, and additional water transfers would be needed to adequately serve the City. OCWD, which provides the groundwater supply to the City, projects that there would be sufficient groundwater supplies to meet any future demand requirements in Newport Beach. As such, the future water supply projection in Table 3.2-2 is based on implementation of

[21] Irvine Ranch Water District. January 2004. Website: www.irwd.com/WaterQuality/WaterQuality.html

[22] Newport Beach, City of. 1999. *Water Master Plan*.

City conservation programs, additional recycled water becoming available, additional production of groundwater, and the MWDOC efforts to reduce the City's dependence on imported water supplies from MWD.

Table 3.2-2 Projected Water Supply and Demand (AFY)

Water Supply Sources	2000	2005	2010	2015	2020
Purchased from MWDOC	4690	5250	5275	5300	5325
Groundwater	14125	15800	15850	15900	15950
Recycled Water	420	350	350	350	350
Supply Totals	***19235***	***21400***	***21475***	***21550***	***21625***
Demand Totals	***19235***	***21400***	***21475***	***21550***	***21625***

SOURCE: City of Newport Beach, Urban Water Management Plan, 2000, Table 6-1, page 19

Table 3.2-3 below includes demands and supplies during a single dry year (2010) and multiple dry water years (2001, 2002, 2003).

Table 3.2-3 Supply Reliability

			Multiple Dry Water Years		
Source	Average/Normal Water Year 2000 (Volume)	Single Dry Water Year (Volume)	Year 1 (Volume) 2001	Year 2 (Volume) 2002	Year 3 (Volume) 2003
Groundwater	14,125	15,255	16,475	17,793	19,217
Imported Water	4,690	5,065	5,470	5,908	6,381
Recycled Water	420	454	490	529	571
Total Estimated Demands	19,235	20,774	22,436	24,231	26,169
Total Projected Supplies	19,235	20,774	22,436	24,231	26,169

SOURCE: City of Newport Beach, Urban Water Management Plan, 2000, Table 6-2 page 20
Unit of Measure: AF/Year

Since the City's entire potable water demand is met with imported and local water supplies, the City is highly dependent on OCWD and MWD to meet its needs during dry years. However, MWD does not anticipate any shortages in the dry-year scenarios analyzed, and in addition, Table 3.2-3 indicates that in average precipitation years, the City would have sufficient water to meet its customers' needs through 2020.

Irvine Ranch Water District

Approximately 50 percent of IRWD's current water supply is purchased from MWD, with the remaining 50 percent coming from local groundwater wells. Until 1979, IRWD received all of its water from imported sources. IRWD began developing a series of local wells called the Dyer Road Wellfield Project in 1979.[23] In general, areas in southern-central Orange County served by the IRWD receive groundwater from mid-April through mid-October and imported water from mid-October through mid-April.[24]

[23] Irvine Ranch Water District. January 2004. Website: www.irwd.com/WaterQuality/WaterSources.html.

[24] Irvine Ranch Water District. January 2004. Website: www.irwd.com/WaterQuality/WaterSources.html

Historical water demands for IRWD's total service area are presented below in Table 3.2-4, as presented in the IRWD's Water Resources Master Plan. As discussed previously, the area served within the Planning Area represents approximately seven percent of IRWD's total service area. With the exception of the drought years in the early 1990's, water use showed a slow upward trend, due to growth in water use by residential, commercial, and industrial users.

Table 3.2-4 IRWD Historical Water Demand

	1981-1982	*1984-1985*	*1989-1990*	*1994-1995*	*1999-2000*	*2000-2001*
Demand (AF)	61,070	65,550	77,850	61,870	88,860	86,550

SOURCE: Irvine Ranch Water District Water Resources Master Plan, adopted 2000, most recently updated in 2003, Figure ES-1

Table 3.2-5 illustrates the future water demands by system for IRWD's service area within the Planning Area, including a small portion of the City of Costa Mesa.

Table 3.2-5 IRWD Future Water Demands for the Planning Area (AF/yr)

	2000	*2005*	*2010*	*2015*	*2020*	*2025*
Potable Water Demands	4,876	5,616	5,848	6,081	6,313	6,313
Reclaimed Water Demands	1,427	1,997	2,179	2,360	2,541	2,541
Total Demand	***6,303***	***7,613***	***8,027***	***8,441***	***8,854***	***8,854***

SOURCE: Irvine Ranch Water District, Water Resources Master Plan, adopted 2000, most recently updated in 2003, Table 3-4 and Table 3-5.

Both treated and clear groundwater supplies are expected to be a significant source of potable water supply in the future. As shown below in Table 3.2-6, the majority of demand will be supplied from either MWD or the clear groundwater production for IRWD's entire service area. As discussed previously, the area served within the Planning Area represents approximately seven percent of IRWD's total service area. In addition, as discussed in the Water Resources Master Plan, MWD water will be required for supplemental supply as well as peak and emergency conditions.

Secure, potable water supplies are required to meet (1) maximum day demands under normal operating conditions, and (2) to meet maximum month demands under worst-case, short-term supply outage scenarios. Under normal operating conditions, the IRWD's Water Resources Management Plan indicates that there would be an adequate water supply to meet average and maximum day future demand through their ultimate planning period of 2025.[25]

In drought or source outage (emergency) conditions where IRWD supply sources are insufficient to meet demand, MWD will allow IRWD and other member agencies to take flows in excess of allotted capacity per the 1994 Allen-McColloch Pipeline (AMP) Purchase Agreement. This additional capacity from the AMP would allow IRWD to meet maximum month demands under all supply outages except for two scenarios: (1) a Diemer Filtration Plant outage or (2) a DRWF outage. Under a Diemer Filtration Plant outage, MWD imported supplies through AMP and East Orange County Feeder #2, IRWD's 2nd and 3rd largest supply sources, would not be available. Similarly, a DRWF pipeline outage would eliminate IRWD's single largest source of supply. Under either

[25] Irvine Ranch Water District, 2003. *Water Resources Management Plan*. Adopted 2000, most recently updated in 2003.

outage scenario, IRWD would be unable to meet maximum month demands in any year through 2025.[26]

Table 3.2-6 Projected Annual Potable Water Demand and Supply under Normal Operating Conditions (AF/yr)

	2001	2005	2010	2015	2020	2025
DEMAND						
	60,717	68,544	76,860	81,866	86,374	90,596
SUPPLY						
CLEAR GROUNDWATER						
Dyer Road Well Field	20,000	28,000	28,000	28,000	28,000	28,000
Irvine Sub-basin Wells	0	4,800	4,800	4,800	4,800	4,800
Subtotal	*20,000*	*32,800*	*32,800*	*32,800*	*32,800*	*32,800*
TREATED GROUNDWATER						
DATS Water	0	7,200	7,200	7,200	7,200	7,200
Wells 51, 52, & 53	0	0	7,200	7,200	7,200	7,200
Wells 21 & 22	0	0	5,500	5,500	5,500	5,500
Irvine Desalter Project	0	5,568	5,568	5,568	5,568	5,568
Subtotal	*0*	*12,768*	*25,468*	*25,468*	*25,468*	*25,468*
MWD TREATED WATER						
Allen-McColloch Pipeline	9,695	6,631	5,251	6,826	8,244	9,573
EOCF#2	21,122	14,446	11,440	14,872	17,961	20,855
Orange County Feeder	1,900	1,900	1,900	1,900	1,900	1,900
Subtotal	*32,717*	*22,976*	*18,592*	*23,598*	*28,106*	*32,328*
Total Supply	***60,717***	***68,544***	***76,860***	***81,866***	***86,374***	***90,596***

SOURCE: Irvine Ranch Water District, Water Resources Master Plan, adopted 2000, most recently updated in 2003, Table 4-11.

Mesa Consolidated Water District

On an annual basis, Mesa delivers approximately 8 billion gallons (24,500 AF) of water to various users.[27] Approximately 75 percent of Mesa's water is provided by local groundwater pumped from Orange County's natural groundwater basin via nine wells. Similar to the City's service, the remaining 25 percent of Mesa's water is imported water from MWD, which delivers water imported from the Colorado River and State Water Project. At various times of the year, Mesa will supplement its groundwater with imported water.[28] As discussed previously, the area served within the Planning Area represents approximately one percent of Mesa's total service area. Thus, information regarding water demand and use was not obtained.

[26] Irvine Ranch Water District, 2003. *Water Resources Management Plan*. Adopted 2000, most recently updated in 2003.

[27] Mesa Consolidated Water District. 2003. *Water Quality Report*.

[28] Mesa Consolidated Water District. 2003. *Water Quality Report*.

Water Conservation

City of Newport Beach

In an effort to effectively manage current water resources, the City's service area participates in regional water management programs that assist in the development of resource mixes that balance water supply sources and meet future local and regional water requirements. In addition to participating in local and regional water management programs, the City also focuses on demand management efforts that promote efficient water use through conservation programs.[29] Currently, the City of Newport Beach participates in a Countywide Low Flush Toilet Retrofit and Rebate Program, which allows City homeowners the opportunity to replace their existing five to six gallon flush toilets with the newer 1.6 gallons per flush toilets. The rebate program provides up to $50.00 per toilet. Additionally, city customer service and field personnel also periodically investigate water waste inquiries by performing reviews and audits of properties that experience leaks, in an effort to locate and repair leaks.

To promote the effective management of imported and local water supplies, the City's service area participates in MWD's and OCWD's Conjunctive Use Programs.[30] These programs help level out the extreme high summer and low winter demands on the import system by using imported water more effectively throughout the year. In particular, OCWD provides financial incentives to promote participation in this program and to encourage the construction of additional groundwater facilities. MWD's Long Term Seasonal Storage Program (SSP) is a conjunctive use program devoted to groundwater management, and encourages agencies such as Newport Beach to purchase import water from MWD at a reduced rate, with additional participation from OCWD. In turn, the discounted water from MWD would encourage retail agency members to develop local facilities for storing excess winter flows for subsequent use during low-flow, high-demand summer months. Terms of the SSP require local agencies to store the water, either directly in surface reservoirs and aquifers or indirectly by using the water in-lieu of existing groundwater pumping. Currently, the City uses the Big Canyon Reservoir to provide both emergency and peak-use water storage, the latter of which allows the City to use water in-lieu of groundwater from its wells.

Furthermore, the City implements urban water conservation practices throughout its service area, or Best Management Practices (BMPs), as included in the Memorandum of Understanding Regarding Urban Water Conservation in California (MOU) to ensure a reliable future water supply. Although the City is not a signatory to the MOU, the City participates in regional programs through the MWDOC. Table 3.2-7 provides an overview of the City's progress in the implementation of the current BMPs.

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[29] Newport Beach, City of. 2000. *Urban Water Management Plan*.

[30] Newport Beach, City of. 2000. *Urban Water Management Plan*.

Table 3.2-7 Best Management Practices

BMP#	Description	Newport's Conservation Programs	Compliance
1	Residential Surveys	Residential Survey Program	Yes
2	Residential Plumbing Retrofit	Showerhead Distribution	Yes
3	Distribution Water Audits		Yes
4	Metering with Commodity Rates		Yes
5	Large Landscape Programs and Incentives	Working with City staff on landscape training Protector Del Agua	Yes
6	High Efficiency Clothes Washer Rebates	Municipal Water District of Orange County (MWDOC) Program recently began in area	Yes
7	Public Information Program	Newsletter/Bill Inserts/Handouts Web page access to information Water Conservation Literature Water Awareness Month Celebration Water Facility Tour	Yes
8	School Education Programs	Water Education Material MWDOC Education Programs Poster/Slogan Program	Yes
9	Commercial, Industrial & Institutional (CII) Water Conservation	No Program in plan	No
10	Wholesale Agency Assistance Program	Not Applicable	N/A
11	Conservation Pricing	Flat rate—Looking at a possible tiered rate	No
12	Water Conservation Coordinator	One-half position	Yes
13	Water Waste Prohibition	Ordinance in place with water waste restrictions	Yes
14	Residential ULFT Replacement Program	Residential Ultra-Low Flush Toilet (ULFT) Replacement Program	Yes

SOURCE: City of Newport Beach, Urban Water Management Plan, 2000, Table 7-1, page 22.

Irvine Ranch Water District

Similar to the City, IRWD focuses on efforts that promote efficient water use through conservation programs, such as the Low Flush Toilet Program. In addition, IRWD has an ascending block rate structure, which means that the rate structure rewards conservation and penalizes water waste. Residential water allocations are based upon the number of residents in the home and the landscape square footage. Customers can accrue penalties on their water bill if their water use exceeds their water allocation. In addition, IRWD lists residential conservation tips on their website in an effort to reduce water waste.

Mesa Consolidated Water District

Mesa regularly implements programs for leak detection, water meter testing and replacement, residential conservation surveys, and pump efficiency. Mesa participates in water education programs and sponsors school water conservation projects. In addition, Mesa participates in a variety of water conservation programs including an Ultra-Low Flush Toilet rebate program, a Home Water Use Efficiency program, and also offers Residential Water Efficient Landscape classes. Further, Mesa works with local cities and communities to create water policies, which promote water conservation.

Recycled Water

City of Newport Beach

In 1999, the City began providing recycled water to their service area, provided by the OCWD from Fountain Valley as part of the District's Green Acres Project. The City annually purchases between 300 and 800 AF, or approximately 98 to 261 MG, of recycled water. The OCWD produces approximately 7.5 million gallons per day of tertiary treated, disinfected recycled water.[31] According to the City's 2000 Urban Management Plan, the City has approximately 10 miles of recycled distribution pipeline that currently supplies eight recycled use sites, among which includes the Newport Beach Country Club and Big Canyon Country Club.

The City has identified and approached all cost-effective end users in the City that could potentially use recycled water. According to the City's 2000 Urban Water Management Plan, the City has maximized opportunities for end users of recycled water and could only increase the number of users if a neighboring agency provided the reclaimed water and wheeled it to the City. However, in most areas, the cost to install mains and services would make the conversion very expensive or cost prohibitive. The City currently serves approximately 1,200 AF per year (AFY) of irrigation demand using potable water. However, in most cases these demands are located a long distance from the existing recycled system such that it is not cost effective to construct additional connections to the system.

To encourage and optimize the use of recycled water in the City's service area, a combination of financial incentives, city policies, staff assistance, and training opportunities have been implemented. The City currently subsidizes the use of recycled water by giving recycled users a 20 percent discount off potable water rates. It is also a policy of the City for recycled water to be used within the jurisdiction wherever its use is economically justified, financially and technically feasible, and consistent with legal requirements, preservation of public health, safety and welfare, and the environment. In addition, the City also has a Cross Control Connection Specialist who reviews on-site irrigation systems to verify that no cross connections have occurred between the potable and recycled water systems. Although no formalized training is provided to the end users of recycled water within the City due to the minimal amount of these users, the City's Cross Control Connection Specialist is available to provide hands-on training on an individualized basis and provide daily support as needed. In turn, the City provides annual training to the Cross Control Connection Specialist to ensure that current regulations and policies are being implemented in Newport Beach.

Irvine Ranch Water District

Currently, reclaimed water makes up 20 percent of IRWD's total water supply. The reclaimed water is delivered through a completely separate distribution system that includes more than 245 miles of pipeline, eight storage reservoirs, and twelve pump stations throughout IRWD's entire service area. Reclaimed water is currently used for toilet flushing in select facilities, approximately 1,000 acres of fields and orchards, and is also used to irrigate landscapes including parks, schools, golf courses, streetscapes, and open space managed by many community associations. In addition, many water features such as fountains are filled with reclaimed water. The IRWD recycled water program is

[31] Newport Beach, City of. 2000. *Urban Water Management Plan*

supervised by the California Department of Health Services and the Orange County Health Agency.[32]

Mesa Consolidated Water District

At the time of preparation of this section, limited information was available regarding Mesa's recycled water program. However, it is known that Mesa encourages commercial and industrial customers to use reclaimed water for greenbelt areas.[33]

REGULATORY CONTEXT

Federal Regulations

Clean Water Act

The Federal Clean Water Act (CWA) establishes regulatory requirements for potable water supplies including raw and treated water quality criteria. The City of Newport Beach would be required to monitor water quality and conform to the regulatory requirements of the CWA.

Safe Drinking Water Act

The Federal Safe Drinking Water Act (SDWA) established standards for contaminants in drinking water supplies. Maximum contaminant levels or treatment techniques were established for each of the contaminants. The listed contaminants include metals, nitrates, asbestos, total dissolved solids, and microbes.

State Regulations

Safe Drinking Water Act (1976)

California enacted its own Safe Drinking Water Act. CDHS has been granted primary enforcement responsibility for the SDWA. Title 22 of the California Administrative Code establishes CDHS authority and stipulates drinking water quality and monitoring standards. These standards are equal to or more stringent than the Federal standards.

Recycled Water Regulations

Within the State of California, recycled water is regulated by the U.S. Environmental Protection Agency (EPA), the State Water Resources Control Board, Regional Water Quality Control Boards, and DHS. The State Water Resources Control Board has adopted Resolution No. 77-1, Policy with Respect to Water Reclamation in California. This policy states that the State Board and Regional Boards will encourage and consider or recommend for funding water reclamation projects that do not impair water rights or beneficial instream uses. The CDHS establishes the recycled water uses allowed in the State, and designates the level of treatment (i.e., undisinfected secondary, disinfected secondary, or disinfected tertiary) required for each of these designated uses (Title 22, California Code of Regulations).

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[32] Irvine Ranch Water District, Website: http://www.irwd.com/Reclamation/Reclamation.html, accessed on January 27, 2004.

[33] Mesa Consolidated Water District, Website: http://www.mesawater.org/html/new_customer.htm, accessed on January 27, 2004.

The Regional Water Quality Control Boards implement the State Board's Guidelines for Regulation of Water Reclamation and issue waste discharge permits that serve to regulate the quality of recycled water based on stringent water quality requirements. The State Department of Health Services develops policies protecting human health and comments and advises on Regional Water Quality Control Board permits.

Title 22

The California Water Code requires the Department of Health Services (DHS) to establish water reclamation criteria. In 1975, the DHS prepared Title 22 to fulfill this requirement. Title 22 regulates production and use of reclaimed water in California by establishing three categories of reclaimed water: primary effluent, which typically includes grit removal and initial sedimentation or settling tanks; adequately disinfected, oxidized effluent (secondary effluent) which typically involves aeration and additional settling basins; and adequately disinfected, oxidized, coagulated, clarified, filtered effluent (tertiary effluent) which typically involves filtration and chlorination. In addition to defining reclaimed water uses, Title 22 also defines requirements for sampling and analysis of effluent and requires specific design requirements for facilities.

Local Regulations

City of Newport Beach Municipal Code

Chapter 14.16, Water Conservation, provides a mechanism for quickly imposing mandatory water conservation measures ranging from voluntary consumption reductions to measures that restrict water usage to the minimum necessary for basic human health and sanitation. The mandatory restrictions on water use, the prohibitions of activities that waste water as well as the penalties and surcharges provided by this chapter are the minimum controls necessary to insure adequate supplies of water are available now and in the future.

In addition, Chapter 14.17, Water-Efficient Landscaping, establishes reasonable procedures and standards for the design, installation, and maintenance of water-efficient landscapes in conjunction with new construction projects within the City to promote the conservation and efficient use of water within the City and prevent the waste of available water resources.

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Section 3.3 Wastewater System

3.3 WASTEWATER SYSTEM

This section describes the existing wastewater system in the Planning Area. Information for this section is based on the City's 1996 Master Plan of Sewers, Irvine Ranch Water District's Water Resources Master Plan, and conversations with the service providers.

EXISTING CONDITIONS

Service Providers

Wastewater service within the Planning Area is provided by the City, Irvine Ranch Water District (IRWD), and Costa Mesa Sanitation District (CMSD). Similar to the boundaries of the City's potable water system, the City generally provides sewer service to the northwestern portion of the Planning Area, including the areas of Banning Ranch and Newport Shores, for a total service area of approximately 13.5 square miles, as illustrated in Figure 3.3-1.[1]

The IRWD boundaries encompass nearly 85,019 acres, or 133 square miles, in southern central Orange County. IRWD is responsible for serving the southeastern portion of the Planning Area, which includes the areas of Newport Coast and Newport Ridge. In addition, IRWD serves a contiguous portion of land that parallels SR-73 at the northern boundary of the Planning Area that includes the East Santa Ana Heights area. IRWD's service area within the Planning Area is approximately 8.5 square miles, accounting for approximately six percent of IRWD's total service boundaries.

The CMSD boundaries encompass all of the City of Costa Mesa and portions of Newport Beach and unincorporated Orange County for a total service area of approximately 19 square miles. CMSD serves small portions of the western boundary of the Planning Area, including the areas of Bay Knolls and Emerson, also shown in Figure 3.3-1. CMSD serves approximately less than one-half square mile within the Planning Area, which accounts for approximately two percent of CMSD's total service boundaries.[2]

Treatment System

City of Newport Beach

Wastewater from the City's system is treated by the Orange County Sanitation District (OCSD). The OCSD is responsible for safely collecting, treating, and disposing the wastewater generated by 2.3 million people living in a 470-square-mile area of central and northwest Orange County. The two sewage water treatment plants operated by the OSCD include Treatment Plant No. 2 located in Huntington Beach, and Reclamation Plant No. 1 located in Fountain Valley.

A majority of the City's sewage flow is pumped to the OCSD Plant No. 2, while flows from the portion of the City north of the Corona del Mar (73) Freeway are pumped to Plant No. 1.[3] The OCSD Reclamation Plant No. 1 currently maintains a design capacity of 174 million gallons per day (mgd) and treats on average a flow of 90 mgd. Treatment Plant No. 2 maintains a design

[1] City of Newport Beach, Master Plan of Sewers, 1996.
[2] Costa Mesa Sanitary District, Administration, Assistant Manager, personal communication, January 27, 2004.
[3] City of Newport Beach, Master Plan of Sewers, 1996.

capacity of 276 mgd and currently treats on average a flow of 153 mgd. Currently Plant No. 1 and Plant No. 2 are operating at 52 percent and 55 percent of design capacity, respectively.[4] The OCSD wastewater treatment plants are divided into several operating systems that work together. The major processes are preliminary treatment, primary treatment, anaerobic digestion, secondary treatment, and solids handling.[5]

Wastewater treated by the OCSD is discharged into the ocean through a 120-inch-diameter ocean outfall pipe that extends 5 miles offshore to a discharge point 180 feet below the ocean surface.[6] The treatment levels meet all current State and Federal requirements. OCSD also reclaims up to 10 million gallons of treated wastewater every day, which is sent for further processing and then used for landscape irrigation and for injection into the groundwater seawater intrusion barrier.

Irvine Ranch Water District

Flows from the IRWD wastewater system are treated at the OCSD Reclamation Plant No. 1, Treatment Plant No. 2, or at the Michelson Water Reclamation Plant located in Irvine. The nominal, dry weather treatment capacity of the Michelson Water Reclamation Plant is 18.0 mgd. In 2001, average effluent flow into the plant was 14 mgd, thus, operating at approximately 78 percent of design capacity.[7] Wastewater collected at the plant undergoes tertiary treatment, which is commonly defined as advanced cleaning that goes beyond the secondary or biological stage, removing nutrients such as phosphorus, nitrogen, and most biological oxygen demand and suspended solids.

Costa Mesa Sanitary District

CMSD sewer lines are tributary to the OCSD treatment plants, and thus, similar to the City, wastewater from the CMSD system is treated by the OCSD.[8] See the above referenced discussion for additional information regarding the OCSD treatment system.

Collection System

City of Newport Beach

The existing collection system for the City of Newport Beach consists of over 200 miles of gravity and force flow sewer mains, varying in size from 2 to 42 inches in diameter, also shown in Figure 3.3-1. Residential and commercial wastewater collected by the City's wastewater collection system is transported, using a system of 20 pump stations, for treatment to the OCSD.[9] In addition, OCSD trunk sewers and force mains also receive sewage flows from Newport Beach sewers at many locations throughout the City.[10] The OCSD trunk sewers, which vary in size from 18 to 42 inches in diameter, substantially reduce the size and number of sewers needed to be built and operated by the City. The OCSD also operates seven pump stations in the City of Newport Beach as follows:

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[4] City of Huntington Beach, Lowe's Home Improvement Warehouse/Northeast Corner of Beach and Warner Project EIR (http://www.ci.huntington-beach.ca.us/files/users/planning/IV_L_3_UTILS_Sewer.pdf), 2003.

[5] Orange County Sanitation District, Treating Wastewater, Webpage: http://www.ocsd.com/info/treating_wastewater/default.asp, 2004.

[6] City of Newport Beach, Urban Water Management Plan, 2000.

[7] Irvine Ranch Water District, Water Resources Master Plan., adopted 2000, most recently updated in 2003, p. 4-4.

[8] Costa Mesa Sanitary District, Sewer System Management Plan, July 19, 2002.

[9] City of Newport Beach, Draft Coastal Land Use Plan, 2003.

[10] City of Newport Beach, Master Plan of Sewers, 1996.

Figure 3.3-1 Wastewater Infrastructure

Fig p.2 (11x17)

- Bitter Point Pump Station (Service Area D0)
- Lido Pump Station (Service Area F0)
- 14th Street Pump Station (Service Area F0)
- A Street Pump Station (Service Area F0)
- Rocky Point Pump Station (Service Area G0)
- Bay Bridge Pump Station (Service Area L0)
- MacArthur Pump Station (Service Area M0)

Irvine Ranch Water District

The existing collection system for the IRWD sewer system consists of gravity and force flow sewer mains. The wastewater collected by the IRWD collection system from the Planning Area is delivered via a system of pump stations for treatment at the Michelson Water Reclamation Plant in Irvine, or the OCSD's Reclamation Plant No. 1 or No. 2.[11]

Costa Mesa Sanitation District

The existing collection system for the CMSD sewer system consists of sewer mains, manholes, laterals, pumping stations and pressurized sewer lines (force mains).[12]

Maintenance

City of Newport Beach

As a part of the City's Sewer System Management Plan (SSMP), which covers the City's service area, the City's Utilities Department follows a defined Sewer Master Plan to replace or reline older wastewater lines.[13] The City also uses remote cameras in sewer lines to look for pipe cracks, root intrusion, and grease buildup to assist in prioritizing the line replacement program. In addition, the City's Sewer Master Plan includes upgrades of its pump stations, including replacing pump stations with gravity systems where possible to prevent plumbing failures associated with pump stations, which can result in sanitary sewer overflows (SSOs). The upgraded pump stations also include spill-warning systems with multiple communication methods (radio, telephone, pager, and direct line to the City's Utilities yard) to inform Utilities staff of any malfunction.

Irvine Ranch Water District

IRWD routinely monitors the wastewater that flows through its sewer system, watching for any illegal substances such as chemicals or improperly pre-treated industrial waste that could cause an upset of the delicate biological process used at the Michelson Water Reclamation Plant.[14]

Costa Mesa Sanitary District

Currently, the CMSD cleans the sewer system once a year, which is the industry standard for agencies with comprehensive sewer maintenance programs. Areas that need more frequent cleaning,

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[11] Michael Hoolihan, Irvine Ranch Water District, personal communication, December 17, 2003.

[12] Costa Mesa Sanitary District, Sewer System Management Plan, July 19, 2002.

[13] City of Newport Beach, Draft Coastal Land Use Plan, 2003.

[14] Irvine Ranch Water District, website: http://www.irwd.com:8090/waterquality/hmc.html, accessed January 27, 2004.

also known as hot spots, are cleaned as frequently as once a week. The CMSD has two sewer cleaning trucks, each with a two-man crew that do the daily cleaning of the gravity sewer lines. In addition, the CMSD has a pumping station maintenance program.[15]

Planned Improvements and Existing Deficiencies

City of Newport Beach

Based on information from the Master Plan of Sewers dated August 1996, portions of the City's existing collection system are in need of improvement or replacement. The Plan indicated that approximately 7,500 linear feet of sewers at four locations within the City would be Priority "A" design and construction work, and would be commenced within three years. In addition, approximately 3,100 linear feet of sewer on San Joaquin Hills Road and Marguerite was identified as Priority "B," with design and construction work to be undertaken within the next five to seven years. Priority "C" projects were also identified that would be undertaken beyond seven years from the date of the Plan on an as-needed basis. The remaining sewer deficiencies within the City were further classified as Priority "D" projects, which would likely never be required despite their inability to meet strict theoretical design capacity requirements.

The City's pumping system was also reviewed and was generally found to have adequate capacity. However, some pump cycling problems were identified that required operational adjustments. In addition, problems were also identified associated with aging pumping mechanical works, controls, and structures. The Master Plan of Sewers indicated that pump station upgrades would be required for twenty-one of the City's twenty-four pump stations, and would be considered as Priority "A" projects.

The remaining sewer collection system deficiencies identified in the City by the Master Plan of Sewers are summarized below:

- Approximately 9,500 linear feet of 8- and 10-inch-diameter unlined concrete sewers that need to be replaced
- Approximately 6,300 linear feet of welded steel sewers that need to be replaced
- Manhole replacement at nineteen locations to enable proper maintenance procedures to be followed, and manhole replacements at an additional twenty-eight sites where gaseous conditions have corroded interior unlined manhole surfaces
- Approximately 1,000 feet of sewer with failed pipe joints that need to be repaired
- Approximately 10,600 linear feet of sewer in need of tree root removal

The Plan further recommended the implementation of a television inspection program that would involve video inspection of five to 10 percent of the sewage system per year, followed up by any required remedies.

Irvine Ranch Water District

Currently, there are no deficiencies or planned improvements for the existing wastewater system owned and operated by IRWD within the Planning Area.[16]

[15] Costa Mesa Sanitary District, Sewer System Management Plan, July 19, 2002.

Costa Mesa Sanitary District

The CMSD Sewer Master Plan Update contains a list of each project identified as necessary, to increase the capacity of portions of the system. Currently in CMSD's service area within the Planning Area, no improvements are required in the near future, and long-term improvements will be planned according to development and metered sewer flows.[17]

REGULATORY SETTING

Federal Regulations

National Pollution Discharge Elimination System (NPDES) Permits

The NPDES permit system was established in the Clean Water Act (CWA) to regulate both point source discharges (a municipal or industrial discharge at a specific location or pipe) and nonpoint source discharges (diffuse runoff of water from adjacent land uses) to surface waters of the United States. For point source discharges, such as sewer outfalls, each NPDES permit contains limits on allowable concentrations and mass emissions of pollutants contained in the discharge.

Disposal of Biosolids

Title 40 of the Code of Federal Regulations (CFR) Part 503, Title 23 California Code of Regulations, and standards established by the CVRWQCB regulate the disposal of biosolids.

REFERENCES

City of Costa Mesa, Sewer System Management Plan, 2002.

City of Huntington Beach, Lowe's Home Improvement Warehouse/Northeast Corner of Beach and Warner Project EIR (http://www.ci.huntington-beach.ca.us/files/users/planning/IV_L_3_ UTILS_Sewer.pdf), 2003.

City of Newport Beach, Draft Coastal Land Use Plan, 2003.

City of Newport Beach, Master Plan of Sewers*,* 1996.

City of Newport Beach, Urban Water Management Plan*,* 2000.

Michael Hoolihan, Irvine Ranch Water District, personal communication, December 17, 2003.

Irvine Ranch Water District, Water Resources Master Plan.*,* adopted 2000, most recently updated in 2003, p. 4-4.

Irvine Ranch Water District, Webpage: http://www.irwd.com:8090/waterquality/hmc.html, accessed January 27, 2004.

[16] Michael Hoolihan, Irvine Ranch Water District, personal communication, December 17, 2003.

[17] Costa Mesa Sanitary District, Sewer System Management Plan, July 19, 2002, page 31.

Orange County Sanitation District, Treating Wastewater, Webpage: http://www.ocsd.com/info/treating_wastewater/default.asp, 2004.

Section 3.4 Storm Drain System

3.4 STORM DRAINAGE

This section discusses the storm drain systems within the Planning Area that are maintained by the City of Newport Beach and Orange County. Information for this section is based on the City of Newport Beach 2000 Storm Drain Master Plan, the City's 2003 Hazards Assessment Study, previous environmental documents that have been prepared for the Planning Area, and conversations with the providers.

EXISTING CONDITIONS

Generally, the City provides storm drain service to the entire Planning Area, including the areas of Emerson, Bay Knolls, and Santa Ana Heights, as well as the recently annexed areas of Newport Coast and Newport Ridge. Currently, Banning Ranch contains no development, but if annexed, the City intends to serve this area. Orange County maintains the regional drainage facilities in the Planning Area, including the Santa Ana River, San Diego Creek, and Buck Gully.

City of Newport Beach

The existing storm drain system owned and operated by the City of Newport Beach consists of pipelines, catch basins, manholes, tide valves, open channels, and retention basins located throughout the system. Pipelines range from three to 120 inches in diameter, and are constructed of materials such as reinforced concrete, corrugated metal, plastic, ductile iron, steel, clay, and asbestos cement. Location of the existing storm drain infrastructure is shown in Figure 3.4-1. Some segments of the system are over 50 years old, while other segments have been recently constructed.[1]

The City of Newport Beach's storm drain system is characterized by two distinctly different geographical areas. The upland areas, generally inland of Coast Highway, have drainage characteristics similar to other coastal plain communities in Orange County. The low-lying areas, below Coast Highway, such as the Balboa Peninsula, Newport Island, and Balboa Island, are very flat and are affected by ocean tides.[2] A system of bayfront bulkheads and tide valves (gates) on storm drain outlets to Newport Bay are in place to protect these low lying areas from flooding due to high tides. The City has installed 6- to 36-inch-diameter tide valves on eighty-nine storm drain outlets to Newport Bay to prevent seawater from backing through the storm drain pipes during high tide events.[3] Of the eighty-nine tide valves, nine are operated by an electric motor that open and close the valves while the remaining valves are manually operated. The valves must be closed when the tide elevation reaches street elevations at each installation. When the tidal elevation drops below street elevation, the gates are reopened. When rain occurs simultaneously with a high tide and the tide gates are closed, stormwater cannot be released until the tide has dropped sufficiently to open the tide gates. As a result, urban runoff is in effect dammed by these tide valves and the low-lying streets in the City can become inundated. In order to minimize this problem, portable and stationary pumps are used to discharge urban runoff collected at street ends into the bay and/or ocean. Overall, urban street flooding is rarely considered a problem in the City of Newport Beach.[4]

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[1] Newport Beach, City of. 2000. *Storm Drain Master Plan*, July.

[2] Newport Beach, City of. 2000. *Storm Drain Master Plan*, July.

[3] Newport Beach, City of. 2000. *Storm Drain Master Plan*, July.

[4] Newport Beach, City of. 2003. *Hazards Assessment Study*, July.

The City's storm drain system also includes three retarding basins. The Koll Center retarding basin is located in north of SR-73, while the Farallon/El Paseo retarding basin is located between Avocado Street and MacArthur Boulevard, near Fashion Island. The Harbor View retarding basin is located between Corona del Mar and San Joaquin Hills Road. The purpose of these three retarding basins is to reduce the flow rate within the respective downstream storm drain systems so that older, possibly undersized, downstream facilities will be able to carry the discharge from new development areas upstream.[5]

Existing Deficiencies and Proposed Upgrades

Inspections of the City's drainage system and, in particular, problem areas where street flooding occurred during the 1997/98 El Nino winter storm season have been conducted, as outlined in the City's Storm Drain Master Plan. It is important to note that this plan does not evaluate the existing storm drain system in recently annexed areas such as Newport Coast, Newport Ridge, Bay Knolls, and Santa Ana Heights. The Master Plan also conducted hydrologic and hydraulic analyses of the entire City to determine the necessary structural upgrades for the City's storm drain system. Upgrades were deemed necessary by the plan where a storm drain that collected runoff at on-grade catch basins overflowed during a 10-year storm event, while upgrades were necessary where storm drain pipes that carried runoff collected at a sump overflowed during a 25-year storm event. In addition, existing streets that could not contain the peak runoff during a 100-year storm event within their street right-of-way were also designated for structural upgrades by the plan. Most of the proposed upgrades recommended in the City's Storm Drain Master Plan are the result of increased imperviousness in drainage areas due to development since the design of the original system and the more conservative design criteria contained in the current Orange County Hydrology Manual.

Three types of upgrades are proposed for the City's storm drain system: Priority A, operational upgrades; Priority B, material upgrades; and Priority C, Hydraulic Upgrades. Operational upgrades include projects that are assumed to be of the highest priority due to occasional flooding. Material upgrades consist of upgrades to the drainage systems with known physical constraints and identified drainage system deterioration. Lastly, the hydraulic upgrades include upgrades for drainage systems with calculated capacity that does not meet current Orange County Hydrology Manual criteria for design level storm events. The total estimated cost of the recommended improvements is approximately $18.5 million.

Additionally, according to the Master Plan, approximately 35,000 linear feet of the storm drain system and the street capacity at thirteen scattered locations within the City's service area required upgrades to their drainage and flow capabilities. In addition, approximately 24,000 feet of the storm drain system required upgrading due to their existing pipe size (less than 18 inches in diameter), pipe material (steel or corrugated metal pipe), and structures. Citywide inlet and structural improvements, located in the City's low-lying areas, are required.

With respect to the Newport Coast and Newport Ridge areas that were annexed in 2002, any development that occurred or began prior to this time was the responsibility of the County of Orange. Thus, those developments meet County regulations for adequate storm drain infrastructure, although any future improvements would be the responsibility of the City. In addition, any new development that occurred within these areas after annexation, are subject to City requirements. These new developments are planned communities where infrastructure was designed to adequately

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[5] Newport Beach, City of. 2000. *Storm Drain Master Plan*, July.

Figure 3.4-1 Storm Drainage Infrastructure

Fig p.2 (11x17)

serve these uses, and thus, do not have any existing deficiencies at this time.[6] As such, there are no proposed upgrades to the existing infrastructure in the Newport Coast and Newport Ridge areas.

Orange County

The Orange County Public Facilities & Resources Department (PFRD) provides, operates, and maintains public facilities and regional resources for the residents of Orange County. PFRD operates and maintains flood control channels, dams, retarding basins, pump stations, and other flood control infrastructure that the Department designs and constructs.[7] Specifically, within the Planning Area, PFRD is responsible for maintaining the regional drainage facilities such as the Santa Ana River, San Diego Creek, and Buck Gully.

REGULATORY CONTEXT

Federal Regulations

NPDES Phase I (General Construction Activity Stormwater Permit)

Phase I of the NPDES Program addresses stormwater runoff from "medium" and "large" municipal separate storm sewer systems (MS4s) generally serving populations of 100,000 or greater; construction activities disturbing five acres of land or greater; and ten categories of industrial activities. With respect to the disturbance of five acres of land or greater from construction activities, the State Water Resources Control Board (SWRCB) issued one statewide General Construction Activity Stormwater Permit (on August 20, 1992) to apply to all construction activities. Landowners are responsible for obtaining and complying with the permit, but may delegate specific duties to developers and contractors by mutual consent. For construction activities, the permit requires landowners, or their designated agent, to

- Eliminate or reduce nonstormwater discharges to stormwater systems and other waters of the United States
- Develop and implement a Stormwater Pollution Prevention Plan
- Perform inspections of stormwater control structures and pollution prevention measures

A Stormwater Pollution Prevention Plan (SWPPP) prepared in compliance with the Permit describes the site, erosion and sediment controls, runoff water quality monitoring, means of waste disposal, implementation of approved local plans, control of post-construction sediment and erosion control measures and maintenance responsibilities, and nonstormwater management controls. Dischargers are also required to inspect construction sites before and after storms to identify stormwater discharge from construction activity, and to identify and implement controls where necessary.

NPDES Phase II

New NPDES Phase II stormwater regulations were finalized and issued by the EPA in January 2000 in an effort to continue to preserve, protect, and improve the nation's water resources from polluted stormwater runoff. These new regulations are designed to implement programs to control urban

[6] Fong Tse, City of Newport Beach Public Works Dept., personal communication, January 14, 2004.
[7] Orange County PFRD website, http://www.ocpfrd.com/bp03_exesum.asp, January 14, 2004.

stormwater runoff from additional MS4s in urbanized areas and the operations of small construction sites that were not already covered by Phase I NPDES permits. The main objectives of the Phase II regulations are to reduce the amount of pollutants being discharged to the maximum extent practicable and protect the quality of the receiving waters. The City's MS4 permit is extensive in its obligation to keep waterways clean by reducing or eliminating contaminants from stormwater and dry-weather runoff. MS4 permits require an aggressive water quality ordinance (Chapter 14.36 of the City's Municipal Code, as discussed below), specific municipal practices to maintain City facilities, and the use of best management practices (as discussed below).

To meet the goal of the Phase II regulations, the permittee must implement a Stormwater Management Program that addresses six minimum control measures, including (1) public education and outreach, (2) public participation/involvement, (3) illicit discharge detection and elimination, (4) construction site stormwater runoff control for sites greater than 1 acre, (5) post-construction stormwater management in new development and redevelopment, and (6) pollution prevention/good housekeeping for municipal operations. These control measures will typically be addressed by developing Best Management Practices (BMPs), which is defined by the EPA as a "Technique, measure or structural control that is used for a given set of conditions to manage the quantity and improve the quality of the stormwater runoff in a cost effective manner." For additional information on the BMPs the City implements, refer to Local Regulations, below.

State Regulations

Basin Plans

Responsibility for the protection of water quality in California rests with the SWRCB and nine Regional Water Quality Control Boards (RWQCB). The SWRCB establishes statewide policies and regulations for the implementation of water quality control programs mandated by Federal and State water quality statutes and regulations. The RWQCBs develop and implement Water Quality Control Plans (Basin Plans) that consider regional beneficial uses, water quality characteristics, and water quality problems.

The Planning Area lies within the jurisdiction of the Santa Ana RWQCB, which regulate surface water quality in the Planning Area. The SARWQCB prepares Basin Plans (water quality objectives for major drainage areas containing numerous local watersheds) that establish implementation programs to protect beneficial uses of water, and does not permit wastewater discharges to degrade water quality to the point where beneficial uses would be adversely affected.

Local Regulations

Orange County Drainage Area Management Plan & BMPs

Newport Beach, along with the other cities in Orange County, has a joint stormwater permit. The Drainage Area Management Plan (DAMP) describes the Orange County Stormwater Program, and is the principal policy and guidance document for this program. Through the DAMP, Newport Beach continues to improve existing stormwater quality management practices, as well as develop and implement stormwater pollutant control programs that are described in the DAMP. Program elements of the DAMP include various BMPs designed to help businesses, contractors, residents, etc., prevent and control the contribution of pollutants to the storm drain system and eventually receiving waters, such as the ocean. BMPs are used for construction activities, new development and significant redevelopment activities, industrial and commercial business activities, residential activities, and common interest area/homeowner association activities.

All construction projects regardless of size are required, at a minimum, to implement an effective combination of erosion and sediment controls and waste and materials management BMPs. Erosion control measures could include physical or vegetative stabilization to reduce erosion for exposed slopes, and wind erosion controls to prevent dust nuisance. Sediment controls include perimeter protection, storm drain inlet protection, resource protection, sediment capture, velocity reduction, and off-site sediment tracking. Waste management BMPs that must be implemented for handling, storing, and disposing of wastes generated by a construction project to reduce or prevent the release of waste materials into stormwater discharges include measures such as, spill prevention and control, solid waste management, hazardous waste management, contaminated soil management, and vehicle and equipment cleaning measures. Materials management BMPs reduce or prevent the contamination of stormwater from construction materials by covering and/or providing secondary containment of storage areas and/or by taking adequate precautions when handling materials. Non-stormwater management BMPs limit or reduce potential pollutants at their source before they are exposed to stormwater. These BMPs are referred to as “good housekeeping practices” that involve day-to-day operations of the construction site and are usually under the control of the contractor. Examples of such BMPs include water conservation practices, dewatering operations, and vehicle and equipment cleaning.

BMPs associated with new development and significant redevelopment activities include source control BMPs such as site design and landscape measures, roof runoff controls, efficient irrigation, storm drain signage, pervious pavements, and alternative building materials. In addition, treatment control BMPs such as infiltration basins, retention irrigation, constructed wetlands, and vegetated swales; and manufactured BMPs such as media filters and drain inlets are occasionally recommended.

Examples of existing development BMPs for industrial and commercial, residential, and common interest area/homeowner association activities include measures such as building and landscape maintenance, automobile repair and maintenance, disposal of waste, water conservation, street sweeping, and drainage system operation and maintenance activities.

Water Quality Management Plan

The City of Newport Beach requires all new development and significant redevelopment projects to prepare and submit a Project Water Quality Management Plan (WQMP) to the City for review and approval. Prior to issuance to grading or building permits, the City requires the project applicant to have an approved final Project WQMP. In addition, all Priority Projects require treatment control BMPs. The City will utilize a checklist to document the identification of a project as a Priority Project or a Non-Priority Project.

City of Newport Beach Municipal Code

Chapter 14.36, Water Quality, provides regulations governing compliance with Federal requirements for the control of urban pollutants to stormwater runoff, which enters the network of storm drains throughout Orange County, in order to improve water quality throughout the City.

In addition, Section 19.28.080 of Chapter 19.28, Subdivision Improvements, sets forth storm drain guidelines such as drainage improvements, drainage capacity, drainage fees, drainage easements, and flood protection measures that are required by the City.

Further, Section 20.44.075 provides for public improvements, including drainage system improvements, identified as needed for the area in the County's Santa Ana Heights Specific Plan, the precursor to the current City of Newport Beach Specific Plan.

REFERENCES

Newport Beach, City of. 2000. *Storm Drain Master Plan*, July.

Newport Beach, City of. 2003. *Hazards Assessment Study*, July.

Section 3.5 Solid Waste

3.5 SOLID WASTE

This section describes existing solid waste management and resource recovery systems for the Newport Beach Planning Area. In addition, a discussion of current local and regional policy regarding the collection and disposal of solid waste is provided. Information for this section is based on the City's Resource Allocation Plan, Source Reduction and Recycling Element, Household Hazardous Waste Element, data from the Integrated Waste Management Board, and conversations with City staff.

EXISTING CONDITIONS

The majority of residential solid waste generated in the City of Newport Beach is collected by city staff and transported to a City-owned transfer station. Refuse is then consolidated and transported to a materials recovery facility where recycling materials are then sorted from refuse by machines and other methods. The remaining solid waste is then taken to one of three County landfills. Details regarding waste haulers, transfer stations, recycling facilities, and landfills are provided below.

Located outside of the City boundaries, Banning Ranch is currently undeveloped. If annexed, the City would serve this area; however, solid waste would be collected by private contractors and taken to materials recovery facility with residual waste deposited in a county landfill, a private processing facility or a landfill owned by the Orange County Integrated Waste Management Department.

Solid Waste Haulers

Newport Beach Municipal Code 12.63.030 states that no person shall provide commercial solid waste handling services or conduct a solid waste enterprise in the City without having been awarded a non-exclusive solid waste franchise and entering into an agreement with the City. As part of its franchise agreement, all solid waste haulers that serve the City are prohibited from transporting any waste, residential, commercial, or industrial, outside of County limits.[1]

The Refuse Division of the City General Services Department collects refuse from the majority of single-family homes and some multi-family complexes within the City.[2] The remaining residential refuse is served by eight licensed and franchised commercial solid waste haulers, and include the following:

- Federal Disposal in Santa Ana
- Rainbow Disposal in Huntington Beach
- CR&R in Stanton
- Ware Disposal in Newport Beach
- Briggeman Disposal Services in Anaheim
- Waste Management of Orange County in Santa Ana
- Key Disposal in Montebello
- EZ Disposal in Fountain Valley

[1] Jeremy Hammond, personal communication, September 24, 2003

[2] Jeremy Hammond, personal communication, September 16, 2003

There are a number of licensed and franchised construction and demolition debris solid waste haulers that also serve the City. These include the following:

- American Wrecking, Inc. in South El Monte
- Greenleaf Grading Company in Huntington Beach
- Kevin Ray Demolition in Brea
- The Lane Company in Santa Ana
- Tight Quarters, Inc. in Santa Ana
- West Coast Land Clearing , Inc. in Long Beach
- Cousyn Grading and Demolition in Costa Mesa
- Roche Excavating in Santa Ana
- Tim Greenleaf Engineering in Huntington Beach
- Southern California Environmental in Lake Forest
- Pacific Earthworks in Dana Point
- Trojan Portable Services in Los Angeles
- Thomas Demolition in Lawndale (Newport Beach, General Services website, 2003, 16 September)

Transfer Stations

Transfer stations are facilities where refuse is sorted from recyclable material, and the residue is then transported to landfills that serve the residents of the County of Orange. As shown in Figure 3.5-1, there are six active, large volume transfer processing facilities that serve the City. All are sorting and recycling facilities, with the exception of the City of Newport Beach Transfer Station, and include the following:

- Stanton Transfer and Recycling Center #8
  11232 Knott Avenue, Stanton, CA 90680
- Rainbow Recycling/Transfer Station
  17121 Nichols Street, Huntington Beach, CA 92647
- Consolidated Volume Transporters
  1131 Blue Gum Street, Anaheim, CA 92806
- Sunset Environmental Inc. Transfer Station and Resource Recycling Facility
  16122 Construction Circle West, Irvine, CA 92606
- Waste Management of Orange (Owner of the Sunset Environmental Transfer Station)
  2050 North Glassell, Orange, CA 92865
- City of Newport Beach Transfer Station
  592 Superior Avenue, Newport Beach, CA 92663

Landfills

As shown in Figure 3.5-1, there are three landfills in Orange County that currently serve the City of Newport Beach. Located at 1942 North Valencia Avenue in the City of Brea, the Olinda Alpha Sanitary Landfill is approximately 667 acres in size, with 420 acres used for waste disposal. The permitted daily maximum of solid waste received is 8,000 tons, while the daily average demand is

Figure 3.5-1 Solid Waste Facilities

Fig p.2 (11x17)

7,000 tons. The annual capacity filled is 2,450,480 tons, with a remaining refuse capacity of 23,850,000 tons. The landfill is expected to close in 2013.[3]

Located at 32250 La Pata Avenue in the City of San Juan Capistrano, the Prima Deshecha Sanitary Landfill is approximately 1,530 acres in size with 1,000 acres used for waste disposal. The landfill's daily average demand is 4,000 tons. The annual capacity filled is 762,317 tons, and the landfill's remaining refuse capacity is 42,790,000 tons. Its closure date is estimated to be December 2040. Both the Olinda Alpha and Prima Deshecha Landfills accept municipal solid waste from commercial haulers and the public.[4]

Frank R. Bowerman Sanitary Landfill is located at 11002 Bee Canyon Access Road in Irvine. This landfill accepts only municipal solid waste from commercial haulers and vehicles operating under commercial status. At approximately 725 acres in size, this landfill has 326 acres that is used for waste disposal. The permitted daily maximum of solid waste is 8,500 tons, while the daily average demand is 7,651 tons. The annual capacity filled is 2,151,000 tons. With an expected closure date of 2024, the landfill has a remaining capacity of 49,170,000 tons.[5]

From the first quarter of 2002 through the first quarter of 2003, Newport Beach deposited approximately 104,027 tons of waste at the Frank R. Bowerman landfill. During the same period, the City deposited approximately 5,492 tons of waste at the Olinda Alpha Landfill, and approximately 6,831 tons of waste at the Prima Deshecha Landfill.[6]

Waste Stream Diversion

In 2001, Newport Beach diverted 49.5 percent of its overall solid waste stream. The City has one composting facility, five recycling programs, and six programs specializing in source reduction. In 2000, 126,738 tons of solid waste generated in Newport Beach were landfilled or buried at the following county facilities: Arvin Sanitary Landfill (Kern), Fontana Refuse Disposal Site (San Bernardino), Frank R. Bowerman Sanitary Landfill (Orange), Olinda Alpha Sanitary Landfill (Orange), Prima Deshecha Sanitary Landfill (Orange), Simi Valley Landfill-Recycling Center (Ventura).[7]

Waste Reduction Programs

Recycling Programs

Newport Beach recycles an estimated 38 percent of the residential waste stream, as well as 100 percent of the concrete, asphalt, and green and brown wastes generated by City operations. The City recycling program is part of the waste collection process. All residential wastes are collected together. Since the early 1990's the City has partnered with CR&R to recycle the City's residential waste. Following collection, the waste is transferred to a materials recovery facility in Stanton where the recyclables are extracted from the waste stream manually and mechanically. This process eliminates the need for additional containers and separate collection pick-ups.[8]

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[3] IWMB website 2003, September 11, 2003.

[4] IWMB website, September 11, 2003.

[5] Susan Amirhosseini, personal communication, 2003

[6] Susan Amirhosseini, personal communication, 2003

[7] IWMB website, September 11, 2003.

[8] City of Newport Beach website, 2003.

The City's nonexclusive solid waste franchise program requires all commercial haulers to recycle at least 50 percent of the waste they collect from Newport Beach. The City's landscape, turf maintenance, and tree trimming contractors are also required to recycle 100 percent of the waste generated from their operations. The City purchases compost and mulch made from these recycled materials. However certain items cannot be placed in general refuse for collection. These include beverage containers, used oil and oil filters, and household hazardous waste.

Beverage Container Recycling

The Department of Conservation, Division of Recycling administers the California Beverage Container Recycling and Litter Reduction Act enacted in 1986. It provides a number of services to achieve those goals, including enforcement, auditing, grant finding, technical assistance, and education. Consumers pay CRV (California Refund Value) when they purchase beverages from a retailer reimbursed when they redeem the container at a recycling center. As shown in Figure 3.5-1, the following facilities operate CRV redemption centers:

- Ralph's, 2555 Eastbluff Drive, Newport Beach, CA 92660
- Vons, 185 E. 17th Street, Costa Mesa, CA 92627
- Ralph's, 380 E. 17th Street, Costa Mesa, CA 92627
- ASOCC Recycling Center, 2701 Fairview Boulevard, Costa Mesa, CA 92626

Used Oil and Oil Filters

The City has obtained a used oil-recycling grant. The funds are used to provide oil-recycling options to local residents. The General Services Department Administrative Division oversees the recycling of these materials, and can direct residents to one of six local drop sites in the City, as shown in Figure 3.5-1 and below:

- Superformance, 3767 Birch Street, Newport Beach, CA 92660
- Newport Coast Chevron, 1550 Jamboree Road, Newport Beach, CA 92660
- Jiffy Lube, 1520 W. Coast Hwy., Newport Beach, CA 92663
- Grahm's 76, 2690 San Miguel, Newport Beach, CA 92660
- Newport Landing Fuel Dock, 503 E. Edgewater, Newport Beach, CA 92661
- Grease Monkey, 2230 S.E. Bristol, Newport Beach, CA 92660

Household Hazardous Waste Programs

There are a number of facilities in County of Orange where residents can safely dispose of materials such as paint, wood preservatives, batteries, auto products, motor antifreeze, household chemicals, and other hazardous substances. These include The Huntington Beach Regional Collection Center, located at 17121 Nichols in Huntington Beach, and the Irvine Regional Collection Center at 6411 Oak Canyon in Irvine, as shown in Figure 3.5-1.

Generation Rates

According to the City's Source Reduction and Recycling Element, which analyzes all solid waste in the City, the residential waste stream composes 19.4 percent of the total waste stream while the industrial and commercial sector each account for 40.3 percent of the waste stream.[9]

The City uses the following generation rates for solid waste:[10]

1. Commercial daily disposal (tons per day): 201
2. Residential daily disposal (lbs. per resident per day): 2.1
3. Industrial daily disposal (tons per day): 201

Improvements to Solid Waste Facilities

All future facilities expansion is currently dependent upon the "Regional Landfill Options for Orange County" (RELOOC) Study being undertaken by the Orange County Integrated Waste Management Department (IWMD). RELOOC is a 40-year strategic plan that will examine options for trash disposal in Orange County. The IWMD is in the process of conducting the environmental review of the RELOOC Strategic Plan as directed by the Board of Supervisors on May 21, 2002. Closure dates for the three landfills that serve Newport Beach may be subject to change, depending upon whether or not the Orange County Board of Supervisors approves the Study.[11] The RELOOC program was created to ensure that the waste generated by the County is properly disposed of and that the County's future disposal needs can be adequately met. The stated goals of RELOOC are as follows:[12]

- To have a feasible, balanced and flexible 40-year strategic plan approved and ready for implementation by 2004 that addresses Orange County's solid waste disposal and capacity needs,
- To protect Orange County's public health, safety, and environment,
- To sustain the economic vitality of the Orange County's solid waste disposal system by ensuring consistent and reliable features and adequate revenue to maintain efficient, cost effective, and high quality operations,
- To provide a fair, objective, open planning process that is presented in nontechnical, easily understood terms, responsive to and involves stakeholders and the public, and results in public understanding.

[9] Jeremy Hammond, personal communication, October 8, 2003.
[10] Jeremy Hammond, personal communication, October 8, 2003.
[11] Susan Amirhosseini, personal communication, 2003
[12] IWMB website, September 16, 2003.

REGULATORY CONTEXT

State Regulations

Assembly Bill 939

The State Legislature, through Assembly Bill 939, The California Integrated Waste Management Act of 1989, mandated that all cities and counties prepare, adopt, and submit a comprehensive solid waste management plan to the county. The plan must address and detail each individual community's efforts and intended policies in the areas of waste characterization, source reduction, recycling, composting, solid waste facilities, education/public information, funding, special wastes, and hazardous wastes. The law also mandates that communities meet certain specific identified targets for percentages of waste reduction and recycling over specific identified targets for percentages of waste reduction and recycling over specified time periods (25 percent by 1995 and 50 percent by the year 2000.)

Local Regulations

City of Newport Beach Municipal Code

In order to fulfill the requirements of the State mandate, the City of Newport Beach has a number of City ordinances related to solid waste management. The City Municipal Code, Section 12.63.030, (Ord. 95-63 § 1 (part), 1995) requires businesses that provide commercial solid waste handling services in City limits to obtain a franchise in order to operate. The ordinance states that because State law requires the City to substantially reduce the amount of solid waste it sends to landfills, and the City is required to report to the State the amount of materials diverted from landfills in compliance with State law, the City must be able to regulate the collection of solid waste from residential and commercial premises through the requirements of a franchise.

Section 20.60.090 of the City Municipal Code contains an ordinance on recyclable materials. This section establishes a comprehensive set of regulations and guidelines regarding the requirement for specific areas for collecting and loading recyclable materials in certain developments in the City.

REFERENCES

Newport Beach, City of. 2003. Newport Beach CA Municipal Code. Website: http://ordlink.com/codes/newportb/index.htm, 23 September.

Newport Beach, City of. 2003. Personal communication with Jeremy Hammond, General Services Division, 16 September.

Newport Beach, City of. 2003. Personal communication with Jeremy Hammond, General Services Division, 24 September.

Newport Beach, City of. 2003. Resource Allocation Plan, Fiscal Year 2003–2004, July.

Newport Beach, City of. 2003. Licensed and Franchised Commercial Solid Waste Haulers. Website: http://www.city.newport-beach.ca.us/GSV/Frachised%20Haulers.htm, 16 September.

Orange, County of. Integrated Waste Management Department. 2003. Landfill Information. Website: http://www.oclandfills.com/landfill_information.htm, 16 September.

Orange, County of. Integrated Waste Management Department. 2003. Personal communication with Susan Amirhosseini, Assistant Public Information Officer, Integrated Waste Management Department, State of California, 16 September.

Orange, County of. Integrated Waste Management Department. 2003. Landfill Tonnage Reports, 2002–2003. Provided by Christine Knapp.

Section 3.6 Energy

3.6 ENERGY

This section defines the existing energy service providers of the Planning Area, including natural gas and electricity services. Information was obtained from discussions with the service providers and City staff.

EXISTING CONDITIONS

Natural Gas

Southern California Gas Company (SCG) provides natural gas service for the Planning Area. Natural gas is a "fossil fuel," indicating that it comes from the ground, similar to other hydrocarbons such as coal or oil. SGC purchases natural gas from several bordering states.

Most of the major natural gas transmission pipelines within the Planning Area are owned and operated by SCG. However, if a customer within Newport Beach meets the requirements to purchase gas from a contracted marketer or agent they may do so.[1] SGC customers have the option of purchasing their natural gas from a list of natural gas suppliers. The list of approved natural gas suppliers is available on the Southern California Gas web site, which is updated periodically.[2]

The Public Utilities Commission (PUC), regulates SCG who is the default provider required by State law, for natural gas delivery to the Planning Area. SCG has the capacity and resources to deliver gas except in certain situations that are noted in State law. As development occurs, SCG will continue to extend its service to accommodate development and supply the necessary gas lines. SGC does not base its service levels on the demands of the Planning Area; rather it makes periodic upgrades to provide service for particular projects and new development. Approximately two months before construction commences on a project, SGC requests that the developer contact them with detailed information about the project's natural gas requirements. If necessary, SGC customizes pipelines and mains to better serve newly constructed facilities. The cost for such service differs from project to project.[3] SGC is continuously expanding its network of gas pipelines to meet the needs of new commercial and residential developments in Southern California.

Electricity

Southern California Edison Company (SCE) is the primary distribution provider for electricity in the Planning Area.[4] Currently, SCE has no immediate plans for expansion within the City of Newport Beach, as most of the City is built out. However, every year SCE expands and improves existing facilities according to demand.[5]

The primary distribution voltage levels serving the Newport Beach area are 12,000 volts (kV) for commercial uses and 4,000 kV for residential uses. Currently, the City is placing existing overhead facilities underground. Substations within the City of Newport Beach include McArthur, Newport, Crown, and Lafayette Substations. However, there are a number of other substations in adjacent

[1] Ella Abidere, personal communication, 2003

[2] SCE website 2003, 3 November

[3] Ella Abidere, personal communication, 2003

[4] SCE website 2003, 30 September

[5] Leanne Swanson, personal communication, 2003, 30 September

cities, such as Hamilton substation in the City of Huntington Beach, which feed circuits in Newport Beach in order to provide reliable service within the City.[6]

Electricity is a "reactive" utility, meaning it is provided on an as-needed basis to customers within existing structures in the Planning Area. For new construction, the provision of service may require a permit.[7]

REGULATORY CONTEXT

Federal Regulations

Federal Energy Regulatory Commission

The Federal Energy Regulatory Commission duties include the regulation of the transmission and sale of electricity in interstate commerce, licensing of hydroelectric projects, and oversight of related environmental matters.

State Regulations

California Public Utilities Commission (CPUC)

CPUC Decision 95-08-038 contains the rules for the planning and construction of new transmission facilities, distribution facilities, and substations. The Decision requires permits for the construction of certain power line facilities or substations if the voltages would exceed 50 kV or the substation would require the acquisition of land or an increase in voltage rating above 50 kV. Distribution lines and substations with voltages less than 50 kV need not comply with this Decision; however, the utility must obtain any nondiscretionary local permits required for the construction and operation of these projects. CEQA compliance is required for construction of facilities constructed in accordance with the Decision.

Title 20 and Title 24, California Code of Regulations (CCR)

Title 20, Public Utilities and Energy, contains the regulations related to power plant siting certification. Title 24, California Building Standards, contains the energy efficiency standards related to residential and nonresidential buildings. Title 24 standards are based, in part, on a State mandate to reduce California's energy demand.

Local Regulations

City of Newport Beach Municipal Code

Chapter 15.32, Underground Utilities, requires the removal of poles, overhead wires and associated overhead structures within designated areas of the City and the underground installation of wires and facilities for supplying electric, communication or similar or associated service.

In accordance with Section 66473.1 of the Subdivision Map Act, Section 19.24.110, Energy Conservation, requires subdivisions of five or more lots, other than condominium conversions, to

[6] Ken Eatherton, personal communication, 2003, 30 September

[7] Herb Wollerman, personal communication, 2003, 3 November

provide for, to the extent feasible, future passive or natural heating or cooling opportunities in the subdivision.

References

Newport Beach, City of. Utilities Department. 2003. Personal communication with Herb Wollerman, Electrical Supervisor, 3 November.

Southern California Edison (SCE). 2003. List of Gas Suppliers for Noncore Transportation Customers. Website: http://www.socalgas.com/business/customer_choice/customers_noncore_listofesps.shtml, 3 November.

Southern California Edison (SCE). 2003. Website: http://www.sce.com/sc3/006_about_sce/006d_sce_ser/default.htm, 30 September.

Eatherton, Ken. 2003. Personal communication with. Facilities Planner for City of Newport Beach, Southern California Edison (SCE), 30 September.

Swanson, Leann. 2003. Personal communication with Engineer, Southern California Edison (SCE), 30 September.

Abidere, Ella. 2003. Personal communication with marketing representative, Southern California Gas (SCG), 3 November.

Southern California Gas (SCG). 2003. Personal communication with Field Planner for City of Newport Beach, 30 September.

Section 3.7 Telecommunication Services

3.7 TELECOMMUNICATIONS SERVICES

This section describes the existing telecommunications services including telephone, television, internet, and cellular phone services that are available in the Newport Beach Planning Area. Information for this section is based upon conversations with the service providers.

EXISTING CONDITIONS

Current telecommunication services available within the Newport Beach Planning Area include the following:

- Telephone service provided by Southwestern Bell Communications (SBC—formerly Pacific Bell) and Cox Communications,
- Digital cable television service provided by Cox Communications and Adelphia,
- Internet service available through various providers,
- Cellular phone service available through various providers.

Current technology allows residents and businesses to utilize a variety of options for their telecommunication needs. Each service provider offers a selection of services and consumers can choose services to fit individual needs.

Telephone Service

Local telephone service is provided by SBC and Cox Cable. SBC provides local telephone service to the majority of the Planning Area. Additionally, SBC, as well as a number of other carriers, provide long distance phone service to the Newport Beach area. SBC also provides internet access via DSL and dial-up features. At this time, Cox provides local telephone services to approximately 5,000 customers,[1] and has a projected approximate annual growth rate of 15 percent for phone service. Although Adelphia does not provide telephone service at this time, Adelphia's cable plant has been constructed to be able to accommodate telephone service should the company choose to do so in the future.[2]

Cable Television Service

Although the City is in the process of updating their cable television franchise agreements, Cox Cable and Adelphia currently provide cable television service to the Planning Area.

Cox Cable

Cox Communications provides multi-media services to the area on the eastern side of Newport Bay. Specifically, Cox serves approximately 15,000 homes within Newport Beach. Within its pool of subscribers, Cox provides cable service to 10,000 homes.[3] Although changes in the field of telecommunications preclude accurate predictions of growth, the company has projected approximate annual growth for cable service to be approximately 5 to 10 percent.

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[1] Jim Leach, Cox Communications, personal communication, September 2003. (Number approximate as of September 2003)
[2] Phil Urbina, Government Affairs Manager, Adelphia Communications, personal communication, September 30, 2003.
[3] Jim Leach, Cox Communications, personal communication, September 2003. (Number approximate as of September 2003)

Because Cox has hundreds of backyard or easement appurtenances and underground or aerial cable plants in public facilities, the company is able to provide service to virtually any residential unit within their service area, and to the majority of commercial facilities.[4] Cox rebuilt their cable system in 1995–97, and its infrastructure is technologically up-to-date.[5] Any future expansion of facilities would be in communities that Cox does not currently serve and where there is growing demand. Opportunities for expanded service exist in areas of new development, such as the Newport Coast area and other areas recently annexed by the City. Cox has indicated that existing infrastructure is adequate to serve the City.

Adelphia

Adelphia uses a 750 MHz hybrid fiber-coaxial plant to provide cable television to the remaining residents in the Planning Area, primarily located on the western side of Newport Bay. Specifically, Adelphia provides cable service for 29,000 homes in various areas of the City, and as of 20003, the company provided cable service to approximately 18,000 customers. At this time, Adelphia's facilities are meeting the needs of their customers and there are no immediate needs to construct additional facilities.[6]

Internet Service

Like cellular phone service, the popularity of internet service has resulted in diversification of internet service providers (ISPs). Depending on the speed of connection desired, residents have a number of options for internet service, including service by Adelphia Powerlink, Cox, and SBC. As stated earlier, SBC provides internet access via DSL and dial-up features. Cox provides high -speed internet access via cable modem to 5,000 homes, and expects to expand service by approximately 15 percent in the next year.[7] There are many resellers of ISP services (approximately 20) but the main carriers for the Planning Area are Earthlink, Covad, Verizon, and Rhythms.[8]

Cellular Phone Service

The popularity of cellular phones has resulted in a number of companies providing service to the community. Cellular phone service companies are licensed and monitored by the State of California Public Utilities Commission (CPUC). The City is responsible for oversight and approval authority within boundaries set by FCC for the siting of, and operation of, cellular transmission antennas located within the City, but does not exercise control over the provision of cellular service.

The main cellular phone service providers in the Planning Area are as follows:

- AT&T Wireless
- Cingulair Wireless (SBC owns 51 percent of Cingulair)
- Sprint
- Nextel
- T Mobile
- Verizon Wireless

[4] Jim Leach, Cox Communications, personal communication, September 2003.

[5] Jim Leach, Cox Communications, personal communication, September 2003.

[6] Phil Urbina, Government Affairs Manager, Adelphia Communications, personal communication, September 30, 2003.

[7] Jim Leach, Cox Communications, personal communication, September 2003.

[8] http://www.dslreports.com/coinfo (accessed September 30, 2003)

REGULATORY CONTEXT

Federal Regulations

Telecommunications Act of 1996

This law was enacted to promote competition and reduce regulation in order to secure lower prices and higher quality services for telecommunication consumers and encourage the rapid deployment of new telecommunication technologies.

Local Regulations

City of Newport Beach Municipal Code

Chapter 5.44, Community Antenna Television, adopts rules and regulations to govern the operations of community antenna television systems in the City.

Chapter 15.70, Wireless Telecommunication Facilities, ensures consistency with Federal law while ensuring public safety, reducing the visual effects of telecom equipment on public streetscapes, protecting scenic, ocean and coastal views, and otherwise mitigating the impacts of such facilities. More specifically, the regulations contained within this Chapter are intended to (1) encourage the location of antennas in nonresidential areas; (2) strongly encourage co-location at new and existing antenna sites; and (3) encourage telecom facilities to be located in areas where adverse impacts on the community and on public views are minimized. Specifically, Section 15.70.060 of this Chapter provides design standards including height, location, screening, and size standards applicable to such facilities.

REFERENCES

Jim Leach, Cox Communications, personal communication, September 2003.

Phil Urbina, Government Affairs Manager, Adelphia Communications, personal communication, September 30, 2003.

http://www.dslreports.com/coinfo (accessed September 30, 2003)

Chapter 4
PUBLIC SERVICES

Section 4.1 Fire Protection and Emergency Services

Chapter 4 PUBLIC SERVICES

4.1 FIRE PROTECTION AND EMERGENCY SERVICES

This section provides information on the existing fire and emergency services within the City. In addition, current staffing, equipment, response times, and standards of these services are described along with their ability to meet the needs of the City. This section focuses on urban fire prevention, as wildland fire hazards are discussed in Section 6.5 (Fire Hazards) of this Technical Background Report. Information for this section is based on the City's Resource Allocation Plan, the City's 2003 Hazard Assessment Study, and conversations with Newport Beach Fire Department staff.

EXISTING CONDITIONS

Service Providers

The Newport Beach Fire Department (Department) serves the entire City. Areas outside of the City boundaries but within the Planning Area are Area 7, the Emerson Tract, and most of Banning Ranch. These areas are served by the Orange County Fire Authority (OCFA). OCFA provides regional fire protection and emergency services to unincorporated portions of Orange County and nineteen City jurisdictions.

Newport Beach Fire Department

The Department is responsible for reducing the loss of life and property from fire, medical, and environmental emergencies. In addition to fire suppression, the Newport Beach Fire Department also provides fire prevention and hazard reduction services. The Fire Prevention Division works in conjunction with the City's Planning and Building Departments to ensure that all new construction and remodels are built in compliance with local and State building and fire codes. This includes adequate exiting and built-in fire protection. The City requires all businesses to be inspected annually for adherence to the fire and life safety codes.[1]

Emergency medical services (EMS) is another major service of the Newport Beach Fire Department. This service allows paramedics to go straight to a medical call. Aside from EMS provided by the Department, there is also a private ambulance service in the City.

Fire stations are strategically located throughout the City to provide prompt assistance to area residents. Each fire station operates within a specific district that comprises the immediate geographical area around the station. Upper Newport Bay (and the circulation challenges it creates) result in Newport Beach having more fire stations per population than typical in order to maintain response times. A list of the fire stations in Newport Beach is provided in Table 4.1-1; and their locations are also shown in Figure 4.1-1.

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[1] Newport Beach, City of. 2003. *Resource Allocation Plan, Fiscal Year 2003–2004*.

Table 4.1-1 Fire Station Facilities		
Station No.	*Street Address*	*Location Area*
Fire Station 1	110 Balboa Boulevard	Balboa Peninsula
Fire Station 2	475 32nd Street	Lido
Fire Station 3	868 Santa Barbara	Newport Center
Fire Station 4	124 Marine Avenue	Balboa Island
Fire Station 5	410 Marigold	Corona del Mar
Fire Station 6	1348 Irvine	Mariner's Mile
Fire Station 7	2301 Zenith	Santa Ana
Fire Station 8	6502 Ridge Park	Newport Coast
SOURCE: Newport Beach Fire Department 2003		

Staffing

In 2003, the Department had 148 full-time employees and over 170 seasonal employees providing 24-hour protection and response to the City's residents and visitors.[2]

Under the direction of the Fire Chief, the Department is divided into five divisions: Safety Operations, Administration, Emergency Medical Services, Training, and Fire Prevention. Safety Operations constitutes the majority of Fire Department employees, with 127 staff members, while the Administration Division consists of approximately 8 staff members, Fire Prevention has 6 staff members, Training has 5 staff members, and EMS consists of 2 staff members, which consist of a technical coordinator and a department assistant.

The Department divides its staff into three shifts per day, with 37 personnel working each shift, for a total of 111 Fire Suppression and EMS personnel working at the eight Newport Beach fire stations each day. Each of the eight fire stations has one engine company, while three have paramedic squads, and two have ladder trucks serving the City of Newport Beach. Seven paramedics serve per shift, with the possibility for 21 total at Stations 2, 3, and 5 with paramedic ambulances. In addition, Station 8 has 1 paramedic firefighter that rides on the engine. Each engine or truck company has a staff of 3 persons per 24-hour shift. Each paramedic ambulance has a staff of 2 firefighter-paramedics per 24-hour shift.[3]

Other Services

In addition to fire protection and emergency medical services, the Department provides other services, as described below.

- The Department also oversees 16 full-time lifeguards, and up to 180 part-time seasonal lifeguards during the summer season. Summer season services, especially those associated with the tidelands, generate significant costs to the City. Lifeguards are headquartered at the Newport Pier, as shown in Figure 4.1-1, and there is a lifeguard boathouse in the Marina with three boats.[4] Including the headquarters, there are a total of 38 lifeguard towers. During the summer months, mid June through Labor Day, there are approximately 36 lifeguard

[2] Newport Beach, City of. 2003. *Resource Allocation Plan, Fiscal Year 2003–2004*.
[3] Newport Beach, City of. 2003. *Resource Allocation Plan, Fiscal Year 2003–2004*.
[4] Terry Ulaszewski, Fire Support Services Manager, personal communication, September. 24, 2003.

Figure 4.1-1 Fire Department Facilities

Fig p.2 (11x17)

towers that are open throughout the day. Throughout the rest of the year, the headquarters remains open and lifeguards patrol the beach in rescue vehicles; however, no towers are open.[5]

- Another service of the Department is to handle incidents associated with hazardous materials. The Department's goal is to protect the public health and the environment throughout the City from accidental releases and improper handling, storage, transportation and disposal of hazardous materials and waters through coordinated efforts of regulation, management, emergency response, enforcement, and site mitigation oversight. The hazardous materials personnel are responsible for in-house training and education, and do not respond to emergencies. In case of a hazardous materials emergency, Huntington Beach Fire Department or Orange County Fire Department is called.
- The Ocean Safety and Beach Rescue (OSBR) service, an activity that requires special training and equipment, allows the Department to offer advanced technical rescue capabilities. Members of the OSBR Committee, which consists of Newport Beach Fire Department personnel certified as California State instructors for Rescue Systems and Emergency Trench Rescue, are trained in confined space rescue, high angle rescue, the use of Biopack self-contained breathing apparatus's, helicopter rescue, rescue diving, and other specialties.

Fire and Medical Incidents

The Department responded to 438 fire incidents and 5,717 medical incidents in the City of Newport Beach during the fiscal year 2002–03.[6] Additionally, there are various categories of emergency incidents that have been reported in the City.

Statistics from the Newport Beach Fire Department regarding incidents that they responded to during 2002 are summarized in Table 4.1-2, below.

Table 4.1-2 2002 Statistics, City of Newport Beach Fire Department

Type of Incident *Sub-Type*	*Responses in 2002*
Fires	
Structural	139
Vehicles	81
Brush / vegetation	30
Miscellaneous / Other	188
Subtotal Fires	*438*
Medical Emergencies	5,717
Fire Alarms	1,164
Other Emergencies (such as Hazardous Materials)	130
Public Assistance	868
Total	***8,317***

SOURCE: ECI, Newport Beach Hazards Assessment Study, 2003

[5] Andrea Talbott, Fire & Lifeguard Services, personal communication, January 13, 2004.

[6] Newport Beach, City of. 2003. *Resource Allocation Plan, Fiscal Year 2003–2004*. (these are estimated numbers)

The table above shows that the eight fire stations serving the City of Newport Beach responded to a total of 8,317 incidents, which results in an average of about 1,040 incidents per station. Note that 69 percent of the responses were medical emergency calls. In Newport Beach, these medical emergencies are handled by the closest available engine company and closest paramedic ambulance, from one of the three fire stations with paramedic ambulances (i.e., Fire Stations 2, 3 and 5).

In 2002, each paramedic ambulance responded to 1,903 medical emergencies on average. These numbers are well within the number of calls recommended by the Insurance Service Office (ISO) when rating a community for fire insurance rates. Specifically, the ISO recommends that a second company be put in service in a fire station if that station receives more than 2,500 calls per year. The reason for this recommendation is to assure reliability of response to a structure fire. If an engine company provides support to the paramedic ambulance by responding to medical aid calls, and this impacts the station's response to structure fire calls, it may be prudent to add another paramedic ambulance or support squad vehicle and increase staffing at that fire station with the most medical aid traffic. A high volume of calls also creates a high potential for multiple calls occurring at once (multiple queuing), which can result in a company being unavailable to respond to a structure fire. Thus, if this forces a response from other stations farther away, it can result in a larger fire before assistance arrives.[7]

Fires in Newport Beach represent about 5 percent of all calls, with structure fires representing less than 2 percent of all calls. This is due to the use of modern fire and building codes, effective fire prevention inspection work by the Fire Department, and effective public education. Fires, when they do occur in newer occupancies, are generally kept small by fire sprinkler systems and the efforts of the Fire Department.

Although structural fires can occur in any developed areas within the Planning Area as discussed in Section 6.5 (Fire Hazards), the older portions of the City are especially susceptible to this hazard. Areas such as Balboa Peninsula, Balboa Island, and Corona del Mar contain structures dating from the 1930's. Due to the age of the structures, older building standards and fire codes were applied, non-fire-resistive construction materials were used, and no current internal sprinklers or other fire safety systems are in place. Another contributing factor is the density of construction in these areas. Generally, residences are built with 3-foot setbacks, while Corona del Mar has 4-foot setbacks, between the houses and property lines. Within these setbacks, projections such as windows and roof awnings are allowed, which affect emergency access to the back of the residences. Narrow streets within these areas also make it difficult to maneuver and position response vehicles.[8]

Response Times

For emergency response, it is recommended that a three- to four-person engine company arrive within a 5-minute response time to 90 percent of all structure fire calls in the City. Response time is defined as 1 minute to receive and dispatch the call, 1 minute to prepare to respond in the fire station or field, and 3 minutes driving time at 35 miles per hour (mph) average (for an approximate distance not exceeding 1.75 miles between the responding fire station and the incident location).[9] Although no formal standards currently exist, the 5-minute response time is a goal of the Department.[10]

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[7] Earth Consultants International. 2003. *City of Newport Beach Hazards Assessment Study*.

[8] Earth Consultants International. 2003. *City of Newport Beach Hazards Assessment Study*.

[9] Earth Consultants International. 2003. *City of Newport Beach Hazards Assessment Study*.

[10] Terry Ulaszewski, Fire Support Services Manager, Newport Beach Fire Department, personal communication, January 22, 2004.

Actual response statistics for the Department for 2002 and the first five months of 2003 are provided in Table 4.1-3 below. These response times are measured from the time the dispatch is made to arrival at the scene by the responding engine company. The averages show that the majority of the fire units in the City reach their destination within the preferred 5-minute response time, and all units respond within 6 minutes of the call being received by dispatch. The longer response times are for Fire Station 8 located in Newport Coast, a large area serviced by one fire station.

In addition to these components, there is another component called "set up" time. This is the time it takes firefighters to get to the source of a fire and get ready to fight the fire. This may range from 2 minutes at a small house fire to 15 minutes or more at a large or multistory occupancy, such as a fire at Fashion Island, Hoag Memorial Hospital, or a large condominium complex.

Table 4.1-3 Average Response Time, from Dispatch to Arrival, for Each Unit in the Newport Beach Fire Department for 2002 and Part of 2003

Units	*Average Response Time (Minutes)*	
	Year 2002	*Jan.–May 2003*
NE61 (Engine—Station 1)	4.09	3.47
NE62 (Engine—Station 2)	4.18	4.18
NM62 (Medical—Station 2)	4.59	5.02
NT62 (Truck—Station 2)	4.44	4.51
NE63 (Engine—Station 3)	4.41	4.36
NM63 (Medical—Station 3)	5.11	5.14
NT63 (Truck—Station 3)	5.00	5.09
NE64 (Engine—Station 4)	4.44	4.40
NE65 (Engine—Station 5)	4.22	4.29
NM65 (Medical—Station 5)	5.17	5.38
NE66 (Engine—Station 6)	4.09	4.29
NE67 (Engine—Station 7)	4.50	5.15
NE68 (Engine—Station 8)	5.58	5.47
Average Totals	***4.60***	***4.67***

SOURCE: Newport Beach Fire Department 2003

As stated previously, although no formal fire protection standards currently exist, an additional goal of the Department is to have a three- to four-person ladder truck company with an aerial device, a second engine company with three to four persons, a paramedic ambulance, and a fire battalion chief to arrive within a 10-minute response time interval to 80 percent of all structure fire calls within the City.[11] ISO recommends a truck company within 2.5 miles if there are five or more buildings that are three or more stories or 35 feet or more in height, or five buildings with fire flow needs greater than 3,500 gallons per minute. Fire Station 2 provides this level of service for the high rises on the west side of Newport Beach. Fire Station 3 provides this level of service for the high rises in the Fashion Island and John Wayne Airport areas. An additional truck company from Costa Mesa or Santa Ana can respond via automatic aid, if needed, within 5 miles of the City limits.

Structural fire response requires numerous critical tasks to be performed simultaneously. The number of firefighters required to perform the tasks varies based upon the risk. The number of firefighters needed at a maximum high-risk occupancy, such as a shopping mall or large industrial occupancy would be significantly higher than for a fire in a lower-risk occupancy. Given the large

[11] Terry Ulaszewski, Fire Support Services Manager, Newport Beach Fire Department, personal communication, January 22, 2004.

number of firefighters that are required to respond to a high-risk, high-consequence fire, Fire Departments increasingly rely on automatic and mutual aid agreements to address the fire suppression needs of their community. If additional resources are needed due to the intensity or size of the fire, a second alarm may be requested. The second alarm results in the response of at least another two engine companies, and a ladder truck. Beyond this response, additional fire units are requested via the automatic or mutual aid agreements.[12]

Insurance Service Office Rating

The ISO provides rating and statistical information for the insurance industry in the United States. To do so, ISO evaluates a community's fire protection needs and services, and assigns each community evaluated a Public Protection Classification (PPC) rating. The rating is developed as a cumulative point system, based on the community's fire-suppression delivery system, including fire dispatch (operators, alarm dispatch circuits, telephone lines available), fire department (equipment available, personnel, training, distribution of companies, etc.), and water supply (adequacy, condition, number and installation of fire hydrants). Insurance rates are based upon this rating. The worst rating is a Class 10, while the best is a Class 1. Based on the type and extent of training provided to fire-company personnel and the City's existing water supply, Newport Beach currently has a Class 2 ISO rating.[13,14]

Disaster and Emergency Preparedness

Homeland Security has brought disaster awareness to the forefront of the minds of the community, safety officials, and City staff. Within the Fire Department, the Disaster Preparedness Coordinator has updated the City's Emergency Management Plan, including the development and implementation of disaster training for employees. The City's Emergency Operations Center (EOC) has undergone a series of considerable upgrades. Department Operations Centers have been upgraded and improved. Training for the residents within the City continues through the Community Emergency Response Team (CERT) program. The next step in preparedness for City workers is the continuation of Emergency Response Team (ERT) training. The continued development of the community's disaster preparedness efforts will aid the residents of Newport Beach in an areawide disaster.

Training and Education

Currently, the Newport Beach Fire Department places emphasis on Emergency Medical Services, Fire Prevention, Lifeguards, and the training and education of both Fire Department staff and community members.

The Department has continual training of its personnel using both classroom instruction and field drills. Recently, the Department has made advancements in personnel development through the advent of Leadership Academies. These Academies are designed as opportunities for individuals to gain the knowledge and skills necessary to be placed in leadership roles.

Department members provide safety instruction and training to school age children every year through the Junior Fire Marshal, the Junior Lifeguard and Lifeguard Cadet Programs. The Department sponsors a CPR joint education program with the Costa Mesa Fire Department in

[12] Earth Consultants International. 2003. *City of Newport Beach Hazards Assessment Study*.

[13] Earth Consultants International. 2003. *City of Newport Beach Hazards Assessment Study*.

[14] Terry Ulaszewski, Fire Support Services Manager, Newport Beach Fire Department, personal communication, January 22, 2004.

which lifeguard personnel provide CPR and other safety instruction to over 700 Newport-Mesa high school students at Newport Harbor, Corona del Mar, and Back Bay High Schools each year. In addition, each year, the Department sponsors Fire Safety Day to provide residents with the knowledge base for safe fire protection strategies and tips on emergency preparedness.[15]

Mutual Aid Agreements

Although the Department has the primary responsibility for fire prevention and fire suppression in the City, fire-fighting agencies generally team up and work together during emergencies. These teaming arrangements are handled through automatic and mutual aid agreements.

The California Disaster and Civil Defense Master Mutual Aid Agreement (California Government Code Sections 8555–8561) states: "Each party that is signatory to the agreement shall prepare operational plans to use within their jurisdiction, and outside their area." These plans include fire and nonfire emergencies related to natural, technological, and war contingencies. The State of California, all State agencies, all political subdivisions, and all fire districts signed this agreement in 1950.

Section 8568 of the California Emergency Services Act, (California Government Code, Chapter 7 of Division 1 of Part 2) states that "the State Emergency Plan shall be in effect in each political subdivision of the State, and the governing body of each political subdivision shall take such action as may be necessary to carry out the provisions thereof." The Act provides the basic authorities for conducting emergency operations following the proclamations of emergencies by the Governor or appropriate local authority, such as a City Manager. The provisions of the act are further reflected and expanded on by appropriate local emergency ordinances. The act further describes the function and operations of government at all levels during extraordinary emergencies, including war.[16] Therefore, local emergency plans are considered extensions of the California Emergency Plan.

Newport Beach has automatic aid agreements with the cities of Costa Mesa, Santa Ana, Huntington Beach, and Fountain Valley, and with the Orange County Fire Authority. These agreements obligate these fire departments to help each other under predefined circumstances. Automatic aid agreements obligate the nearest fire company to respond to a fire regardless of the jurisdiction. Mutual aid agreements obligate fire department resources to respond outside of their district upon request for assistance.[17]

Numerous other agencies are available to assist the City if needed. These include local law enforcement agencies that can provide support during evacuations and to discourage people from traveling to the fire zone to watch the fire, as this can hinder fire suppression efforts. Several State and Federal agencies have roles in fire hazard mitigation, response, and recovery, including: the Office of Emergency Services, the Fish and Wildlife Service, National Park Service, US Forest Service, Office of Aviation Services, National Weather Service, and National Association of State Foresters, the Department of Agriculture, the Department of the Interior, and, in extreme cases, the Department of Defense. Private companies and individuals may also assist.[18]

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[15] Newport Beach, City of. 2003. *Resource Allocation Plan, Fiscal Year 2003–2004*.

[16] Southern California Emergency Services Association (SCESA). 2003. California Government Code. The Emergency Services Act of California. Website: www.scesa.org/cal_govcode.htm.

[17] Earth Consultants International. 2003. *City of Newport Beach Hazards Assessment Study*.

[18] Earth Consultants International. 2003. *City of Newport Beach Hazards Assessment Study*.

Standardized Emergency Management System

The SEMS law refers to the Standardized Emergency Management System described by the Petris Bill (Senate Bill 1841; California Government Code Section 8607, made effective January 1, 1993) that was introduced by Senator Petris following the 1991 Oakland fires. The intent of the SEMS law is to improve the coordination of State and local emergency response in California. It requires all jurisdictions within the State of California to participate in the establishment of a standardized statewide emergency management system.

All local governments, including counties, cities, school districts and special districts, must use SEMS to be eligible for funding of their personnel related costs under State disaster assistance programs. The City of Newport Beach is currently using this system for emergency response in the City. The Disaster Preparedness coordinator of the Department's Training Division oversees SEMS within the City of Newport Beach.[19]

Depending on the type of incident, several different agencies and disciplines may be called in to assist with emergency response. Agencies and disciplines that can be expected to be part of an emergency response team include medical, health, fire and rescue, police, public works, and coroner.

Emergency response in every jurisdiction in the State of California is handled in accordance with SEMS, with individual City agencies and personnel taking on their responsibilities as defined by the City's Emergency Plan. This document describes the different levels of emergencies, the local emergency management organization, and the specific responsibilities of each participating agency, government office, and City staff.

The framework of the SEMS system is the following:

- *Incident Command System*—a standard response system for all hazards that is based on a concept originally developed in the 1970's for response to wildland fires.
- *Multi-Agency Coordination System*—coordinated effort between various agencies and disciplines, allowing for effective decision-making, sharing of resources, and prioritizing of incidents.
- *Master Mutual Aid Agreement and related systems*—agreement between cities, counties and the State to provide services, personnel and facilities when local resources are inadequate to handle and emergency.
- *Operational Area Concept*—coordination of resources and information at the county level, including political subdivisions within the county.
- *Operational Area Satellite Information System*—a satellite-based communications system with a high-frequency radio backup that permits the transfer of information between agencies using the system.

The SEMS law requires the following:

- Jurisdictions must attend training sessions for the emergency management system.

[19] Terry Ulaszewski, Fire Support Services Manager, personal communication, September. 24, 2003.

- All agencies must use the system to be eligible for funding for response costs under disaster assistance programs.
- All agencies must complete after-action reports within 120 days of each declared disaster.

Fire Service Funding

The majority of funding for fire services is obtained through general tax revenue. In fiscal year 2001–02, $16,616,950 of the total $19,340,449 revenue was general tax revenue.[20] Operations funding are derived from the City's General Fund, and Capital Improvement monies are derived from funds that fit into one of the following three categories:

- Business Excise Tax funds (allocated for Fire and Library facilities only)
- Tidelands funds (allocated for Life guard component only)
- General Fund

In addition, in 2002, the Department billed $1.2 million in EMS billings, and applied for and received approximately $30,000 in Federal grant monies.[21]

In addition, other forms of funding for fire protection include service fee programs. These programs include paramedic services, emergency ambulance transportation, fire permit fees, a Fire Medics program, and the Junior Lifeguard program.

Projected Needs

The Department does not use population projections to determine projected future needs. The Department's service goals are based on accepted service levels within Fire Protection, such as a 5-minute response time for a first-arriving fire engine at a fire or medical aid event, and 8-minute response time for a fist-arriving fire engine for a paramedic unit.

As part of the operating budget, the Department has an equipment replacement program which guarantees replacement of all of its apparatus needs, such as vehicles and boats. Most fire stations in Newport Beach were built in the 1950's and 1960's and therefore are currently deficient in the areas of capacity, serviceability, and physical condition. Many will need to be replaced or relocated in order to meet current needs.[22] However, securing adequate acreage of land to meet the needs of modern facilities will be a challenge in a City that is already predominantly built out.[23] The Department is looking for available land to meet the immediate needs of the Corona del Mar Station, as it currently houses one fire Engine and one paramedic unit, and needs a permanent facility to house the paramedic unit.

Department staffing levels have historically been driven not by population as much as by location. As of September 2003, the Department is conducting an in-house operational research study using various programs to optimize station locations based upon growth in geographic areas. They are considering the relocation of Station 1 to a point further north up the Peninsula, and if development in the Banning Ranch area occurs, Station 2 might be relocated to a location further west on Coast

[20] Newport Beach, City of. 2003. *Resource Allocation Plan, Fiscal Year 2003–2004*.

[21] Terry Ulaszewski, Fire Support Services Manager, personal communication, September. 24, 2003.

[22] Timothy Riley, Chief of Newport Beach Fire Department, personal communication, November 11, 2003.

[23] Timothy Riley, Chief of Newport Beach Fire Department, personal communication, November 11, 2003.

Highway. As the Newport Coast area builds out, Station 5, which has a paramedic unit, might be relocated to a point further east on Coast Highway to better serve the down coast area.[24]

Traditionally, the Department has placed fire stations in the areas where the most growth is occurring. The original growth centers in Newport Beach were the Peninsula, Balboa Island, and Fashion Island areas, and Station 6 was later added near the near the Costa Mesa border. After the 1970's, demands upon the Department remained fairly constant until approximately 2001. At that time, the City Council decided to add a station (Station 7) in the Santa Ana Heights area between Newport Beach and Costa Mesa, as it was experiencing growth at the time. Santa Ana Heights has since been annexed to the City, but prior to its annexation, the service area for Station 7 was previously under Orange County jurisdiction. Station 7 is housed in a nonpermanent trailer, but as it is part of a redevelopment area, the City is actively working on developing a permanent station.

Equipment Needs

With the exception of Station 8, which was built in 1989, and Station 7, which has yet to be built, the construction dates for all of the City's fire stations range from the 1950's to the 1970's. Stations 1, 2, 3, 5, and 6 need to be seismically retrofitted, and the bays need to be widened and heightened to meet regulation standards. As of September 2003, with the exception of Stations 8 and 4, which are currently adequate, all fire stations are being modified with mixed gender equipment. Restrooms, locker rooms, and berthing rooms need to be supplied for both men and women.[25]

REGULATORY CONTEXT

Local Regulations

City of Newport Beach Municipal Code

Title 9 Fire Code of the City's Municipal Code, which was updated in 2001, contains a number of different ordinances that deal with a range of issues. It contains ordinances on topics ranging from articulating fire flow requirements, to the provision of automatic sprinkler systems in public buildings, to requiring an accurate occupant count in public places, and the provision of emergency power in public locations.

REFERENCES

Earth Consultants International. 2003. *City of Newport Beach Hazards Assessment Study*.

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Newport Beach, City of. 2003. *Resource Allocation Plan, Fiscal Year 2003–2004*.

Riley, Timothy, Chief of Newport Beach Fire Department. Personal communication. November 11, 2003.

[24] Terry Ulaszewski, Fire Support Services Manager, personal communication, September. 24, 2003.
[25] Ulaszewski, Terry. 2003. Personal communication with Fire Support Services Manager, 24 September.

Southern California Emergency Services Association (SCESA). 2003. California Government Code. The Emergency Services Act of California: www.scesa.org/cal_govcode.htm.

Ulaszewski, Terry. 2003. Personal communication with the Fire Support Services Manager, 24 September,

Section 4.2 Police Protection

4.2 POLICE PROTECTION

This section defines the police protection service providers of the Planning Area, as well as describes staffing levels and equipment, staffing standards, number of and types of calls received, and crime prevention programs available. Information for this section is based upon the City's Resource Allocation Plan and conversations with City staff.

EXISTING CONDITIONS

Service Providers

The Newport Beach Police Department (NBPD) has one police facility that provides local police services to the City of Newport Beach. Centrally located at 870 Santa Barbara Drive, as shown in Figure 4.1-1, the NBPD provides services in crime prevention and investigation, community awareness programs, and other services such as traffic control. The NBPD conducts on-going assessments to determine future funding, staffing, and equipment needs.

Areas outside the City boundaries, but within the Planning Area, including Area 7, the Emerson Tract, and a majority of Banning Ranch, are served by the North Operations Division of the Orange County Sheriff's Department. The nearest Sheriff's station to the Planning Area is located at 550 North Flower Street in the City of Santa Ana. Currently, there are 378 sworn and professional staff members in this division.[1]

Staffing Levels and Equipment

As of November 2003, the NBPD employed a total of 280 personnel, including 146 sworn officers, 86 nonsworn personnel, and 48 seasonal and part-time personnel.[2] With a 2003 population of 80,000 residents, the level of service is 1.8 officers per 1,000 City residents.[3] This figure is a broad indicator of available service; however, it should be considered in concert with more primary indicators including the following:

- Response time
- Volume of calls for service
- Number of officers available at any given time
- Number of violent crimes
- Number of Part 1 crimes (Part 1 crimes are the eight most serious crimes and include homicide, forcible rape, aggravated assault, burglary, larceny-theft, auto theft, and arson).[4]

The NBPD is currently composed of the Office of the Chief of Police and three Divisions that include Support Services, Patrol/traffic, and Detectives.[5] Included under the Support Services Division are many items that pertain to the entire Department, such as building maintenance, utilities, office equipment, uniforms, training, dispatch, and records.

[1] Orange County Sheriff's Department website, accessed on December 31, 2003.
[2] Newport Beach Police Department, Personnel Status Report, 2003.
[3] California Department of Finance, City/County Population Estimates…, 2003
[4] Newport Beach, Resource Allocation Plan, 2003.
[5] City of Newport Beach, Resource Allocation Plan, 2003.

As of 2003, NBPD owned the following equipment,[6] which is currently maintained at an acceptable level of service to meet the City's needs:[7]

- 37 marked patrol units, including crew-cab truck and commercial enforcement truck
- 36 unmarked vehicles (includes special weapons van, crime scene van, hostage negotiation van, and volunteer trucks)
- 2 prison transport vans
- 15 motorcycles
- 3 leased helicopters with surveillance equipment
- 3 K-9 (dog unit)
- 15 bicycles (Bicycle Unit includes Parking Enforcement and Volunteers)

Staffing Standards

While there are no current law enforcement staffing standards available, NBPD strives to maintain 1.9 officers per 1,000 residents in the City. This ratio allows the NBPD to meet the needs of a permanent and transient population that can swell to 200,000 on any given day.[8] The increase in population is due to the influx of beachgoers, daytime employment, and visitors to the City.

As discussed previously, with the 2003 level of service at 1.8 officers per 1,000 residents, the NBPD falls slightly short of their goal. In order to raise the level of service to 1.9 officers per 1,000 residents with a current population of 80,000, the NBPD would need to increase the number of sworn personnel by 6 officers, for a total of 152 sworn personnel.

Classification of Calls

All emergency calls for police, fire, and paramedic services are initially answered by one of the 14 full-time or 3 part-time dispatchers at the Dispatch Center. While the number of calls received varies with the season, an average of 2,000 emergency calls is received per month, with an average answer time of just 3 seconds. If an incident requires fire or paramedic response, the caller is connected with Metronet, who provide fire and emergency medical services dispatch for seven cities as part of a joint powers agreement.[9]

Currently, the total number of calls received in the Dispatch Center is nearing 250,000 per year. Although not all calls to the Center require a physical response, an average of 65,000 events per year are dispatched. Dispatchers use a radio system to communicate with police officers in the field, animal control and parking control officers, as well as the regional helicopters (ABLE), other Orange County law enforcement agencies and neighboring dispatch centers.[10]

Once a call is received, the appropriate department (e.g., police, fire, etc.) is then responsible for responding to the incident in a timely manner. In 2002, the average police response time to emergency calls averaged 3 minutes and 59 seconds.[11]

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[6] John Klein, personal communication, December 152003.
[7] John Klein, written communication, November 14, 2003.
[8] John Klein, written communication, November 14, 2003
[9] NBPD website, accessed October 22, 2003.
[10] NBPD website, October 22, 2003.
[11] John Klein, written communication, November 14, 2003.

Crime Statistics

Table 4.2-1 illustrates the various Part I offenses for 2003 that took place in the City. Robberies are differentiated from burglaries in that burglaries include a break-in or trespassing of property to commit the theft. It should be noted that data was not yet available for the months of November and December at the time this section was prepared.

Table 4.2-1 2003 City of Newport Beach Part 1 Offenses

Offense	*YTD Total*
Criminal Homicide	0
Forcible Rape	6
Robbery	22
Assault	489
Aggravated	51
Simple	438
Burglary	579
Residential	233
Commercial	185
Garage	161
Larceny-Theft	1,431
Petty Theft	497
Grand Theft	345
BTFMV [a]	589
Grand Theft Auto	158
Arson	8
Total	***2,693***

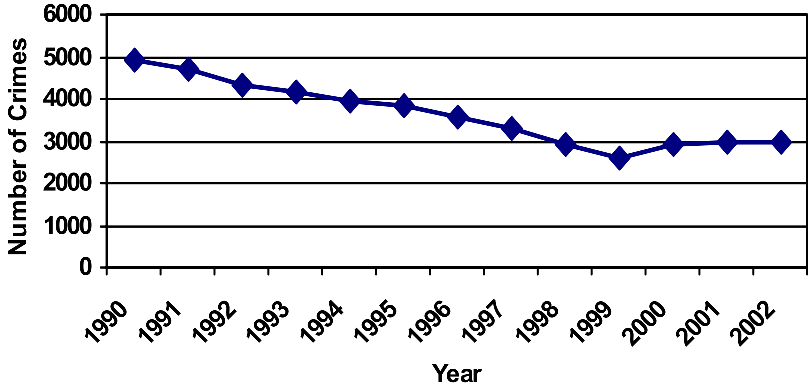
SOURCE: www.nbpd.org/crime_statistics/2003_part1crimes.asp. December 7, 2003

[a] Burglary-Theft from a Motor Vehicle

Criminal offenses in 2003 are relatively similar as compared to the previous year.[12] Through October 2003, as this table illustrates, 2,693 Part 1 crimes were reported to the NBPD, compared to 2,700 in 2002 for the same time period. There were 3,117 total offenses in 2002, and it is anticipated that a similar number of offenses would occur for 2003. As indicated in Table 4.2-1, the principal crime reported in the City was larceny-theft, with the primary crime under this category consisting of burglary-theft from a motor vehicle. Other frequently reported Part 1 crimes include burglary and simple assault.

As illustrated in the graph below, the crime rate in Newport Beach generally declined throughout the 1990's. However, since 2000, crime rates have remained relatively steady at approximately 3,000 offenses per year.

[12] NBPD website, accessed on December 7, 2003.



SOURCE: John Klein, written communication, November 14, 2003.

Figure 4.2-1 Thirteen-Year Crime Trend and Average

Crime Prevention

The NBPD offers various crime prevention programs and courses including

- Neighborhood Watch
- Business Watch
- Personal Safety Programs
- Drug Abuse Resistance Education (D.A.R.E.)
- Citizens' Police Academy

Neighborhood Watch is a crime prevention program that enlists the active participation of citizens in cooperation with the police department in an effort to reduce crime in their communities. The mutual assistance program involves increased communication between neighbors, citizen training to recognize and report suspicious activities in their neighborhoods, and implementation of crime prevention techniques, such as home security measures.[13]

Business Watch is a program that is based on the concept of Neighborhood Watch, and involves business owners getting to know each other and working together in an active role to reduce crime in the business community. Employees are trained in various areas such as, reporting suspicious activity, shoplifting and robbery prevention, and Operation Identification.[14]

The Personal Safety Program offers presentations at churches, schools, community organizations, and businesses throughout the City. This program is designed to provide information and literature to heighten the public's awareness and enhance personal safety. Presentations offer advice on safety precautions for residents to take while at home and in their cars.[15]

D.A.R.E. was created in 1983 to teach children from kindergarten through high school that popularity, self-worth, and self-confidence are not attained by submitting to negative peer pressure and destructive temptation. Every week for 17 weeks, D.A.R.E. sends a specially trained police officer into the classrooms of fifth and sixth grade students to teach the students not only why they

[13] NBPD website, accessed on December 7, 2003.

[14] NBPD website, October 22, 2003.

[15] NBPD website, October 22, 2003.

should refuse drugs and alcohol, but also how to do so. The D.A.R.E. program follows a carefully structured curriculum, focusing on topics such as personal safety, drug use and misuse, resisting peer pressure, building self-esteem, role models and support systems. Through their participation in the D.A.R.E. program at an age when they are most vulnerable to social pressure, the children establish the foundation for a healthy and productive lifestyle.[16]

The Citizens' Police Academy is a program designed to increase citizens' understanding of the NBPD's operations, in order to enhance the relationship between the community and the Department. Students learn how the Department is organized, how the community is served by the NBPD, and how emergency calls are responded to within the City. The Academy is conducted over a twelve-week period, during which time students learn from NBPD personnel who are experts in the areas of SWAT, K-9, narcotics, major crimes, patrol and helicopter operations, traffic laws, firearms and other related fields. All students participate in practical demonstrations and a ride-along during the Academy session, and are eligible to apply for the volunteer program within the NBPD once they graduate.[17]

Mutual Aid Agreements

The City of Newport Beach is part of an Orange County-wide Mutual Aid system, where any City within the County can request and receive assistance from other cities for any emergency situation.

Homeland Security

The City of Newport Beach and the NBPD closely monitor the Homeland Security National Threat Level. As a Participant in the Orange County Joint Terrorism Task Force, the Department is actively involved in evaluating terrorist information as it develops. The Department's goal is to provide the highest level of service and safety to the residents and visitors of Newport Beach.[18]

Projected Needs

Currently, there are not any immediate or near-future plans for expansion of police facilities, staff, or equipment inventory.[19]

REGULATORY CONTEXT

There are no Federal, State, or local policies that are directly applicable to police services within the Planning Area.

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California Department of Finance. 2003. *E-1 City/County Population Estimates, with Annual Percent Change, January 1, 2002 and 2003, Sacramento, California*, May.

Newport Beach, City of. 2003. *Resource Allocation Plan, Fiscal Year 2003–2004*.

[16] NBPD website, October 22, 2003.
[17] NBPD website, October 22, 2003.
[18] NBPD website, October 22, 2003.
[19] John Klein, written communication, 14 November 2003

Newport Beach Police Department (NBPD). 2003. Dispatch. Website: http://www.nbpd.org, 22 October.

———. 2003. Personnel Status Report. 14 November.

———. 2003. Website: http://nbpd.org/crime_statistics/2003_part1crimes.asp, 7 December.

Section 4.3 Education

4.3 EDUCATION

This section describes existing school systems, facilities, and enrollment for the City of Newport Beach as well as current local and regional policy regarding new school development. Information from this section is based upon State education data and conversations with the School District staff. One school district provides primary, secondary and high school education to the residents of the City. Four local and several regional colleges and universities offer services for residents.

EXISTING CONDITIONS

The Newport-Mesa Unified School District (NMUSD or District), covering 58.83 square miles, serves the City of Newport Beach as well as the City of Costa Mesa and other unincorporated areas. NMUSD produced 1,118 graduates in the 2001/02 school year. Among the City's 75,817 residents, 96.7 percent have a high school diploma or higher, 58.5 percent attended an undergraduate institution, and 21.4 percent have graduate or professional degrees.

Public Schools Facilities

NMUSD consists of thirty-two public schools including twenty-two elementary schools, two junior high schools, five high schools, two alternative education centers, and one adult school. Of these, two high schools, one middle school, and eight elementary schools are located within Newport City limits. Refer to Table 4.3-1 for a list of the City's school facilities and Figure 4.3-1 for school locations.

Public School Enrollment

District enrollment was about 22,275 students for 2002/03. Table 4.3-1, which includes public and adult schools, shows individual school enrollment numbers data.

Private School Facilities

Several private schools serve the City's residents. Those located in Newport Beach include Carden Hall (K–8), Harbor Day School (K–8), Our Lady Queen of Angles (K–8), St. Andrews Presbyterian (K–8), Newport Christian School (K–6), Newport Montessori School (K–2) and Tutor Time Child Care/Learning Center (K). Sage Hill High School (9-12) serves residents of the City and is located in Newport Coast. The Susan Phillips Day School (K), located in Costa Mesa, also serves residents of the City.

Standards

School capacity is the primary concern associated with educational facilities. According to School District administrators, current school capacity is adequate to serve Newport Mesa School District. Another measure of educational facilities is campus size. No singular standard for school size exists for California educational facilities. The rule-of-thumb approach used for the past several decades recommended a minimum 10 net usable acres for elementary schools, 25 acres for middle schools and 35 to 40 acres for high schools. According to School District staff, most of the elementary and high schools are near or above these standards, while the two middle schools are below the standard.

Table 4.3-1 Newport Beach Public School Enrollment 2002/03	
School	***County Enrollment Numbers***
HIGH SCHOOLS	
Corona del Mar High	1,890
Costa Mesa High*	1,959
Estancia High*	1,338
Newport Harbor High	2,275
Orange Coast Middle College High School*	79
MIDDLE SCHOOLS	
Ensign (Horace) Intermediate	1,167
Tewinkle (Charles W.) Middle*	1,136
ELEMENTARY SCHOOLS	
Adams Elementary*	521
Andersen (Roy O.) Elementary	495
California Elementary*	391
College Park Elementary*	434
Davis Elementary*	833
Eastbluff Elementary	333
Harbor View Elementary	502
Kaiser (Heinz) Elementary*	760
Killybrooke Elementary*	461
Lincoln Elementary	612
Mariners Elementary	651
Newport Coast Elementary	487
Newport Elementary	471
Newport Heights Elementary	602
Paularino Elementary*	340
Pomona Elementary*	557
Rea (Everett A.) Elementary*	763
Sonora Elementary*	375
Victoria Elementary*	421
Whittier Elementary*	654
Wilson Elementary*	651
Woodland Elementary*	528
ALTERNATIVE AND ADULT SCHOOLS	
Back Bay Alternative High School*	80
Monte Alternative Vista High School*	239
Newport-Mesa Alternative Adult Education Center*	N/A

Source for Enrollment statistics: California Department of Education. 2003. Dataquest Website http://data1.cde.ca.gov/dataquest, accessed 19 December.

* Located in Costa Mesa

Figure 4.3-1 Educational Facilities

Fig p.2 (11x17)

As land constraints and evolving educational needs have necessitated revisions to these standards, the California Department of Education has published *The Guide to School Site Analysis and Development* in order to establish a valid technique for determining acreage for new school formulas that permit each district to accommodate its individual conditions. The Department of Education recommends that a site utilization study be prepared for a potential site, based on these formulas.

While facility standards are used by planners, the NMUSD also uses other statistics to evaluate schools in the District. There were about 22,275 students enrolled at the primary, secondary, and high school level for the 2002/03 school year. For the same year, the District's pupil to teacher ratio was 20.4, a number below that of both the County and State at 22.2 and 20.7 pupils per teacher, respectively. Average class size for the District was 24.1, while county and State was 27.4 and 26.2, leaving NMUSD with 3.3 and 2.3 fewer students per classroom, respectively. The number of students per computer was 4.6 and number of students per computer with CD-ROM was 5.0, both numbers are significantly higher than corresponding county and State statistics.[1]

Projected Needs

The District does not currently identify any projected needs.

Planned Improvements

There is a Measure A Bond renovation in progress throughout the District. During construction, portable classrooms will accommodate the displaced student population.[2] See the Section "Funding, Local Sources" for a discussion of the Measure A School Modernization Program.

Programs

The District provides traditional curriculum education, as well as many additional programs for special students.

- The Seamless Transition Employment Program (STEP) provides transitional services for developmentally disabled students, ages 18 to 22, in a community classroom setting. STEP curriculum covers pre-employment training, mobility training using local transit systems, self-advocacy and independent living skills, parent education, and connections with employment vendors.
- The Workforce Investment Act created a program that provides services for economically disadvantaged youth, ages 14-21, including basic skills in math and reading, development of work readiness skills, completion of requirements for a diploma or equivalent, and connections to and retention of employment and/or post-secondary education.
- The Gifted and Talented Education Honors Program (GATE) is available for elementary though high school students and is a program designed to meet the exceptional learning and developmental needs of identified GATE students. GATE students receive an average of three and one half hours of instruction each week, including honors or advanced placement classes,

[1] California Department of Education, Dataquest Website http://data1.cde.ca.gov/dataquest, accessed December 19, 2003.

[2] Ruth Levin, Administrative Assistant, Facilities Department, Newport Mesa Unified School District, written communication, January 9, 2004.

postsecondary education opportunities, and before/after school and Saturday classes. The aspects of the GATE program that include accelerated learning and placement, independent study, and mentoring programs are designed to involve students and parent. Each school plan describes the program specific to the site. For the school year, 2002/03, the NMUSD had more than 1,500 students, or 6.8 percent of total enrollment, in the GATE program.

Technology

An important consideration in the future planning of school facilities is the use of information technologies, such as the Internet and wireless communications. Design and space considerations should reflect, when possible, the incorporation of such information technologies.

Each school site typically includes the technological infrastructure to support the administrative operations and educational delivery to the students. The electronic infrastructure should include telephone systems/switch and intercom, public address, Cable Television, and Local Area Network (LAN). The LAN includes a fiber optic backbone from a Central Processing Unit room where cabling connects to the site network server to allow access to common software, files, information, and the Internet.

The NMUSD considers technology an essential tool for students and has, therefore, placed an emphasis on technology. As stated in the District's Strategic Goals, NMUSD will provide its students a sequential skills technology framework beginning with kindergarten and building through 12th grade. In 2002/03, the number of students per computer was 4.6 and number of students per computer with CD-ROM was 5.0, significantly higher than county and State statistics.[3]

Funding

To accommodate increasing numbers of students, districts fund new school facilities through a combination of several State sources, including State bonds, local bonds, special taxes, developer fees, and various Federal funding sources. Districts have also used multitrack, year-round education as a way to avoid or defer the cost of new construction.

State Sources

The major State funding program for providing permanent school facilities is the Leroy F. Greene State School Building Lease-Purchase Program of 1976 (Lease-Purchase Program), which is funded by State bonds. These bonds are placed on the ballot by the legislature on a regular basis for approval by voters. In 2000, adoption of Proposition 39 changed the required majority for local voter approval of bonds from two-thirds to 55 percent. Once these bonds receive voter approval, school districts may apply for the funds. Eligibility is based on a district's need to house current, as well as projected, enrollment. The Lease-Purchase Modernization Program is an affiliated program that provides funds for improvements to enhance facilities at least 30 years old.

Another source of State funding is the School Facility Program or Assembly Bill 16 (AB16), administered by the State Office of New Public School Construction. Under AB16, \$13.05 billion was allotted for school facilities in 2002 and the program is funded at \$12.3 billion for 2004. In 2002, Assembly Bill 16 created the Critically Overcrowded School Facilities (COS) program, which

[3] California Department of Education, Dataquest Database. Website: http://data1.cde.ca.gov/dataquest, accessed December 19, 2003.

supplements the new construction provisions within the School Facilities Program. The COS program allows school districts with critically overcrowded school facilities, as determined by the California Department of Education, to apply for a preliminary apportionment for new construction projects.[4] COS was funded at $1.7 billion in November 2002 and $2.44 billion in spring 2004.[5]

Levels of developer fee contribution are determined by the State Allocation Board and increase annually. Current State statutes dictate that school districts have the authority to levy fees (known as statutory or Level I fees) on new development at rates of $2.14 per square foot of new residential and $0.34 per square foot for commercial and industrial development.[6] Because these Level I fees often do not generate sufficient funding for new schools, districts such as NMUSD use fees (known as Level II fees) to generate one-half the cost of providing new school facilities. Use of Level II fees assumes that the State will provide the other half of the cost of new schools through the issuance of general obligation bonds. In the event that the State does not have funding available, participating districts have the option to temporarily increase the fees (then known as Level III fees) on new residential development to try and meet their needs. The district must, however, refund these funds when general obligation funds from the State do become available. It should also be noted that some income for school districts is obtained through the State lottery but cannot be used for funding construction projects due to the fluctuating funding levels available through this means.

Local Sources

Local funding sources include both non-revenue and revenue monies. Non-revenue funds include lease/purchases, certificates of participation, and other mechanisms typically in the form of loans. Revenue funds are generated from several sources, including the District's general fund, money from the sale of unused school sites, general obligation funds, redevelopment agreement funds, developer fees, and others.

After land is acquired, school districts are exempt from local zoning regulations and planning processes. But the construction of new schools, like all development, is dependent upon multiple factors, most basically the availability of funds. Also, without support from the City itself, available funding does not guarantee new facilities will be built. It is also important to note that increases in the tax base do not necessarily affect the financial status of the school districts. Thus, a strong local economy does not necessarily mean that new school facilities will be built and that programs will be expanded. Further, other operating expenses that continually increase, such salaries, can significantly decrease an already limited budget and eliminate opportunities for new development.

Total revenues for the Newport-Mesa Unified School District in the year 2001/02 were $162.7 million. This translates into $7,600 per student, which is 105 percent of the average unified expenditure in the State of California. Of these revenues, 3.8 percent is State aid, 61.2 percent comes from local property taxes and fees, 4.8 percent is from Federal revenues, 21.8 is from State revenues (including Lottery), and the remaining 8.25 percent is from miscellaneous local revenues.[7]

Voters in the District passed the Measure A School Modernization Program in March 2000 authorizing the sale of $110 million in general obligation bonds. The District added $2 million in

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[4] California Department of Education. Facilities Department, Website: www.cde.ca.gov/facilities, accessed January 5, 2004.

[5] California Office of Public School Construction, Website: http://www.opsc.dgs.ca.gov/default.htm, accessed January 5, 2004.

[6] State Allocation Board, Website: www.opsc.dgs.ca.gov/SAB/Default.htm, accessed January 5, 2004.

[7] Education Data Partnership, Ed-Data: Fiscal, Demographic, and Performance Data on California's K–12 Schools. Website: www.ed-data.k12.ca.us/welcome.asp, accessed December 19, 2003.

deferred maintenance funds to the program and estimates a matching share of approximately $61.3 million from eligibility in the California State School Facilities Program. The program will modernize twenty-eight campuses in the District, all of which are at least 25 years old and have not previously been modernized with State funds. All construction activity under the Measure A Program is expected to be completed in 2006.[8]

Private, Post-Secondary, and Community College Education

There are four small colleges or universities within city limits. All four are private, three are for-profit, and one is not-for-profit. Platt College Newport, located on MacArthur Blvd., has 262 full-time students. Platt specializes in Information Technology, Graphic Design, and Multimedia. Interior Designers Institute has 53 full-time students. The small Newport University offers business administration, behavioral sciences, and law degrees. The Insurance Education Association specializes in professional education and serves more than 20,000 students through on-line services as well as its Newport Beach and San Francisco offices.

There are several nearby Colleges/Universities that also serve Newport Beach residents. These include, but are not limited to: the University of California, Irvine, with more than 20,000 students located 10 miles from the City; California State University is 10 miles from Newport Beach and has more than 22,000 students in attendance; the University of Phoenix, with approximately 18,000 full-time students, located eight miles from Newport Beach; and Coastline Community College, with more than 3,000 students, also within 8 miles of the City. Regional community colleges include Orange Coast College in Costa Mesa with more than 25,000 students, Santa Ana College in the City of Santa Ana also with approximately 25,000 students, and Golden West College in Huntington Beach with 7,000 students enrolled.

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[8] Newport Mesa Unified School District, Measure A website: accessed January 5, 2004.

Section 4.4 Parks and Recreation

4.4 PARKS AND RECREATION

This section describes the existing parks and recreation facilities within the Planning Area. Information for this section is based on the City of Newport Beach Recreation and Open Space Element last updated in 1998, and conversations with City staff. Additional information reviewed in preparation of this section included information obtained from the City of Newport Beach official website.

EXISTING CONDITIONS

Parklands are important land use components in an urban environment, providing both visual relief from the built environment and contributing to residents' quality of life through recreation and aesthetic value. This section describes the City's existing parkland, identifies planned expansions and improvements, and outlines current needs and future issues.

PARKS

The City has approximately 278 acres of developed parks and 102 acres of active beach recreation acreage (as defined below), for a total of 380.6 acres. Newport Beach's parklands range in size from mini-parks such as the Lower Bay Park (0.1 acre) to the 39-acre Bonita Canyon Sports Park, the City's newest and largest park. Newport Beach's park types and uses are described below.[1]

- *Community Parks* serve the entire City and are easily accessible via arterial roads. These parks generally contain amenities such as community buildings, parking, swimming, picnicking facilities, active sports, and other facilities that serve a larger population. Community Parks may have a particular theme or orientation such as active sports or aquatic facilities.
- *Neighborhood parks* serve all ages and are generally one to eight acres in size. (Some existing neighborhood parks are smaller and some are larger than this standard.) When possible, they may be located adjacent to a public school. Neighborhood parks contain a wide variety of improvements that often include turf areas, active sport fields and courts, community buildings, playgrounds and picnic facilities. Other improvements may include senior center, youth center, and aquatic facilities.
- *Mini Parks* are smaller parks that may take one of two different forms. Most mini parks are less than one acre in size, serve a population within a quarter-mile radius, and are located within a neighborhood, separate from major or collector roads. Some mini parks serve the entire City and are located as urban trail heads along major trails or streets.

  Conventional mini parks may include playground equipment, passive green spaces, or a focus on one active sport such as tennis or basketball. Mini parks that serve as staging areas may include drinking fountains, restrooms, benches, shade trees, bicycle racks or, in some cases, parking.

[1] The term "Active recreation" is used throughout this document and refers to an area or activity that requires the use of organized play areas including, but not limited to, softball, baseball, football, and soccer fields; tennis and basketball courts; and various forms of children's play equipment. "Passive recreation," conversely, typically does not require the use of organized play areas. Passive recreation areas are often open space areas, which can include "pocket" parks, trails, and other unimproved lands.

Neighborhood parks that include unique recreational facilities, such as basketball courts, tennis courts, turf areas, active sports fields, community buildings, unique play areas, or view parks are considered citywide resources and, thus, are usually used by all citizens.

- *View Parks* are smaller passive parks designed to take advantage of a significant view. They are often located on coastal bluffs to focus upon ocean or bay views. Most view parks are between one-half to three acres in size and serve the entire City. View parks are generally improved with landscaping, walkways, and benches.

- *Bikeways* are major throughway trails that connect to regional trails. They are primarily on major roads and are intended to serve both functional and recreational cyclists. Secondary Bikeways connect to backbone trails and serve cyclists and children riding to and from school.

- *Environmentally Sensitive Areas* (ESAs) are passive open space areas possessing unique environmental value that generally warrant some form of protection or preservation. ESAs sometimes provide passive recreational opportunities, such as hiking, interpretive centers, and viewparks. Such areas include, but are not limited to, the following:
  - Riparian areas
  - Freshwater or Saltwater marshes
  - Intertidal areas
  - Other wetlands

- *Greenbelts* may be either publicly or privately owned and may include areas with some recreational facilities, although the primary function of greenbelts is passive open space.

- *Jogging Trails* are routes commonly used for community-wide running.

- *Marine Life Refuges* usually serve the purpose of protection of marine and intertidal species. Often times, these refuges are managed at the State level.

- *Tidelands* are lands below water and filled areas that are water-adjacent. Currently, the City holds 1,168 acres of "tidelands" in trust and is responsible for their management. This includes lifeguard service, maintenance of the beach, boardwalk, public docks, marinas, etc. Tidelands have proven costly to maintain and do not currently generate revenues to support their recreational uses.

- *Open Space* includes passive open space areas that do not function as public parks. Such areas may or may not be accessible to the general public. Those areas that are accessible generally provide passive recreational opportunities, such as hiking, interpretive centers, and viewparks.

- *Pedestrian Trails* include improved or unimproved walkways or sidewalks located within park, beach, greenbelt, or open space area.

- *Public Beaches* serve a number of local and regional functions. In some neighborhoods, beaches function as neighborhood or community parks such as Peninsula Park at Balboa Pier. Easy accessibility, lack of entrance fees and a lack of other available parks have contributed to this function. Sandy beach areas adjacent to the bay or ocean are usually designated as public beach and may include active sports, snack bars, showers, drinking fountains, restrooms, walkways, docks, benches, shade trees and parking areas. Active beach recreation takes place within about 100 feet of the water's edge. Thus, the public beach area located within 100 feet of the water's edge is included in the active recreation acreage calculations.

- *Recreation Trails* incorporate two or more trail types, including bicycle, equestrian and pedestrian, and typically include rest stop amenities. Recreation trails also provide links between parks and open space areas.
- *Regional Equestrian Trails*, as designated by the Orange County General Plan Transportation Element, are backbone routes.
- *Public Schools* are considered part of the recreation system in the City because some of the fields, pools, and playground areas serve the general public during weekends and after school. Thus, discussion of existing school facilities is included in this document.
- *Staging Areas* are suggested gathering or drop-off locations for connecting to equestrian, pedestrian, jogging or bicycle trails, area beaches, or tidepools.
- *Ecological Reserves*, in this case, are managed by the State Department of Fish and Game. In Newport Beach, The Upper Newport Bay Ecological Reserve is set aside for resource protection, water maintenance, and for educational and recreational purposes.

Table 4.4-1 lists the City's parkland acreages, including active beach recreation areas. The acreages are presented by Service Area, a designation created by the City for ease of park planning, overall operations, and parkland maintenance. These divisions also allow equitable administration of parkland dedications and fees provided by residential development. Table 4.4-1 also lists the deficit/excess parkland for each service area, which is discussed later in the section. The Service Areas are depicted on Figure 4.4-1. Existing and proposed parks are illustrated on Figure 4.4-2.

Table 4.4-1 Parkland Acreage

Service Area	Existing Park Acreage: 2003[a]					1998 School Recreation Acreage
	Park Acres Needed 1998	Park Acres Existing 2003	Active Beach Recreation Acreage	Combined Park/Beach Acreage	Deficit (–) Excess (+)	
1: West Newport	64.7	9.1	34	43.1	–21.6	0
2: Balboa Peninsula	25.5	6.5	44	50.5	+25.0	3.3
3: Newport Heights et al.	64.3	50.2	0	50.2	–14.1	37.8
4: Santa Ana Heights	3.2	2.0	0	2.0	–1.2	0
5: Lower Bay	17.3	0.1	0	0.1	–17.2	0
6: Balboa Island	17.9	0.3	1	1.3	–16.6	0
7: Eastbluff	31.3	71.0	0	71.0	+39.7	22.8
8: Big Canyon	13.9	0	0	0	–13.9	0
9: Newport Center	10.9	4.0	0	4.0	–6.9	0
10: Corona del Mar	44.4	23.9	11.4	35.3	–9.1	0
11: Harbor View	54.6	111	0	111	+56.4	4.6
12: Newport Coast[b]	28	N/A	12.6	N/A	N/A	—
Totals	***376[c]***	***278.1***	***102.6[d]***	***380.7***	***+4.7***	***68.5***

SOURCE: Newport Beach Recreation and Open Space Element 1998

[a] 2003 Calculation is based on the City of Newport Beach Recreation and Open Space Element (June 1998) inventory and includes Arroyo Park and Bonita Canyon (Service Area 11).

[b] Estimated 2002 population of 5,699 and approximately 5,500 linear feet of active beach (5,699 population x 5 acre per thousand = 28 acres)

[c] 69,600 + 5,699 population x 5 acre per thousand = 376 acres

[d] Includes beach area where active recreation takes place (i.e., typically within 100 feet of the water. In addition, there are 174 acres of passive beach open space, 136 acres of open space land in the Upper Bay Ecological Reserve, and an undetermined amount of water open space in the Upper Bay and Newport Harbor)

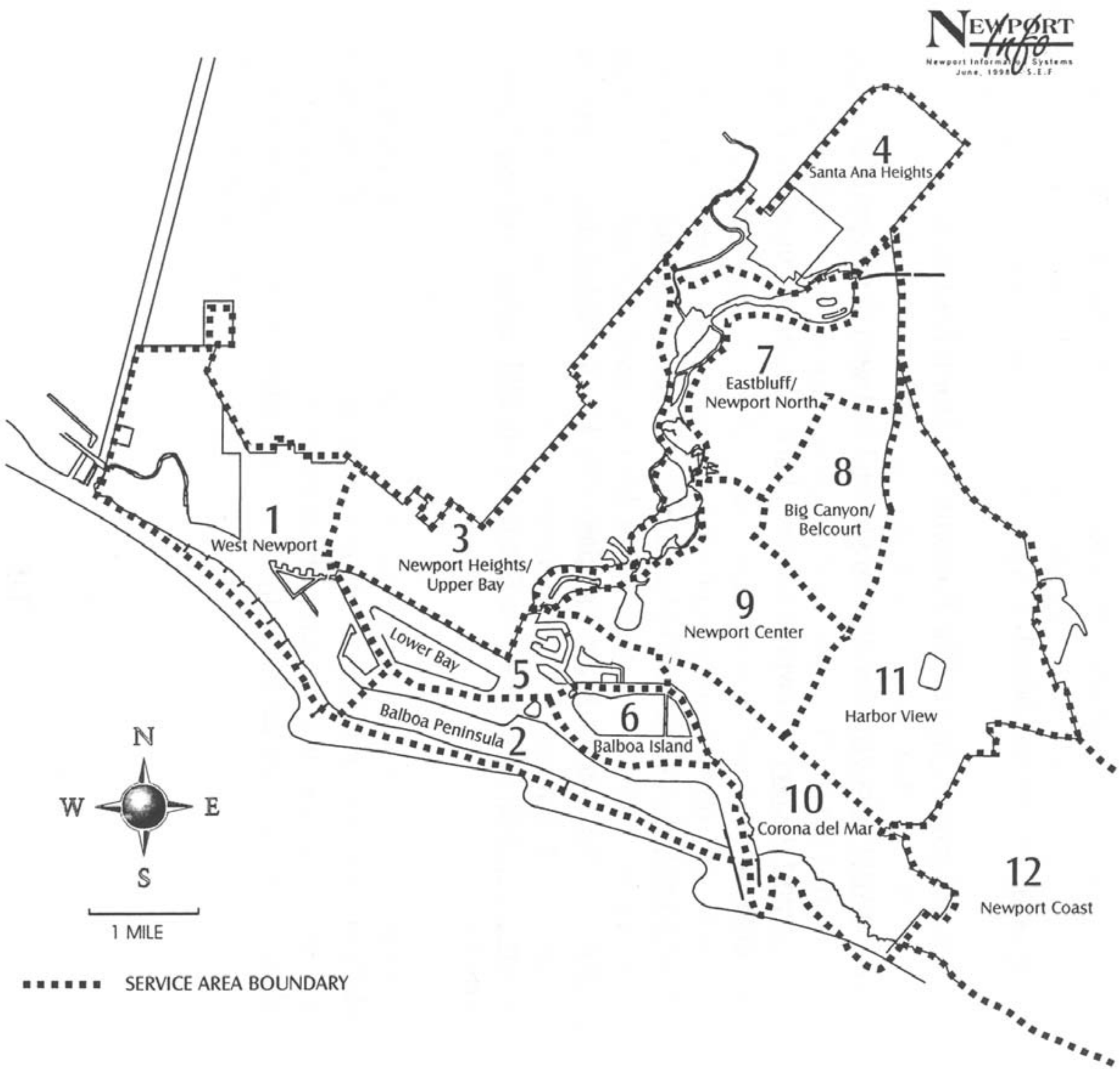

Figure 4.4-1 Service Area Locations

Recreational Facilities

Newport Beach's parks contain a variety of recreational facilities, with areas available for organized sports, including soccer fields, baseball diamonds, tennis courts, volleyball courts, and basketball courts. Additionally, benches, picnic tables, and barbecues are available for informal recreation activities. Recreational opportunities exist for children in many of the play areas in the City's parks. Biking and walking trails are also popular recreational amenities within the City. Swimming pool facilities and several aquatic sporting activities are available to the public at the Marian Bergeson Aquatic Center and Newport Harbor High School through joint use agreements with the Newport Mesa Unified School District.

Additional recreational resources within the City include three community centers, several multipurpose recreation centers, a senior center, and two gymnasium facilities. The City does not own or maintain any municipal golf courses. Table 4.4-2 lists public open space and recreation facilities in Newport Beach by service area as of 1998.

Figure 4.4-2 Parks and Recreational Facilities

Fig p.2 (11x17)

Table 4.4-2 Existing (2003) Public Open Space and Recreation Facilities

Park-Recreation Facility	*Usable Acres*	*Active/ Passive*	*Type and Facilities*	*ADA Access?*
SERVICE AREA 1: WEST NEWPORT				
Channel Place Park	1.2	A	Active Neighborhood Park: Turf area; half basketball court; 2 picnic tables; 2 barbecues; play area and swings; benches; restrooms; dr/fountain; bay frontage	play area only
Gateway Park	0.3	P	Passive Mini-Park: Landscaped entry sign (no recreation facilities)	
Lido Park	0.2	P	View Park: Turf; benches; dr/fountain; view of bay	yes
Newport Island Park	0.3	A	Active Neighborhood Park: Turf area; ½ basketball court; 2 picnic tables; 1 barbecue; play area; benches; dr/fountain; view of bay	yes
Newport Shores Park	0.2	A	View Park: Turf area; play area; benches; dr/fountain; view of bay	yes
Rhine-Wharf Park	0.1	P	View Park: Benches; view of bay	yes
West Newport Community Center	0.4	A	Recreation center: Gym; classrooms; locker rooms, play area (+ .3 ac. free parking)	play area only
West Newport Park	4.6	3.8 A 0.8 P	Active Neighborhood Park: Turf area; half basketball court; 17 picnic tables; play areas; benches; 4 tennis courts; 4 racquetball courts; restrooms/showers; dr/fountains; (+ 1.9 ac. metered parking)	Play area
Sunset View Park	0.8	P	View Park: Turf area; benches; walkway	yes
38th Street Park	1.0	A	Active Neighborhood Park: Turf area; 1½ basketball courts; 2 picnic tables; play area; dr/fountain; restrms.	play area only
Total Park Acreage	***9.1***	***6.9 ac active + 2.2 ac. passive***		
West Newport Beaches	34 ac. active 34 ac. passive		Public Beaches: Swimming; beach play; volleyball; sunning; benches (average width = 200', with active recreation concentrated in 100' nearest the water)	no
SERVICE AREA 2: BALBOA PENINSULA				
Balboa Community Center	0.1	A	Recreation Center: Meeting room; dance floor; restrooms (+ .1 ac. parking)	limited
"L" Street Park	0.3	P	Mini Park: Turf area; benches; dr/fountain	no
Las Arenas Park	1.3	A	Active Neighborhood Park: Turf area; half basketball court; play area; benches; 4 tennis courts; dr/fountains, Girl Scout House (lease from City)	no
"M" Street Park	0.1	P	Mini Park: Turf area; benches	yes
Newport and Balboa Piers	n/a		Municipal Piers: Walking; views; fishing; food concessions	yes
Peninsula Park (at Balboa Pier)	3.5	2.6 A 0.9 P	Active Neighborhood Park: Turf area; 4 picnic tables; 3 barbecues; 1 ball diamond; 1 athletic field; beach volleyball; play area; gazebo; restrooms/showers; view of ocean (+ 1.1 ac. metered parking)	yes
Veterans Memorial Park	0.4	P	Neighborhood Park: Turf area; 3 picnic tables; benches; 2 barbecues; dr/fountain; view of bay, American Legion Hall (+ .9 ac. metered parking)	no
West Jetty Park	0.8	P	View Park: Turf area; benches; fishing; 1 recreational table; view of ocean/bay	yes
Total Park Acreage	***6.5***	***5.3 ac. active + 1.2 ac. passive***		
School Recreation Site: Newport Elementary School	3.3	A	Turf area; basketball; playground (located on beach front sand area leased from City since 1950)	
Peninsula Beaches: Bay and Ocean (e.g. 10th Street Beach, 16–19th Street Beach, etc.)	44 ac. active 132 ac. passive		Public Beaches: Swimming; beach play; sunning; benches; dr/fountain; parking lots/meters, hand-carried boat launching (ocean beaches avg. width = 400', with active recreation concentrated in 100' nearest the water)	

Table 4.4-2 Existing (2003) Public Open Space and Recreation Facilities

Park-Recreation Facility	*Usable Acres*	*Active/ Passive*	*Type and Facilities*	*ADA Access?*
SERVICE AREA 3: NEWPORT HEIGHTS—UPPER BAY				
Bob Henry Park	4.4	3.5 A 0.9 P	Active Neighborhood Park; 2 ball fields; soccer field; play equipment; restrooms; athletic group storage; dr/fountain; (+ .4 ac. free parking)	yes
Bolsa Park	0.2	A	Mini Park: Turf area; play area and equipment; 1 picnic table; benches; dr/fountain	yes
Castaways Park	17.4	P	View Park: Bike and hiking trails; view of bay	yes
Cliff Drive Park & Community Center	4.6	0.4 A 4.2 P	View Park and Community Center: Multi-Purpose Room; half basketball court; play area; picnic area; barbecues; benches; restrooms; views of bay and ocean; street parking only	yes
Ensign Park	1.8	P	View Park: Turf area, benches; view of bay; Theater Arts Center (+ .3 ac. parking)	yes
Galaxy Park	1.0	P	View Park: Turf area; benches; view of back bay	yes
Kings Road Park	0.4	P	View Park: Turf area; benches; view of ocean/bay	no
Mariners Park (including A. Vincent Jorgensen Community Center)	6.0	A	Community Park: Multi-purpose room; playfields with lights on one side; softball diamonds w/bleachers; 2 tennis courts w/lights; 2 racquetball courts; play area; BBQ's benches; restrooms; (plus branch library and fire station)	yes
North Star Beach	11.6	P	Public Beach: Beach, sunning, dr/fountain [State-owned but jointly-held w/County as tidelands trust] (+ .5 ac. free parking). Plus Newport Aquatic Center: Club recreation center with Classrooms; weight room, locker rooms, hand-carried boat launching; outrigger canoe launching (leased from City)	no
Westcliff Park	2.8	P	View Park: Turf area; view of ocean/bay (+ .2 ac. parking)	no
Total Park Acreage	***50.2***	***21.6 ac. active + 28.6 ac. passive***		
School Recreation Sites:				
Mariners Elementary School	5.4	A	Basketball; playfields. Accommodates overflow from adjacent Mariner's Park for active recreation.	
Newport Heights Elem. School	4.9	A	Open space/play areas. Provides facilities near boundary with Costa Mesa.	
Horace Ensign Jr. High School	7.6	A	Volleyball; basketball; playfields; gymnasium. Playfields used for soccer and other organized programs; gym available for some City programs.	
Newport Harbor High School	19.9	A	Tennis; volleyball; basketball; playfields; swim pool.	
Total School Recreation Acres	***37.8***	***A***		
SERVICE AREA 4: SANTA ANA HEIGHTS				
Bayview Park	2.0	1.0A 1.0P	Active Neighborhood Park: Turf area; bike trail access; full basketball court; play area; 2 picnic tables; play area; dr/fountains; view of upper Bay	yes
Total Park Acreage	***2.0***	***1 ac. active + 1 ac. passive***		
SERVICE AREA 5: LIDO ISLE - LOWER BAY				
Myrtle Park	0.1	P	Mini Park: Turf area; benches; pay phone	yes
Total Park Acreage	***0.1***		***0.1 ac. passive***	
SERVICE AREA 6: BALBOA ISLAND				
Balboa Island Park and Carroll Beek Community Center	0.3	A	Neighborhood Park-Active: Recreation center; ½ basketball court; 1 bench; play area; 1 dr/fountain	yes
Total Park Acreage	***0.3***	***0.3 ac. active***		
Balboa Island Beaches	1.0 active 6.9 passive		Swimming, beach play, boating (active recreation area = area nearest water, approximately 1 acre)	

Table 4.4-2 Existing (2003) Public Open Space and Recreation Facilities

Park-Recreation Facility	*Usable Acres*	*Active/ Passive*	*Type and Facilities*	*ADA Access?*
SERVICE AREA 7: EASTBLUFF—NEWPORT NORTH				
Big Canyon Park	39.2	P	Environmentally Sensitive Area: Hiking trails; view of back bay	no
Bonita Creek Park	13.1	A	Community Park: Rec. center; 1 lighted soccer field; 2 ball diamonds (1 lighted); ½ basketball court; restrooms; play area; picnic area; 8 picnic tables; (+1.1 ac. free parking)	yes
Eastbluff Park	18.7	10.2 A 8.5 P	Community Park: Turf area; 1 ball diamond; 1 athletic field; play area; 3 picnic tables; 2 BBQ's; benches; restrooms; dr/fountains (+.8 ac. free parking) (Park includes portion used by Boys/Girls Club, with gym, activity center, community room, and classrooms)	yes
Total Park Acreage	***71.0***	***23.3 ac. active + 47.7 ac. passive***		
School Recreation Site:				
Corona del Mar High School &	22.8	A	Basketball; field sports; tennis; volleyball	
Marian Bergeson Aquatic Ctr .			Swimming; diving; water polo	
SERVICE AREA 9: NEWPORT CENTER				
"Newporter North" Park	4.0	P	View Park: Turf area; benches; view of upper bay.	yes
Total Park Acreage	***4.0***	***4 ac. passive***		
SERVICE AREA 10: CORONA DEL MAR				
Bayside Park	2.5	0.4 A 2.1 P	Neighborhood Park: Turf area; play area; benches	yes
Begonia Park	2.0	0.8 A 1.2 P	Neighborhood Park: Turf area; 2 play areas; 2 barbecues; 2 picnic tables; benches; drinking fountain; view of bay/ocean	no
Harbor View Nature Park	10.2	P	Passive Neighborhood Park: Hiking trails	no
Inspiration Point	1.4	P	View Park: Turf area; benches; view of ocean	yes
Irvine Terrace Park	6.5	A	Active Neighborhood Park: Turf area; play area; 1 basketball court; 2 small playfields; 2 tennis courts; benches; 5 picnic tables; 2 barbecues; dr/fountains; view of bay/ocean; restrooms	south portion only
Lookout Point	1.0	P	View Park: Turf area; benches; drinking fountains; telescope; view of bay/ocean	yes
Old School Park	0.3	P	Mini Park: Turf area; bench	yes
Total Park Acreage	***23.9***	***7.7 ac. active + 16.2 ac. passive***		
Corona del Mar Beaches:				
Corona del Mar State Beach ("Big Corona": City-operated State Beach)	11.4	A	State Beach Park: Turf area; 10 volleyball courts; 4 picnic tables; 4 barbecues; 20 fire rings; benches; swimming; fishing; restrooms/showers; food concessions; dr/fountains; view of bay/ocean; pay phones; (+ 5.7 ac. metered parking)	no
"Little Corona" Beach	1.5	P	Public Beach: Tidepools; group visits	
Beach Totals:	***11.4 active 1.5 passive***			

Table 4.4-2 Existing (2003) Public Open Space and Recreation Facilities

Park-Recreation Facility	*Usable Acres*	*Active/ Passive*	*Type and Facilities*	*ADA Access?*
SERVICE AREA 11: HARBOR VIEW				
Arroyo Park	18.3	A	Community Park: 2 barbecues, concrete picnic tables, 1 play area, water fountains, 1 full-size multi-purpose field, and 1 full basketball court.	yes
Buffalo Hills Park	16.1	10.0 A 6.1 P	Community Park: Turf area; 2 play areas; 1 ball diamond; 1 basketball court; 1 volleyball court; athletic field; benches; 11 picnic tables; 5 barbecues; 2 restrooms; drinking fountains	yes
Bonita Canyon Sports Park	40.8	3.5 A 37.3 P	Community Park: 2 barbecues, picnic tables, 2 play areas, water fountains, 5 full-size multi-purpose fields, and 1 full basketball court, 2 tennis courts, restrooms.	yes
Grant Howald Park	4.9	4.3 A 0.6 P	Community Park: Community Youth Center (with dance floor, multipurpose room, and meeting room); play area; 1 lighted ball diamond; 1 basketball court; 2 tennis courts; picnic area; turf area; 3 tables; 2 barbecues; restrooms (+ .8 ac. free parking)	yes
Jasmine Creek Park	0.2	P	View Park: Turf area; benches; view of ocean	yes
Lincoln Athletic Center	12.4	A	Community Park: 3 playfields (2 lighted); 1 basketball court; gym; restrooms, (leased from School District)	no
Oasis Passive Park and Senior Center	5.6	2.8 A 2.8 P	Community Center: Senior Center; turf area; public garden plots; (+ 1.5 ac. free parking)	yes
San Joaquin Hills Park	3.5	A	Active Neighborhood Park: Turf area; benches; 4 tennis courts; restrooms; dr/fountains; 2 picnic tables; lawn bowling greens and clubhouse (leased to Newport Harbor Lawn Bowling Assoc.; petanque court (+ .6 ac. free parking)	no
San Miguel Park	6.9	5.2 A 1.7 P	Active Neighborhood Park: Turf area; 1 athletic field; 1 ball diamond; 1 basketball court; 4 racquetball courts; play area; 6 picnic tables; benches; 2 barbecues; dr/fountains; restrooms (+ .4 ac. free parking)	yes
Spyglass Hill Park	1.3	A	Mini park: Turf area; benches; play area; dr/fountain	yes
Spyglass Reservoir Park	1.0	A	Mini Park: Turf area; play area; playground equipment; benches; 1 picnic table; panoramic view	yes
Total Park Acreage	***111***	***62.3 ac. active + 48.7 ac. passive***		
School Recreation Sites:				
Andersen Elementary School	1.6		• Basketball; Field Sports; Volleyball	
Harbor View Elem. School	3.0		• Field Sports	
Lincoln Elementary	*		* Acreage included within Lincoln Athletic Ctr. above.	
Total School Recreation Acres	***4.6***	***A***		
Other Recreation Area: Upper Newport Bay Regional Park (County)			Passive Regional Park: Bike paths; views; nature trails; 10,000 sf. nature center; 136 acres (excluding water)	
Grand Total: Park Acreage	***278.1***		***128.4 ac. active + 149.7 ac. passive (plus 136 acres in Upper Bay Regional Park: water, trails, ecological reserve, open space)***	
Grand Total: Active Beach Recreation Acreage	***90.4***		***(plus 174 ac. passive beach open space—typically not active recreational because of distance from water)***	
Grand Total: School Recreation Acreage	***68.5***			

Other Recreational Facilities

Beach and Harbor Facilities

The City has approximately 17 miles of sandy ocean beach (including the Upper Newport Bay). The widths of the beaches along the ocean vary from area to area. The beaches at Little Corona and the Marine Life Refuge, for example, are narrow and rocky. The Balboa Peninsula has small beaches on the bay side, such as those located at 10th and 15th Streets, and a broad ocean beach, averaging over 400 feet in width. In west Newport, by contrast, the beach is seldom more than 200 feet wide.

Public parking is available at Corona del Mar State Beach, Balboa Pier, Newport Pier, 18th Street, North Star Beach, and City Hall. Restroom facilities are concentrated in relatively few areas adjacent to piers and some street ends. There are long stretches of beach land that do not have easily accessible public restrooms. The lack of public restrooms is a problem for visitors to Upper Newport Bay.

Newport Harbor, in Lower Newport Bay, is one of the largest small craft harbors in the United States. Thousands of small boats are moored at residential piers, commercial slips or bay moorings, or launched at the boat ramps and kept in dry storage in areas adjacent to the harbor and the Upper Bay or trailered from other areas. The harbor contains 1,230 residential piers, 2,119 commercial slips and side ties, and 1,221 bay moorings. The Harbor Patrol has 11 moorings and five slips that are available to guests and provides a mooring location for visiting boats. The harbor has eight marinas, four gas docks/service stations, and boat pump-out facilities. Businesses in the area include several boat rental companies and providers of fishing excursions and harbor tours. Several clubs provide their members with storage and launching facilities. Privately-owned launching facilities are available to the general public in the Upper Bay but are primarily used for launching power boats due to the fact that most sailboats cannot pass under the Coast Highway bridge that extends over the Bay. The public beach at 18th Street is used to launch small sailboats. City sailing programs use the beaches at 16th and 18th Streets for sailing classes.

School Facilities with Joint Use Agreements

In general, school recreation facilities are open to the public during non-school hours. The Newport Mesa Unified School District has a joint use agreement with the City of Newport Beach that allows the shared use of school recreation facilities for public use. Typically elementary schools provide adjunct recreation opportunities to surrounding neighborhoods, while junior high and high schools provide adjunct community-wide facilities. The Newport Mesa Unified School District also presently leases "dormant" school sites to the City for recreational purposes. In 1998, 68 acres of School District land were available for recreational uses under joint use agreements.

Private Facilities

There are several private facilities within City limits as detailed in Table 4.4-3. These facilities are important because, while they do not contribute to the City's public parkland inventory, they generally offer, for a fee, additional services to the public. The facilities in Service Area 12 are located in a recently annexed area of the City and present parkland acquisition opportunities for the City. The table lists all categories of recreation facilities available in the City, including yacht clubs, golf courses, and country clubs. While some of these facilities are for members only, many are open to the public either for general use of the facility's amenities or else for a specific City-sponsored or City-organized event that utilizes a unique aspect of the facility that may not be available in those facilities owned by the City. An example is the Newport Aquatic Center, which, as described in the "Programs" Section, is utilized by the City for certain aquatic activities available to the public.

Table 4.4-3 Private Recreation Resources

Name of Park	Acres	Active/Passive	Description
SERVICE AREA 12: NEWPORT COAST (PRIVATE PARKS WITHIN RECENTLY ANNEXED AREA)			
Canyon Watch Park	3.2	P	View Park: Boulder outcroppings; picnic tables; scenic overlook; off-street parking
Crestridge Park	8.4	P	Passive Neighborhood Park: Ornamental landscaping; tot lot; walkway connections to Crestridge Road and Newport Coast Dr. West
Harbor Watch Park	1.6	P	View Park: Boulder outcroppings; scenic overlook
Los Trancos Canyon View Park	5.9	P	View Park: Picnic areas; benches; drinking fountains; scenic overlook; Los Trancos Canyon Trail access
Newport Coast Local Park	12.8	A	Active Neighborhood Park: May include softball fields; soccer field, tot lot; basketball court; volleyball court; play jogging trail; pavilions; drinking fountains; restroom
Newport Ridge Community Park	26.2	A/P	Community Park: athletic fields; basketball courts; sand volleyball court; tot lot; pavilions; entry court; gazebo; picnic area; restrooms; parking lot
Total Private Park Acreage	***58.1***		

Group	Facilities
EXISTING (1998) PRIVATE RECREATION FACILITIES—YACHT CLUBS	
YACHT CLUBS	
Bahia Corinthian Y/C	Marina, Sailing Docks, Moorage, Boat Launch, Clubhouse
Balboa Y/C	Sailing Lessons, Sailing Docks, Moorage, Boat Launch, Clubhouse
Balboa Bay Club	Volleyball, Gym, Swimming Pool, Scuba Lessons, Sailing Docks, Moorage, Clubhouse, Showers, Beach Area
Lido Isle Y/C	Sailing Docks, Moorage, Launching, Clubhouse
Newport Harbor Y/C	Sailing lessons, Sailing Docks, Moorage, Boat Launch, Clubhouse, Showers, Beach Area
Shark Island Y/C	Sailing Docks, Clubhouse, Showers
South Shore Y/C	Races; Parent/Child class; volleyball, Sailing Docks, Boat Launch, Clubhouse, Showers
Voyagers Y/C	Racing & Cruising, Clubhouse, Showers

Group	Facilities	Open to Public?	Service Area
OTHER EXISTING (1998) PRIVATE RECREATION FACILITIES			
GOLF COURSES & COUNTRY CLUBS			
Back Bay Golf Course(at Hyatt Newporter)	9-hole executive course, par 27	Yes	9
Big Canyon Country Club	18-hole course, par 72, 6400 yards		8
Newport Beach Country Club	18-hole course, par 71, 6230 yards		9
Newport Beach Golf Course	18-hole course, par 59, 3200 yards	Yes	4
Pelican Hill Golf Course	Two 18-hole courses, par 70 and 71, 6800 yards and 7000 yards	Yes	12
TENNIS CLUBS			
Balboa Bay Club Racquet Club	24 tennis courts		9
Newport Beach Tennis Club	19 tennis courts, 1 junior Olympic size pool		7
Palisades Tennis Club	15 tennis courts		9
Peninsula Point Racquet Club	2 tennis courts		2

Table 4.4-3 Private Recreation Resources			
Group	*Facilities*	*Open to Public?*	*Service Area*
YOUTH, FAMILY, AND OTHER CLUBS			
American Legion Hall (at Veterans Memorial Park)	Clubhouse/Activity Center with multipurpose room(leased from City)		2
Balboa Bay Club	1 tennis court, 1 racquetball court, 1 gym, 1 25-meter lap pool, 1 20-yard children's pool, 1 exercise room, sailing docks, moorage, clubhouse		3
Boys & Girls Club (at Eastbluff Park)	Gym, activity center, community room, and classrooms (leased from City)	Yes	7
Girl Scout House (at Las Arenas Park)	Clubhouse/Activity Center with multipurpose room (leased from City)	Yes	2
Lawn Bowling Club (at San Joaquin Hills Park)	Clubhouse with multipurpose room; 2 lawn bowling courts plus 1 Petanque court in park separate from Lawn Bowling Club (leased from City)	Yes	11
Newport Aquatic Center (at North Star Beach)	Classrooms; weight room, locker rooms, hand-carried boat launching; outrigger canoeing (leased from City)	Yes	3
Orange Coast Y.M.C.A (under consideration for City purchase)	2 basketball courts, 2 racquetball courts, 1 classroom, 1 25-yard pool, 1 15-yard children's pool, 1 aerobics room, 1 sand volleyball court	Yes	4
Orange Coast College Sailing and Rowing Base	Hand-carried boat launching; crew rowing; restrooms	Yes	3
Boy Scout Sea Base	Webelos Aquatic Camp and Summer day camp: classes in sailing, canoeing, rowing, kayaking, etc.	Yes	3
COMMUNITY ASSOCIATIONS (WITH PARALLEL RECREATION PROGRAMS)			
Eastbluff Homeowners Community Association	1 pool, activity center		7
Harbor View Community Assoc.	1 pool, activity center		11
Lido Isle Community Assoc.	3 tennis courts, 1 activity room		5
Newport Hills Comm. Assoc.	1 pool, activity center		11
Newport Shores Comm. Assoc.	1 pool		1

SOURCE: Newport Beach Recreation and Open Space Element 1998

SERVICES

The City of Newport Beach Recreation and Senior Services Department is charged with providing community services as well as recreational and leisure time opportunities. The Department is responsible for the planning and development of the City's parks and recreational facilities. Specifically, the Department manages adult and youth sports classes; special events; after-school, summer, and aquatic programs; community classes and enrichment programs; senior recreation programs; and reservations for ballfields, picnics, and facilities. The City also offers many important services to senior citizens, such as the Oasis Senior Center, a large senior center dedicated to meeting the needs of seniors and their families through educational, recreational, cultural and social services. The General Services Department is responsible for the maintenance of City parks.

Recreation and Community Services

Recreation and parks programs are structured to meet the recreational interests of Newport Beach's residents. As previously mentioned, adult and youth sports classes, after-school programs, summer programs, special events, and aquatic programs are offered through the Department. Cultural and recreational programs in Newport Beach are conducted at many City facilities, including neighborhood parks, the Balboa Community Center, the Bonita Creek Community Center, the Carroll Beek Center, the Cliff Drive Community Center, the Community Youth Center, the West

Newport Community Center, the Oasis Senior Citizens Center, and local libraries. City programs are also conducted at local school facilities.

Many of the programs in the City are geared towards children. Newport Beach Recreation Services offers an after-school program that includes recreational activities for students in grades 1st through 6th. Swimming lessons and other aquatic activities are offered at the Marian Bergeson Aquatic Center and Newport Harbor High School Pool. For different age groups, summer and winter youth sports day camps are offered at the Community Youth Center at Grant Howald Park and Balboa Community Center. Organized through the Newport Beach Aquatics Club, the City offers an age-group swim team and junior water polo. The swim team is dedicated to the development of competitive swimming. The City also utilizes one of the two local gymnasiums for its youth basketball program.

Various organized sports are also offered, in addition to outdoor recreation and special interest courses. Youth Sports are designed as recreational, skill development programs. Programs are geared for children ages 5 to 14. A total of seven different programs are offered. Two separate Pee Wee sports programs for 3 to 5 year olds are also offered throughout the year. Softball, basketball, touch football, volleyball, and soccer programs are available for adults.

Other services are geared towards teens. The City of Newport Beach Youth Council is a teen group that meets monthly to address a variety of issues that face teens in the Newport Beach community. The council has four subcommittees that plan, organize, market, and implement the four main programs including City Government Day and producing a report to City Council. Recreation Services offers organized outings for 7th and 8th grade students. For the school year 2003-2004, students participated in a day of snowboarding and skiing.

PLANNED IMPROVEMENTS

Planned improvements include active and passive open space areas, as well as the addition of amenities such as turf areas, play fields, and expansion of existing view parks. Table 4.4-4 lists these improvements by Service Area.

CURRENT AND FUTURE NEEDS

Most existing playing fields in the City are used throughout the year by various youth and adult groups for recreational and competitive sports leagues, school district activities, and City events. Facilities such as Buffalo Hills Park, Bonita Creek, Grant Howald Park, and the Lincoln Athletic Center are used to the extent that they generally are not available for general public use without advanced reservations. Park buildings are regularly used at full capacity throughout the year as well as the day and evening to accommodate cultural and recreation programs and community meetings. Current heavy usage of parks and facilities combined with an increasing population indicate an increased future demand for parkland and expansion of facilities. Table 4.4-5 contains a general geographical description of the City's twelve service areas as well as individual area needs.

Table 4.4-4 Description of Planned Improvements			
Service Area	*Type of Park*	*Description of Services*	*Approx. Acreage*
1. West Newport Annexation Area/ Banning Ranch[a]	Community	▪ Will be located within the future specific plan annexation area to serve both the annexation area and the entire community. ▪ Proposed to be developed with active lighted recreational facilities, picnic and turf areas, and a possible gymnasium to serve the full community. ▪ The precise size of this facility is yet to be determined. ▪ Minimum size should be 15 flat usable acres, with a shape that will accommodate the desired playfields and other facilities.	15 to 30 acres
	Neighborhood	▪ Intended to serve the residents of the 2,600 future dwelling units in the annexation area. ▪ Will be developed with both active recreational facilities and passive amenities such as walkways and turf areas.	approx 8 acres
	View Park	▪ Will be located on the bluffs within the annexation area. ▪ Will also function as a rest stop for the planned blufftop trail system.	approx 1 acre
	Recreation Trail	▪ Will run in a north-south direction along the bluff top and will link Coast Highway with the Santa Ana River Trail (via a potential bikeway Bridge Street bridge) and with Talbert Regional Park in Costa Mesa.	
	ESA—Open Space	▪ Areas along the Santa Ana River channel, both within the annexation area and within present City boundaries, will be mapped as environmentally sensitive areas in conjunction with preparation of the specific plan for the area. ▪ These areas will be protected and, where consistent with the preservation of environmental resources, public access will be provided.	
1. Sites already within City	ESA Oxbow Loop (formerly "Semeniuk Slough")	▪ This ESA, a remnant channel of the Santa Ana River from the time when the river emptied into Newport Bay, loops around the northeast boundary of the Newport Shores neighborhood. ▪ Is a functioning wetland and may be improved and enhanced by the Santa Ana River flood control project wetland mitigation program. ▪ Designated for "Recreational and Environmental Open Space" under the Local Coastal Program and Land Use Element and will be preserved. ▪ Future use will balance environmental values, public access, and the needs of the adjacent residential area.	
	Neighborhood Park and View Park "Caltrans West"	▪ Located at the northwest corner of Coast Highway and Superior Avenue, will include a new neighborhood park proposed to contain active sports fields and support facilities. ▪ Will serve some existing and future residents in adjacent service areas. ▪ Will be a blufftop view park that will provide a link in the continuous blufftop bikeway in West Newport.	6 to 14 acres
	View Park Addition "Sunset"	▪ Located on the east side of Superior Avenue near Coast Highway, will be added to the existing 0.8-acre Sunset View Park in order to increase its area and add new turf areas, benches, and walkways. ▪ Will extend the view park to the public parking lot off of Superior.	.8 acre
	Recreation Trail	▪ Located on the coast. ▪ Will cross Superior Avenue and link Sunset View Park, the "Caltrans West" park and the future West Newport blufftop trail (see above).	
2. Balboa Peninsula	Marinapark Area	▪ Encompasses the existing Las Arenas and Veterans Memorial Parks, the American Legion Hall, Balboa Community Center, Girl Scout House, the Marinapark Mobilehome Park, and the public beach from 15th to 19th Streets. ▪ Retention of such existing facilities as the public beach, the four tennis courts (two lighted), and the community center, the area affords future opportunities for park, recreation, and aquatic facilities, which are not yet fully planned.	

Table 4.4-4 Description of Planned Improvements

Service Area	*Type of Park*	*Description of Services*	*Approx. Acreage*
3 & 4	Recreation Trail "West Upper Bay"	▪ Will extend along the west and north sides of the Upper Bay as part of the Upper Bay Regional Park. ▪ Will serve equestrians, bicyclists, and pedestrians. ▪ Connections to the San Diego Creek trail will be provided and staging areas will include parking facilities, restrooms, picnic tables, bicycle racks, and hitching posts.	
5	None—*No additional facilities are planned due to lack of potential sites in the service area*		
6	None—*No additional facilities are planned due to lack of potential sites on the Island*		
7	Recreation Trail "East Upper Bay"	▪ Will extend along the east side of the Upper Bay as part of the Upper Bay Regional Park. ▪ Will connect to the San Diego Creek Trail and the west and north portions of the Upper Bay trail (see Service Areas 3 & 4 preceding).	
	ESA "San Diego Creek Saltwater Marsh"	▪ A portion of the area previously known as "San Diego Creek North." ▪ Site was required mitigation for the San Joaquin Hills Transportation Corridor. ▪ Will be monitored and maintained in accordance with the Newport Bay Water-shed/San Diego Creek Comprehensive Stormwater Sedimentation Control Plan.	
8	None—*No additional facilities are planned due to lack of potential sites within the service area. In addition to the private recreational facilities available within the service area, public facilities are located near the service area boundaries in Areas 7 and 11.*		
9	View Park and Open Space "Upper Bayview Landing"	▪ Located at Jamboree Road and Coast Highway near the Newport Dunes Resort. ▪ The view-park portion of this open space dedication will be improved as a trail staging area for bicyclists and pedestrians, while the remainder will be retained as open space. ▪ Area may be graded in order to enhance views from Coast Highway.	11 acres
	ESA Open Space "Newporter Knoll"	▪ Located adjacent to Newporter North View Park, between the Newporter Resort and the Upper Bay. ▪ Will be preserved as a passive open space area.	12 acres
	Neighborhood Park "Newport Village"	▪ Located north of the Central Library near MacArthur Boulevard. ▪ Precise location will be determined. ▪ Will serve Service Area 9 and other nearby areas.	
10	ESA and Open Space "Buck Gully and Morning Canyon"	▪ Buck Gully is located between Corona Highlands and Corona del Mar. ▪ Morning Canyon is between Shore Cliffs and Cameo Shores. ▪ Designated for Recreational and Environmental Open Space in the City's Land Use Element and the Local Coastal Program. ▪ All construction on properties abutting the ESAs, including but not limited to, fences, retaining walls, pools of any size or depth, tennis courts or other activity areas, is expressly prohibited within 25 feet of the property line. Additional grading restrictions are imposed in the LCP.	
11	Mini Park "Bison"	▪ Located at the northeast corner of MacArthur Boulevard and Bonita Canyon Road.	.1 acre
12	*Opportunities for conversion of private parks for public use. See Table 4.4-3. In addition, one public park is currently planned for future use.*		

[a] The West Newport (Banning Ranch) annexation area lies just outside the City north of Newport Shores. The property is within the City's sphere of influence and will ultimately be annexed. Land uses and development configuration for the property will be determined through the specific plan process in conjunction with annexation. At that time, recreational and environmental resources will also be mapped. For this discussion, recreational facilities and open space preservation areas are shown conceptually, with precise locations to be determined at the specific plan level.

Table 4.4-5 Service Area Location and Needs

Service Area Number	General Location	Features and/or specific location description	Area Needs
1	West Newport	Coastal area west of the Newport Pier, including West Newport, Newport Shores, Lido Peninsula, and Newport Island	Most of the existing recreation land is in beaches. A new community or neighborhood park is needed to accommodate demand for a new sports field.
2	Balboa Peninsula	Bay Island and the peninsula, from the Newport Pier to the jetty	Most of the existing recreation land is in beaches. There is little vacant land available for development. Unmet park needs can be satisfied by renovating and upgrading facilities, such as those at Las Arenas Park and Peninsula Park. Additional active park facilities are desired, which would include restrooms, showers, and drinking fountains. Additional boat launching, mooring facilities, and additional pedestrian pathways are also desired.
3	Newport Heights/Upper Bay	Newport Heights, Harbor Highlands and adjacent area along the Upper Newport Bay north to Santa Isabel Street	This area is largely built out and contains several important park and recreation facilities. Substantial school recreation facilities, including Newport Harbor High School, Ensign Junior High, Mariners Elementary, and Newport Heights Elementary, compensate for its deficiency in total park area.
4	Santa Ana Heights	Santa Ana Heights and airport area bounded by Campus Drive on the west and north	This area's population has increased rapidly. The present two-acre Bayview Park and the proximity to the Upper Bay recreation area provide substantial recreational opportunities, but additional parkland will most likely be needed. A community center and equestrian center are desired.
5	Lower Bay	Lido Isle, Linda Isle, Harbor Island, and Promontory Point/Bayside Drive area	This area is largely built out and contains substantial private recreational and boating facilities. It is also adjacent to Area 3, which contains extensive recreational facilities. The provision of additional parkland may not feasible in this area.
6	Balboa Island	Balboa Island	This area is similar in terms of recreation needs and existing conditions to Area 5. Thus, the acquisition of additional parkland may not feasible in this area.
7	Eastbluff/Newport North	Eastbluff and North Ford areas	This area contains major undeveloped parcels designated for residential development. Most of the excess of parkland is limited to passive use. Additional sports fields and other active facilities will be needed to accommodate the recreational demands from new development.
8	Big Canyon/Belcourt	The Big Canyon and Belcourt developments	Although there are substantial private facilities, there are no public recreation facilities in this area. To eliminate the deficiency of 14 acres, park facilities could be provided in or near this service area.
9	Newport Center	Newport Center, Park Newport, Newport Country Club, Newport Dunes, and adjacent area	This area is similar to Area 8 above, but has a 7-acre deficiency. This could be mitigated by the provision of public recreation facilities in or near the service area.
10	Corona del Mar	Corona del Mar, Cameo Shores, and Irvine Terrace	There is little vacant land left for residential development in this area. Thus, present active and passive facilities should meet present and future need, given that facilities are continually renovated and upgraded.
11	Harbor View	Harbor View, Spyglass Hill, Harbor Ridge, and Bonita Canyon	This area contains substantial active and passive recreation facilities. Thus, the City's efforts should be focused on maintaining and/or upgrading existing facilities.
12	Newport Coast	The Newport Coast	This area is presently undergoing development. The area provides considerable private recreation facilities within its master plan. One of the important issues to be decided will be whether these facilities will become public or remain private. Currently, there is only one public park planned.

SOURCE: Newport Beach Recreation and Open Space Element 1998

Parkland

As shown previously in Table 4.4-1, the City contains 380.6 acres of park and active beach recreation area as of 2003. The table identifies current acreage needs calculated for each service area based on the 1998 population of the service area. There are several methods used to evaluate the adequacy of a city's parkland inventory. In the past, the City of Newport Beach has used service area population compared to a standard parkland ratio (five acres per 1,000 residents[2]) to evaluate the inventory of each service area. Using this method yields three service areas with excess parkland and seven areas with a deficit of parkland, for a total citywide parkland excess of 4.6 acres. Table 4.4-1 shows that Balboa Peninsula, Eastbluff and Harbor View have an excess of parkland acreage compared to need. The remaining service areas show deficits of parkland acreage, with the highest deficits occurring in West Newport, Lower Bay, and Balboa Island service areas. The table does not account for service area needs of Newport Coast Service Area 12.

Another way to determine parkland acreage needed is using total city population and the standard parkland ratio. Using a 2003 citywide population of 81,361 to determine need yields 407 acres of parkland required to meet the City's standard of five acres per 1,000 residents. Compared to the standard, the City's existing parkland acreage of 380.6 equates to a citywide deficit of 26.4 acres. In other words, compared to the standard of 5 acres per 1,000 residents, the City's current parkland ratio is 4.2 acres per 1,000 residents. This method can be used to determine future parkland need. Applying the same City standard of 5 acres per 1,000 residents to an estimated 2010 population of approximately 91,000 residents,[3] there will be a need for 455 acres total in the City. Assuming no additional parks are built until that time, this would result in a deficit of 74.4 acres in 2010.

The results from the two methods above show that the City is near or below the current standard, depending on the method chosen for evaluation. However, the conclusion is that demand for parks will likely exceed the future inventory if no new parks are developed. Additionally, resident surveys have indicated a need for specific park facilities in the City. The following needs were identified in the 1998 Recreation and Open Space Element. According to City Staff, these needs represent current 2003 conditions.

Sports Fields

The fastest growing recreational demand in Newport Beach is for additional sports fields, especially lighted facilities made available for after-work/school sports leagues. This need stems from increased participation by girls in a number of field sports, the lengthening of seasons for many sports and consequent season overlap, the need for sports facilities for the physically challenged, and the continuing high level of participation in company sports leagues such as co-ed softball.

Indoor Facilities

There is a growing need for additional gymnasium space and other indoor sports facilities for uses such as basketball, volleyball, and gymnastics.

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[2] This is slightly lower than the National Recreation and Park Association (NRPA) standards, which recommend a range of 6.25 to 10.5 acres per 1000 population of local or close to home recreation open space. "Local or close to home" refers to mini-parks, neighborhood park/playgrounds and community parks.

[3] As projected in the 1998 Recreation and Open Space Element.

Community Pool Facilities

There is a desire among the community for additional adult and youth swimming pools for use in aquatic sports facilities and for associated programs. In a 1998 community survey, 34 percent of respondents listed community/indoor swimming pools as a much-needed public resource. The most often requested activities for both adults and youths were pool sports at 22 percent and 52 percent, respectively.

Boating Facilities

There is a substantial demand for public boat launching facilities, marine sanitation facilities, and guest slips. There is also a continued high level of interest in activities and facilities for crew rowing and outrigger paddling. The City also is in need of boat storage areas for its programs.

REGULATORY SETTING

State Regulations

The primary instrument for protecting and preserving parkland is the State Public Park Preservation Act. Under the Public Resource Code, cities and counties may not acquire any real property that is in use as a public park for any non-park use unless compensation or land, or both, are provided to replace the parkland acquired. This provides no net loss of parkland and facilities.

The State Street and Highway Code assists in providing equestrian and hiking trails within the right-of-way of County roads, streets, and highways.

Local Regulations

City of Newport Beach Park Dedication Ordinance

The City's current Park Dedication Ordinance works in conjunction with its Park Fee Policy to control the dedication of parkland and in-lieu park fees. These policies help the City to acquire new parkland.

City of Newport Beach Circulation and Improvement Open Space Agreement

Another important agreement that contributes to the City's development and acquisition of parkland and open space areas is the Circulation and Improvement Open Space Agreement (CIOSA) in conjunction with the Irvine Company. In exchange for various building entitlements, the City of Newport Beach receives pre-payment of required "fair-share" road improvement fees, a commitment to construct road improvements adjacent to the proposed projects, an interest free loan, and land for recreation and open space areas and potential senior housing sites.

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Section 4.5 Civic and Cultural Amenities

4.5 CIVIC AND CULTURAL AMENITIES

This section presents an overview of the civic, social, and cultural arts resources available in Newport Beach. Civic amenities that contribute to quality of life, such as library and community facilities, are identified. Social and cultural amenities include theatres, auditoriums, museums, and recreational facilities. Public recreational facilities such as parks are discussed separately in Section 4.4. Information for this section is based on conversations with City staff and various websites associated with cultural amenities within Orange County.

EXISTING CONDITIONS

The Newport Beach area offers a variety of cultural facilities and opportunities for all sectors of the population. There are also numerous community-based organizations and clubs providing cultural opportunities. Public libraries, movie theaters, and recreational facilities offer additional cultural and arts-related opportunities.

CIVIC FACILITIES

Newport Beach provides a number of civic-related facilities that enhance the community by providing services to its residents. Figure 4.5-1 illustrates the location of the various civic facilities in the City including public facilities such as City Hall, library branches, Post Offices, and City departments; private facilities such as the Chamber of Commerce; and cultural facilities including various museums are also shown on the map. Police and fire stations are discussed in Sections 4.1 and 4.2, and illustrated on Figure 4.1-1.

The Newport Beach Public Library consists of a Central Library and three branches that provide a permanent collection of books, periodicals and other materials in addition to hosting events, lectures and programs for community enrichment. The Central Library is located at 1000 Avocado Avenue and operates seven days a week, with limited hours on Sundays. The branch libraries are located in Corona del Mar, the Balboa Peninsula and near Mariners Park. Hours of operation vary at the branch libraries, which are open five to six days a week. Development plans have been submitted for a new “Mariners Joint Use” library to replace the existing Mariners Branch library. The new facility, which will include shared use with the Mariners Elementary School, is anticipated to open in 2005.

Community facilities available to residents for recreational and meeting use include: the Balboa Community Center on the peninsula near the Newport pier; the Bonita Creek Community Center in Bonita Creek Park at Jamboree and University Drive; the Carroll Beek Center on Balboa Island; the Cliff Drive Community Center off Riverside Drive near the main Post Office; the Community Youth Center in Grant Howald Park at 5th & Iris, Corona del Mar; the Vincent Jorgeson Room at Mariners Branch Library; and the West Newport Community Center on 15^{th} Street.

COMMUNITY-BASED ORGANIZATIONS AND PROGRAMS

Community-Based Organizations

Two of Newport Beach’s community-based organizations provide services related to business and city promotion.

- The Newport Beach Chamber of Commerce, located on Jamboree Drive, supports the business community by providing events for networking and also sponsors public events such as the annual harbor boat parade.

- The Newport Beach Conference and Visitors Bureau, located in Newport Center, provides information regarding travel to Newport Beach including accommodations, dining and entertainment resources.

Cultural Arts Organizations

Newport Beach's nonprofit arts community includes a broad array of organizations, and a substantial number of arts programs and activities. There is a diverse range of artistic disciplines, and a strong focus on programs for children and youth. Through its grant program, the City of Newport Beach distributes funds to arts organizations (not individuals) on a yearly basis, which enables them to expand their cultural programs offered in the community. Grants typically range from $500 to $7,500. Through its Department of Recreation Services, the City also provides year-round educational programs for adults and children in music, dance, arts and crafts, and drama. In 2001 and 2002, funds amounting to $40,000 were awarded to local organizations each year.

Local Programs

The City's cultural arts programs have grown in recent years to become one of the largest individual cultural and arts providers in the community. Some of the City's diverse programs, which are offered by the Department of Recreation and Senior Services, include a variety of drawing and painting classes, dance classes, and jewelry and floral design. There are also a variety of arts and dance classes for children. All activities are organized within the Department of Recreation and Senior Services, but classes are taught by contracted instructors, and some of the larger classes are often subcontracted.

City of Newport Beach Arts Commission

The City of Newport Beach has an Arts Commission that acts in an advisory capacity to the City Council on all matters pertaining to artistic, aesthetic, and cultural aspects of the City. Established more than 30 years ago, the Arts Commission recommends to the City Council ordinances, rules, and regulations as it may deem necessary for the administration and preservation of the arts, performing arts, and historical, aesthetic, and cultural aspects of the community. It actively encourages cultural enrichment programs on behalf of the City, such as visual and performing arts activities and arts education programs. The Arts Commission also participates in the designation of historical landmarks, and reviews design elements for public sculpture, fountains, murals, benches, and other fixtures. There are currently seven Arts Commissioners, all of whom are appointed by the City Council. Their term of office is four years, and they meet on a monthly basis.

Other Arts Organizations

Newport Beach's nonprofit arts community contains private nonprofit arts organizations, plus several additional unincorporated arts groups.

- The Newport Beach Theater is a non-profit theater company dedicated to providing children and young adults with the opportunity to participate in both theater performance and production.

Figure 4.5-1 Civic and Cultural Facilities

Fig p.2 (11x17)

- The Newport Theatre Arts Center is a local community theatre that stages a variety of different shows each year for adults and children.
- Ballet Montmartre/Newport Beach Ballet Academy introduces children to dance through its outreach programs, and presentations at the Loats Auditorium at Newport Harbor High School.
- Harmonia Baroque Players is a chamber music group that gives annual concerts at the Newport Harbor Lutheran Church, and provides educational programs to local schools.
- The Mozart Classical Orchestra is a chamber orchestra that performs in Newport Beach.
- The Newport Beach Recital Series promotes music appreciation, cultural diversity, and community outreach. The Series presents its Neptune Music Festival each summer, holds concerts at the Balboa Bay Club, and its youth artists' platform prepares young musicians for international competition.
- The Newport Beach Arts Foundation, a non-profit corporation, was formed to raise funds for arts programs beyond those available through City funding. Its aim is to enrich the cultural life of Newport Beach, and to present innovative visual and performing artists to the community. The Foundation plans to sponsor dance, theatre and musical performances, film projects, literary readings, public art, and visual arts exhibitions. In addition, one of the Foundation's goals is to raise funds for a community cultural arts center. In 2003, the Foundation donated $15,000 to the City of Newport Beach in support of planned Arts Commission Programs.[1]

CULTURAL FACILITIES

Performing and Visual Arts Facilities

The primary performing arts facilities in Newport Beach are those that are associated with local cultural arts organizations and programs. They include:

- Newport Theatre Arts Center
- Newport Harbor Lutheran Church
- Sherman Gardens and Library

Other performing arts venues include the Balboa Bay Club, and the Orange County Museum of Art, which has an auditorium that seats 120 people. Local schools have auditoriums and other facilities that can be used as performing arts spaces, such as Loats Auditorium at Newport Harbor High School. In addition, the Balboa Theater is a planned facility, which will seat approximately 350 people.

Civic facilities in the Newport Beach, such as the library and City Hall, have exhibition spaces that display the work of local artists. The Central Library has 32 feet of visual arts gallery wall space, and displays different exhibitions of local artists monthly. The library also hosts a variety of programs for adults, including Sunday musicals, art exhibitions, author appearances, lecture series, book discussions, and Internet workshops.

[1] Michaels, Catherine. 2003. City Arts Commission. City of Newport Beach Staff Report, 18 February.

Museums

In addition to the numerous galleries throughout the City, Newport Beach is also home to a variety of museums. Located in near the Fashion Island Shopping Center, Newport Harbor Art Museum, of the Orange County Museum of Art, features modern and contemporary art. The museum houses a permanent collection of paintings, sculpture, photography, and changing installations, all documenting California's artistic heritage. The Museum also offers educational programs. The Newport Harbor Nautical Museum is located in the "Pride of Newport, "a 190-foot paddle wheeler docked in Newport Harbor. The museum focuses on industrial and recreational history and features local photographs, artifacts, and memorabilia. Sherman Library for California History, located in Corona del Mar, features detailed exhibits on the history of the Pacific southwest, as well as a public garden.[2] The Newport Sports Collection Museum, located in Newport Center offers several educational programs to motivate youth to stay in school and be active in athletics. Museums are depicted on Figure 4.5-1.

Cultural Attractions

There are many different sources of entertainment and cultural attractions in the City. These include a number of movie theatres, such as the Edwards Theatres in the historic Lido Theater in Lido Marina Village, Edwards Big Newport, and Edwards Island Cinemas in Fashion Island. Other local attractions include the Balboa Fun Zone, an amusement park originally built in 1936. This amusement center features a Ferris wheel, merry-go-round, bumper cars, and a large video arcade. Adjacent to the Fun Zone is the Balboa Pavilion, a registered historic structure built in 1905 in conjunction with the completion off the Pacific Electric Red Car Line.

Events and Festivals

- The Newport Beach Jazz festival is held annually outdoors at the Hyatt Newporter.
- The City Arts Commission host Concerts in the Parks during spring and summer.
- Newport Beach Festival of the Arts is a yearly local arts and crafts show held outdoors at the Newport Dunes Resort.
- The yearly Sandcastle contest features sand castle building competitions on the beach.
- The Imagination Celebration is a yearly countywide arts festival for children, and venues include the Orange County Museum of Art, the Newport Beach Central Library, and the Newport Nautical Museum.
- The annual Taste of Newport festival, held each September, features over thirty restaurants, fifteen wineries, and live entertainment.
- The annual Newport Harbor Christmas Boat Parade lights up the Harbor every year with a holiday lights display.
- The Newport Beach Film Festival is a yearly volunteer-based festival. In 2002, the festival presented 70 features and 100 short films to an audience of nearly 20,000. Films from

[2] Burr White. 2003. Website: http://burrwhite.com/beachnbay/artsand culturalevents.htm, October.

twenty-five countries were presented, and the festival featured the largest short films program of any major festival in the United States.[3]

Coastal/Harbor Attractions

Newport Beach's coastal location allows the City to host various ocean-related activities such as regattas and races. In April, Newport Beach hosts the Newport to Ensenada Yacht Race, in which more than 600 boats race from Newport Beach to Ensenada, Mexico. Each summer, Newport Harbor hosts the Flight of the Lasers, a longtime local sailboat race. The Character Boat Parade is a parade that takes place in Newport Harbor each July, and features boats decorated around a theme. The Wooden Boat Festival, also in July, features both classic and contemporary wooden boats.

Sightseeing boat tours of the Harbor depart daily from the Balboa Pavilion, and there are also daily departures to Santa Catalina Island, which is 26 miles off shore. Additionally, there is a ferryboat to Balboa Island, an island in Newport Bay that is home to numerous gift shops, galleries, and restaurants.

Regional Cultural Resources

The City's location within Orange County provides Newport Beach proximity to several notable regional cultural attractions. Located in Costa Mesa, the South Coast Repertory Theater is one of the most innovative and celebrated theater companies in the country. The theater offers a ten-month season, as well as outreach and educational programs. Orange County Performing Arts Center, located in Costa Mesa, is a regional performance hall that features a variety of dance and music, including symphony, ballet, musical theater, and opera. The Center is home to the Pacific Symphony Orchestra, Philharmonic Society of Orange County, Opera Pacific, and Pacific Chorale. In addition, the Barclay Theater, located at the University of California, Irvine, and a wide variety of museums in Laguna Beach provide additional cultural resources in proximity to Newport Beach.

REGULATORY CONTEXT

There are no applicable Federal, State, or local policies that are directly applicable to civic and cultural amenities within the Planning Area.

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Chapter 5

ENVIRONMENTAL RESOURCES

Section 5.1 Biological Resources Addendum

prepared by Chambers Group

Biological Resources Addendum

Local Coastal Plan and General Plan

Submitted to:
City of Newport Beach
Planning Department
P.O. Box 1768
Newport Beach, CA
92658-8915

Submitted By:
EIP Associates
December 4, 2003

Biological Resources Addendum
City of Newport Beach
Local Coastal Plan and General Plan

Prepared for:

City of Newport Beach

Prepared by:

EIP Associates

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City of Newport Beach

Prepared by:

EIP Associates

December 2003

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1. INTRODUCTION

SECTION 1.0 – INTRODUCTION

In August of 2003, EIP conducted reconnaissance-level biological surveys to supplement and refine information presented in the *City of Newport Beach, California, Local Coastal Plan – Biological Appendix* (Chambers Group and Coastal Resources Management, December 2002) and the *City of Newport Beach, California, General Plan – Newport Beach Biological Resources* (Chambers Group and Coastal Resources Management, January 2003). A detailed mapping and characterization of seven "Environmental Study Areas" (ESAs) – Banning Ranch, Buck Gully, Coastal Foredunes, MacArthur-San Miguel, Morning Canyon, Semeniuk Slough, and Spyglass Hill – was performed to provide further detail on the habitat composition and quality of each ESA, including the presence of potential waters/wetlands of the U.S., and the habitat's potential to support special-status species. From these data, a ranking system was developed, based on inherent habitat value, to evaluate the sensitivity of the ESAs to future development and guide the City with respect to biological resource permitting and ultimate development of the site(s).

1.1 PURPOSE OF STUDY

EIP Associates was contracted by the City of Newport Beach to supplement the findings presented in the *City of Newport Beach, California, Local Coastal Plan – Biological Appendix* (Chambers Group and Coastal Resources Management, December 2002) and the *City of Newport Beach, California, General Plan – Newport Beach Biological Resources* (Chambers Group and Coastal Resources Management, January 2003).

A Local Coastal Plan (LCP) is required under provisions of the California Coastal Act and is a basic planning tool used by local governments to guide development in the coastal zone, in partnership with the Coastal Commission. The Biological Appendix prepared for the *City of Newport Beach, California, Local Coastal Plan* in December 2002 included the delineation of 19 Environmentally Sensitive Habitat Areas (ESHAs), which are defined by the California Coastal Act as areas in which "plant or animal life or their habitats are either rare or are especially valuable because of their special role in an ecosystem that could easily be disturbed or degraded by human activities or development." The City of Newport Beach determined that the data used to delineate four of the ESHAs (Semeniuk Slough, Buck Gully, Morning Canyon, and Banning Ranch) was not detailed enough for the area to warrant designation as an ESHA. This document aims to provide the detail necessary to allow the Coastal Commission the ability to determine what areas, if any, within these four ESAs may be designated as ESHAs. An additional Non-ESHA Sensitive Habitat (p. 4-58 in *City of Newport Beach, California, Local Coastal Plan*) – the Coastal Foredunes – was also re-evaluated for the same purpose. This refinement of the habitat mapping of these areas will facilitate the decision-making process associated with any proposed development in these areas.

The Biological Resources section of the *General Plan* is intended to serve as an update to the *City of Newport Beach, California, General Plan* by identifying ESHAs in Newport Beach that warrant protection. The Biological Resources Report for the General Plan includes the delineation of nine areas previously designated as ESHAs, two of which (MacArthur and San Miguel, and Spyglass Hill) the City concluded warranted additional analysis. As above, this document aims to provide the detail necessary to allow the City and Coastal Commission the ability to determine what areas, if any, within these two ESAs may be designated as ESHAs, according to criteria in the California Coastal Act. Refinements to maps based on this additional data will allow the City and potential developers to facilitate the decision-making process surrounding development proposed in these areas.

2. METHODOLOGY

SECTION 2.0 – METHODOLOGY

2.1 LITERATURE REVIEW/INFORMATION SEARCH

Information on occurrences of special-status species in the vicinity of the Study Area was gathered from the California Department of Fish and Game's (CDFG) *Natural Diversity Data Base* (CDFG, 2003) and the California Native Plant Society's (CNPS) *Electronic Inventory of Rare and Endangered Vascular Plants of California* (CNPS, 2003) for the quadrangles containing the Study Area (i.e. Newport Beach, Tustin, and Laguna Beach 7.5 minute quadrangles). The CNDDB and CNPS *Electronic Inventory* are historical observation records and do not constitute an exhaustive inventory of every resource.

Additional background on biological resources within the study area was derived from the *Preliminary Descriptions of the Terrestrial Natural Communities of California* (Holland, 1986), the *California Native Plant Society's Inventory of Rare and Endangered Plants of California* (Tibor, Ed., 2001), *The Jepson Manual – Higher Plants of California* (Hickman, J.C., Ed., 1993), and the *Draft Program Environmental Impact Report Newport Banning Ranch Local Coastal Program* (PCR, 2000).

Lastly, EIP biologists reviewed the *City of Newport Beach, California, Local Coastal Plan – Biological Appendix* (Chambers Group and Coastal Resources Management, December, 2002) and the C*ity of Newport Beach, California, General Plan – Newport Beach Biological Resources* (Chambers Group and Coastal Resources Management, January, 2003) for relevant information on the specific ESAs covered in this report.

2.2 HABITAT VALUE RANKING

Basis of the Ranking System

For this report, EIP Associates has developed a system to rank specific areas within each of the respective ESAs based on a composite score of variables that collectively represent habitat quality. Habitats are attributed a low (3), moderate (2) or high (1) rank based on the number of positive or negative ecological attributes or functions (see below) in each area. In general, the more positive attributes or functions maintained by the habitat, the higher the rank, whereas areas with more negative attributes or functions are ranked lower. Moderate and highly ranked habitats are those more ecologically valuable and more likely to be adversely affected by development.

The following attributes were evaluated in ranking the various habitats within each ESA:

- Ability of the habitat to support special status species (recorded or potential)
- Waters of the U.S. or jurisdictional wetlands
- DFG/CNDDB Sensitive Community (e.g. sage scrub, dune, etc.)
- Degree of habitat integrity / connectivity

While most of the above habitat characteristics are easily documentable from a variety of sources, habitat integrity/connectivity is a more subjective measure of biological value, which considers various attributes affecting a given habitat's quality in a particular geographic area. Attributes contributing to (or detracting from) habitat integrity include:

- <u>Patch size and connectivity</u> – Large "pieces" of habitat adjacent to or contiguous with similar or related habitats are particularly useful for more mobile species that rely on larger territories for food and cover.

- <u>Presence of invasive / non-native species</u> – Invasive/non-native species often provide poorer habitat for wildlife than native vegetation. Proliferation of exotic plant species alters ecosystem processes and threatens certain native species with extirpation.

- <u>Disturbance</u> – This includes disturbance due to human activities such as access (trails), dumping, vegetation removal, development, pollution, etc.

- <u>Proximity to development</u> – Habitat areas bordering development provide marginal habitat values to wildlife due to impacts from negative edge effects. This proximity presents the possibility of secondary effects to the habitat due to spillover or human intrusion. Deterioration of habitat results from intrusion of lighting, non-native invasive plant species, domestic animals, and human activity.

- <u>Fragmentation</u> – The converse of "connectedness", habitat fragmentation is the result of development of large areas of undisturbed, contiguous habitat. The resulting breaking up of these areas into isolated, disjunct parcels can create barriers to migration, reduce wildlife food and water resources and generally compress territory size to reduce existing wildlife populations to nonviability. Fragmentation increases negative edge effects, whereby the interior area of habitat is affected by the different conditions of the disturbance on its edges. The smaller a particular habitat is, the greater the proportion of its area which experiences the edge effect, and this can lead to dramatic changes in plant and animal communities. In general, loss of habitat produces a decline in species total population size, and fragmentation of habitat can isolate small sub-populations from each other. This process leads to conditions whereby animals and plant species are endangered by local, then more widespread, extinction.

Use of the Ranking System

The habitat ranking system can be used to direct development away from higher-value habitats or, at a minimum, indicate which areas will likely receive a greater level of resource agency scrutiny in the permitting process. It may also be used to guide mitigation.

Specific habitats within the respective ESAs are attributed a rank of 1 (high value) where proposed development would definitely require a resource permit, including, but not limited to:

1. U.S. Clean Water Act, Section 404 Permit through the U.S. Army Corps of Engineers - waters of the U.S. and associated wetlands;
2. U.S. Endangered Species Act, Section 7 or 10 consultation with the U.S. Fish and Wildlife Service – Listed threatened or endangered species or those proposed for listing;
3. California Fish & Game Code, Section 2081 Incidental Take Permit from the California Department of Fish and Game - Threatened or endangered species or those proposed for listing under the California Endangered Species Act;
4. California Fish & Game Code, Section 1601-1603 Streambed Alteration Agreement with the California Department of Fish and Game – waters of the State.

Habitats with a rank of 2 (moderate value) maintain significant characteristics to support the presence of special status plant and wildlife species. Proposed development in these areas will require additional field surveys to determine if resources are present, which would necessitate permitting activities.

Habitats with a rank 3 (low) are generally predominated by non-native species or otherwise exhibit a history of disturbance that make resource permitting a very unlikely requirement in these areas.

2.3 FIELD SURVEYS

Reconnaissance-level field surveys of were conducted on August 25, 26, and 27, 2003, by Ron Walker and Joshua Boldt of EIP Associates to examine each ESA in order to describe existing resources and to determine their distribution and relative abundance. Surveys focused on identification of areas exhibiting characteristics of natural or undisturbed habitats and areas that could potentially support special-status plant or wildlife species. Surveys of each ESA were conducted on foot and, in each, habitat types were identified and mapped and observed wildlife and plant species were recorded.

Surveys were conducted following a period of elevated precipitation for the Newport Beach area. While precipitation totals for the 2001-2002 wet season were well below average (3.55 in., average is 11.52 in.), those for the 2002-2003 wet season were slightly above average (14.73 in.)

(http://www.oc.ca.gov/prfd/envres/Rainfall/rainfalldata.asp). Consequently, the composition of vegetation communities – in particular annual species and the extent of wetland areas – was likely to be representative of what is typically found in years of average precipitation.

2.4 MAP PREPARATION

Maps and data were created in GIS (Geographical Information Systems) format at a 1:2400 scale, or 1 inch = 200 feet, using ArcView 3.2a, using aerial photographs, coastal zone boundaries, ESA boundaries (Chambers, 2002, 2003) roads, parks, and parcels as base layers. Field observations and measurements were used to subdivide habitats within the existing ESA boundaries. Roads (either dirt or paved) that bisected a habitat were included within the boundaries of an ESA; whereas roads at the edge of an ESA were excluded. The subdivided ESAs were then ranked according to their relative value and resource permitting requirements. Maps of all the ESAs were printed out, using the aerial photos as a base

2.5 ESA DEFINITION

When the City of Newport Beach drafted the first Local Coastal Program (LCP) Land Use Plan in the 1980s, the term "environmentally sensitive habitat area" was used to identify riparian areas, wetlands, intertidal areas, and other habitats that are considered to be environmentally sensitive. These environmentally sensitive habitat areas were described as being located on all or portions of twelve large areas. In 2002, a biological assessment study was conducted for use in updating the biological resource sections of the LCP Land Use Plan (Chambers Group and Coastal Resources Management, December, 2002) and the General Plan (Chambers Group and Coastal Resources Management, January, 2003). This biological assessment study carried over the term "environmentally sensitive habitat area" or "ESHA" to describe twenty-eight areas, including the twelve areas described in the existing LCP Land Use Plan.

The California Coastal Commission staff advised City staff that describing areas as ESHAs should be given careful consideration given the limitations on development within these areas as set forth in Section 30240(a) of the Coastal Act. Section 30240(a) requires the protection of environmentally sensitive habitat areas against any significant disruption of habitat values and limits uses to only those that are dependent on those resources. Consequently, subsequent drafts of the LCP Land Use Plan now identify these areas as "environmental study areas" (ESAs) to distinguish their geographic identification from the ESHAs that may be located within them. To avoid further confusion, this addendum to the 2002 biological assessment study has been prepared to more correctly identify the twenty-eight areas (nineteen in the coastal zone and nine outside of the coastal zone) as "environmental study areas."

ESAs are typically undeveloped areas supporting natural habitats that may be capable of supporting sensitive biological resources. An ESA may support species and habitats that are sensitive (e.g. wetlands) and rare within the region or may function as a migration corridor for wildlife. ESAs may contain areas referred to as Environmentally Sensitive Habitat Areas (ESHAs), as defined under Section 30107.5 of the California Coastal Act. These are areas in which “plant or animal life or their habitats are either rare or are especially valuable because of their special nature or role in an ecosystem that could easily be disturbed or degraded by human activities or development”. While an ESHA is, by Coastal Commission definition, a sensitive habitat, an ESA, as defined in this report, requires further study to determine if such a designation is appropriate or if a given area contains resources of particular value or concern.

3. BIOLOGICAL HABITATS

SECTION 3.0 – BIOLOGICAL HABITATS

3.1 ENVIRONMENTAL STUDY AREAS

A variety of diverse, valuable, and sensitive habitats occur within the City of Newport Beach. Environmental Study Areas (ESAs) are those portions of the City that contain natural habitat. An ESA may contain areas that are considered ESHAs.

3.1.1 Semeniuk Slough (Oxbow Loop)

3.1.1.1 Description

Semeniuk Slough is a remnant channel of the Santa Ana River that historically drained into West Newport Bay and is still exposed to limited tidal influence through a tidal culvert connected between the Santa Ana River and the slough. The 76.74-acre site is bordered by the Newport Shores residential development to the south, the Santa Ana River to the west, and the Banning Ranch ESA to the north and east (Figures 2-3). The ESA is located on the USGS Newport Beach 7.5-minute topographic quadrangle. The Semeniuk Slough ESA includes the main slough channel immediately north of Newport Shores and the coastal salt marsh habitat to the north, including a narrow sliver of salt marsh habitat in the far north of the ESA, flanked by the Santa Ana River on the west and the Banning Ranch ESA on the east. Several smaller interconnected channels and inundated depressions are located throughout the salt marsh habitat.

Semeniuk Slough is predominantly an open-water estuary, with southern coastal salt marsh as the predominant fringing vegetation and chenopod scrub and ornamental vegetation as a less significant component of the ESA. Southern coastal salt marsh vegetation on-site is dominated by pickleweed (*Salicornia virginica*), alkali heath (*Frankenia salina*), California cord grass (*Spartina foliosa*), California sea-lavender (*Limonium californicum*), and salt grass (*Distichlis spicata*), with shore grass (*Monanthohloe littoralis*), fleshy jaumea (*Jaumea carnosa*), and saltwort (*Batis maritima*) as associated species. Sea-fig (*Carpobrotus chilensis*) has invaded some of the upland portions of the salt marsh habitat in areas adjacent to disturbance. Other ornamental plant species found along the margin of the main slough channel, primarily in the eastern and southern section of the ESA near Newport Shores, include myoporum (*Myoporum* sp.), acacia (*Acacia* sp.), Mexican fan palm (*Washingtonia robusta*), pine (*Pinus* sp.), and eucalyptus (*Eucalyptus* sp.). An island in the southwest part of the ESA has been graded or otherwise disturbed in the recent past and the resulting plant community is less established than the surrounding salt marsh. This area is dominated by a mixture of salt marsh species, such as salt grass, heliotrope (*Heliotropium curassavicum*), and pickleweed, and upland ruderal species, such as burclover (*Medicago* sp.) and melilotus (*Melilotus* sp.) A small area of chenopod scrub occurs along the levee separating the Santa Ana River and the Semeniuk Slough ESA and is dominated by saltbush (*Atriplex* sp.)

3.1.1.2 Habitat Value Ranking

The following resources contribute to the habitat value rankings illustrated in Figures 2-3.

DFG/CNDDB Sensitive Habitats:

The following sensitive habitats occur within the Semeniuk Slough ESA:

- Southern Coastal Salt Marsh

Special-Status Species (Potential)

Habitats within the Semeniuk Slough ESA include southern coastal salt marsh, open estuary, and chenopod scrub. These habitats are capable of supporting a variety of special-status plants and animals, including:

- *Cordylanthus maritimus* ssp. *maritimus* (Salt marsh bird's beak): FE, SE, CNPS 1B
- *Aphanisma blitoides* (aphanisma): CNPS 1B
- *Atriplex pacifica* (South Coast saltbush): CNPS 1B
- *Atriplex parishii* (Parish's brittlescale): CNPS 1B
- *Centromadia parryi* ssp. *australis* (southern tarplant): CNPS 1B
- *Helianthus nuttallii* ssp. *parishii* (Los Angeles sunflower): FSC, CNPS 1A
- *Lasthenia glabrata* ssp. *coulteri* (Coulter's goldfields): CNPS 1B
- *Suaeda esteroa* (Estuary seablite): CNPS 1B
- *Cicindela gabbii* (tiger beetle): CSC
- *Tryonia imitator* (California brackishwater snail): FSC
- *Eucycolgobius newberryi* (tidewater goby): FE, CSC
- *Laterallus jamaicensis coturniculus* (California black rail): FSC, ST
- *Rallus longirostris levipes* (light-footed clapper rail): FE, SE
- *Charadrius alexandrinus nivosus* (western snowy plover): FT, CSC
- *Sterna antillarum brown* (California least tern): FE, SE
- *Passerculus sandwichensis beldingi* (Belding's savannah sparrow): SE
- *Gavia immer* (Common loon): FSC, CSC
- *Pelecanus erythrorhynchos* (American white pelican): CSC
- *Circus cyaneus* (northern harrier): CSC
- *Elanus leucurus* (white-tailed kite): FSC
- *Falco columbarius* (merlin): CSC
- *Numenius americanus* (long-billed curlew): FSC, CSC
- *Rynchops niger* (black skimmer): CSC

- *Sterna elegans* (Elegant tern): FSC, CSC
- *Passerculus sandwichensis rostratus* (large-billed savannah sparrow): CSC

FE = Federally Endangered
FT = Federally Threatened
SE = State Endangered
ST = State Threatened
FSC = Federal Species of Concern
CSC = State Species of Special Concern
CNPS 1A = California Native Plant Society List 1A Plant
CNPS 1B = California Native Plant Society List 1B Plant
CNPS 2 = California Native Plant Society List 2 Plant

Special-Status Species (Known Occurrences)

The following special-status species have recorded CNDDB occurrences or other known occurrences within or adjacent to the Semeniuk Slough ESA:

- *Centromadia parryi* ssp. *australis* (southern tarplant) (CNPS 1B) (CNDDB Occurrence #65): This occurrence of southern tarplant is from the "Newport Slough, south of the oil fields on the edge of the salt marsh and the access road." This is mapped at the western end of the access road north of the main slough channel in the Semeniuk Slough ESA. More than 100 plants were observed in 1998. This population is presumed to still be present.

- *Suaeda esteroa* (Estuary seablite) (CNPS 1B) (CNDDB Occurrence # 13): This occurrence of estuary seablite is from the "Newport Slough, south of the oil fields on the edge of the salt marsh and the access road." This is mapped along the margin of the access road north of the main slough channel, east of the southern tarplant occurrence, in the Semeniuk Slough ESA. This population is presumed to still be present.

- *Passerculus sandwichensis beldingi* (Belding's savannah sparrow) (CSC) (CNDDB Occurrence # 43): The location of this occurrence of Belding's savannah sparrow is the "Santa Ana River mouth, Newport Slough area." The CNDDB maps this occurrence on the entire southwest portion of the ESA. 17 pairs were observed in 1996, and 36 pairs in 2001. This population is presumed to still be present. In addition, this species is known to breed in nearby areas including Upper Newport Bay and salt marsh habitat in Huntington Beach (MEC 1991).

- *Aphanisma blitoides* (aphanisma) (CNPS 1B) (CNDDB Occurrence # 23): The information for this occurrence is from a 1932 herbarium collection from "Costa Mesa, along base of sea cliffs." It is mapped along the bluff separating Banning Ranch from Highway 1 and Semeniuk Slough. Although this population is presumed to still be present, it has not been observed since 1932.

- The California least tern (*Sterna antillarum*) (FE, SE), which has a large nesting colony on the Huntington Beach side of the Santa Ana River mouth, forages occasionally in the slough channels (Atwood and Minsky 1983).

- Small numbers of western snowy plover (*Charadrius alexandrinus nivosus*) (FT, CSC) breed in the Huntington Beach least tern colony in some years (Gallagher 1997). Western snowy plovers are observed occasionally in Semeniuk Slough (MEC 1991).

- The California brackish water snail (*Tryonia imitator*) (FSC) has been collected in substantial numbers in the channels of Semeniuk Slough (MEC 1991).

<u>Waters/Wetlands of the U.S.</u>

The entire Semeniuk Slough ESA site is salt marsh/open estuary, except for small area of chenopod scrub along western border.

<u>Integrity</u>

The Semeniuk Slough ESA is a relatively large, uninterrupted coastal salt marsh. It is hydrologically and tidally connected to the Santa Ana River, which empties into the Pacific Ocean, and is also contiguous with the large Banning Ranch ESA on its northern and eastern borders. This provides wildlife with a relatively large, diverse area for foraging, shelter, and movement. The proximity to the Newport Shores residential development has introduced numerous ornamental and non-native species to the eastern perimeter of the site, and also allows use of the sloughs for recreational use. A few oil-well related structures are located in the southern part of the ESA, immediately north of the main slough channel. The land surrounding these structures has been cleared. Two roads bisect the ESA - one leading from the Santa Ana River levee to the Banning Ranch area, and the other leading to the oil well structures.

3.1.2 Buck Gully

3.1.2.1 Description

The Buck Gully ESA is a steep, open canyon extending 2.5 miles from Little Corona Beach to Newport Coast Drive in the San Joaquin Hills (Figures 9-12). The canyon is divided by the Coast Highway. The lower section extends from Little Corona Beach to the Coast Highway and the larger, upper section stretches from the Coast Highway to Newport Coast Drive. The 261.95-acre ESA is bordered by the Pacific Ocean and Little Corona Beach to the west, and residential and commercial development to the east, north, and south of the site. The Buck Gully site is located on the Laguna Beach 7.5-minute USGS topographic quadrangle.

The Buck Gully ESA is dominated by Diegan coastal sage scrub and southern mixed chaparral, with southern willow scrub, annual grassland, and coastal freshwater marsh occurring as smaller components of the community. Diegan coastal sage scrub and southern mixed chaparral encompass the majority of the gully - from the upper rims to the alluvial bottoms. A narrow ribbon of southern willow scrub riparian habitat is supported by an unnamed creek that flows along the canyon bottom the length of the gully. Patches of annual grassland occur throughout the chaparral and coastal sage scrub habitats and also in areas where native vegetation has been cleared for fire prevention.

The narrow, western reach of the canyon is largely encroached upon by the adjacent residential areas to the southeast and northwest. The upper slopes in this area of the canyon support a mix of disturbed southern mixed chaparral, a small patch of coastal sage scrub, and non-native ornamental vegetation originating from the surrounding homes. Typical chaparral species in this area include toyon (*Heteromeles arbutifolia*), laurel sumac (*Malosma laurina*), and ceanothus (*Ceanothus* sp.) Non-native and ornamental species include giant reed (*Arundo donax*), acacia, eucalyptus, myoporum, Mexican fan palm, Brazilian pepper tree (*Schinus terebinthifolius*), Peruvian pepper tree (*Schinus molle*), castor bean (*Ricinus communis*), tree tobacco (*Nicotiana glauca*), pampas grass (*Cortaderia* sp.), and fennel (*Foeniculum vulgare*). The canyon bottom in this area is dominated by riparian vegetation including willows (*Salix* spp.), blackberry (*Rubus* sp.), cattail (*Typha* sp.), and bulrush (*Scirpus* sp.). A small freshwater marsh comprised almost exclusively of cattail is situated at the mouth of the gully adjoining Little Corona Beach.

The central section of the canyon immediately northeast of the Coast Highway, while closely confined by residential development, contains fewer ornamental plant species than the coastal portion and supports southern mixed chaparral and southern willow scrub habitats with species compositions similar to the lower canyon. The chaparral in this area supports toyon, laurel sumac, ceanothus, chamise (*Adenostoma fasciculatum*), lemonadeberry (*Rhus integrifolia*), scrub oak (*Quercus berberidifolia*), southern honeysuckle

(*Lonicera subspicata*), redberry (*Rhamnus crocea*), bush monkey flower (*Mimulus aurantiacus*), and sugar bush (*Rhus ovata*).

Approximately adjacent to the intersection of 5th Avenue and Poppy Avenue, the gully veers east and opens into a broader canyon. The southern slopes of the canyon in this area support dense stands of southern mixed chaparral, while the northern slopes support disturbed annual grassland, possibly established as chaparral and coastal sage scrub, but subsequently cleared for fire prevention by homeowners. At present, the annual grassland contains black mustard (*Brassica nigra*), tocalote (*Centaurea melitensis*), artichoke thistle (*Cynara cardunculus*), wild oats (*Avena fatua*), soft chess (*Bromus hordeaceus*), barley (*Horedum* sp.), ripgut brome (*Bromus diandrus*), and fennel. Diegan coastal sage scrub becomes more dominant as the canyon slopes on the upper portions of the canyon veer eastward. This community is composed of California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), white sage (*Salvia apiana*), prickly pear (*Optunia* sp.), coyote brush (*Baccharis pilularis*), blue elderberry (*Sambucus mexicana*), laurel sumac, lemonadeberry, and California bush sunflower (*Encelia californica*).

The canyon floor of Buck Gully supports a southern willow scrub community, dominated by willows and mule fat (*Baccharis salicifolia*), with occasional western sycamore (*Platanus racemosa*) and cottonwood (*Populus fremontii*). Associated plant species include cattail, blue elderberry, poison oak (*Toxicodendron diversilobum*), rush (*Juncus* spp.), and nutsedge (*Cyperus* sp.).

The upper canyon is broader than the lower canyon and is therefore less impacted by adjacent development. Vegetation in this area is primarily Diegan coastal sage scrub and southern mixed chaparral, interrupted by occasional patches of annual grassland, and southern willow scrub associated with the creek at the canyon bottom.

3.1.2.2 Habitat Value Ranking

The following resources contribute to the habitat value rankings illustrated in Figures 9-12.

<u>DFG/CNDDB Sensitive Habitats:</u>

The following sensitive habitats occur within the Buck Gully ESA:

- Diegan coastal sage scrub
- Southern mixed chaparral
- Southern willow scrub
- Coastal freshwater marsh

Special-Status Species (Potential)

The Diegan coastal sage scrub, southern mixed chaparral, southern willow scrub, annual grassland, and coastal freshwater marsh in the Buck Gully ESA are capable of supporting a variety of special-status plants and animals, including:

- *Chorizanthe parryi* var. f*ernandina* (San Fernando spineflower): FC, SE, CNPS 1B
- *Verbesina dissita* (crownsbeard): FT, ST, CNPS 1B
- *Abronia villosa* var. *aurita* (chaparral sand-verbena): CNPS 1B
- *Aphanisma blitoides* (aphanisma): CNPS 1B
- *Atriplex coulteri* (Coulter's saltbush): CNPS 1B
- *Atriplex pacifica* (South Coast saltbush): CNPS 1B
- *Atriplex serenana* var. *davidsonii* (Davidson's saltbush): CNPS 1B
- *Calochortus weedii* ssp. *intermedius* (intermediate mariposa lily): CNPS 1B
- *Centromadia parryi* ssp. *australis* (southern tarplant): CNPS 1B
- *Chaenactis glabriuscula* var. *orcuttiana* (Orcutt's pincushion): CNPS 1B
- *Dudleya multicaulis* (many-stemmed dudleya): CNPS 1B
- *Dudleya stolonifera* (Laguna Beach dudleya): FT, ST, CNPS 1B
- *Euphorbia misera* (cliff spurge): CNPS 2
- *Helianthus nuttallii* ssp. *parishii* (Los Angeles sunflower): FSC, CNPS 1A
- *Horkelia cuneata* ssp. *puberula* (mesa horkelia): CNPS 1B
- *Isocoma menziesii* var. *decumbens* (decumbent goldenbush): CNPS 1B
- *Lasthenia glabrata* ssp. *coulteri* (Coulter's goldfields): CNPS 1B
- *Lepidium virginicum* var. *robinsonii* (Robinson's pepper-grass): CNPS 1B
- *Nama stenocarpum* (mud nama): CNPS 2
- *Navarretia prostrata* (prostrate navarretia): CNPS 1B
- *Quercus dumosa* (Nuttall's scrub oak): CNPS 1B
- *Sagittaria sanfordii* (Sanford's arrowhead): CNPS 1B
- *Sidlacea neomexicana* (salt spring checkerbloom): CNPS 2
- *Eucycolgobius newberryi* (tidewater goby): FE, CSC
- *Phrynosoma coronatum blainvillei* (San Diego horned lizard): FSC, CSC
- *Cnemidophorus hyperythrus* (orange-throated whiptail): CSC
- *Crotaulius ruber ruber* (northern red-diamond rattlesnake): CSC
- *Charadrius alexandrinus nivosus* (western snowy plover): FT, CSC
- *Sterna antillarum brown* (California least tern): FE, SE
- *Empidonax traillii extimus* (southwestern willow flycatcher): FE
- *Polioptila californica californica* (coastal California gnatcatcher): FT, CSC

- *Vireo bellii pusillus* (least Bell's vireo): FE, SE
- *Phalacrocorax auritus* (double-crested cormorant): CSC
- *Accipiter cooperii* (Cooper's hawk): CSC
- *Elanus leucurus* (white-tailed kite): FSC
- *Campylorhynchus brunneicapillus* (coastal cactus wren): CSC
- *Dendroica petechia brewsteri* (yellow warbler): CSC
- *Icteria virens* (yellow-breasted chat): CSC
- *Perognathus longimembris pacificus* (Pacific pocket mouse): FE, CSC

FE = Federally Endangered
FT = Federally Threatened
SE = State Endangered
ST = State Threatened
FSC = Federal Species of Concern
CSC = State Species of Special Concern
CNPS 1A = California Native Plant Society List 1A Plant
CNPS 1B = California Native Plant Society List 1B Plant
CNPS 2 = California Native Plant Society List 2 Plant

<u>Special-Status Species (Known Occurrences)</u>

The following special-status species have recorded CNDDB occurrences within the Buck Gully ESA:

- *Euphorbia misera* (cliff spurge) (CNPS 2) (CNDDB Occurrence # 21): The location for this occurrence is listed as "Corona del Mar State Beach" and consists of a total of three colonies at the following locations: "Inspiration Point south of Orchid Ave. at Ocean Blvd.; adjacent to Glen Dr./Beach Dr.; and south of Glen Dr." This first location is just north of the mouth of Buck Gully. A "Glen Dr." does not exist in Newport Beach, but the colonies associated with these locations are assumed to be in the general vicinity of the first colony. 60 plants were observed in 1989. This population is presumed to still be present.

- *Dudleya multicaulis* (many-stemmed dudleya) (CNPS 1B) (CNDDB Occurrence # 94): The source for this occurrence is a 1908 herbarium collection from "Corona del Mar bluffs." This population has not been relocated and is believed to be no longer present.

- *Quercus dumosa* (Nuttall's scrub oak) (CNPS 1B) (CNDDB Occurrence # 3): This occurrence is reported to be due east of the corner of 5th Ave. and Poppy Ave. in Buck Gully in an area of chaparral and coastal sage scrub. Four to seven plants were observed in 1991, and this occurrence is presumed to still be present.

- *Lasthenia glabrata* (Coulter's goldfields) (CNPS 1B) (CNDDB Occurrence # 58): Location information for this occurrence is "Buck Gully, about one mile upstream from Highway 1." Two plants were observed in 1998 in a clay depression near willow woodland in the valley bottom. This occurrence is presumed to still be present.

Waters/Wetlands of the U.S.

The unnamed creek channel flowing the length of Buck Gully is a likely water of the U.S. Sections of the riparian corridor and the coastal freshwater marsh at the mouth of the canyon near Little Corona Beach may also be considered "associated wetlands."

Integrity

The lower (western) portion of Buck Gully is isolated from the upper Buck Gully by the Coast Highway. This area is closely confined by residential development on the south and north. The proximity to development, accessibility by local residents and their pets, and abundance of non-native ornamental plant species detract from the quality of habitat for wildlife species in this area. The upper (eastern) portion of Buck Gully is a broad, open, relatively undisturbed canyon. Coastal sage scrub and mixed chaparral dominate much of the area, except for the riparian corridor along the canyon bottom and the tops of the canyon, which are influenced by the adjacent residential development. Much of the native vegetation near the rim of the canyon has been removed to reduce wildfire hazard.

Ornamental and non-native plant species from the adjacent residential development have encroached into Buck Gully, especially in the lower, narrow portions. Annual grasslands in Buck Gully consist of non-native annual grasses and forbs. Some non-native inclusions were also observed in the Diegan coastal sage scrub, southern mixed chaparral, and southern willow scrub habitats.

3.1.3 Morning Canyon

3.1.3.1 Description

Morning Canyon, an 8.26-acre ESA perpendicular to the coastline, is located between Corona Highlands and Cameo Highlands above the Coast Highway, and between Shore Cliff and Cameo Shores on the ocean side of Coast Highway (Figure 9). Morning Canyon is bordered by the Pacific Ocean to the west, Pelican Hills Golf

Course to the east, and residential development to the north and south. This ESA is located on the Laguna Beach 7.5 minute USGS topographic quadrangle.

Morning Canyon is characterized by disturbed, remnant, southern mixed chaparral vegetation on the canyon floor and along the upland slopes. This area, however, contains few remaining native species and is dominated by non-native and ornamental species that have invaded the canyon from adjacent residential areas located immediately to the northwest and southeast. Native plant species in the remnant southern mixed chaparral community include coyote brush, toyon, mountain mahogany (*Cercopcarpus betuloides*), lemonadeberry, and blue elderberry. Non-native species include fennel, pampas grass, acacia, date palm (*Phoenix* sp.), fig (*Ficus* sp.), hottentot fig (*Carpobrotus edulis*), Himalayan blackberry (*Rubus discolor*), tree tobacco, pittosporum (*Pittosporum* sp.), and castor bean.

The canyon bottom once supported a southern willow scrub and willows, mule fat, and mugwort (*Artemisia douglasiana*) can still be observed growing among the dominant non-native vegetation, though these species are no longer common enough to consider this habitat to be southern willow scrub. Non-native plant species now dominate the bottom and lower slopes of the canyon and include giant reed, acacia, hottentot fig, eucalyptus, myoporum, Mexican fan palm, Brazilian pepper tree, Peruvian pepper tree, pampas grass, ivy (*Hedera* sp.), and fennel.

Although most of the native riparian-associated species have been displaced by non-native and ornamental species, the area is still used by riparian wildlife, such as American crow (*Corvus brachyrhyncus*), northern mockingbird (*Mimus polyglottos*), mourning dove (*Zenaida macroura*), cedar waxwing (*Bombycilla garrulous*), English sparrow (*Passer domesticus*), raccoon (*Procyon lotor*), and opossum (*Didelphis virginiana*). The presence of a perennial watercourse along with a structurally diverse woody vegetation community provides the necessary habitat attributes that are essential to riparian-associated species.

3.1.3.2 Habitat Value Ranking

The following resources contribute to the habitat value rankings illustrated in Figure 9.

<u>DFG/CNDDB Sensitive Habitats:</u>

- Southern mixed chaparral (disturbed, remnant)

<u>Special-Status Species (Potential)</u>

Habitats within the Morning Canyon ESA include disturbed, remnant southern mixed chaparral and the creek channel. These habitats are capable of supporting a variety of special-status plants and animals, including:

- *Verbesina dissita* (crownsbeard): FT, ST, CNPS 1B
- *Abronia villosa* var. *aurita* (chaparral sand-verbena): CNPS 1B
- *Calochortus weedii* ssp. *intermedius* (intermediate mariposa lily): CNPS 1B
- *Dudleya multicaulis* (many-stemmed dudleya): CNPS 1B
- *Dudleya stolonifera* (Laguna Beach dudleya): FT, ST, CNPS 1B
- *Horkelia cuneata* ssp. *puberula* (mesa horkelia): CNPS 1B
- *Isocoma menziesii* var. *decumbens* (decumbent goldenbush): CNPS 1B
- *Lepidium virginicum* var. *robinsonii* (Robinson's pepper-grass): CNPS 1B
- *Quercus dumosa* (Nuttall's scrub oak): CNPS 1B
- *Sidlacea neomexicana* (salt spring checkerbloom): CNPS 2
- *Vireo bellii pusillus* (least Bell's vireo): FE, SE
- *Phrynosoma coronatum blainvillei* (San Diego horned lizard): FSC, CSC
- *Crotaulius ruber ruber* (northern red-diamond rattlesnake): CSC
- *Elanus leucurus* (white-tailed kite): FSC
- *Empidonax traillii extimus* (southwestern willow flycatcher): FE
- *Dendroica petechia brewsteri* (yellow warbler): CSC
- *Icteria virens* (yellow-breasted chat): CSC

FE = Federally Endangered
FT = Federally Threatened
SE = State Endangered
ST = State Threatened
FSC = Federal Species of Concern
CSC = State Species of Special Concern
CNPS 1A = California Native Plant Society List 1A Plant
CNPS 1B = California Native Plant Society List 1B Plant
CNPS 2 = California Native Plant Society List 2 Plant

<u>Special-Status Species (Known Occurrences)</u>

There are no recorded occurrences of special-status species in the CNDDB for the Morning Canyon ESA.

Wetlands/Waters of the U.S.

The unnamed creek channel flowing the length of Morning Canyon is likely a jurisdictional waters of the U.S.

Integrity

The lower, southwestern section of Morning Canyon is separated from the upper section of Morning Canyon by the Coast Highway. The entire canyon is very narrow and closely bordered by residential development on the northwest and southeast, the Pacific Ocean to the southwest, and the Pelican Hills Golf Course at the northeastern edge of the area. Ornamental species have completely displaced native vegetation in much of canyon and now dominate throughout the majority of this ESA. Pets from the adjacent residences likely use the area and further discourage wildlife use of the canyon.

3.1.4 MacArthur and San Miguel

3.1.4.1 Description

The 7.69-acre MacArthur and San Miguel ESA (Figure 7), consists of two relatively small and isolated patches of undeveloped land divided by San Miguel Drive, and bordered by Avocado Avenue to the northwest and MacArthur Boulevard to the southeast. The area south of San Miguel Drive is bordered by an open lot to the south (north of the Central Library), while the area north of San Miguel Drive is bordered by San Joaquin Hills Road to the northeast. The site is located on the USGS Newport Beach 7.5-minute topographic quadrangle.

The area south of San Miguel Drive is 3.54 acres of predominantly Diegan coastal sage scrub habitat, consisting of California sagebrush, deerbrush (*Lotus scoparius*), and coyote brush, along with the non-native tocalote and scattered instances of prickly pear. Other common, non-native species include black mustard and various grasses. The perimeter of this portion of the site has been previously disturbed by adjacent road development and several ornamental species occur immediately outside the boundaries of this area, including eucalyptus, myoporum, and Peruvian pepper tree. Much of the adjacent undeveloped land - particularly the large lot separating the site from the Central Library - supports ruderal vegetation.

Two drainages intersect in the middle of this parcel. An east-west flowing drainage supports a limited amount of disturbed southern willow scrub habitat containing willow, cattails, bulrush and mule fat. The north-south flowing drainage supports a small seasonal wetland consisting of cattail and duckweed (*Lemna* sp.)

The area north of San Miguel Drive consists of 4.15 acres dominated by mowed annual grassland containing ripgut brome, wild oat, soft chess, Bermuda grass (*Cyonodon dactylon*), Bermuda buttercup (*Oxalis pes-*

caprae), and black mustard. There are also some scattered coyote brush, California sagebrush, and saltbush (*Atriplex* sp.) shrubs typically associated with the coastal sage scrub that likely dominated the site prior to development. This area has been graded adjacent to MacArthur Boulevard, but then slopes steeply towards Avocado Avenue. A public transit center on the northern third of this parcel is bordered by ornamental (Mexican fan palm and pine) trees and turf grass, which also occur at the corner of MacArthur Boulevard and San Miguel Drive. Two concrete-lined ditches - one adjacent to Avocado Avenue and the other crossing the site near San Miguel Drive – drain the area. Sediment depostion at the downstream ends of these drainages support limited vegetation including wetland-associated species such as nutsedge.

3.1.4.2 Habitat Value Ranking

The following resources contribute to the habitat value rankings illustrated in Figure 7.

<u>DFG/CNDDB Sensitive Habitats:</u>

The following sensitive habitats occur within the MacArthur/San Miguel ESA:

- Diegan coastal sage scrub
- Southern willow scrub (disturbed)

<u>Special-Status Species (Potential)</u>

Habitats within the MacArthur/San Miguel ESA include Diegan coastal sage scrub and southern willow scrub. These habitats are capable of supporting a variety of special-status plants and animals, including:

- *Chorizanthe parryi* var. f*ernandina* (San Fernando spineflower): FC, SE, CNPS 1B
- *Verbesina dissita* (crownsbeard): FT, ST, CNPS 1B
- *Abronia villosa* var. *aurita* (chaparral sand-verbena): CNPS 1B
- *Aphanisma blitoides* (aphanisma): CNPS 1B
- *Atriplex coulteri* (Coulter's saltbush): CNPS 1B
- *Atriplex pacifica* (South Coast saltbush): CNPS 1B
- *Atriplex serenana* var. *davidsonii* (Davidson's saltbush): CNPS 1B
- *Calochortus weedii* ssp. *intermedius* (intermediate mariposa lily): CNPS 1B
- *Dudleya multicaulis* (many-stemmed dudleya): CNPS 1B
- *Dudleya stolonifera* (Laguna Beach dudleya): FT, ST, CNPS 1B
- *Euphorbia misera* (cliff spurge): CNPS 2
- *Horkelia cuneata* ssp. *puberula* (mesa horkelia): CNPS 1B
- *Isocoma menziesii* var. *decumbens* (decumbent goldenbush): CNPS 1B
- *Lepidium virginicum* var. *robinsonii* (Robinson's pepper-grass): CNPS 1B

- *Navarretia prostrata* (prostrate navarretia): CNPS 1B
- *Quercus dumosa* (Nuttall's scrub oak): CNPS 1B
- *Sidlacea neomexicana* (salt spring checkerbloom): CNPS 2
- *Phrynosoma coronatum blainvillei* (San Diego horned lizard): FSC, CSC
- *Cnemidophorus hyperythrus* (orange-throated whiptail): CSC
- *Polioptila californica californica* (coastal California gnatcatcher): FT, CSC
- *Vireo bellii pusillus* (least Bell's vireo): FE, SE
- *Campylorhynchus brunneicapillus* (coastal cactus wren): CSC

FE = Federally Endangered
FT = Federally Threatened
SE = State Endangered
ST = State Threatened
FSC = Federal Species of Concern
CSC = State Species of Special Concern
CNPS 1A = California Native Plant Society List 1A Plant
CNPS 1B = California Native Plant Society List 1B Plant
CNPS 2 = California Native Plant Society List 2 Plant

Although suitable habitat exists for these species within the MacArthur/San Miguel ESA, the small, fragmented nature of the area and its proximity to development, makes it unlikely that most species would utilize this area.

Special-Status Species (Known Occurrences)

There are no recorded occurrences of special-status species in the CNDDB for the MacArthur/San Miguel ESA.

Waters/Wetlands of the U.S.

The two drainages traversing the parcel south of San Miguel Drive, along with the small seasonal wetland associated with the north-south flowing drainage, could be potential "waters of the U.S." The concrete-lined ditches north of San Miguel Drive are, however, not likely to be considered "waters of the U.S."

Integrity

This ESA is relatively small in size (7.69 acres) and completely isolated from any adjacent, associated habitats by urban development, thereby precluding the use of this ESA by most wildlife species. This proximity to development has introduced numerous ornamental and non-native species to the perimeter of the site, further reducing the integrity of the ESA. The fact that the area north of San Miguel Drive is maintained in a mowed condition makes use of this area by wildlife highly unlikely.

3.1.5 Spyglass Hill

3.1.5.1 Description

The 17.31-acre Spyglass Hill ESA includes the uppermost reaches of Big Canyon (Figure 8). The site consists of a well-defined canyon with vegetated slopes bordered by residential development and a seasonal, southeast to northwest flowing drainage at the canyon bottom. This ESA is west of Spyglass Hill Road and northeast of Mission Bay Drive. The site is located on the USGS Newport Beach 7.5-minute topographic quadrangle.

This community is dominated by the Diegan coastal sage scrub and southern mixed chaparral, with several ornamental trees along the northeast-facing slope, just up from the vegetated canyon bottom. In addition, native vegetation immediately adjacent to the residential development has been cleared for fire prevention purposes.

The upland areas on the north and east slopes of the main drainage support dense Diegan coastal sage scrub habitat, dominated by California sagebrush, coyote brush, lemonadeberry, California buckwheat, deerweed, white sage, and laurel sumac. Slopes south and west of the drainage support southern mixed chaparral, dominated by toyon, ceanothus, coyote brush, bush mallow (*Malacothamnus* sp.), scrub oak, live oak (*Quercus agrifolia*), bush monkey flower, poison oak, blue elderberry, lemonadeberry, and chamise. The drainage itself is ephemeral and therefore is unable to support typical riparian habitat. It is characterized by species associated with the Diegan coastal sage scrub to the northeast and the southern mixed chaparral to the southwest.

3.1.5.2 Habitat Value Ranking

The following resources contribute to the habitat value rankings illustrated in Figure 8.

DFG/CNDDB Sensitive Habitats:

The following sensitive habitats occur within the Spyglass Hill ESA:

- Diegan coastal sage scrub
- Southern mixed chaparral

<u>Special-Status Species (Potential)</u>

The Diegan coastal sage scrub and southern mixed chaparral habitats within the Spyglass Hill ESA are capable of supporting a variety of special-status plants and animals, including:

- *Chorizanthe parryi* var. f*ernandina* (San Fernando spineflower): FC, SE, CNPS 1B
- *Verbesina dissita* (crownsbeard): FT, ST, CNPS 1B
- *Abronia villosa* var. *aurita* (chaparral sand-verbena): CNPS 1B
- *Aphanisma blitoides* (aphanisma): CNPS 1B
- *Atriplex coulteri* (Coulter's saltbush): CNPS 1B
- *Atriplex pacifica* (South Coast saltbush): CNPS 1B
- *Atriplex serenana* var. *davidsonii* (Davidson's saltbush): CNPS 1B
- *Calochortus weedii* ssp. *intermedius* (intermediate mariposa lily): CNPS 1B
- *Dudleya multicaulis* (many-stemmed dudleya): CNPS 1B
- *Dudleya stolonifera* (Laguna Beach dudleya): FT, ST, CNPS 1B
- *Euphorbia misera* (cliff spurge): CNPS 2
- *Horkelia cuneata* ssp. *puberula* (mesa horkelia): CNPS 1B
- *Isocoma menziesii* var. *decumbens* (decumbent goldenbush): CNPS 1B
- *Lepidium virginicum* var. *robinsonii* (Robinson's pepper-grass): CNPS 1B
- *Navarretia prostrata* (prostrate navarretia): CNPS 1B
- *Quercus dumosa* (Nuttall's scrub oak): CNPS 1B
- *Sidlacea neomexicana* (salt spring checkerbloom): CNPS 2
- *Phrynosoma coronatum blainvillei* (San Diego horned lizard): FSC, CSC
- *Cnemidophorus hyperythrus* (orange-throated whiptail): CSC
- *Crotaulius ruber ruber* (northern red-diamond rattlesnake): CSC
- *Polioptila californica californica* (coastal California gnatcatcher): FT, CSC
- *Campylorhynchus brunneicapillus* (coastal cactus wren): CSC
- *Perognathus longimembris pacificus* (Pacific pocket mouse): FE, CSC

FE = Federally Endangered

FT = Federally Threatened

SE = State Endangered

ST = State Threatened

FSC = Federal Species of Concern

CSC = State Species of Special Concern

CNPS 1A = California Native Plant Society List 1A Plant

CNPS 1B = California Native Plant Society List 1B Plant
CNPS 2 = California Native Plant Society List 2 Plant

Special-Status Species (Known Occurrences)

The following special-status species have recorded CNDDB occurrences within the Spyglass Hill ESA:

- *Perognathus longimembris pacificus* (Pacific pocket mouse) (FE, CSC) (CNDDB Occurrence # 4): This is a historic collection from 1971 centered around "Spyglass Hill". The occurrence is believed to be no longer present.

Waters/Wetlands of the U.S.

The unnamed creek channel flowing the length of through this ESA is a potential waters of the U.S.

Integrity

The Spyglass Hill ESA is a relatively undisturbed area of high-quality Diegan coastal sage scrub and southern mixed chaparral. Except for the area immediately adjacent to the residential development to the west and southwest, the habitats in the Spyglass Hill ESA are almost entirely composed of native species. However, this ESA is completely isolated from any adjacent, associated habitats by residential development, and overall the area is relatively small (17.31 acres). This is an ideal example of fragmented habitat. While supporting undisturbed native vegetation communities, the isolated nature of the area possibly precludes its use by many wildlife species.

3.1.6 Coastal Foredunes

3.1.6.1 Description

Foredune habitats are identified by stands of dense to sparse annual and perennial herbs, grasses, or shrubs occurring on sand dunes along the coast. In Newport Beach, southern coastal foredune habitat extends southwest, from 10th Street to the tip of the Balboa peninsula along the ocean side of Balboa, immediately adjacent to the bike lane (Figures 4-6). The vegetation in this community is generally sparse with overall cover ranging from 20 to 70 percent in some areas, while other areas are completely devoid of vegetation. Areas of open sand fragment this southern coastal foredune habitat. Dominant plants include non-native species such as sea-fig, hottentot fig, sea rocket (*Cakile maritima*), and native purple sand-verbena (*Abronia umbellata*), beach evening primrose (*Camissonia cheiranthifolia*), beach morning glory (*Calystegia soldanella*), and beach bur (*Ambrosia chamissonis*). Many areas are almost completely covered by sea-fig and hottentot fig, which seem to have been introduced from the residences fronting the beach area. Although many areas within the Coastal Foredunes ESA have extensive non-native cover, these species are considered to be a component of southern coastal foredune habitat and were therefore not mapped differently from those areas supporting a predominance of native species.

3.1.6.2 Habitat Value Ranking

The following resources contribute to the habitat value rankings illustrated in Figures 4-6.

<u>DFG/CNDDB Sensitive Habitats:</u>

The following sensitive habitats occur within the Coastal Foredunes ESA:

- Southern coastal foredune

<u>Special-Status Species (Potential)</u>

Habitats within the Coastal Foredunes ESA include southern coastal foredune and open beach, which could support a variety of special-status plants and animals, including:

- *Cordylanthus maritimus* ssp. *maritimus* (salt marsh bird's-beak): FE, SE, CNPS 1B
- *Aphanisma blitoides* (aphanisma): CNPS 1B
- *Atriplex coulteri* (Coulter's saltbush): CNPS 1B
- *Atriplex pacifica* (South Coast saltbush): CNPS 1B
- *Chaenactis glabriuscula* var. *orcuttiana* (Orcutt's pincushion): CNPS 1B
- *Hordeum intercedents* (vernal barley): CNPS 3
- *Nemacaulis denudata* var. *denudata* (coast woolly-heads): CNPS 1B
- *Charadrius alexandrinus nivosus* (western snowy plover): FT, CSC
- *Sterna antillarum brown* (California least tern): FE, SE
- *Phalacrocorax auritus* (double-crested cormorant): CSC
- *Passerculus sandwichensis tostratus* (large-billed savannah sparrow): CSC

FE = Federally Endangered
FT = Federally Threatened
SE = State Endangered
ST = State Threatened
FSC = Federal Species of Concern

CSC = State Species of Special Concern
CNPS 1A = California Native Plant Society List 1A Plant
CNPS 1B = California Native Plant Society List 1B Plant
CNPS 2 = California Native Plant Society List 2 Plant

Special-Status Species (Known Occurrences)

The following special-status species have recorded CNDDB occurrences within the Coastal Foredunes ESA:

- *Nemacaulis denudata* var *denudata* (coast woolly-heads) (CNPS 1B) (CNDDB Occurrence # 17): This occurrence consists of three collections on Newport Peninsula from the harbor entrance north to about 9th St. Collections include "…..from 6th St. to harbor entrance", "…. 8th and 9th St. sand dunes", and "Newport Beach". This occurrence is presumed to still be present.

Waters/Wetlands of the U.S.

No potential wetlands/waters of the U.S. were observed during biological surveys within the Coastal Foredunes ESA.

Integrity

Ornamental and non-native species, likely introduced from the adjacent residences, dominate much of the southern coastal foredune habitat in this ESA. Numerous residences use the beach area as an extension of their backyards and residents have planted and irrigated the ornamental species that have replaced native species in these areas. Increased human activity and public access also adversely impact these dune habitats, as evidenced by the numerous trails bisecting the dunes.

3.1.7 Banning Ranch

3.1.7.1 Description

The 282.40-acre Banning Ranch ESA is located near the mouth of the Santa Ana River (Figures 13-14). This ESA is bordered to the northeast and east by residential and commercial development, to the north by Talbert Regional Park, to the south by West Coast Highway, and to the south and west by the Newport Shores residential community and the Semeniuk Slough ESA. The Banning Ranch site is located on the Newport Beach 7.5 minute USGS topographic quadrangle.

The Banning Ranch ESA encompasses four distinct topographic features that influence the type and character of biological resources on the site. The western edge of Newport Mesa, which comprises much of the eastern portion of the site, represents a coastal plane that slopes gently from east to west. Historic oil-extraction related infrastructure is found throughout the mesa, including the location of wells, pipelines, buildings, improved and unimproved roads, and open storage pipes and machinery.

Bluffs form the western edge of the mesa, which are very steep along the southern and southwestern edges of the mesa, but become less severe in the north. These bluffs provide a transition between mesa uplands to the east and the lowlands to the west.

The bluffs and mesa are incised at various points along their/its length by a number of drainages. Two of these drainage features - one in the southern portion of the site and one in the northern portion - are markedly larger than the others and referred to as “arroyos”.

The majority of the lowlands in the western portion of the project site were historically tidal marsh associated with Semeniuk Slough. The construction of a levee between the Banning Ranch lowlands and Semeniuk Slough removed the former from tidal influence, very likely to facilitate oil extraction activities. Subsequent channelization of the Santa Ana River and oil extraction activities at Banning Ranch, dating back at least 75 years, have altered these lowlands area to where they are now characterized by narrow channels and low pockets of periodically-standing water in some areas. Tidal influence is presently limited to only 4.8 acres at the southwest corner of the lowlands. The entire area supports a network of roads, pipelines, oil derricks, and a few buildings.

Plant communities on the Banning Ranch property range from relatively undisturbed native to highly disturbed exotic populations. Upland (mesa) areas generally support southern coastal bluff scrub and non-native grassland, while the lowlands support riparian and wetland vegetation. Current plant communities include: (1) southern coastal bluff scrub; (2) sage scrub-grassland ecotone/sere; (3) annual grassland; (4) ruderal (uplands); (5) ruderal wetlands; (6) vernal pool; (7) alkali meadow; (8) southern coastal salt marsh; (9) coastal brackish marsh; (10) mulefat scrub; (11) southern black willow forest; (12) developed areas; (13) disturbed areas; and (14) ornamental vegetation (Figures 13-14).

Scattered portions of both upland and lowland areas of Banning Ranch contain ruderal vegetation dominated by non-native grasses and forbs. Plant species associated with this community include black mustard, wild radish (*Raphanus sativus*), pampas grass, fennel, and filaree (*Eroidum* sp.). The lowland portions of this ESA consist of ruderal wetlands, alkali meadows, southern coastal salt marsh, and coastal brackish marsh. Ornamental vegetation occurs throughout the site, though primarily in the upland areas, and include hottentot-fig, myoporum, and eucalyptus.

3.1.7.2 Habitat Value Ranking

The following resources contribute to the habitat value rankings:

DFG/CNDDB Sensitive Habitats:

The following sensitive habitats occur within the Banning Ranch ESA:

- Southern Coastal Bluff Scrub
- Vernal Pool
- Alkali Meadow
- Southern Coastal Salt Marsh
- Coastal Brackish Marsh
- Southern Black Willow Forest

Special-Status Species (Potential)

The southern coastal bluff scrub, annual grasslands, ruderal wetlands, vernal pool, alkali meadow, southern coastal salt marsh, coastal brackish marsh, mulefat scrub, and southern black willow forest in the Banning Ranch ESA are capable of supporting a variety of special-status plants and animals, including:

- *Chorizanthe parryi* var. f*ernandina* (San Fernando spineflower): FC, SE, CNPS 1B
- *Cordylanthus maritimus* ssp. *maritimus* (salt marsh bird's-beak): FE, SE, CNPS 1B
- *Verbesina dissita* (crownsbeard): FT, ST, CNPS 1B
- *Abronia villosa* var. *aurita* (chaparral sand-verbena): CNPS 1B
- *Aphanisma blitoides* (aphanisma): CNPS 1B
- *Atriplex coulteri* (Coulter's saltbush): CNPS 1B
- *Atriplex pacifica* (South Coast saltbush): CNPS 1B
- *Atriplex parishii* (Parish's brittlescale): CNPS 1B
- *Atriplex serenana* var. *davidsonii* (Davidson's saltbush): CNPS 1B
- *Calochortus weedii* ssp. *intermedius* (intermediate mariposa lily): CNPS 1B
- *Centromadia parryi* ssp. *australis* (southern tarplant): CNPS 1B
- *Chaenactis glabriuscula* var. *orcuttiana* (Orcutt's pincushion): CNPS 1B
- *Dudleya multicaulis* (many-stemmed dudleya): CNPS 1B
- *Dudleya stolonifera* (Laguna Beach dudleya): FT, ST, CNPS 1B
- *Euphorbia misera* (cliff spurge): CNPS 2
- *Helianthus nuttallii* ssp. *parishii* (Los Angeles sunflower): FSC, CNPS 1A
- *Hordeum intercedents* (vernal barley): CNPS 3
- *Horkelia cuneata* ssp. *puberula* (mesa horkelia): CNPS 1B

- *Isocoma menziesii* var. *decumbens* (decumbent goldenbush): CNPS 1B
- *Lasthenia glabrata* ssp. *coulteri* (Coulter's goldfields): CNPS 1B
- *Lepidium virginicum* var. *robinsonii* (Robinson's pepper-grass): CNPS 1B
- *Nama stenocarpum* (mud nama): CNPS 2
- *Navarretia prostrata* (prostrate navarretia): CNPS 1B
- *Quercus dumosa* (Nuttall's scrub oak): CNPS 1B
- *Sagittaria sanfordii* (Sanford's arrowhead): CNPS 1B
- *Sidlacea neomexicana* (salt spring checkerbloom): CNPS 2
- *Branchinecta sandiegoensis* (San Diego fairy shrimp): FE
- *Cicindela gabbii* (tiger beetle): CSC
- *Tryonia imitator* (California brackishwater snail): FSC
- *Eucycolgobius newberryi* (tidewater goby): FE, CSC
- *Phrynosoma coronatum blainvillei* (San Diego horned lizard): FSC, CSC
- *Cnemidophorus hyperythrus* (orange-throated whiptail): CSC
- *Crotaulius ruber ruber* (northern red-diamond rattlesnake): CSC
- *Laterallus jamaicensis coturniculus* (California black rail): FSC, ST
- *Rallus longirostris levipes* (light-footed clapper rail): FE, SE
- *Charadrius alexandrinus nivosus* (western snowy plover): FT, CSC
- *Sterna antillarum brown* (California least tern): FE, SE
- *Empidonax traillii extimus* (southwestern willow flycatcher): FE
- *Polioptila californica californica* (coastal California gnatcatcher): FT, CSC
- *Vireo bellii pusillus* (least Bell's vireo): FE, SE
- *Passerculus sandwichensis beldingi* (Belding's savannah sparrow): SE
- *Phalacrocorax auritus* (double-crested cormorant): CSC
- *Accipiter cooperii* (Cooper's hawk): CSC
- *Circus cyaneus* (northern harrier): CSC
- *Elanus leucurus* (white-tailed kite): FSC
- *Falco columbarius* (merlin): CSC
- *Numenius americanus* (long-billed curlew): FSC, CSC
- *Rynchops niger* (black skimmer): CSC
- *Athene cunicularia* (burrowing owl): CSC
- *Eremophila alpestris* (horned lark): CSC
- *Campylorhynchus brunneicapillus* (coastal cactus wren): CSC
- *Lanius ludovicianus* (loggerhead shrike): CSC
- *Dendroica petechia brewsteri* (yellow warbler): CSC
- *Icteria virens* (yellow-breasted chat): CSC

- *Passerculus sandwichensis rostratus* (large-billed savannah sparrow): CSC
- *Perognathus longimembris pacificus* (Pacific pocket mouse): FE, CSC

FE = Federally Endangered
FT = Federally Threatened
SE = State Endangered
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FSC = Federal Species of Concern
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CNPS 1A = California Native Plant Society List 1A Plant
CNPS 1B = California Native Plant Society List 1B Plant
CNPS 2 = California Native Plant Society List 2 Plant

<u>Special-Status Species (Known Occurrences)</u>

The following special-status species have recorded CNDDB occurrences or other known occurrences within or adjacent to the Banning Ranch ESA:

- *Centromadia parryi* ssp. *australis* (southern tarplant) (CNPS 1B) (CNDDB Occurrence #64): This occurrence of southern tarplant is from the "south end of the Newport oil fields in disturbed areas adjacent to oil pipelines" and is mapped near the southwestern border of the Banning Ranch ESA near its boundary with the Semeniuk Slough ESA. More than 1000 plants were observed in 1998. It was also observed on Banning Ranch by PCR during surveys conducted in 2000 for the *Draft Program Environmental Impact Report Newport Banning Ranch Local Coastal Program* (PCR, 2000). This population is presumed to still be present.

- *Aphanisma blitoides* (aphanisma) (CNPS 1B) (CNDDB Occurrence # 23): The information for this occurrence is from a 1932 herbarium collection from "Costa Mesa, along base of sea cliffs" and was mapped along the bluff separating Banning Ranch from Highway 1 and Semeniuk Slough. Although this population is presumed to still be present, it has not been observed since 1932.

- San Diego fairy shrimp (*Branchinecta sandiegoensis*) (FE) was documented by PCR during surveys conducted in February and March 2000 for the *Draft Program Environmental Impact Report Newport Banning Ranch Local Coastal Program* (PCR, 2000) from the vernal pool and a small depression immediately to the south.

- Coastal California gnatcatcher (*Polioptila californica californica*) (FT, CSC) has been observed primarily within coastal bluff scrub onsite during focused surveys from 1992 to 1998. 19 pairs were observed in 1992 and between 1993 and 1996, the number of observed pairs ranged from 16 to 29. 17 pairs were observed in 1997, and 19 pairs were observed in 1998 (PCR, 2000).

- Coastal cactus wren (*Campylorhynchus brunneicapillus*) (CSC) Ten pairs were observed in 1997 and seven pairs were observed in 1998 (PCR, 2000).

- The following special-status species were observed either on-site or flying over the area during surveys conducted by PCR for the *Draft Program Environmental Impact Report Newport Banning Ranch Local Coastal Program* (PCR, 2000): California least tern, yellow warbler, Belding's savannah sparrow, southwestern willow flycatcher, northern harrier, Cooper's hawk, golden eagle, sharp-shinned hawk, white-tailed kite, and osprey. No further details about these observations were given.

Waters/Wetlands of the U.S.

A 1998 wetland delineation performed by PCR determined there were 57.5 acres of jurisdictional waters on Banning Ranch, including 57.15 acres of jurisdictional wetlands and 0.35 acre of unvegetated channels. The majority of these wetlands are in the lowland portion in the northwest part of the ESA, with other jurisdictional areas associated with four drainages originating at various locations on the upper portions of the site. In addition, one vernal pool was identified near the central portion of the site (PCR, 2000).

Integrity

The Banning Ranch ESA is a large, relatively undeveloped, but historically disturbed assemblage of diverse habitats that, together with the contiguous Semeniuk Slough ESA, provides wildlife with a significantly large, diverse area for foraging, shelter, and movement. Infrastructure related to oil exploration and extraction is scattered throughout the area, especially in the northern portion of the mesa, degrading the native habitats where they occur. Much of the land surrounding developed areas (i.e. oil infrastructure) is disturbed and does not support any vegetation. Improved and unimproved roads bisect the entire ESA, fragmenting habitat and creating increased areas of "edge effect". Areas supporting annual grassland and ruderal vegetation communities are dominated by non-native species, typically annual grasses and forbs. Ornamental species are found throughout the site, primarily in upland areas. The entire Banning Ranch ESA is closed to public access, though pets from nearby residences and feral domestic animals are common transients through these habitats.

While disturbance associated with the oil infrastructure does diminish the quality of habitat in the Banning Ranch ESA to some extent, the overall area should be regarded as relatively high-quality wildlife habitat due to its large size, habitat diversity, and continuity with the adjacent Semeniuk Slough ESA.

3.2 SUMMARY

The information in this report is presented as a supplement to the *City of Newport Beach, California, Local Coastal Plan – Biological Appendix* (Chambers Group and Coastal Resources Management, December 2002) and the *City of Newport Beach, California, General Plan – Newport Beach Biological Resources* (Chambers Group and Coastal Resources Management, January 2003). Together with the ESA maps provided in Figures 2-14, this information can facilitate the decision-making process associated with any proposed development in these areas. This will guide the City in focusing development in areas with the fewest impacts to biological resources and attempting preservation and protection in areas with the highest biological value. The habitat value ranking system presented in this report will also guide resource permitting efforts of prospective developers by indicating which sub-areas of the studied ESAs either definitely will require some level of permitting or for which additional studies need to be performed to determine whether such permitting is required.

4. LITERATURE CITED

SECTION 4.0 – LITERATURE CITED

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APPENDIX

Appendix A

Figures

Section 5.2 Hydrology and Water Quality

5.2 HYDROLOGY AND WATER QUALITY

This section describes the existing surface water and groundwater resources within the Planning Area, as well as the quality of these resources. Federal, State, and local regulations pertaining to hydrology and water quality are also provided. Information for this section is from Local Coastal Program, Hazards Assessment Study, and 2002 Water Quality Report, all of which were prepared for the City of Newport Beach. In addition, information was obtained from the 2002 Annual Ocean and Bay Water Quality Report prepared for Orange County, as well as California's Groundwater Bulletin prepared by the State Department of Water Resources.

EXISTING CONDITIONS

Watersheds

The Planning Area is located within the boundaries of four watersheds, each of which contain an interconnected system of surface water resources that feed into the underlying groundwater aquifer or drain into the ocean. The main tributaries and groundwater resources located within the Planning Area are discussed in detail below.

The watersheds within the Planning Area include the Newport Bay, Newport Coast, Talbert, and San Diego Creek Watersheds. Both the Newport Bay and Newport Coast Watersheds cover most of the Planning Area, with the remaining smaller portions covered by the Talbert and San Diego Creek Watersheds.

- The Newport Bay Watershed covers 13.2 square miles along the coast of central Orange County.[1] This watershed encompasses most of the western portion of the Planning Area in addition to the eastern portion of Costa Mesa. The East Costa Mesa, Santa Isabel, and other smaller channels of this watershed drain into Newport Bay.
- The Newport Coast Watershed covers 11.2 square miles, chiefly the Newport Coast area in the City north of Laguna Beach.[2] Newport Coast Creek and Muddy Creek, which are the main tributaries of this watershed, drain the San Joaquin Hills.
- The Talbert Watershed, which encompasses a small northwestern portion of the Planning Area in the vicinity of the Banning Ranch area, covers 21.4 square miles straddling the mouth of the Santa Ana River, and has two main tributaries that drain into it.[3] On the western side, the Talbert and Huntington Beach Channels drain through the Talbert Marsh before emptying into the Pacific Ocean. On the eastern side, the Greenville-Banning Channel empties into the Santa Ana River. The Santa Ana River currently outlets into the Pacific Ocean near West Newport.
- The San Diego Creek Watershed, which encompasses the northern portion of the Planning Area, covers 112.2 square miles in central Orange County, with its main tributary, San Diego

[1] Watershed & Coastal Resources Division at the County of Orange website (http://www.ocwatersheds.com/watersheds/newportbay_intro.asp)

[2] Watershed & Coastal Resources Division at the County of Orange website (http://www.ocwatersheds.com/watersheds/newportcoast.asp)

[3] Watershed & Coastal Resources Division at the County of Orange website (http://www.ocwatersheds.com/watersheds/talbert.asp)

Creek, draining into Upper Newport Bay.[4] Smaller tributaries of this watershed include Serrano Creek, Borrego Canyon Wash, Agua Chinon Wash, Bee Canyon Wash, Peters Canyon Wash, Sand Canyon Wash, Bonita Canyon Creek, and the Santa Ana Delhi Channel.

Surface Water Resources

The Planning Area can be divided into three geographic areas: (1) a low elevation area comprised of Banning Ranch, West Newport, Balboa Peninsula, and Newport Bay, (2) elevated marine terrace areas that include Newport Heights and Westcliff, and (3) high relief terrain of the San Joaquin Hills in the southeastern portion of the City.[5] The low elevation and terrace areas are generally drained by urbanized and relatively low relief streams that empty into Newport Bay, and the rugged natural streams with steeper gradients drain the Newport Ridge and Newport Coast areas.

As shown in Figure 5.2-1, surface water resources such as freshwater wetlands, estuaries, tideland and submerged lands, reservoirs, and waterways are located within the Planning Area. Upper Newport Bay extends south of the Corona del Mar Freeway (SR 73) to the Pacific Ocean, virtually dividing the City into east and west sides. This bay area makes up the tidelands and submerged lands in the City, and connects with the estuary waters south of it, including Newport Dunes, Lido Channel, and Newport Channel. An additional estuary is also located in the northern portion of the Planning Area, east of Upper Newport Bay and south of SR 73. Small amounts of freshwater wetlands are scattered throughout the central portion of the City east of Upper Newport Bay and North Star Beach.

The Planning Area contains two above-ground reservoirs: Big Canyon and San Joaquin Reservoirs, which are generally located in the central portion of the City, as shown in Figure 5.2-1. Big Canyon Reservoir is located within a quarter mile north of San Joaquin Hills Road and San Joaquin Reservoir is located approximately 0.75 miles northeast of Big Canyon Reservoir.

The main tributaries within the Planning Area are the Santa Ana River, San Diego Creek, and Big Canyon Wash, as shown in Figure 5.2-1 and described below.

Santa Ana River

Flowing over 100 miles from the San Bernardino Mountains to the Pacific Ocean, the Santa Ana River traverses portions of San Bernardino, Riverside, and Orange Counties. The River drains an area of over 2,700 square miles before flowing into the Pacific Ocean between Newport and Huntington Beaches.[6] The Santa Ana River transports more than 125 million gallons per day of reclaimed water from Riverside and San Bernardino Counties for recharge into the Orange County Groundwater Basin. This satisfies approximately 40 percent of the County's water demand.[7]

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[4] Watershed & Coastal Resources Division at the County of Orange website (http://www.ocwatersheds.com/watersheds/sandiegocreek.asp)

[5] City of Newport Beach 2003 Hazards Assessment Study

[6] 2003 City of Corona TBR

[7] Watershed & Coastal Resources Division at the County of Orange website (http://www.ocwatersheds.com/watersheds/intro_regional_jurisdictions.asp)

Figure 5.2-1 Water Resources

Fig p.2 (11x17)

The Santa Ana River is the "receiving waters" of the urban, industrial, and agricultural runoff from the inland cities that it traverses such as Santa Ana and Costa Mesa. A receiving water is defined as a river, lake, ocean, stream, or other body of water into which wastewater or treated effluent is discharged. The River also provides water for recreation and for aquatic and wildlife habitat in the inland cities.

Three components make up the flow of the water in the Santa Ana River, and the ratio of these components varies throughout the year.[8] The first component is "storm flows," directly resulting from rainfall, usually between the months of December and April. The rainfall and surface water runoff from the storms is captured and percolated into the groundwater basins. The "baseflow" makes up the second component of water supply, a large portion of which comes from the discharges of treated wastewater into the river, in addition to rising groundwater in the basin. This baseflow includes the nonpoint source discharges, as well as the uncontrolled and unregulated agricultural and urban runoff. The third component of the water supply is imported water, which is characterized by the Santa Ana Regional Water Quality Control Board (SARWQCB) as "nontributary flow."

San Diego Creek

San Diego Creek is the main tributary to Newport Bay, and drains the cities of Irvine, Laguna Woods, Lake Forest, portions of Newport Beach, Orange, and Tustin. Its headwaters lie about a mile east of the I-5 and I-405 Freeway intersection, at an elevation of about 500 feet.[9] The creek flows westerly from its headwaters and empties into Newport Bay in the vicinity of Jamboree Road, one mile west of the University of California at Irvine campus. Flooding on this creek has historically caused significant damage in Newport Beach because it is the biggest stream, with a drainage area of 118 square miles, to flow through the City.[10] Portions of San Diego Creek were channelized in 1968 for flood protection purposes. However, channelization of the creek also resulted in increased sediment flow into Upper Newport Bay, requiring extensive dredging projects to restore the ecosystem.[11]

Big Canyon Wash

The City contains the Big Canyon Wash, which drains from Big Canyon Reservoir in a northwesterly direction towards Upper Newport Bay. A wash is a dry riverbed, area, or channel that only contains water during the rainy season. These riverbeds are completely dry throughout most of the year. Washes are formed when flooding occurs on a desert plain. The ground does not easily absorb water, generating a large amount of runoff that collects in the wash area. While providing rich habitat for a variety of wildlife species, rainstorms in remote locations can result in flash flooding of local washes.

Groundwater Resources

As shown in Figure 5.2-1, the Coastal Plain of Orange County Groundwater Basin (Orange County Basin) underlies the northwestern portion of the Planning Area. This groundwater basin provides groundwater for much of central and north Orange County, including the Newport Beach Planning

[8] 2003 City of Corona TBR

[9] City of Newport Beach 2003 Hazards Assessment Study

[10] City of Newport Beach 2003 Hazards Assessment Study

[11] City of Newport Beach 2003 Hazards Assessment Study

Area. The Orange County Basin underlies a coastal alluvial plain the northwestern portion of Orange County, and is bounded by consolidated rocks exposed on the north in the Puente and Chino Hills, on the east is the Santa Ana Mountains, and on the south in the San Joaquin Hills. The basin is bounded by the Pacific Ocean on the southwest and by a low topographic divide approximated by the Orange County – Los Angeles County line on the northwest. In addition, the basin underlies the lower Santa Ana River watershed.[12]

The sediments containing easily recoverable fresh water extend to about 2,000 feet in depth. Although water-bearing aquifers exist below that level, water quality and pumping lift currently make these materials economically unviable to pump. Upper, middle, and lower aquifer systems are recognized in the basin. Well yields range from 500 to 4,500 gallons per minute (gpm), but are generally 2,000 to 3,000 gpm. The total capacity of the Orange County Basin is approximately 38,000,000 acre-feet (AF).[13]

Recharge to the basin is derived from percolation of Santa Ana River flow, infiltration of precipitation, and injection into wells. The Santa Ana River flow contains natural flow, reclaimed water, and imported water that is spread in the basin forebay. Historical groundwater flow was generally toward the ocean in the southwest, but modern pumping has caused water levels to drop below sea level inland of the Newport-Inglewood fault zone. This trough-shaped depression encourages sea water to migrate inland, contaminating the groundwater supply. Strategic lines of wells in the Alamitos and Talbert Gaps inject imported and reclaimed water to create a mound of water seaward of the pumping trough to protect the basin from seawater intrusion.[14]

Surface Water Quality

Newport Bay is designated as "water quality-limited" for four impairments under the Federal Clean Water Act's Section 303(d) List, meaning that it is "not reasonably expected to attain or maintain water quality standards" due to these impairments without additional regulation.[15] Under section 303(d) of the 1972 Clean Water Act, states, territories, and authorized tribes are required to develop lists of impaired waters. The law requires that these jurisdictions establish priority rankings for waters on the lists and develop Total Maximum Daily Loads (TMDLs) for these waters. Generally, a TMDL specifies the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and requires a jurisdiction to allocate pollutant loadings among point and nonpoint pollutant sources to achieve that amount. Point sources are defined as discrete conveyances such as pipes or direct discharges from businesses or public agencies. Nonpoint pollution refers to the introduction of bacteria, sediment, oil and grease, heavy metals, pesticides, fertilizers, and other chemicals into rivers, bays, and oceans from less defined sources including roadways, parking lots, yards, and farms.[16]

For these water quality-limited bodies, the SARWQCB and the US Environmental Protection Agency (EPA) have developed TMDLs for the following substances in Newport Beach: sediment, nutrients, fecal coliform, and toxic pollutants.[17] A description of the TMDLs for each of these substances are provided below:

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[12] California Department of Water Resources, California's Groundwater – Bulletin 118, Update 2003.

[13] California Department of Water Resources, California's Groundwater – Bulletin 118, Update 2003.

[14] California Department of Water Resources, California's Groundwater – Bulletin 118, Update 2003.

[15] City of Newport Beach 2003 Draft Local Coastal Program

[16] City of Newport Beach 2003 Hazards Assessment Study

[17] City of Newport Beach 2003 Draft Local Coastal Program

- *Sediment*. Adopted on October 9, 1998, the Sediment TMDL requires local partners (stakeholders in the watershed) to survey Newport Bay regularly and to reduce annual sediment delivered into the Bay from 250,000 cubic yards to 125,000 cubic yards (a 50 percent reduction) by 2008.

- *Nutrients*. Approved by US EPA on April 16, 1999, the Nutrient TMDL limits nitrogen and phosphorus inputs to Newport Bay. The Nutrient TMDL attempts to reduce the annual loading of nitrogen by 50 percent, from 1,400 pounds per day to approximately 850 to 802 pounds per day at San Diego Creek, by 2012. Phosphorus loading must fall from 86,912 pounds per year in 2002 to 62,080 pounds by 2007.

- *Fecal Coliform*. Approved in December 1999, the Fecal Coliform TMDL attempts to reduce the amount of fecal coliform inputs to Newport Bay enough to make the Bay meet water contact recreation standards (swimming, wading, surfing) by 2014 and shellfish harvesting standards (where waters support shellfish acceptable for human consumption) by 2010.

- *Toxic Pollutants*. Adopted by US EPA on June 14, 2002, the Toxic Pollutants TMDL addresses Newport Bay inputs like heavy metals (chromium, copper, lead, cadmium, zinc) and priority organics such as endosulfan, DDT, Chlordane, PCBs, Toxaphene, diazinon, and chlorpyriphos. It may lead to the reduction or elimination of pesticide use by residents, businesses, and municipal services in the Newport Bay watershed. This TMDL also addresses existing toxic deposits in sediments in Rhine Channel and other areas in the Lower Bay.

The City of Newport Beach, SARWQCB, Department of Fish and Game, County of Orange, and other cities in the Newport Bay watershed have established the Newport Bay Watershed Executive Committee, which is advised by the Watershed Management Committee (WMC), to implement the TMDLs.[18] The WMC typically meets quarterly to comply with the TMDLs established by the SARWQCB. Generally, all the TMDLs established by the SARWQCB require that watershed-based solutions be developed by the watershed stakeholders, followed by joint funding for the implementation of these projects throughout the watershed.

Additionally, a municipal separate storm sewer system (MS4) permit is provided to the City by the SARWQCB under the National Pollutant Discharge Elimination System (NPDES) to regulate the amount of storm water contaminants that are delivered into the City's waterways.[19] MS4 permits require an aggressive water quality ordinance, specific municipal practices to maintain city facilities like the MS4, and the use of best management practices (BMPs) in many residential, commercial, and development-related activities to further reduce the amount of contaminants in urban runoff. MS4 permits also require local agencies to cooperatively develop a public education campaign to inform people about what they can do to protect water quality.

Water Quality Monitoring

As part of the Orange County Health Care Agency (HCA), Environmental Health's Ocean Water Protection Program is responsible for protecting the public from exposure to ocean and bay water that may be contaminated with sewage or may cause illness due to elevated bacteria levels along the County's coastline, as well as the harbor and bay shoreline. Over the past 40 years, the Health Care Agency and local sanitation agencies (Orange County Sanitation District and South Orange County

[18] City of Newport Beach 2003 Draft Local Coastal Program
[19] City of Newport Beach 2003 Draft Local Coastal Program

Wastewater Authority) have been testing the coastal waters in Orange County for bacteria that indicate the possible presence of disease-causing organisms. The sanitation agencies and HCA program staff participate in the weekly collection of water samples at approximately 150 ocean, bay and drainage locations throughout coastal Orange County, including the City of Newport Beach.[20]

The results of bacteriological water samples are reviewed every day, and ocean and bay water closures, postings and health advisories are issued, when necessary, under the requirements stipulated by the California Health and Safety Code and Title 17 of the California Code of Regulations. In 1999, bacteriological ocean water quality standards that are more protective of public health were added to the State's Health and Safety and Code, and the Code of Regulations; these standards are informally called AB 411 Standards.

When a known release of sewage is reported to the Ocean Water Protection Program staff, the ocean or bay water areas that may be affected by the sewage discharge are immediately closed to ocean water-contact sports. The closed ocean or bay water area will be reopened or reduced in size when the contamination source has been eliminated and after two daily consecutive sampling results indicate the affected area meets the AB 411 Ocean Water-Contact Sports Standards.[21]

Other events such as rainstorms can also increase contaminant levels that exceed standards. During and after a significant rainstorm event, storm drains, creeks, and rivers carry floodwaters and urban runoff (which may include fertilizers, road oils, litter, and large amounts of bacteria from a variety of sources such as animal waste and decomposing vegetation) to the ocean. The level of contamination of bacteria can rise significantly in ocean and bay waters close to discharging storm drains and outlets of creeks, rivers, and streams during and after rainstorms. The elevated bacterial levels in the coastal ocean waters may continue for a period of at least three days depending on the intensity of the rain and the volume of runoff.[22]

Bacteriological water samples are collected each week at approximately two locations in Newport Slough, and at 31 locations in Newport Bay. The Ocean Water Protection Program staff review the results of bacteriological water analyses to determine compliance with established standards. When a bacteriological water sample fails to meet any of the AB 411 Ocean Water-Contact Sports Standards the following occurs:

- Warning signs are posted at the affected ocean or bay areas indicating that the waters have exceeded health standards.
- All the information regarding the posted area is updated on the Ocean and Bay Water Closure and Posting Hotline and Web Page.
- Additional bacteriological water samples are collected at the posted areas and the results are evaluated daily to determine if the areas posted with warning signs should be increased, reduced, shifted, or removed.

The total number of postings, total number of days posted, and total number of Beach Mile Days posted due to violations of AB 411 standards for the years 2000 through 2002 at Newport Slough and Newport Bay are shown below in Table 5.2-1. The term Beach Mile Days (BMD) is used to present the measurement of the number of days and the area of ocean or bay waters that are closed

[20] Orange County Health Care Agency Environmental Health, 2002 Annual Ocean and Bay Water Quality Report, June 2003.
[21] Orange County Health Care Agency Environmental Health, 2002 Annual Ocean and Bay Water Quality Report, June 2003.
[22] Orange County Health Care Agency Environmental Health, 2002 Annual Ocean and Bay Water Quality Report, June 2003.

due to a sewage spill or posted for a violation of the AB 411 standards. BMDs are calculated by multiplying the number of days of a closure or posting by the number of miles of beach closed or posted.

Table 5.2-1 Postings

Year	Postings	Days	Beach Mile Days
NEWPORT SLOUGH			
2000	N/A	N/A/	N/A
2001	9	381	5.1
2002	13	339	3.9
NEWPORT BAY			
2000	75	1483	64
2001	94	1663	67.7
2002	61	1514	58.4

SOURCE: Orange County Health Care Agency Environmental Health, 2002 Annual Ocean and Bay Water Quality Report, June 2003, pages 24–25.

Groundwater Quality

Groundwater within the Orange County Basin is primarily calcium and sodium bicarbonate in character. Impairments to the groundwater basin include sea water intrusion near the coast and colored water from natural organic materials in the lower aquifer system. In addition, the basin is characterized with increasing salinity, high nitrates, and MTBE.[23]

The most typical source of groundwater contamination in the City is the erosion of natural deposits, which could deliver chemicals such as arsenic, barium, fluoride, nickel, and selenium along with radiologicals such as radium and uranium into the groundwater. Additionally, the use of fertilizers in the City also contributes nitrate and nitrite into the groundwater. Upon sampling of the City's groundwater in 2002, none of the regulated chemicals found in the groundwater violated their respective MCLs as set by the California EPA.

REGULATORY CONTEXT

Federal Regulations

Clean Water Act of 1972

The California Water Resources Control Board and its regional boards are responsible for enforcing water quality standards within the State. As mandated by Section 303(d) of the Federal Clean Water Act, the RWQCB maintains and updates a list of "impaired waterbodies" that do not meet State and Federal water quality standards. The State is then required to prioritize waters/watersheds for total maximum daily loads (TMDL) development. This information is compiled in a list and submitted to the U.S. Environmental Protection Agency for review and approval. This list is known as the 303(d) list of impaired waters. The State Water Resources Control Board (SWRCB) and RWQCBs

[23] California Department of Water Resources, California's Groundwater – Bulletin 118, Update 2003.

have ongoing efforts to monitor and assess water quality, to prepare the Section 303(d) list, and to develop TMDLs.

Section 404 of the Federal Clean Water Act authorizes the U.S. Army Corps of Engineers to issue permits for the discharge of dredged or fill material into waters of the United States, including wetlands. This section of the Clean Water Act has been interpreted to give the U.S. Army Corps of Engineers jurisdiction over permitting wetlands fill.

State Regulations

California Wetlands Conservation Policy (1993)

The goal of the California Wetlands Conservation Policy (1993) is to ensure no net loss of wetlands within the State. This policy, incorporated in an executive order by previous Governor Pete Wilson, also encourages a long-term net gain in the State's quantity, quality, and permanence of wetlands acreage and values. Interpretation of this order indicates that any developer wishing to fill in wetlands for construction of new development must perform mitigation in the form of constructed wetlands elsewhere at ratios ranging from 2:1 to 10:1. In addition to the U.S. Army Corps of Engineers, State regulatory agencies claiming jurisdiction over wetlands include the California Department of Fish and Game (CDFG) and the SWRCB.

California Department of Fish and Game Lake or Streambed Alteration Program

CDFG, through provisions of the State of California Administrative Code, is empowered to issue agreements for any alteration of a river, stream, or lake where fish or wildlife resources may adversely be affected. Streams (and rivers) are defined by the presence of a channel bed and banks, and at least an intermittent flow of water. CDFG regulates wetland areas only to the extent that those wetlands are part of a river, stream, or lake as defined by CDFG.

Typically, wetland delineations are not performed to obtain CDFG Agreements. The reason for this is that CDFG generally includes any riparian habitat present within the jurisdictional limits of streams and lakes. Riparian habitat includes willows, mulefat, and other vegetation typically associated with the banks of a stream or lake shoreline. In most situations, wetlands associated with a stream or lake would fall within the limits of riparian habitat. Thus, defining the limits of CDFG jurisdiction based on riparian habitat will automatically include any wetland areas

Metropolitan Water District Groundwater Recovery Program

MWD established the Groundwater Recovery Program, which provides financial assistance to member agencies to improve and enhance the quality of local ground waters that does not meet the regulatory standards of the EPA and DHS. If available, this funding may be used to improve water quality within the Newport Beach area.

SARWQCB National Pollutant Discharge Elimination System Permit

The City of Newport Beach is listed as a co-permittee for the SARWQCB's NPDES permit and is bound to comply with all the aspects of the permit requirements. The NPDES permit program controls water pollution by regulating point and nonpoint sources that discharge pollutants into waters of the United States. The City holds a NPDES permit to operate its municipal separate storm sewer systems (MS4s). Newport Beach's MS4 Permit (adopted January 2002) directs it to keep pollutants out of its MS4 to the maximum extent practicable and to ensure that dry-weather flows entering recreational waters from the MS4 do not cause or contribute to exceedances of water quality standards. The Permit requires the City to do the following:[24]

- Control contaminants into storm drain systems
- Educate the public about stormwater impacts
- Detect and eliminate illicit discharges
- Control runoff from construction sites
- Implement "best management practices" or "BMPs" and site-specific runoff controls for new development and redevelopment
- Prevent pollution from municipal operations, including fixed facilities and field activities

Reclaimed Water Regulations

Within the State of California, reclaimed water is regulated by the U.S. EPA, SWRCB, RWQCBs, and the State Department of Health Services. The SWRCB has adopted Resolution No. 77-1, Policy with Respect to Water Reclamation in California. This policy states that the State Board and Regional Boards will encourage and consider or recommend for funding water reclamation projects that do not impair water rights or beneficial instream uses.

The RWQCBs implement the State Board's Guidelines for Regulation of Water Reclamation and issue waste discharge permits that serve to regulate the quality of reclaimed water based on stringent water quality requirements. The State Department of Health Services develops policies protecting human health and comments and advises on RWQCB permits (RCIP Existing Setting Report and Resolution No. 77-1, Policy with Respect to Water Reclamation in California).

Local Regulations

County of Orange Stormwater Program

The City is a member of the County of Orange's Stormwater Program, which coordinates all cities and the county government in Orange County to regulate and control storm water and urban runoff into all Orange County waterways, and ultimately, into the Pacific Ocean. The Orange County Stormwater Program administers the current NPDES MS4 Permit and the 2003 Drainage Area Management Plan (DAMP) for the County of Orange and the thirty-four incorporated cities within the region.

City of Newport Beach Municipal Code

Chapter 14.36, Water Quality, of the City of Newport Beach Municipal Code requires the City to participate as a "Co-permittee" under the NPDES Permits in the development and adoption of an ordinance to accomplish the requirements of the Clean Water Act. The purpose of this chapter is for the City to participate in the improvement of water quality and comply with Federal requirements for the control of urban pollutants to storm water runoff, which enters the network of storm drains throughout Orange County.

[24] City of Newport Beach 2003 Hazards Assessment Study

References

California Department of Water Resource. 2003. *California's Groundwater Bulletin 118*, October 1.

Newport Beach, City of. Utilities Department. 2003. *2003 Water Quality Report*.

Orange, County of. Health Care Agency. Environmental Health. 2003. *2002 Annual Ocean and Bay Water Quality Report*, June.

Section 5.3 Air Quality

5.3 AIR QUALITY

This section describes the existing air quality conditions within the Planning Area, the regulatory agencies responsible for managing and improving air quality, and the laws and plans that have been adopted for its improvement. Information for this section is based on data from the South Coast Air Quality Management District and the California Air Resources Board.

EXISTING CONDITIONS

Regional Climate

The Planning Area is located within the South Coast Air Basin (Basin), named so because its geographical formation is that of a basin, with the surrounding mountains trapping the air and its pollutants in the valleys or basins below. This area includes all of Orange County and the nondesert portions of Los Angeles, San Bernardino, and Riverside Counties. The regional climate within the Basin is considered semi-arid and is characterized by warm summers, mild winters, infrequent seasonal rainfall, moderate daytime onshore breezes, and moderate humidity.

Local Climate

The Planning Area is located in central coastal Orange County. The annual average temperature in the City ranges from 55 to 68 degrees Fahrenheit (°F). The area also experiences a typical daily wind pattern that is a daytime onshore sea breeze (from the west) and a nighttime land breeze. This regime is broken only by occasional winter storms and infrequent strong northeasterly (from the northeast) Santa Ana winds from the mountains and deserts north of the Basin. On practically all spring and early summer days, the daily wind patterns flush much of the Basin of high levels of air pollutants. From late summer through the winter months, the flushing is less pronounced because of lighter wind speeds.

Air Quality Background

Air pollutant emissions within the Basin are generated by stationary, mobile, and natural sources. Stationary sources can be divided into two major subcategories: point and area sources. Point sources occur at an identified location and are usually associated with manufacturing and industry. Construction activities such as excavation and grading also contribute to point source emissions. Examples are boilers or combustion equipment that produce electricity or generate heat. Area sources are widely distributed and produce many small emissions. Examples of area sources include residential and commercial water heaters, painting operations, portable generators, lawn mowers, agricultural fields, landfills, and consumer products such as barbeque lighter fluid and hair spray. Mobile sources refer to emissions from on- and off-road motor vehicles, including tailpipe and evaporative emissions. On-road sources may be legally operated on roadways and highways. Off-road sources include aircraft, trains, and construction vehicles. Mobile sources account for the majority of the air pollutant emissions within the Basin. Air pollutants can also be generated by the natural environment such as when fine dust particles are pulled off the ground surface and suspended in the air during high winds.

Both the Federal and State governments have established ambient air quality standards for outdoor concentrations of various pollutants in order to protect public health. The national and State ambient air quality standards have been set at levels whose concentrations could be generally harmful to human health and welfare and to protect the most sensitive persons from illness or discomfort with a margin of safety. Applicable ambient air quality standards are identified later in this section. The South Coast Air Quality Management District (SCAQMD) is responsible for bringing air quality within the South Coast Air Basin into conformity with the national and State standards.

The air pollutants for which national and State standards have been promulgated and which are most relevant to air quality planning and regulation in the air basins include ozone, carbon monoxide, suspended particulate matter, sulfur dioxide, and lead. In addition, toxic air contaminants are of concern in the air basins. Each of these is briefly described below.

- *Ozone* is a gas that is formed when volatile organic compounds (VOCs) and nitrogen oxides (NOx), both byproducts of internal combustion engine exhaust, undergo slow photochemical reactions in the presence of sunlight. Meteorological conditions that are needed to produce high concentrations of ozone are direct sunshine, early morning stagnation in source areas, high ground surface temperatures, strong and low morning inversions, greatly restricted vertical mixing during the day, and daytime subsidence that strengthens the inversion layer. Ozone concentrations are generally highest during the summer months when direct sunlight, light wind, and warm temperature conditions are favorable.

- *Carbon Monoxide* (CO) is a colorless, odorless gas produced by the incomplete combustion of fuels. CO concentrations tend to be the highest during the winter morning, with little to no wind, when surface-based inversions trap the pollutant at ground levels. Because CO is emitted directly from internal combustion engines, unlike ozone, and motor vehicles operating at slow speeds are the primary source of CO in the Basin, the highest ambient CO concentrations are generally found near congested transportation corridors and intersections.

- *Respirable Particulate Matter* (PM_{10}) and *Fine Particulate Matter* ($PM_{2.5}$) consists of extremely small, suspended particles or droplets 10 microns and 2.5 microns or smaller in diameter. Some sources of particulate matter, like pollen and windstorms, are naturally occurring. However, in populated areas, most particulate matter is caused by road dust, diesel soot, combustion products, abrasion of tires and brakes, and construction activities.

- *Sulfur dioxide* (SO_2) is a colorless, extremely irritating gas or liquid. It enters the atmosphere as a pollutant mainly as a result of burning high sulfur-content fuel oils and coal, and from chemical processes occurring at chemical plants and refineries.

- *Lead* occurs in the atmosphere as particulate matter. The combustion of leaded gasoline is the primary source of airborne lead in the Basin. The use of leaded gasoline is no longer permitted for on-road motor vehicles; therefore, most lead combustion emissions are associated with off-road vehicles such as racecars. Other sources of lead include the manufacturing and recycling of batteries, paint, ink, ceramics, ammunition, and secondary lead smelters.

- *Toxic Air Contaminants* refer to a diverse group of air pollutants that can affect human health, but have not had ambient air quality standards established for them. This is not because they are fundamentally different from the pollutants discussed above, but because their effects tend to be local rather than regional.

Regional Air Quality

The entire South Coast Air Basin is designated as a Federal-level extreme nonattainment area for ozone, meaning that national standards are not expected to be met for more than 17 years from the time of designation, and a nonattainment area PM_{10}. It has recently improved from nonattainment to attainment with the national standard for nitrogen dioxide (NO_2)—a pure form of NOx and is about to be designated an attainment area for CO. The South Coast Air Basin is a State-level nonattainment area for ozone, CO (Los Angeles County only), and PM_{10}. However, regional air quality throughout the Basin has improved substantially over the 1980's and 1990's, even as substantial growth has occurred.

Local Air Quality

In an effort to monitor the various concentrations of air pollutants throughout the South Coast Air Basin, the SCAQMD has divided the region into 27 source receptor areas (SRAs) in which 31 monitoring stations operate. The Planning Area is located within SRAs 18, which covers the North Coastal Orange County area. Ambient air pollutant concentrations within SRA 18 are monitored on Costa Mesa Drive in Costa Mesa. Of the air pollutants discussed previously, only ambient concentrations of ozone, CO, NO_2, and SO_2 are monitored in SRA 18. Table 5.3-1 identifies the national and State ambient air quality standards for relevant air pollutants and provides a summary of ambient air quality measured within SRA 18 through the period of 2001 to 2003. As shown, as of 2003, SRA 18 did not exceed State or national standards for any criteria pollutant monitored.

Table 5.3-1 Summary of Ambient Air Quality at the Costa Mesa Monitoring Station (SRA 18)

Pollutant	Air Quality Standards	Year		
		2001	2002	2003
OZONE				
Maximum 1-hour concentration		0.098	0.087	0.107
Number of days exceeding national 1-hour standard	>0.12 ppm	0	0	0
Number of days exceeding State 1-hour standard	>0.09 ppm	1	0	4
Maximum 8-hour concentration		0.073	0.070	0.088
Number of days exceeding national 8-hour standard	>0.08 ppm	0	0	1
CARBON MONOXIDE (CO)				
Maximum 8-hour concentration		4.64	4.29	5.90
Number of days exceeding national 8-hour standard	≥9.5 ppm	0	0	0
Number of days exceeding State 8-hour standard	>9.0 ppm	0	0	0
NITROGEN DIOXIDE (NO_2)				
Maximum 1-hour concentration		0.082	0.106	0.107
Number of days exceeding State 1-hour standard	>0.25 ppm	0	0	0
SULFUR DIOXIDE (SO_2)				
Maximum 24-hour concentration		0.005	0.011	0.012
Number of days exceeding national 24-hour standard	>0.14 ppm	0	0	0
Number of days exceeding State 24-hour standard	>0.04 ppm	0	0	0

SOURCE: ARB 2004, www.arb.ca.gov/adam/cgi-bin/db2www/adamtop4b.d2w/Branch.
ppm = parts by volume per million of air.
Ambient concentrations of PM_{10}, $PM_{2.5}$, and 1-hour CO are not monitored in SRA 18.

Toxic Air Contaminant Emissions

Toxic air contaminants are airborne substances that are capable of causing chronic (i.e., of long duration) and acute (i.e., severe but of short duration) adverse effects on human health. They include both organic and inorganic chemical substances that may be emitted from a variety of common sources including gasoline stations, motor vehicles, dry cleaners, industrial operations, painting operations, and research and teaching facilities. Toxic air contaminants are different than the "criteria" pollutants previously discussed in that ambient air quality standards have not been established for them, largely because there are hundreds of air toxics and their effects on health tend to be local rather than regional.

Lifetime cancer risk is defined as the increased chance of contracting cancer over a 70-year period as a result of exposure to a toxic substance or substances. It is the product of the estimated daily exposure of each suspected carcinogen by its respective cancer unit risk. The end result represents a worst-case estimate of cancer risk. The California Air Resources Board (ARB) has produced a series of estimated inhalation cancer risk maps based on modeled levels of outdoor composite toxic pollutant levels. The 2000 map (the most recent map available) indicates that the City of Newport Beach is exposed to an estimated inhalation cancer risk of more than 250 persons per million. These risk maps depict inhalation cancer risk due to modeled outdoor toxic pollutant levels, and do not account for cancer risk due to other types of exposure. The largest contributors to inhalation cancer risk are diesel engines.

Sensitive Receptors

As discussed previously, the national and State ambient air quality standards have been set at levels whose concentrations could be generally harmful to human health and welfare and to protect the most sensitive persons from illness or discomfort with a margin of safety. The SCAQMD defines typical sensitive receptors as residences, schools, playgrounds, child care centers, athletic facilities, hospitals, long-term health care facilities, rehabilitation centers, convalescent centers, and retirement homes. Each of these land use types is present within the Planning Area.

Land Use Planning and Air Quality

Land use patterns and density of development affect the amount of air pollutants that are generated by communities. Land uses that are segregated throughout a community increase the number of motor vehicle trips and associated air pollutant emissions since opportunities to walk, ride bicycles, and use public transportation between such uses as homes and work/shopping are generally reduced. This is compounded in areas such as the Newport Beach Planning Area where low densities increase the distance between uses, and public transportation routes and vehicles are limited. Higher density communities often mix residential uses with, or very near, commercial, business, and employment uses, thus reducing the population's reliance on motor vehicle use, or reducing the distance of necessary vehicle trips. Smaller, higher-density uses also produce less air emissions on a per unit basis from the use of natural gas for space and water heating. Higher-density uses typically equal smaller properties, which reduce the emissions associated with the use of landscape maintenance equipment. Communities that are either jobs-rich, like Newport Beach, or housing-rich also increase the potential for emissions to be generated as employees or residents have to commute long distances to and from their homes and work.

REGULATORY CONTEXT

Air quality within the air basins is addressed through the efforts of various Federal, State, regional, and local government agencies. These agencies work jointly, as well as individually, to improve air quality through legislation, regulations, planning, policy-making, education, and a variety of programs. The agencies responsible for improving the air quality within the air basins are discussed below.

Federal Regulations

U.S. Environmental Protection Agency

The United States Environmental Protection Agency (EPA) is responsible for setting and enforcing the National Ambient Air Quality Standards for atmospheric pollutants. It regulates emission sources that are under the exclusive authority of the Federal government, such as aircraft, ships, and certain locomotives. The EPA also maintains jurisdiction over emissions sources outside State waters (outer continental shelf), and establishes various emissions standards for vehicles sold in states other than California.

As part of its enforcement responsibilities, the EPA requires each State with Federal nonattainment areas to prepare and submit a State Implementation Plan (SIP) that demonstrates the means to attain the Federal standards. The SIP must integrate Federal, State, and local plan components and regulations to identify specific measures to reduce pollution, using a combination of performance standards and market-based programs within the timeframe identified in the SIP.

State Regulations

California Air Resources Board

The ARB, a part of the California Environmental Protection Agency, is responsible for the coordination and administration of both Federal and State air pollution control programs within California. In this capacity, the ARB conducts research, sets California Ambient Air Quality Standards, compiles emission inventories, develops suggested control measures, provides oversight of local programs, and prepares the SIP. The ARB establishes emissions standards for motor vehicles sold in California, consumer products (such as hair spray, aerosol paints, and barbecue lighter fluid), and various types of commercial equipment. It also sets fuel specifications to further reduce vehicular emissions.

Southern California Association of Governments

The Southern California Association of Governments (SCAG) is a council of governments for Imperial, Los Angeles, Orange, Riverside, San Bernardino, and Ventura Counties. It is a regional planning agency and serves as a forum for regional issues relating to transportation, the economy and community development, and the environment.

Although SCAG is not an air quality management agency, it is responsible for developing transportation, land use, and energy conservation measures that affect air quality. The organization also promotes using carpools, buses, trains, and other alternative forms of transportation throughout the region. SCAG's Regional Comprehensive Plan and Guide (RCPG) provides growth forecasts that are used in the development of air quality–related land use and transportation control strategies by the SCAQMD. The RCPG is a framework for decision-making for local governments, assisting them in meeting Federal and State mandates for growth management, mobility, and environmental standards, while maintaining consistency with regional goals regarding growth and changes through the year 2015, and beyond. Policies within the RCPG include consideration of air quality, land use, transportation, and economic relationships by all levels of government.

South Coast Air Quality Management District

The SCAQMD is the agency principally responsible for comprehensive air pollution control in the South Coast Air Basin. To that end, the SCAQMD, a regional agency, works directly with SCAG, county transportation commissions, local governments, and cooperates actively with all Federal and State government agencies. The SCAQMD develops rules and regulations, establishes permitting requirements, inspects emissions sources, and enforces such measures though educational programs or fines, when necessary.

The SCAQMD is directly responsible for reducing emissions from stationary (area and point), mobile, and indirect sources. It has responded to this requirement by preparing a series of Air Quality Management Plans (AQMPs). The most recent of these was adopted by the Governing Board of the SCAQMD on August 1, 2003. This AQMP, referred to as the 2003 AQMP, was prepared to comply with the Federal and State Clean Air Acts and amendments, to accommodate growth, to reduce the high pollutant levels in the Basin, to meet Federal and State ambient air quality standards, and to minimize the fiscal impact that pollution control measures have on the local economy. It identifies the control measures that will be implemented to reduce major sources of pollutants. These planning efforts have substantially decreased the population's exposure to unhealthful levels of pollutants, even while substantial population growth has occurred within the Basin. As discussed on pages 2-7 through 2-7 of the *2003 AQMP*, levels of ambient pollutants monitored throughout the Basin have decreased substantially since 1980.The future air quality levels projected in the 2003 AQMP are based on several assumptions. For example, the SCAQMD assumes that general new development within the Basin will occur in accordance with population growth and transportation projections identified by SCAG in its most current version of the RCPG, which was adopted in March 1996. The AQMP also assumes that general development projects will include strategies (mitigation measures) to reduce emissions generated during construction and operation.

Local Regulations

City of Newport Beach

Local jurisdictions, such as the City of Newport Beach, have the shared responsibility to help develop and implement some of the control measures of the AQMP. Transportation-related strategies for congestion management, low emission vehicle infrastructure, and transit accessibility and non-transportation-related strategies for energy conservation can be encouraged by policies of local governments. A summary of the AQMP control measures that are partially within the jurisdiction of local governments to implement is provided in Table 5.3-2.

Table 5.3-2 AQMP Control Strategies for Local Governments		
AQMP Strategy Name		*Effect*
MISCELLANEOUS SOURCES		
MSC-01	Promotion of Lighter Colored Roofing and Road Materials and Tree Planting Programs	Energy Conservation
TRANSPORTATION STRATEGIES		
TCM-A	HOV Improvements	Trip Reduction
TCM-B	Transit & Systems Management	Trip Reduction
TCM-C	Information Based Measures	Trip Reduction
SOURCE: SCAQMD 2003 Air Quality Management Plan.		

REFERENCES

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Section 5.4 Topography

5.4 TOPOGRAPHY

This section describes the existing topography, slope, and elevation of the Planning Area. Information for this section was obtained from the Hazards Assessment Study prepared for the City of Newport Beach.

EXISTING CONDITIONS

Several significant topographic features bound the Planning Area. The central and northwestern portions of the Planning Area are situated on a broad mesa—which is an isolated and relatively flat-topped natural elevation—that extends southeast to join the San Joaquin Hills. This mesa, known as the Newport Mesa, has been deeply dissected by stream erosion, resulting in moderate to steep bluffs along the Upper Newport Bay estuary. The Upper Newport Bay is bordered by 40- to 100-foot-high bluffs. The Newport Mesa rises from about 50 to 75 feet above mean sea level at the northern end of the estuary in the Santa Ana Heights area, to about 100 feet above sea level in the Newport Heights, Westcliff, and Eastbluff areas. Along the southwestern boundary of the Planning Area, sediments flowing from the Santa Ana River and San Diego Creek transect the mesa and have formed the beaches, sandbars, and mudflats of Newport Bay and West Newport. Balboa Peninsula, a barrier beach that protects the bay, and the harbor islands of the City generally range from about 5 to 10 feet above sea level. The coastal platform occupied by Corona del Mar, located in the south central portion of the City, ranges from about 95 to 100 feet above sea level. In the southern part of the City, the San Joaquin Hills, which reach an elevation of 1,164 feet at Signal Peak, rise abruptly from the sea, separated from the present shoreline by a relatively flat, narrow shelf. This platform (also called a terrace) is now elevated well above the water and is bounded by steep bluffs along the shoreline.

The local topography in the Planning Area ranges from gently sloping areas in the northwest portion of the City to steeper topography in the eastern and southern areas. As shown in Plate 3-3 (Slope Distribution Map) of Chapter 6 (Public Safety) of this document, over 50 percent of the Planning Area, including most of the northern and western portions, as well as some portions of the Newport Coast area, have a slope gradient that range from approximately 0 to 10 degrees. Slopes increase with proximity to the Newport Mesa and San Joaquin Hills, and areas with more severe slopes are generally concentrated in the southern and eastern portions of the City. The bluffs that border the water-bodies in the City, including Newport Bay and City streams, have a slope gradient ranging from 10 to 26 degrees and also 26 to 40 degrees. In addition, most of the San Joaquin Hills have a slope gradient of 10 to 40 degrees. Parts of the San Joaquin Hills located near the southern border of the City of Newport Beach have a slope gradient of 40 degrees and greater.

Elevations across the City range from approximately 0 to 394 feet in the areas comprised of West Newport, Balboa Peninsula, and Newport Bay to approximately 2,460 to 3,281 feet in the high relief terrain areas of the San Joaquin Hills in the eastern portion of the City. Elevations across the Planning Area are shown in Plate 4-1 (Geomorphic Map) of Chapter 6 (Public Safety) of this document.

Given the high gradient slopes and difference in elevations within Newport Coast and Newport Ridge, canyons and ridges comprise much of these areas. Development in these areas has taken an alternative approach. Rather than including structures on the hillsides and preserving the ridgelines, these areas contain residential uses on top of ridges in order to preserve the canyons as natural open space.

REGULATORY CONTEXT

Local Regulations

City of Newport Beach Municipal Code

Chapter 15.10, Excavation and Grading Code, provides regulations to safeguard life, limb, property and the public welfare by regulating grading, drainage and hillside construction on private property and for similar improvement proposed by private interests on City right-of-way where regulations are not otherwise exercised. For example, Section 15.10.090 states that the slope of cut surfaces can be no steeper than is safe for the intended use, and that cut slopes shall be no steeper than two horizontal to one vertical. In addition, Section 15.10.120 requires that terraces at least six feet in width shall be established at not more than thirty (30) foot vertical intervals to control surface drainage and debris. Section 15.10.130 requires that the faces of cut and fill slopes be prepared and maintained to control against erosion. Further, Section 15.10.040 requires the elimination of hazards, in compliance with the Uniform Code for the Abatement of Dangerous Buildings, as determined by the Building Official.

Chapter 20.55, SPR Site Plan Review Overlay District, establishes a "Site Plan Review" (SPR) overlay district to require site plan review by the Planning Commission for any proposed development within the overlay district to insure that the project conforms to the objectives of the General Plan. Section 20.55.030 of this Chapter includes applicable slope criteria.

Chapter 20.60, Site Regulations, contains land use and development regulations that are applicable to sites in all or several districts, including Section 20.60.045 of this Chapter, which determines the allowable number of units per slope area.

Bulk and height limitations are included in the Zoning Code in order to minimize impacts to topographic features and to ensure that the unique character and scale of Newport Beach is preserved. Specifically, Chapter 20.65.040, Height Limitation Zones establishes five height limitation zones within the City. Residential development is limited to a height of 24 to 28 feet and non-residential development is limited to a height of 26 to 35 feet within the Shoreline Height Limitation Zone. Outside of the Shoreline Height Limitation Zone, heights up to 50 feet are permitted within planned community districts.

REFERENCES

Newport Beach, City of. 2003. *Hazards Assessment Study*.

Section 5.5 Visual Resources

5.5 VISUAL RESOURCES

This section describes the existing visual elements that contribute positively to the City and its surroundings. Discussions of Federal and State regulations that are relevant to visual resources are also provided. Issues and opportunities related to the formulation of policies regarding visual resources are also discussed.

EXISTING CONDITIONS

Visual resources are an important component of the quality of life of any geographic area. As users experience a place, their primary sensory interaction with that place is visual in nature, and a wide variety of shapes, colors, and textures, composed by topography, structures, roadways, and vegetation, forms the views of and from the City. The City of Newport Beach is sited on a coastal plain and is bounded on two sides by developed urban lands of Costa Mesa and Irvine. The rolling green hills of Crystal Cove State Park create views to the east and form the City boundary at the east, while the Pacific Ocean fills the views to the southwest. Development in Newport Beach has been designed to capture views of the ocean, capitalizing on the ridgelines and hillsides as vantage points. The Upper and Lower Newport Bay, draining an area of 118 square miles via the San Diego Creek, bisects the City, creating a dominant physical land feature that includes estuaries, beaches, coastal bluffs, and meandering waterways unique to Newport Beach. From the higher elevations in the City, views to the north include the rolling hills of the San Joaquin Corridor, and in the distance the Santa Ana Mountains. This combination of hills, canyons, bluffs, and water features create a visually dynamic landscape.

Open Space

Open space areas provide visual relief from urbanized areas and scenic view opportunities for motorists, pedestrians, and residents. Open space is distributed throughout Newport Beach including the beach, bay, parks and undeveloped areas such as Banning Ranch, and canyons, hillsides and bluffs of Newport Ridge/Coast.

Ocean/Harbor/Bay

The Pacific Ocean provides the predominant visual setting for the majority of Newport's scenic attributes. The ocean can be seen from residences atop coastal bluffs and hilltop ridges, from the offices of high-rise development, and can be enjoyed by visitors of the beaches, shopping areas and from many of the major north/south corridors. Associated with the ocean, the bay and harbor areas also provide picturesque nautical views.

Newport Beach includes many areas that are environmentally sensitive in nature. Many of these are water-associated habitats such as marine intertidal and subtidal, riparian, or marsh areas. Intertidal areas consist of platform intertidal reefs and pocket sandy beaches, with conspicuous offshore rocks, stacks, and arches. Undeveloped plant and animal habitat areas provide attractive landscapes that also contribute to the City's visual quality. Many of these habitat areas have been identified as Environmental Study Areas (ESAs) and are discussed in detail in the Biological Resources Report prepared by Chambers Group and revised by EIP Associates. The ESAs listed (partial list) below contribute to the City's visual resources:

- Semeniuk Slough (Santa Ana River Marsh)

- North Star Beach
- West Bay
- Upper Newport Bay Ecological Reserve and DeAnza/Bayside Marsh Peninsula
- San Diego Creek

Coastal Views

Newport Beach is located in a unique physical setting that provides a variety of spectacular coastal views, including those of the open waters of the ocean and bay, harbor, sandy beaches, rocky shores, wetlands, canyons, and coastal bluffs. The City has historically been sensitive to the need to protect and provide access to these scenic and visual resources and has developed a system of public parks, piers, trails, and viewing areas. Coastal views are also provided from a number of streets and highways and, due to the grid street pattern in West Newport, Balboa Peninsula, Balboa Island, and Corona del Mar, many north/south-tending streets provide view corridors to the ocean and bay.

Aerial View of Newport Pier & Balboa Peninsula

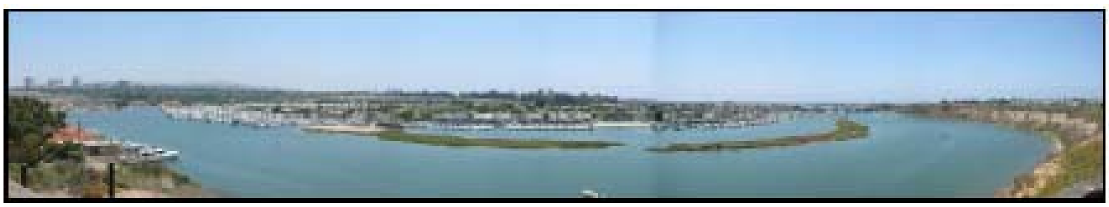
View from atop Mariner's Mile

Scenic Coastal Vistas

The wide-open vistas in the City of Newport Beach are associated with natural features, such as the ocean and bay, both dominant visual images within the City. Internally, north/south streets provide unique vistas that characterize individual neighborhoods. Significant vistas, as identified in the City's Draft Local Coastal Plan, include public coastal views from the following roadway segments:

- Back Bay Drive
- Balboa Island Bridge
- Bayside Drive from Coast Highway to Linda Island Drive
- Bayside Drive at Promontory Bay

- Coast Highway/Santa Ana River Bridge
- Coast Highway/Newport Boulevard Bridge and Interchange
- Coast Highway from Newport Boulevard to Marino Drive
- Coast Highway/Newport Bay Bridge
- Coast Highway from Jamboree Road to Bayside Drive
- Eastbluff Drive from Jamboree Road to Backbay Drive
- Irvine Avenue from Santiago Drive to University Drive
- Jamboree Road from Eastbluff Drive/University Drive to State Route 73
- Jamboree Road in the vicinity of the Big Canyon Park
- Jamboree Road from Coast Highway to Bayside Drive
- Lido Island Bridge
- Newport Boulevard from Hospital Road/Westminster Avenue to Via Lido Drive
- Newport Center Drive from Newport Center Drive E/W to Farallon Drive/Granville Drive
- Ocean Boulevard
- State Route 73 from Bayview Way to University Drive
- Superior Avenue from Hospital Road to Coast Highway
- University Drive from Irvine Avenue to the Santa Ana—Delhi Channel



View of DeAnza/ Bayside Marsh Peninsula from Castaways Park

Mountains and Ridges

The Santa Ana Mountains are located northeast of the City. The San Joaquin Hills frame the City's northeast border. The Santa Ana Mountains are within the Cleveland National Forest and provide long-range views, forming the northern backdrop to the City. Views of these mountains are particularly significant from the newer developments on the City's northern side.

Slopes rising up from coastal plains provide a dramatic contrast to the generally flat topography at the coastline and visually dominate the majority of the relatively low-scale urban development at the beachfront. Canyons and gullies formed by water coursing from the mountains to the ocean similarly provide stunning contrast to the coastal tidelands and beaches. The majority of the undeveloped headlands lie in the eastern portion of the City in the area known as Newport Coast/Ridge. Buck Gully, Morning Canyon, Ridge Park, Los Trancos, Muddy Canyon, and Pelican Hill typify the topographic landforms that render spectacular views of the city.

Coastal Bluffs

Coastal bluffs are a prominent landform in Newport Beach. There are ocean facing coastal bluffs along the shoreline of Corona del Mar, Shorecliffs, and Cameo Shores. There are also coastal bluffs facing the wetlands of Upper Newport Bay, Semeniuk Slough, and the degraded wetlands of the Banning Ranch property.

Little Corona

Lower Newport Bay

Coastal bluffs surround Lower Newport Bay. These can be seen along Coast Highway from the Semeniuk Slough to Dover Drive, along Bayside Drive in Irvine Terrace, and in Corona del Mar above the Harbor Entrance. These bluffs faced the open ocean before the Balboa Peninsula formed and are now generally separated from the shoreline. Coastal bluffs are considered significant scenic and environmental resources.

Upper Newport Bay Coastal Bluffs

Upper Newport Bay

Most of the coastal bluff top lands have been subdivided and developed over the years. However, many have been preserved as parkland and other open space. Also, most of the faces of the coastal bluff surrounding the Upper Newport Bay have been protected by dedication to the Upper Newport Bay Nature Preserve or dedicated as open space as part of planned residential developments. Eastbluff Remnant, Mouth of Big Canyon, Castaways, Newporter North, and Newport Beach Marine Life Refuge are undeveloped open spaces. In other areas, including Newport Heights, Cliff Haven, Irvine Terrace, Corona del Mar, Shorecliffs, and Cameo Shores, the coastal bluffs fall within conventional residential subdivisions.

Development on these lots occurs mainly on a lot-by-lot basis. As a result, some coastal bluffs remain pristine and others are physically or visually obliterated by structures, landform alteration or landscaping. Residential development has begun to affect coastal bluff areas due to the siting and scale of some new and renovated homes. While some development has maintained the natural character of the coastal bluffs, other developments have been larger and more visually prominent, potentially impacting views of those bluffs.

Mouth of Big Canyon

Parks and View Parks

The City currently contains more than forty parks, in addition to ecological preserves and beaches, which together provide more than 441 acres of parkland and passive open space. A portion of the Crystal Cove State Park is also within the city and provides open space views for Newport Beach residents. Parkland is described further in Section 4.4.

Much of the built environment within the City is scenic because of it's setting, the presence of low-rise buildings that preserve views, and wide landscaped roadways. View parks have been created specifically to take advantage of a significant view. View parks are small, one-half to three acre in size passive parks, often located on coastal bluffs to focus upon ocean or bay views. View parks in Newport Beach include the following:

- *West Newport*. The Sunset View Park provides an ocean view trail along the bluff top above the lower campus of Hoag Hospital. This park is accessible from Superior Avenue.
- *Newport Heights/Cliff Haven*. Cliff Drive Park, Ensign Park, and Kings Road Park are located on the bluff top above Mariner's Mile and Coast Highway. These parks provide views of the Lower Bay and the Pacific Ocean. Cliff Drive Park and Ensign Park are accessible from Cliff Drive. Kings Road Park is accessible from Kings Road.
- *Corona del Mar*. A half-mile linear view park that provides spectacular views of the harbor entrance and Pacific Ocean is located along the bluff top above.
- *Corona del Mar State Beach*. The park begins at Lookout Point above Pirate's Cove and runs along Ocean Boulevard to Inspiration Point at the end of Orchid Avenue.
- *Upper Newport Bay*. Castaways Park is a 17.4-acre view park. Castaways Park has bike and hiking trails and overlooks that provide panoramic views of the Newport Bay and the Pacific Ocean. Castaways Park is accessible from Dover Drive and Polaris Drive. Castaways Park contains environmentally sensitive habitats, which are separated and protected from public recreation and viewing areas. An 11-acre passive open space and view park is planned for the

bluff above the Newport Dunes. The Upper Bayview Landing park site is located at the northwest corner of the intersection of Coast Highway and Jamboree Road. This park will provide views of the bay and serve as a staging area for bicyclists and pedestrians.

- *Westcliff Park, Galaxy Park, and Bayview Park* are bluff-top parks that provide views of the Upper Newport Bay. Westcliff Park is accessible from Polaris Drive. Galaxy Park is accessible from Galaxy Drive. Bayview Park is accessible from Mesa Drive.
- *The Upper Newport Bay Nature Preserve* is a 140-acre regional park that surrounds the Upper Newport Bay Ecological Preserve. The park provides hiking, bike, and equestrian trails and is accessible from Irvine Avenue, University Drive, and Bayview Way.
- *Newporter Knoll* is a 12-acre passive open space area located on the bluff above Shellmaker Island. The 4-acre Newporter North View Park is adjacent and provides a bluff top trail and overlook. The Newport North View Park is accessible from San Joaquin Hills Road. Both areas are part of the Newporter North ESA and the provision of additional public access must be consistent with the protection of natural resources in this area.

Undeveloped Land

The Banning Ranch property is located primarily on unincorporated County of Orange land and is surrounded by the City of Newport Beach. For the last 50 years, the site has been used as an oil production field. Today, the site contains the remnants of old wells and pipelines. Some oil production, however, still occurs on site. The site is characterized by a mesa area, coastal bluffs, and lowlands, which are part of the Santa Ana River floodplain. While the site is degraded considerably, its scenic quality as a "natural" area has been identified as potentially contributing to Newport Beach's scenic resources.

The protected canyons, hills, and bluffs of the eastern portion of the city are also recognized for their scenic quality. As identified previously under Mountains and Ridges, topographic landforms of the Newport Coast and Newport Ridge region contribute significantly to the aesthetic quality residents value. The canyons and hillsides associated with Buck Gully, Morning Canyon, Ridge Park, Los Trancos, Muddy Canyon, and Pelican Hill provide impressive views for visitors and residents.

The Irvine Company has played an integral role in conserving lands for open space in and surrounding Newport Beach. Through the creation of the Irvine Ranch Land Reserve, The Irvine Company is responsible for dedicating more than 50,000 acres of permanently protected open space in Orange County. The reserve includes portions of the Upper Newport Bay, the Crystal Cove State Park and large portions of Newport Coast and Newport Ridge.

Scenic Highways

California's Scenic Highway Program was created by the Legislature in 1963. Its purpose is to preserve and protect scenic highway corridors from change that would diminish the aesthetic value of lands adjacent to highways. Scenic corridors typically pertain to highways and visible lands outside the highway right-of-way generally described as the view from the road. There are no officially designated scenic vistas or scenic highways within Newport Beach.

However, State Route 1 (SR-1) is identified as Eligible for State Scenic Highway designation. A State scenic highway changes from eligible to officially designated when the local jurisdiction adopts a scenic corridor protection program, applies to the California Department of Transportation

Figure 5.5-1 Coastal Views—Map 1 of 3

Fig p.2 (11x17)

Figure 5.5-2 Coastal Views—Map 2 of 3

Fig p.2 (11x17)

Figure 5.5-3 Coastal Views—Map 3 of 3

Fig p.2 (11x17)

(Caltrans) for scenic highway approval, and receives notification from Caltrans that the highway has been designated as a Scenic Highway. The city must also adopt ordinances to preserve the scenic quality of the corridor or document such regulations that already exist in local codes.

The City identifies coastal views such as Coastal View Roads and Public View Points. These areas are identified in the Draft Local Coastal Plan Coastal Views maps 1 through 3.

REGULATORY SETTING

Federal

No existing Federal regulations pertain to the visual resources within the Planning Area.

State

California Coastal Act Policy 30251. The scenic and visual qualities of coastal areas shall be considered and protected as resources of public importance. Permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas to minimize the alteration of natural land forms, to be visually compatible with the character of surrounding areas, and, where, feasible, to restore and enhance visual quality in visually degraded areas. New development in highly scenic areas such as those designated in the California Coastline Preservation and Recreation Plan prepared by the Department of Parks and Recreation and by local government shall be subordinate to the character of its setting.

Caltrans Scenic Highways. The California Department of Transportation (Caltrans) defines a scenic highway as any freeway, highway, road, or other public right-of-way, that traverses an area of exceptional scenic quality. Suitability for designation as a State Scenic Highway is based on vividness, intactness, and unity, as described in *Caltrans Guidelines for Official Designation of Scenic Highways* (1995):

- *Vividness* is the extent to which the landscape is memorable. This is associated with the distinctiveness, diversity, and contrast of visual elements. A vivid landscape makes an immediate and lasting impression on the viewer.
- *Intactness* is the integrity of visual order in the landscape and the extent to which the natural landscape is free from visual intrusions (e.g., buildings, structures, equipment, grading).
- *Unity* is the extent to which development is sensitive to visually harmonious with the natural landscape.

Local

Shoreline Height Limitation Zone. Concern over the intensity of development around Lower Newport Bay led to the adoption of a series of ordinances in the early 1970's that established more restrictive height and bulk development standards around the bay. The intent was to regulate the visual and physical mass of structures consistent with the unique character and visual scale of Newport Beach. As a result, new development within the Shoreline Height Limitation Zone is limited to a height of 35 feet. Residential development is limited to a height of 24 to 28 feet and non-residential development is limited to a height of 26 to 35 feet. Outside of the Shoreline Height

Limitation Zone, heights up to 50 feet are permitted within the planned community districts. There are also two properties in the coastal zone that are within the High Rise Height Limitation Zone, which are permitted heights up to 375 feet. The first is the site of Newport Beach Marriott Hotel in Newport Center; the other is an undeveloped office site northeast of the Jamboree Road/State Route 73 interchange.

Floor Area Ratios. Floor areas are strictly limited citywide. In the coastal zone, residential development is limited to floor areas ranging from 1.5 to 2.0 times the buildable area of the parcel (the land minus required setback yards), which typically translates to actual floor area ratios of 0.95 to 1.35. Nonresidential development floor area ratios range from 0.30 to 1.25.

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Photos taken from the *Draft Local Coastal Plan—Coastal Land Use Plan*, April.

Section 5.6 Mineral Resources

5.6 MINERAL RESOURCES

This section describes existing mineral resources within the Planning Area and current applicable local and regional policies. Information for this section was obtained from the following sources: (1) the City's Utilities Department, Oil and Gas Division; (2) the California Division of Oil, Gas, and Geothermal Resources; (3) the California Geological Survey (formerly known as the Division of Mines and Geology); and (4) previous environmental documentation prepared for the City.

EXISTING MINERAL RESOURCES

Oil and gas seeps are common occurrences in many parts of California, including in and around the Planning Area. Historically, drilling for oil in this part of Orange County began as early as 1904,[1] and subsequently, oil production became the primary mineral extraction activity in and around the City.

Oil and Gas Production

For the purposes of this report, an oil well is defined as a hole drilled from the surface into the earth for prospecting for, or production of oil, natural gas, or other hydrocarbon substances. This definition also encompasses a well or a hole used for the subsurface injection into the earth of oil field waste, gases, water, or liquid substances, including any well or hole that has not been abandoned and is now in existence.

According to the California Department of Oil, Gas, and Geothermal Resources, two separate production and reserve areas exist within the Planning Area, as shown in Figure 5.6-1: (1) Newport oil field, which lies within the City limits and (2) West Newport oil field, which is located in the Banning Ranch area. The Newport oil field is located in the western portion of the City, and is estimated to have oil reserves of approximately 35 million barrels (Mbbl) and produces approximately 55 billion cubic feet of gas.[2] Located in the western tip of the Planning Area, the West Newport oil field produces approximately 20.5 billion cubic feet of gas with a daily production per oil well of approximately 5 bbl. Estimated oil reserves within this field are approximately 728 Mbbl.[3]

Figure 5.6-1 also illustrates the location of active, abandoned, and shut-in oil wells in the Planning Area. As shown, the concentration of active wells lies within the West Newport and Newport production areas. Approximately three active gas wells (out of 68 total oil and gas wells) are located in the Newport production area, while there are approximately 65 active oil and four active injection wells (out of 862 total wells) located in the West Newport production area. Of those 65 wells in the West Newport area, approximately 16 are directionally drilled from onshore to off-shore and an additional 29 wells are currently not used for production but have not been abandoned (classified as "shut-in"). Thus, as of 2002, there were approximately 68 wells (plus four injection wells) producing oil and natural gas within the City, which includes wells from both the Newport and the West Newport oil fields. Fifteen (not counting one injection well) of the 68 producing wells are operated

[1] ECI, Hazards Assessment Study, 2003.

[2] California Division of Oil, Gas, and Geothermal Resources, 2002 Annual Report—Production and Reserves.

[3] California Division of Oil, Gas, and Geothermal Resources, 2002 Annual Report—Production and Reserves.

by the City; 48 are operated by West Newport Oil Company, three by Hoag Memorial Hospital, and two by South Coast Oil.[4]

Thirty-three abandoned oil wells are located in numerous sites throughout the City, concentrated along the northwest boundary. However, there are no other known active oil or gas wells located in any other areas outside of the identified oil fields.[5]

Surface Mining Resources

Mining activities within the State are regulated by the Surface Mining and Reclamation Act (SMARA) of 1975. This Act provides for the reclamation of mined lands and directs the State Geologist to classify (identify and map) the nonfuel mineral resources of the State to show where economically significant mineral deposits occur and where they are likely to occur based upon the best available scientific data. Based on guidelines adopted by the California Geological Survey, areas known as Mineral Resource Zones (MRZ) are classified according to the presence or absence of significant deposits, as defined below. These classifications indicate the potential for a specific area to contain significant mineral resources:

- *MRZ-1*—Areas where available geologic information indicates there is little or no likelihood for presence of significant mineral resources
- *MRZ-2*—Areas underlain by mineral deposits where geologic data indicate that significant measured or indicated resources are present or where adequate information indicates that significant mineral deposits are present or where it is judged that a high likelihood for their presence exists
- *MRZ-3*—Areas containing known mineral occurrences of undetermined mineral resource significance
- *MRZ-4*—Areas of no known mineral occurrences where geologic information does not rule out the presence or absence of significant mineral resources

According to the California Geological Survey, the Planning Area does not have any land classified as MRZ-2; rather, it is classified by mineral resource zones MRZ-1 and MRZ-3 as shown in Figure 5.6-2. Generally, areas along the coast within the Planning Area are located in MRZ-1 areas, indicating that little or no likelihood for the presence of significant mineral resources exist. The remaining portion of the Planning Area is in MRZ-3 where areas that contain mineral resources are of undetermined significance. Other than oil and gas resources, there is no active mining within the Planning Area.

[4] Dave Sanchez, California Division of Oil, Gas, and Geothermal Resources, December 11, 2003.

[5] Tim Deutsch, City of Newport Utilities Department, Personal communication, December 10, 2003

Figure 5.6-1 Mineral Resources

Fig p.2 (11x17)

Figure 5.6-2 Mineral Resource Zones

Fig p.2 (11x17)

REGULATORY CONTEXT

State Regulations

SMARA

As previously discussed, mining activities are regulated by SMARA. The purpose of this act is to create and maintain an effective and comprehensive surface mining and reclamation policy with regulation of surface mining operations so as to assure that (1) adverse environmental effects are prevented or minimized and that mined lands are reclaimed to a usable condition which is readily adaptable for alternative land uses; (2) the production and conservation of minerals are encouraged, while giving consideration to values relating to recreation, wildlife, range and forage, and aesthetic enjoyment; and (3) residual hazards to the public health and safety are eliminated. These goals are achieved through land use planning by allowing a jurisdiction to balance the economic benefits of resource reclamation with the need to provide other land uses.

Local Regulations

City of Newport Beach Municipal Code

Chapter 20.81, Oil Wells, of the City of Newport Beach Municipal Code contains ordinances that address oil wells and related issues within the City. Specifically, this chapter regulates the restricted and designated drilling areas throughout the City, states the required approval process necessary for permitted area alteration, contains fire prevention regulations, prohibits the creation of nuisance associated with drilling activities, and requires appropriate watchmen to be in charge of oil fields.

Charter of the City of Newport Beach

Section 1401, Oil Well Drilling, prohibits the drilling of, production, or refining of oil, gas, or other hydrocarbon substances within the City boundaries, as defined by the effective date of the Charter. Areas annexed to the City after the effective date of this Charter, if such activities were being conducted in such areas at the date of annexation, can continue to occur.

REFERENCES

California Division of Oil, Gas, and Geothermal Resources, 2002 Annual Report—Production and Reserves, 2002.

Dave Sanchez, California Division of Oil, Gas, and Geothermal Resources, personal communication, December 11, 2003.

ECI, Hazards Assessment Study, 2003.

Tim Deutsch, City of Newport Utilities Department, personal communication, December 10, 2003.

California Geological Survey website, http://www.consrv.ca.gov/cgs/geologic_resources/mineral_resource_mapping/index.htm, December 2003.

Section 5.7 Cultural Resources

5.7 CULTURAL RESOURCES

This section describes the cultural (historical, archaeological, and paleontological) resources present or potentially present in the Newport Beach Planning Area. Significant cultural resources in the area include structures that may be eligible for the National Register of Historic Places (NRHP), the California Register of Historical Resources (CRHR).

Information for this section is based on data obtained from the City's Draft Local Coastal Program, an unofficial inventory prepared by the Ad Hoc Historic Preservation Committee, the County of Orange, and previous environmental documentation prepared for the City.

EXISTING CONDITIONS

Prehistory—Paleontology

Fossils in the central Santa Ana Mountains represent the oldest formations in the County at 145 to 175 million years old and contain aquatic fossil types, such as radiolarians (single-celled plankton), ammonites (extinct members of the class including nautili, squid, and octopi), and bivalves (such as oysters and clams). The predominance of these fossil types indicates that Orange County, for much of its geological history, was underwater.[1]

During the Miocene Epoch (26 million years ago [mya] to 7 mya), tectonic forces produced uplifts that resulted in the formation of mountains and initiated movement on the nascent San Andreas Fault system, forming numerous coastal marine basins, including the Los Angeles Basin, of which Orange County is a part. As the sea retreated, the County became a shallow bay surrounded by jungle and savannah areas, as indicated by the mix of aquatic and terrestrial fossils found in rocks of Miocene age. Miocene-age rock units that underlie the Planning Area, particularly in the Newport Coast area, are considered to be of high-order paleontological significance (6 to 9 on a scale of 1 to 10).[2,3]

Further tectonic activity began to uplift the land during the Pliocene Epoch (7 mya to 2.5 mya), and the sea slowly receded from the coast as it existed. This recession resulted in the formation of a succession of shoreline deposits that formed a marine terrace that can be observed today in Corona del Mar. North of Corona del Mar, a series of three marine terraces may be observed from MacArthur Boulevard when driving toward the beach. Sandstone deposited in the Newport Beach area during the Pliocene Epoch contains a variety of marine mammals, sea birds, and mollusks.

During the Pleistocene Epoch (2.5mya to 15,000 years ago), the seas continued to retreat as tectonic uplift continued. Although the Pleistocene Epoch is known as the "Ice Age," glacial ice never reached southern California, and paleontological evidence indicates that a heavily vegetated, marshy area extended inland beyond the shoreline. However, a variety of vertebrate animals typically associated with the Ice Age inhabited the area: local paleontological sites, particularly near the Castaways, have yielded fossils of Ice Age horses, elephants, bison, antelopes, and dire wolves. Also, a number of localities in the portions of the Vaqueros formation that underlie the Newport Coast area

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[1] Newport Beach, City of. 2003. *Draft Local Coastal Program Coastal Land Use Plan*, 20 January, 4-58.

[2] Newport Beach, City of. 2003. *Draft Local Coastal Program Coastal Land Use Plan*, 20 January, 4-58.

[3] Newport Beach, City of. 1996. *Newport Coast LCP Second Amendment*, 3 December, 7.

have yielded a variety of invertebrate and vertebrate fossils, and are considered to be of high-order paleontological significance (9 on a scale of 1 to 10). Other geological formations that underlie the Planning Area have also yielded significant fossils in the Planning Area, particularly in the Newport Banning Ranch portion of the SOI, as well as in other areas of the County. These include the Topanga and Monterey Formations. Known paleontological deposits at Fossil Canyon, in the North Bluffs area of the Planning Area, is considered a unique paleontological locality, and known vertebrate deposits within the Planning Area are considered to be among the most important in the State.[4,5,6] The Newport Banning Ranch portion of the SOI is particularly rich, and contains at least fourteen documented sites of high significance.[7]

Prehistory and Archaeology

The first generally accepted period of human occupation of Southern California began at about the end of the Pleistocene Epoch, about 10,000 to 12,000 years ago. Archaeological sites around Upper Newport Bay have yielded some of the evidence for the earliest human occupation of Orange County and date to about 9,500 years before present (BP). Over fifty sites have been documented in the Planning Area, including the recently annexed Newport Coast area[8,9,10] and in the Newport Banning Ranch portion of the SOI,[11] and known sites in nearby areas such as Bolsa Chica are of similar or greater scientific interest. Many of these sites have yielded—or have been determined to have the potential to yield—substantial information regarding the prehistory of the City and County, and have included human burials.

At least two and possibly three distinct cultural groups inhabited the area, and later period sites indicate that the area including the Planning Area was heavily populated at the time of European contact. Ethnographically, the Planning Area falls within a region in which tribal boundaries are unclear: both the Gabrielino and the Luiseño/Juaneño lay ancestral territorial claims. Certainly during the post-contact period, the project area fell within the Mission San Juan Capistrano sphere of influence (as discussed further in the Historical Period subsection below), and its proximity to the Mission itself would suggest Juaneño habitation, but tribal territories in this case cannot be unambiguously defined. According to David Belardes of the Juaneño Band of Mission Indians, the territory of the Juaneño extended north to the Santa Ana River drainage; however, Gabrielino territory is thought by some to extend south of the Santa Ana River Drainage to Aliso Creek, and possibly even further south.[12]

The Luiseño/Juaneño were hunter/gatherers, organized into sedentary and semi-sedentary, autonomous villages. A large village was typically associated with a territory of approximately 30 square miles, which contained several hunting, fishing, and collecting areas in different ecological zones. Satellite gathering camps and procurement areas were often established within these areas.

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[4] Newport Beach, City of. 2003. *Draft Local Coastal Program Coastal Land Use Plan*, 20 January, 4-58.

[5] LSA Associates. 1998. *Environmental Impact Report, Phase IV-2 of the Newport Coast Planned Community, Newport Coast Planning Areas 3A-2, 3B, 14, MCDP Sixth Amendment and Coastal Development Permit*. EIR No. 568, 10 February, 4.10-3.

[6] Newport Beach, City of. 1974. *Newport Beach General Plan Conservation of Natural Resources Element*, 14 January, 34–35.

[7] Keeton Kreitzer Consulting. 2000. *Screencheck Program Environmental Impact Report: Newport Banning Ranch Local Coastal Program*, 28 April, 4.4-2 and 4.4-3.

[8] Newport Beach, City of. 2003. *Draft Local Coastal Program Coastal Land Use Plan*, 20 January, 4-58.

[9] Newport Beach, City of. 2003. *Draft Local Coastal Program Coastal Land Use Plan*, 20 January, 4-58.

[10] Newport Beach, City of. 1974. *Newport Beach General Plan Conservation of Natural Resources Element*, 14 January, 34–35.

[11] Keeton Kreitzer Consulting. 2000. *Screencheck Program Environmental Impact Report: Newport Banning Ranch Local Coastal Program*, 28 April. Prepared for the County of Orange Planning and Development Services Department.

[12] EIP Associates. 1998. *Dana Point Headlands Draft Environmental Impact Report*, 4.12-5.

Seasonal moves to exploit resources outside a village's territory occurred during several weeks of the year.

The coastal Luiseño/Juaneño bands exploited a variety of plant food resources. Seeds and acorns constituted the staples, combining to account for up to 75 percent of the typical diet. Many fruits, berries, bulbs, and roots saw use as medicines, beverage bases, and manufacturing materials as well as food. Terrestrial game accounted for an estimated five to ten percent of the coastal Luiseño/Juaneño diet; fish and marine mammals represented an additional 20 to 35 percent.

Luiseño/Juaneño material culture associated with food procurement includes the tools mentioned above: manos and metates, as well as mortars and pestles for processing acorns and seeds, and pulverizing pulpy materials and small game. They probably hunted first with spears, and then later with bows and arrows. The projectiles themselves would have had fire-hardened wood or chipped stone tips. Near-shore fishing and marine mammal hunting were accomplished with light balsa or dugout canoes.

The Historical Period

Overview

In July of 1769, the expedition led by the Spaniard Gaspar de Portola reached the boundaries of present-day Orange County. Members of the expedition named the region Santa Ana ("The Valley of Saint Anne"). Father Junipero Serra, a member of the expedition, returned six years later continue his work of establishing the Catholic Church and converting the Native Americans in the area to Catholicism.[13]

While the East Coast of North America was engaged in revolution and spectacular change, the West Coast too was undergoing a quiet and almost undetected transformation. Father Serra dedicated the Mission of San Juan Capistrano, Orange County's first permanent settlement, on November 1, 1776. The Mission became a self-sustaining unit based upon an agricultural economy. Its chapel and adjoining structure were the first signs of civilization erected upon the fertile, virgin soil of the Santa Ana Region.

In 1801, Jose Antonio Yorba, a volunteer in the Portola expedition, also returned to Santa Ana. He established the county's first rancho (Santiago de Santa Ana) in what are today the cities of Villa Park, Orange, Tustin, Costa Mesa, and Santa Ana.

Following Mexico's liberation from Spanish rule in 1821, the extensive land holdings of the Mission San Juan Capistrano were subdivided and awarded to a number of distinguished war heroes. By this time, Yorba's Rancho Santiago de Santa Ana had grown to resemble a feudal manor. Cattle were introduced into the area in 1834, and a prosperous hide and tallow industry developed. Southern California became a virtual suburb of New England as sailing ships loaded with cargo traveled back and forth between coasts. In 1835, author-seaman Richard Henry Dana arrived at what is today known as Dana Point. He later immortalized Spanish Orange County in his book *Two Years before the Mast* by describing it as "the only romantic spot on the Coast." The Spanish California tradition of a carefree lifestyle, fiestas with music and dancing, bear and bull fights, rodeos, and gracious hospitality, survived until the 1860.

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[13] Orange, County of. 2003. Brief History of Orange County. Webpage: http://www.oc.ca.gov/history/ oc_history.asp, accessed 10 December.

A severe drought brought an end to the cattle industry. Adventurous pioneers, such as James Irvine, capitalized on the economic downfall of the ranchos. Irvine, an Irish immigrant, established a 110,000-acre sheep ranch that is today one of the most valuable pieces of real estate in America.

In 1887, silver was discovered in the Santa Ana Mountains. Hundreds of fortune seekers flocked to the "diggings." Land speculators and farmers came by rail from the East to settle in such boomtowns as Buena Park, Fullerton, and El Toro.

Orange County was formally organized as a political entity separate from the County of Los Angeles in 1889. The wilderness had finally given way to irrigated farmlands and prosperous communities. A year-round harvest of Valencia oranges, lemons, avocados, and walnuts made agriculture the single most important industry in the fledgling county. And with orange groves beginning to proliferate throughout the area (150,000 orange trees), the new county was named for the fruit: "Orange County."

The twentieth century brought with it many industrious individuals such as Walter Knott, a farmer turned entrepreneur, who founded the Knott legacy in Buena Park. During the years that followed, Orange County witnessed the discovery of oil in Huntington Beach, the birth of the aerospace industry on the Irvine Ranch, and filming of several Hollywood classics in the Newport area. In 1955, Walt Disney opened his Magic Kingdom in Anaheim. Noted as the pioneer of animated films, Disney revolutionized the entertainment world again with his "theme park" recreation concept.

By 1960, the neighboring metropolis of Los Angeles was "bursting at the seams." As the population spilled over the county line and across the rural Santa Ana Valley, it left in its wake an urban landscape of homes, shopping malls, and industrial parks.

Historical Resources

Definitions of Historical Resources

Federal

The National Historic Preservation Act established the National Register of Historic Places (NRHP) to recognize resources associated with the country's history and heritage. Structures and features must usually be at least 50 years old to be considered for listing on the NRHP, barring exceptional circumstances. Criteria for listing on the NRHP, which are set forth in Title 26, Part 63 of the Code of Federal Regulations (36 CFR Part 63), are significance in American history, architecture, archaeology, engineering, and culture as present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and that are (A) associated with events that have made a significant contribution to the broad patterns of our history; (B) associated with the lives of persons significant in our past; (C) embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; possess high artistic values, represent a significant and distinguishable entity whose components may lack individual distinction; or (D) have yielded, or may be likely to yield, information important in prehistory or history. Criterion D is usually reserved for archaeological and paleontological resources.

State

The California Register of Historical Resources (CRHR) was created to identify resources deemed worthy of preservation on a State level and was modeled closely after the NRHP. The criteria are nearly identical to those of the NRHP but focus upon resources of statewide, rather than national, significance. The CRHR automatically includes resources listed on the NRHP.

Local

Properties that are not listed on the NRHP or CRHR may also be considered historical for the purposes of CEQA. The City of Newport Beach has established the Newport Beach Register of Historical Property ("City Register") to recognize structures or properties of local historical or architectural significance. Additionally, in 1991, City Council established an Ad Hoc Historic Preservation Advisory Committee (AHHPAC) to investigate the historic resources of the community and make recommendations regarding preservation. The AHHPAC completed its assignment on May 12, 1992, and reported its findings, which included a Historic Resource Inventory, to City Council June 8, 1992. The inventory categorized the properties surveyed in five hierarchical "classes" of significance:[14,15]

- Class 1—Major Historic Landmark
- Class 2—Historic Landmark
- Class 3—Local Historic Site
- Class 4—Structure of Historic Interest
- Class 5—Point of Historic Interest

Under this scheme, Classes 1 to 3 would be eligible to use the State Historic Building Code; Class 4 and 5 properties would be listed for recognition purposes only. The Committee recommended that City Council act to include the inventory in the City Register, and also recommended additional actions with respect to the Newport Pier Assessment District. However, the AHHPAC Historic Resources Inventory was never officially adopted by the City and the properties listed within were not added to the City Register.[16]

Historical Resources in the Planning Area

Twelve properties in the City have been listed or designated eligible for listing on the NRHP or CRHR, or otherwise listed as historic or potentially historic in the California Historic Resources Information System (CHRIS) maintained by the Office of Historic Preservation. These properties are shown on Figure 5.7-1.

NRHP

Four properties within the City have been listed on the NRHP:[17]

- Balboa Inn
- Balboa Pavilion
- Crystal Cove Historic District
- Lovell Beach House

[14] Ad Hoc Historic Preservation Advisory Committee (AHHPAC). 1992. *Historic Resource Inventory*.

[15] Ad Hoc Historic Preservation Advisory Committee (AHHPAC). 1992. Report to City Council, May.

[16] Ad Hoc Historic Preservation Advisory Committee (AHHPAC). 1992. Report to City Council, May.

[17] Newport Beach, City of. 2003. *Draft Local Coastal Program Coastal Land Use Plan*, 20 January, 4-58.

State-Recognized Resources

Also, four properties within the City have been listed as California Historical Landmarks:[18]

- Old Landing (No. 198)
- Site of First Water-to-Water Flight (No. 775)
- McFadden Wharf (No. 794)
- Balboa Pavilion (No. 759)

Four additional properties are also listed in the CHRIS database:[19]

- B.K. Stone Building
- Balboa Island Firehouse No. 4
- Bank of Balboa/Bank of America
- Our Lady of Mount Carmel Church

Locally Recognized Resources

The City has listed seven properties in the City Register in recognition of their local historical or architectural significance, as described above. In addition to the Balboa Pavilion and the Balboa Inn, which are also listed in the NRHP and CRHR, the City Register includes the following:

- *Rendezvous Ballroom Site*—A popular Balboa Dance Hall that featured numerous famous Big Bands of the 1930's and 1940's. It was destroyed by fire in 1966.

- *Pepper's Restaurant*—Located next to the Newport Pier, the exposed structural components of Pepper's Restaurant are timbers used in the original Balboa Island Bridge and McFadden Wharf.

- *Balboa Theater*—Built in 1928, the Balboa Theater is a former vaudeville theater that at one time housed an infamous speakeasy during the prohibition period. Currently, the theater is under renovation.

- *Balboa Saloon*—The 1924 building is representative of the nautical history and Main Street commercial masonry style of Newport Beach.

- *Dory Fishing Fleet*—The Dory Fishing Fleet is located adjacent to Newport Pier. The fleet and open-air fish market have operated at this location since the founding of the fleet in 1891 by Portuguese fishermen. The last remaining fleet of its type, it is a historical landmark designated by the Newport Beach Historical Society. It is a general policy of the City that an area immediately west of the Newport Pier be reserved for the Newport Dory Fishing Fleet.

In addition to the formally recognized resources described above, the Historic Resource Inventory compiled by the AHHPAC includes 61 properties in five designated levels of significance, as described above. The inventory was never officially adopted by the City, and the structures were never placed on the City Register, but the inventory still serves as a useful guide to potentially historic properties that may have historic or cultural significance to the City. The inventory is included under separate cover.

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[18] Newport Beach, City of. 2003. *Draft Local Coastal Program Coastal Land Use Plan*, 20 January, 4-58.

[19] California. Office of Historic Preservation. 2003. California Historic Resources Information System records check, December.

Figure 5.7-1 Historic Resources

Fig p.2 (11x17)

Also, several sites of potential historical significance have been identified in the Newport Banning Ranch portion of the Planning Area.

REGULATORY CONTEXT

The treatment of cultural resources is governed by Federal, State, and local laws and guidelines. There are specific criteria for determining whether prehistoric and historic sites or objects are significant and/or protected by law. Federal and State significance criteria generally focus on the resource's integrity and uniqueness, its relationship to similar resources, and its potential to contribute important information to scholarly research. Some resources that do not meet Federal significance criteria may be considered significant by State criteria. The laws and regulation seek to mitigate impacts on significant prehistoric or historic resources. The Federal, State, and local laws and guidelines for protecting historic resources are summarized below.

Federal Regulations

The National Historic Preservation Act of 1966

The National Historic Preservation Act of 1966 established the NRHP as the official Federal list of cultural resources that have been nominated by State Offices for their historical significance at the local, State, or national level. Properties listed in the NRHP, or "determined eligible" for listing, must meet certain criteria for historical significance and possess integrity of form, location, and setting. Significance is determined by four aspects of American history or prehistory recognized by the NRHP Criteria, which are listed above under "Definitions of Historical Resources." Eligible properties must meet at least one of the criteria and exhibit integrity, measured by the degree to which the resource retains its historical properties and conveys its historical character, the degree to which the original fabric has been retained, and the reversibility of changes to the property.

State Regulations

The California Register of Historic Resources (Public Resources Code Section 5020 et seq.)

State law also protects cultural resources by requiring evaluations of the significance of prehistoric and historic resources in CEQA documents. A cultural resource is an important historical resource if it meets any of the criteria found in Section 15064.5(a) of the CEQA Guidelines. These criteria are nearly identical to those for the NRHP, which are listed on page 4.4-2 of this document under "Definitions of Historical Resources."

The State Historic Preservation Office (SHPO) maintains the CRHR. Properties listed, or formally designated eligible for listing, on the NRHP are automatically listed on the CRHR, as are State Landmarks and Points of Interest. The CRHR also includes properties designated under local ordinances or identified through local historical resource surveys.

California Health and Safety Code (Sections 7050.5, 7051, and 7054)

These sections collectively address the illegality of interference with human burial remains (except as allowed under applicable sections of the Public Resources Code), as well as the disposition of Native American burials in archaeological sites and protects such remains from disturbance, vandalism, or inadvertent destruction; establishes procedures to be implemented if Native American skeletal remains are discovered during construction of a project, treatment of the remains prior to, during and after evaluation, and reburial procedures.

California Senate Bill 297 (1982)

This bill addresses the disposition of Native American burials in archaeological sites and protects such remains from disturbance, vandalism, or inadvertent destruction; establishes procedures to be implemented if Native American skeletal remains are discovered during construction of a project; and establishes the Native American Heritage Commission to resolve disputes regarding the disposition of such remains. It has been incorporated into Section 15064.5(e) of the State CEQA Guidelines.

Local Regulations

Newport Beach City Council Policy Manual

Places of Historical and Architectural Significance (K-2)

This regulation establishes City Council authority to designate as historical property any building or part thereof, object, structure, monument, or collection thereof having importance to the history or architecture of the City of Newport Beach in accordance with the criteria set forth within. Accordingly, the City Clerk is required to maintain a register, which will be known as the City of Newport Beach Register of Historical Property. The City Council may at any time repeal, revise, or modify any such designation upon reconsideration of the historical or architectural importance of the places therein described.

Paleontological Guidelines (K-4)

The policies set forth within this guideline are to be used to guide the development or redevelopment of lands within the City. Through its planning policies and permit conditions, the City has to ensure the preservation of paleontological resources and require that the impact caused by any development be mitigated in accordance with CEQA. The City has to prepare and maintain sources of information regarding paleontological sites and the names and addresses of responsible organizations and qualified individuals who can analyze, classify, record, and preserve paleontological findings. If determined necessary by the Planning Director, it is the responsibility of a landowner or developer prior to the commencement of land development to examine the proposed site in order to determine the existence and extent of paleontological resources. Qualified observers are to prepare and submit a written report describing the findings and making recommendations for further action. Based on the report and recommendations of the observers, the City has to take such steps as are necessary to assure that the findings or sites are recorded, preserved, and protected.

Archaeological Guidelines (K-5)

The policies set forth within this guideline are to be used to guide the development or redevelopment of lands within the City. The City is required to, through its planning policies and permit conditions, insure the preservation of significant archeological resources and require that the impact caused by any development be mitigated in accordance with CEQA. The City is to prepare and maintain sources of information regarding archeological sites and the names and addresses of responsible organizations and qualified individuals who can analyze, classify, record, and preserve archeological findings. If determined necessary by the Planning Director, it is the responsibility of the landowner or developer prior to the commencement of land development to cause the proposed site to be examined to determine the existence and extent of archeological resources. The examination is required to be preformed by qualified observers, approved by the City, who will prepare and submit a written report describing the findings and making recommendations for further action. Based on the report and recommendations of the observers, the City has to take such steps as are necessary to assure that any findings or sites are recorded, preserved, and protected.

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Chapter 6
PUBLIC SAFETY

Hazards Assessment Study
City of Newport Beach, California

Coastal Hazards

Seismic Hazards

Geologic Hazards

Flooding Hazards

Fire Hazards

Hazardous Materials Management

Aviation Hazards

Prepared for
City of Newport Beach Planning Department

3300 Newport Boulevard
Newport Beach, California 92658-8915

Prepared by
Earth Consultants International

150 El Camino Real, Suite 212
Tustin, California 92780
(714) 544-5321

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CHAPTER 1: COASTAL HAZARDS

1.1 Physical and Historical Setting

Newport Beach, located in Orange County, California, enjoys about 14.9 kilometers [km] (9.25 miles [mi]) of shoreline along the Pacific Ocean, and approximately 80 km (50 mi) of waterfront if one includes the shoreline, Newport Bay, and islands within City limits. The western part of the City is characterized by a series of channels and islands that provide berthing for approximately 9,000 small boats. This harbor has been acclaimed as one of the finest small boat harbors in the world, protected from the open ocean by the Balboa Peninsula. The two main channels that form this protected harbor come together near the harbor mouth, on the southeastern side of Balboa Island, and flow out to sea, where two jetties stand as sentries against the encroaching sea. The City's beach setting provides economic, environmental and public safety benefits: money spent locally by visitors to the area's beaches generate millions of dollars in sales tax receipts that benefit not only the City of Newport Beach, but the County of Orange and the federal government. The coastal setting, including the Upper Newport Bay estuary, also provide habitat for numerous species of birds, plants, and marine animals, many of them protected or endangered. The beaches are therefore an important resource that requires protection and careful management.

This seemingly natural-looking and idyllic setting is the result of relatively recent active forces of nature and even more recent man-made modifications. In fact, the present coastline of northwestern Newport Beach bears little resemblance to the coastline of the early 1800s, or even the early 1900s. Between 1769, when the Spanish first arrived in southern California, and 1825, the Santa Ana River flowed out to sea through Alamitos Bay, near the present-day boundary between Los Angeles and Orange counties. In 1825, when severe storms caused extensive flooding in the area, the river resumed its ancient course through the Santa Ana Gap and around the toe of Newport Mesa to the ocean. The down-coast littoral drift, plus continuing floods, caused the river to build the Balboa peninsula. During the floods of 1861-1862, the river mouth swept farther to the southeast, to the rock bluffs which form the east side of the present channel entrance. Until 1919, the river outlet to the sea continued to migrate back and forth from the rock bluffs to a point about 600 meters [m] (2,000 feet [ft]) up-coast of the present channel entrance (U.S. Corps of Engineers, 1993). In 1919, a year after a serious flood, local interests built a dam at Bitter Point (which appears to have been located 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 dates back to the 1870s, when the McFadden brothers acquired the Newport Landing and established a commercial trade and shipping business that operated successfully for the next 15 years. In the late 1880s, the McFadden brothers built a large ocean pier near McFadden Square (the Newport Pier) and moved their entire business to the wharf. With completion of the Santa Ana Newport Railroad (later the Southern Pacific Railroad) in 1891, the McFadden area became a booming commercial and shipping center. 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.

The harbor entrance began to take its current shape with the construction of the original west jetty in 1918, a rubblemound structure that extended 460 m (1,500 ft) out from the end of Balboa Peninsula. In 1922, the County of Orange extended this jetty another 122 m (400 ft). The jetty suffered extensive damage due to storms that hit the area in 1920; repairs were completed in 1927-1928, when the east jetty was also constructed. The repairs to the west jetty included a long, curving revetted approach on the west side that caused the adjacent shoreline to erode completely. As a result, in 1930, the City repaired the west jetty and added two rubblemound groins. The area between the groins was filled with sand. Between 1934 and 1936, the Federal government, in cooperation with the Orange County Harbor district, extended both jetties to their present configuration. As part of the Orange County Erosion Control Project of 1964, the groin field in West Newport Beach was constructed between 1968 and 1973 (U.S. Army Corps of Engineers, 1993; Department of Boating and Waterways and State Coastal Conservancy, 2002).

As the paragraphs above illustrate, the Newport Beach area as we know it today has developed rapidly, the result of man's will modifying the natural environment at a pace that far exceeds the geologic time scale. When nature is left to run its course, some processes take hundreds of thousands of years to mold the landscape, while other natural processes occur suddenly, with little or no warning. These catastrophic events tend to occur infrequently, perhaps only once every few decades, or even every few hundreds to tens of thousands of years, and so it is only relatively recently that scientists have started to fully appreciate the magnitude of the low probability but high risk events that can shape the landscape. Furthermore, we now realize that many of these processes have the potential to destroy property and compromise the safety of people that live in areas susceptible to natural hazards. This is especially true in coastal areas, where as a result of rapid growth, large populations are now exposed to coastal hazards. This chapter discusses the coastal hazards that Newport Beach may be susceptible to, including tsunamis, rogue waves, storm surges, seiches, bluff erosion, hurricanes, changes in sea level, and degradation of water quality. Other natural and man-made hazards that can impact this portion of Orange County are discussed in subsequent chapters of this report.

1.2 Jurisdictional Overview

There are many agencies that are tasked with the protection and management of coastal features along the U.S. western coast, including at Newport Beach. At the federal level, the primary government agencies involved with shoreline erosion issues are the U.S. Army Corps of Engineers (Corps) and the Federal Emergency Management Agency (FEMA). Several state agencies have jurisdiction over specific coastal issues, including the California Department of Boating and Waterways (DBW), the California Coastal Commission, the California Lands Commission, the State Coastal Conservancy, the California Geological Survey (CGS), and the Department of Parks and Recreation (DPR). The Corps, DBW, and sometimes the State Coastal Conservancy are involved with funding shoreline maintenance projects, while the DPR, as a land manager, decides how and whether to re-build and/or protect its facilities after major storms. FEMA also has a variety of programs to provide assistance during or in response to major flooding and storm events. The California Coastal Commission and the State Lands Commission are the primary agencies with regulatory authority over proposals to build coastal protective structures, while the CGS is charged with identifying the geologic hazards in the state. Local governments, including the City of Newport Beach and Orange County, also process a number of permit actions and provide funding for shoreline protection measures.

The United States Army Corps of Engineers (Los Angeles District) manages the Operations and Maintenance (O&M) Navigation Program. The O&M program includes maintenance dredging and navigation structure repair at 14 harbors along the southern California coastline, including Newport Harbor. It also provides engineering, design and plan preparation, specifications, and environmental documentation for navigation projects. Further, the O&M program establishes schedules, prepares service requests, monitors work progress, prepares and updates five-year dredging plans, and maintains database information on dredging schedules, past bid data, and post project data. Other O&M duties include: overseeing hydrographic surveys of District harbors; conducting yearly inspection of all navigation structures (to evaluate the need for repair); and contracting for the removal of wrecks and other obstructions that could cause a hazard to navigation.

The functions of several of these agencies are discussed further in this chapter as they pertain to specific projects that impact the Newport Beach area.

1.3 Tsunamis and Rogue Waves

A **tsunami** is a sea wave caused by any large-scale disturbance of the ocean floor that occurs in a short period of time and causes a sudden displacement of water. Tsunamis can travel across the entire Pacific Ocean basin, or they can be local. For example, an earthquake off the coast of Japan could generate a tsunami that causes substantial damage in Hawaii. These distantly generated tsunamis are also referred to as teletsunamis. This report will address the potential for both teletsunamis and locally generated tsunamis impacting the Newport Beach coastline.

Large-scale tsunamis are not single waves, but rather a long train of waves. The most frequent causes of tsunamis are shallow underwater earthquakes and submarine landslides, but tsunamis can also be caused by underwater volcanic explosions, oceanic meteor impacts, and even underwater nuclear explosions. Tsunamis are characterized by their length, speed, low period, and low observable amplitude: the waves can be up to 200 km (125 mi) long from one crest to the next, they travel in the deep ocean at speeds of up to 950 km/hr (600 mi/hr), and have periods of between 5 minutes and up to a few hours (with most tsunami periods ranging between 10 and 60 minutes). Their height in the open ocean is very small, a few meters at most, so they pass under ships and boats undetected (Garrison, 2002), but may pile up to heights of 30 m (100 ft) or more on entering shallow water along an exposed coast, where they can cause substantial damage. The highest elevation that the water reaches as it runs up on the land is referred to as wave runup, uprush, or inundation height (McCulloch, 1985; Synolakis et al., 2002). Inundation refers to the horizontal distance that a tsunami wave penetrates inland (Synolakis et al., 2002).

Earthquake-generated tsunamis have been studied more extensively than any other type. Researchers have found that there is a correlation between the depth and size of the earthquake and the size of the associated tsunami: the larger the earthquake and the shallower its epicenter, the larger the resulting tsunami (Imamura, 1949; Iida, 1963, as reported in McCulloch, 1985). The size of the tsunami is also related to the volume of displaced sea floor (Iida, 1963). Given these correlations, several researchers in the last decades have modeled tsunami runups for various areas along the Pacific Ocean, including in the western United States (Houston, 1980; Brandsma et al., 1978; Synolakis, 1987; Titov and Synolakis, 1998; and many others – refer to http://www.usc.edu/dept/tsunamis/tsupubs).

Rogue waves are very high waves, as much as tens of meters high, but, compared to tsunamis, they are very short from one crest to the next, typically less than 2 km (1.25 mi) long. Rogue waves arise unexpectedly in the open ocean, and their generating mechanism is a source of controversy and active research. Some theories on rogue wave formation include:

- Strong currents that interact with existing swells making the swells much higher;
- A statistical aberration that occurs when a number of waves just happen to be in the same place at the same time, combining to make one big wave;
- The result of a storm in the ocean where the wind causes the water surface to be rough and choppy, creating very large waves.

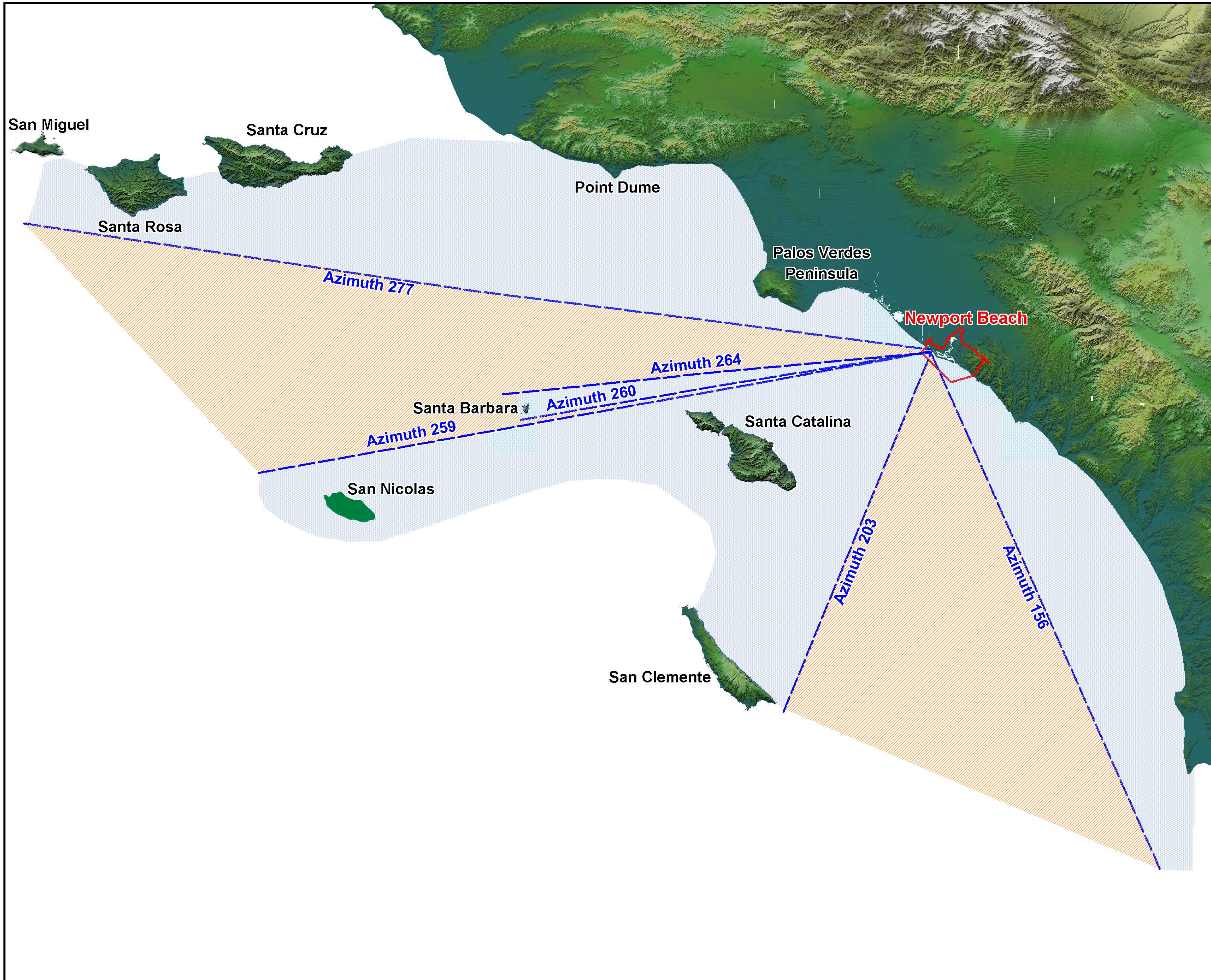
Rogue waves are unpredictable and therefore nearly impossible to plan for. Nevertheless, as described in Section 1.3.1 below, some high waves that have historically impacted the Orange County coastline may be best explained as rogue waves. If this is the case, rogue waves have the potential to impact the Newport Beach area in the future.

1.3.1 Notable Tsunamis and Rogue Waves in the Newport Beach Area

In the Pacific Basin, most tsunamis originate in six principal regions, all of which have prominent submarine trenches. Of the six regions, only two have produced major tsunami damage along the California coastline in historical times. These are the Aleutian (Gulf of Alaska) region and the region off Chile, in South America (CDMG, 1976). Southern California is generally protected from teletsunamis by the Channel Islands, which deflect east- and northeast-trending waves, and by Point Arguello, which deflects waves coming in from the continental area of Alaska (see Plate 1-1). Tsunamis generated by local earthquakes or landslides have historically posed only a minor, localized risk to southern California. However, the record also shows that the highest sea waves recorded in the southern California area were caused by a locally generated tsunami, the 1812 Santa Barbara event.

Although the historical record for southern California is short, over 30 tsunamis have been recorded in southern California since the early 1800s (see Table 1-1). Given that instrumented tidal measurements in southern California were first made in 1854, wave heights for pre-1854 events are estimated based on historical accounts.

Most records are for the San Diego and Los Angeles areas, with only a few events actually mentioned in the Orange County area. Most of the recorded tsunamis produced only small waves between 0.15 and 0.3 m (0.5 – 1 ft) high that did not cause any damage, but six are known to have caused damage in the southern California area. Those six are marked in **bold** in Table 1-1, and are described further in the text below.



Wave Exposure Map

Newport Beach, California

EXPLANATION

Areas exposed to distantly generated deep-water swell activity

Zones of island interference creating shadows to incoming wave energy

Approximate azimuth in degrees, read clockwise from true north

City of Newport Beach and sphere of influence boundaries

Scale: 1:1,000,000

10 0 10 20 30 Miles

20 0 20 40 60 Kilometers

Base Map: USGS 10- and 30-m Digital Elevation Models

Source:US Army Corps of Engineers, 1993

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CITY OF NEWPORT BEACH CALIFORNIA

Plate 1-1

Table 1-1: Historical Tsunami Record for Southern California - 1812 to Present
(Tsunamis that caused damage in southern California are in bold)

Date	Source	Wave Height
December, 1812	**Southern California; earthquake or landslide in Santa Barbara Channel?**	**Santa Barbara: ~2-3 m (6.6-9.8 ft); Ventura: ~2-3 m (6.6-9.8 ft)**
November, 1853	Kurils Islands	Unknown; possibly observed in San Diego
May, 1854	Southern California; possibly same as July or December events	Unknown; observed in San Diego
July, 1854	Unknown; possible meteorological origin	San Diego: ~0.3 m (~1 ft)
December 23, 1854	Japan	San Diego: < 0.1 m (0.3 ft)
December 24, 1854	Japan	San Diego: 0.1 m (0.3 ft)
July, 1855	Southern California; possible offshore landslide caused by earthquake in Los Angeles	Unknown; large waves reported at Point San Juan
April, 1868	Hawaii	San Diego: 0.1 m (0.3 ft)
August, 1868	Chile	San Diego: 0.3 – 0.8 m (0.6-2.6 ft); San Pedro: 1.8 m (5.9 ft) Wilmington: 1.8 m (5.9 ft)
August, 1872	Aleutian Islands	San Diego: < 0.1 m (0.3 ft)
May, 1877	Chile	San Pedro: 1 m (3.3 ft); Wilmington: 1 m (3.3 ft); Gaviota: 3.7 m (12.1 ft)
August, 1879	Southern California; possible undersea landslide caused by earthquake in San Fernando area	Unknown; tsunami reported at Santa Monica
December, 1899	Southern California; Underwater landslide generated by earthquake in San Jacinto area?	Unknown; large wave reported along southern California coast
February, 1902	El Salvador-Guatemala	Unknown; large wave reported in San Diego
January, 1906	Ecuador	Unknown; reported in San Diego
August, 1906	Chile	San Diego: 0.1 m (0.3 ft)
May, 1917	South Pacific	Unknown; large waves reported in La Jolla
June, 1917	South Pacific	Unknown; reported in San Diego
April, 1919	South Pacific	Unknown; reported in San Diego
November, 1922	Chile	San Diego: 0.2 m (0.7 ft)
February, 1923	Kamchatka	San Diego: 0.2 m (0.7 ft)
October, 1925	Unknown; possible meteorological origin or submarine volcanic event	Long Beach: 0.34 m (0.1 ft)
January, 1927	**Southern California; possible submarine landslide caused by earthquake in Imperial Valley**	**Unknown; large waves reported along southern California coast**
November, 1927	Central and southern California; offshore earthquake off Point Arguello, possibly on the Hosgri fault	La Jolla: 0.2 – 0.3 m (0.7 – 1 ft); Surf: 1.8 m (5.9 ft) Port San Luis: 1.5 m (4.9 ft)
June, 1928	Southern Mexico	La Jolla: < 0.1 m (0.3 ft)

Date	Source	Wave Height
August, 1930	Southern California; offshore earthquake in Santa Monica Bay	Santa Monica: 0.6 m (1.9 ft)
March, 1933	Japan	Los Angeles: 0.2 m (0.7 ft); Santa Monica < 2.0 m (6.6 ft)
March, 1933	Southern California; Long Beach Earthquake	Long Beach: 0.1 m? (0.3 ft)
August, 1934	**Unknown; possibly caused by earthquake near Balboa, or of meteorological origin (rogue waves?)**	**Newport Beach: 3 m rise (9.8 ft); 9-12 m (30 –39 ft) waves**
April, 1943	Chile	San Diego: 0.1 m (0.3 ft)
December, 1944	Japan	San Diego: < 0.1 m (0.3 ft)
April, 1946	Aleutian Islands	Avila: 1.2 m (3.4 ft)
March, 1957	**Aleutian Islands**	**San Diego: 0.2 – 1.0 m (0.7–3.3 ft)**
May, 1960	**Chile**	**Santa Monica: 1.4 m (4.6 ft)**
May, 1964	**Gulf of Alaska**	**Santa Monica: 1.0 m (3.3 ft)**
February, 1965	Aleutian Islands	Santa Monica: 0.08 m (0.3 ft)
May, 1968	Japan	Santa Monica: 0.2 m (0.7 ft); Long Beach: 0.1 m (0.3 ft)
May, 1971	South Pacific	Los Angeles: 0.05 m (0.2 ft)
November, 1975	Hawaii	La Jolla: 0.1 m (0.3 ft)
June, 1977	South Pacific	Los Angeles: 0.05 m (0.2 ft); Long Beach: 0.12 m (0.4 ft)

Source: Compiled from Lander and Lockridge (1989) and McCulloch (1985)

1.3.1.1 Santa Barbara Tsunami of 1812

A strong earthquake in the Santa Barbara area on December 21st, 1812 produced a tsunami that caused damage in Santa Barbara and Ventura counties and was reported along the coast of southern California. However, the tsunami of 1812 occurred before the Newport Beach area was settled, so there are no data specific to Newport Beach for this event. The most likely source for the earthquake is a fault zone in the Santa Barbara Channel, although onshore faults east of Santa Barbara cannot be ruled out.

While some historical accounts suggest the tsunami produced a maximum one-mile runup and wave heights of 15 m (49 ft) at Gaviota, 9 to 10.5 m (29.5 – 34.5 ft) at Santa Barbara and 3.5 m (11.4 ft) at Ventura, contemporary records from the missions at Santa Barbara and Ventura do not mention tsunami runup or damage to nearby coastal communities (Lander and Lockridge, 1989). The mission records describe only a disturbed ocean and fear of tsunami, suggesting that the accounts of high waves, most of which were recorded years after the event, may have been exaggerated (Lander and Lockridge, 1989). For example, an account of "an old trader" printed in the San Francisco Bulletin 52 years after 1812, reported a 1-mile runup in Gaviota. From this account, a 15 m (49 ft) wave height was derived using topographic maps.

Accounts collected by Trask (1856), 44 years after the event, report that waves damaged the lower part of the town of Santa Barbara, half a mile inland. Trask (1856) also recorded reports of a ship damaged by a tsunami wave near San Buenaventura (present day Ventura). This may be the same vessel reported by Los Angeles Star in 1857 to have been swept up a canyon at El Refugio Bay, near Gaviota. A third-hand account of tsunami damage to the mission in Ventura, located 4.5 m (14.8 ft) above sea level, is not corroborated by the mission records (Grauzinis et al., unpublished report). Grauzinis et al. (unpublished, based on data from Soloviev and Go, 1975; McCulloch, 1985; Marine Advisors, 1965; Iida et al., 1967; Wood, 1916; Heck, 1947; Toppozada et al., 1981), conclude that the most reliable historical data support a tsunami height of less than 3 m (9.8 ft) at Santa Barbara and Ventura, 3.5 m (11.4 ft) at El Refugio, and lower elsewhere in southern California. This is roughly consistent with analysis of predicted tidal data for the region by Long (1988) who suggests a wave height of 2 m (6.6 ft) at Santa Barbara and Ventura.

1.3.1.2 Tsunami of January 1927

A magnitude 5.7 earthquake followed by several aftershocks occurred in the Imperial Valley, at the border between the United States and Mexico, on January 1, 1927. According to Montandon (1928), sea waves in San Pedro destroyed a seawall or embankment causing about three million dollars in damage (Lander and Lockridge, 1989). However, since the Imperial Valley is far from the coast, and the earthquake was moderate in size, it is doubtful that these two events are related, unless the earthquake triggered a submarine landslide.

1.3.1.3 Possible Tsunami of 1934

On August 21, 1934 large destructive waves were reported along the coast of southern California from Malibu to Laguna Beach. The true source of the waves is not known, however several causative events have been suggested. Although official records show no large earthquakes in the area on the day of the waves, a small, magnitude 3 tremor was reported in the Balboa region before the waves struck. Submarine landsliding, volcanic activity, and unusual meteorological conditions (rogue waves?) have also been suggested as possible explanations for the waves. A runup of 270 m (886 ft) inland, 3 m (9.8 ft) above mean high tide level was recorded at Newport Beach, which flooded part of the City to a depth of one meter (3.3 ft). Four people were injured near the channel entrance to Newport Bay, at the western pier. Many houses were destroyed, including a two-story home in Balboa that was detached from its foundation. Part of the pavement on Balboa Peninsula was washed away, temporarily isolating the residents of this area from the mainland. Thousands of tons of debris were tossed onshore. The waves also flooded a moorage in Balboa Island and collapsed part of the breakwater in Long Beach (Lander and Lockridge, 1989).

1.3.1.4 Aleutian Island Tsunami of 1957

A magnitude 8.3 earthquake in the Aleutian Islands on March 9, 1957 generated a small tsunami in the San Diego area that damaged two ships in San Diego Harbor and caused minor damage at La Jolla (McMulloch, 1985; Iida et al., 1967; Salsman, 1959; Joy, 1968). A wave height of up to one meter (3.3 ft) was reported at Shelter Island, off the San Diego coast, although the tide gauge there recorded only a 0.2 m (0.7 ft) wave. No reports of damage were recorded in the City of Newport Beach.

1.3.1.5 Chilean Tsunami of 1960

On May 22, 1960, a moment magnitude 9.4 earthquake off the coast of Chile produced a tsunami that damaged coastal communities in southern California between Santa Barbara and San Diego. A wave height of 1.4 m (4.6 ft) was recorded in Santa Monica and the tidal gauge in San Diego was carried away by the tsunami waves (Lander and Lockridge, 1989). Significant damage was recorded in the Los Angeles and Long Beach Harbors, where 30 small craft were sunk and over 300 were set adrift. Over 340 boat slips, valued at $300,000, were also damaged in the area. At Santa Monica, eight small boats were swept away and a runup of 91 m (300 ft) flooded a parking lot along the Pacific Coast Highway. Damage of $20,000 was reported in the Santa Barbara area. At San Diego, two passenger ferries were knocked off course by the waves; the first ferry was pushed against a dock in Coronado, destroying 80 m (260 ft) of the dock, and the second was rammed into a flotilla of anchored destroyers. The waves also rammed a 100-ton dredge into the Mission Bay Bridge, knocking out a 21 m (70 ft) section and sinking a barge at Seaforth Landing (Lander and Lockridge, 1989; Iida et al., 1967; Talley and Cloud, 1962; Joy, 1968).

1.3.1.6 Good Friday Earthquake Tsunami of 1964

On March 28, 1964 a moment magnitude 9.2 earthquake in the Gulf of Alaska produced the largest and most damaging tsunami to ever hit the West Coast. The tsunami killed 16 people in northern California and Oregon and caused $8,000,000 in damage in California. Although damage was primarily focused in coastal areas north of San Francisco, southern California experienced hundreds of thousands of dollars in losses. A wave height of 1 m (3.3 ft) was recorded in Santa Monica. In Los Angeles Harbor, the wave damaged six small-boat slips, pilings, and the Union Oil Company fuel dock. It also scoured the harbor sides, causing, all tolled, $175,000 to $275,000 in damage. The tsunami also destroyed eight docks in the Long Beach Harbor at a loss of $100,000 (Spaeth and Berkman, 1972). Minor damage was also reported elsewhere along the southern California coast.

1.3.2 Tsunami Scenarios for Newport Beach

Because of the substantial increase in population in the last century and extensive development along the world's coastlines, a large percentage of the Earth's inhabitants live near the ocean. As a result, the risk of loss of life and property damage due to tsunamis has increased substantially. In fact, worldwide, tsunamis have been responsible for over 4,000 human deaths in the past decade alone (Synolakis et al., 2002).

McCarthy et al. (1993) reviewed the historical tsunami record for California and suggested that the tsunami hazard in the southern California region from the Palos Verdes Peninsula south to San Diego, is moderate. However, as discussed previously, the southern California historical record is very short. Given that the recurrence interval for many of the faults in the world is in the order of hundreds to thousands of years, it is possible that southern California has been impacted by teletsunamis for which we have no record. More significantly, there are several active faults immediately offshore of the southern California area, and any of these could generate a future earthquake that could have a tsunami associated with it. Finally, several submarine landslides and landslide-susceptible areas have been mapped offshore, within 3.5 to 14 km of the coastline (Field and Edwards, 1980; McCulloch, 1985; Clarke et al., 1985). Synolakis et al. (1997) reviewed the McCarthy et al. (1993) study and other data, and concluded that not only do early, pre-1980 methods give tsunami runup results that are more than 50 percent lower than what current inundation models predict, but that there is a need to model near-shore tsunami events. For the Orange County coastline particularly, near-shore tsunamis should be considered worst-case scenarios, as these have the potential to cause high runups that would impact the coastline with almost no warning.

Having recognized the potential hazard, the next step is to quantify it so it can be managed appropriately. Although the record of tsunamis impacting the California coast goes back only to 1812, there are sufficient data from which mathematical models of tsunami runup for the California coast can be developed. Houston and Garcia looked at the worldwide, long-term historical data, and combined it with mathematical models to estimate the predicted, distantly generated, 100-year and 500-year probability tsunami runup elevations for the west coast of the United States (Garcia and Houston, 1975; Houston and Garcia, 1974; 1978; Houston et al., 1975; Houston, 1980; as presented in McCulloch, 1985).

These predictions are used by the Federal Insurance Administration to calculate flood-insurance rates, thus the 100- and 500-year terms risk levels selected, similar to storm flooding. As with flooding, the 100- and 500-year designations do not mean that these tsunamis occur only once every 100 or 500 years, but rather, these terms describe the tsunami that has a 1 percent (for 100-year) or 0.2 percent (for 500-year) probability of occurring in any one year. The 100-year and 500-year tsunami runup elevations are thought to have the potential to cause significant damage to harbors and upland areas, while smaller 50-year events may cause damage to boats and harbor facilities, but the onshore damage will be restricted to very low-lying areas. Smaller than 50-year tsunamis may still cause minor damage to unprotected boats and harbor facilities (CDMG, 1976). The 100-year (R_{100}) and 500-year (R_{500}) teletsunami runup heights predicted for Newport Beach are 1.49 and 1.98 m (4.9 and 6.5 ft), respectively (Houston, 1980, based on Figure 208 in McCulloch, 1985).

The predicted tsunami runup heights by Houston (1980) were used in this report to prepare maps showing tsunami inundation zones for Newport Beach. However, for various reasons, these values are to be used only as a guide to quantify the risk of distantly generated tsunamis on the California coastline. Houston (1980) did not have the technology available to quantify the effect that estuaries, the offshore zone where water is 5 to 10 meters deep, and the shoreline have on tsunami runup (C. Synolakis, personal communication, 2002). Furthermore, Houston's (1980) predicted heights are based on mean sea level elevation data, and therefore do not show the maximum credible heights that are possible if a tsunami coincides with peak high tide, or with storm-induced high water. To account for this, several scenarios were prepared herein to show the estimated inundation areas expected for Newport Beach under different sea level conditions. These scenarios are simple, linear, first-order assessments of inundation of all land areas at an elevation equal to or below the elevation of the water column calculated for each scenario, without taking into consideration the shallow bathymetry and near-shore topography, which are known to have a significant impact on tsunami inundation. As a result, these scenarios should be used for general planning purposes only, until the more detailed tsunami inundation maps for this area (discussed below) become available.

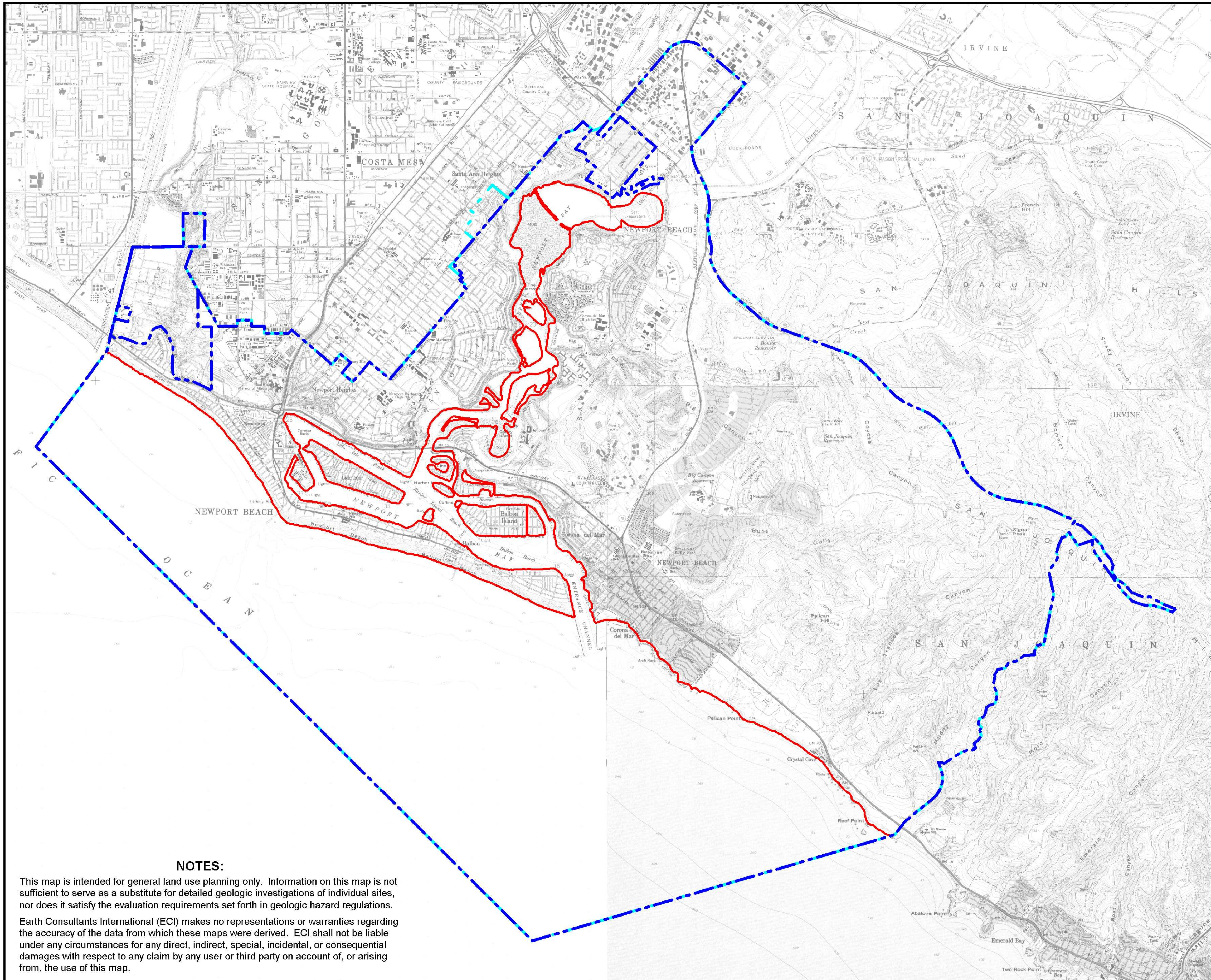
The University of Southern California Tsunami Research Group, under the direction of Professor Costas Synolakis, is currently preparing tsunami inundation models on behalf of the Office of Emergency Services for the northern Orange County area. Unfortunately, the maps that they are preparing will not address tsunami inundation in the Newport Bay area because detailed modeling of the inundation depths (bathymetry) and currents in the bay is required, and the State budget does not allow for this level of detail (C. Synolakis, personal communication, 2002). This research group is also modeling potential locally generated tsunamis caused by either offshore faulting or submarine landsliding. Their initial models indicate that these locally generated tsunamis are a concern: earthquakes in the Santa Barbara Channel could generate a 2 m (6.6 ft) runup, while an earthquake-induced submarine landslide could generate a runup of as much as 20 m (66 ft) (Borrero et al., 2001). Their north Orange County models will include locally generated tsunamis caused by both offshore faulting or landsliding, but again, they are excluding Newport Bay.

1.3.2.1 Scenario 1: Tsunami Inundation at Mean Sea Level

The tsunami inundation maps prepared for this study are based on several sea water levels that are specific to each area, and often legally defined. Mean sea level (MSL) is defined as the average height of the ocean surface for all tide stages, measured over a 19-year period based on hourly height observations made on an open coast, or in adjacent waters having free access to the sea (Bates and Jackson, 1987). Mean sea level is adopted as the *datum plane* or *zero elevation* for a local or regional area. The City of Newport Beach has defined the sea level datum of 1929 (referred to as the National Geodetic Vertical Datum of 1929 – NVGD29) established by the United States Coast and Geodetic Survey, as the official datum plane of the City (City Ordinance No. 994). All other water levels and topographic elevation points in the City are measured relative to this datum. The NGVD29 system, however, has fallen in disuse, and other jurisdictions, such as the County of Orange, now use the NAVD88 system, which in this area is on average 2.37 feet higher than the NGVD29 datum. The maps presented herein are based on the City's current NGVD29 datum. These can be expected to change in the future when, and if the City adopts the NAVD88 system. The mean sea level elevation at Newport Beach is shown graphically on Plate 1-2.

Mean Sea Level

Newport Beach, California



EXPLANATION

- Mean Sea Level
- Newport Beach City Boundary
- Sphere of Influence

Scale: 1:60,000

0.5 0 0.5 1 1.5 Miles

1 0 1 2 3 Kilometers

Base Map: USGS Topographic Map from Sure!MAPS RASTER

Source: USGS 10-m Digital Elevation Model

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CITY OF NEWPORT BEACH CALIFORNIA

Plate 1-2

NOTES:

This map is intended for general land use planning only. Information on this map is not sufficient to serve as a substitute for detailed geologic investigations of individual sites, nor does it satisfy the evaluation requirements set forth in geologic hazard regulations.

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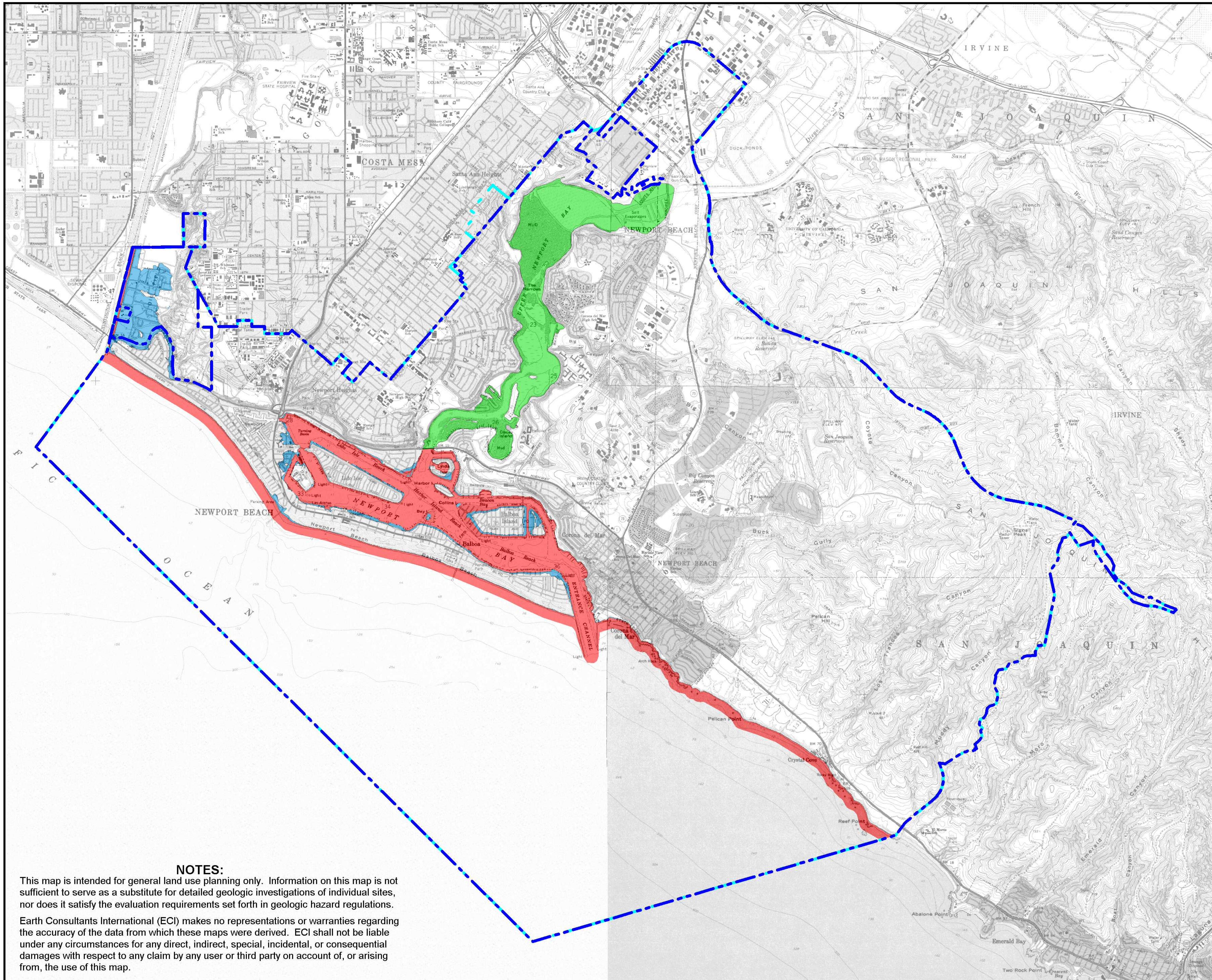
Plate 1-3 shows the predicted tsunami inundation areas for Newport Beach if the predicted 100- and 500-year tsunami runup heights (4.9 and 6.5 feet, respectively) are superimposed on the mean sea level. Plate 1-3 shows that Newport Bay and most of the harbor would be inundated, with the potential to damage small vessels and docks. Some of the properties adjacent to the Bay would also be impacted, especially the northwestern section of Balboa Island, which is predicted to be inundated. The water level in Upper Newport Bay is anticipated to rise some, but the data available are insufficient to quantify the hazard in this area.

1.3.2.2 Scenario 2: Tsunami Inundation at Mean High Water

Mean High Water (MHW) is referred to as the "average height of all the high waters recorded at a given place over a 19-year period or computed equivalent period" (Bates and Jackson, 1987). The MHW can often be recognized by the upper line of debris on the beach. For Newport Beach, the calculated MHW is 0.78 m (2.57 ft). Plate 1-4 illustrates the inundation zone for a tsunami occurring at high tide. Most of the harbor area, including the inland, developed portion of the Balboa Peninsula, Balboa Island, and Upper Newport Bay could be inundated during such an event. Near-shore sections of Lido Isle and Linda Isle would also be impacted, and Lido Isle would be cut off from the mainland due to flooding along Newport Boulevard and 32nd Street. This scenario is expected to cause considerable damage to homes in the low-lying areas, and to all moored boats.

1.3.2.3 Scenario 3: Tsunami Inundation at Extreme High Tide

A tsunami occurring during extreme high tide would represent the worst-case scenario for teletsunamis. Thus we modeled the 100- and 500-year wave runup on top of the highest recorded tide in the area of 2.66 m (8.74 ft), measured at station 9410580 on January 28, 1983 (NOAA/NOS, 2002). In this model, a significant portion of Newport Harbor and the low-lying areas south of Highway 1 would be inundated by both the 100- and 500-year wave runups (see Plate 1-5). The 100-year event shows that except for a small sliver of Lido Isle, the entire Newport Bay area would flood. Flooding is also anticipated in the area where Newport Dunes Resort is located. In the 500-year event, all of Lido Isle is expected to flood. The probability of a tsunami occurring during extreme high tide is highly improbable. However, these tsunami runups are possible if a tsunami occurs immediately offshore of Newport Beach, whether as a result of faulting or landsliding. Therefore, Plate 1-5 illustrates all of the areas that could benefit from evacuation plans and routes, as well as warning systems.



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Scenario 1: Tsunami Inundation at Mean Sea Level

Newport Beach, California

EXPLANATION

Tsunami Hazard Zones

- 100-year Zone (Inundation Elevation = 4.9 feet)
- 500-year Zone (Inundation Elevation = 6.5 feet)
- Zone of Minimal but Potential Tsunami Inundation
- Newport Beach City Boundary
- Sphere of Influence

Tsunami Inundation Elevations: Mean Sea Level +Tsunami Height (100-year = 4.9 feet; 500-year = 6.5 feet)

Scale: 1:60,000

0.5 0 0.5 1 1.5 **Miles**

1 0 1 2 3 **Kilometers**

Base Map: USGS Topographic Map from Sure!MAPS RASTER

Source: Houston,1980; USGS 10-m Digital Elevation Model

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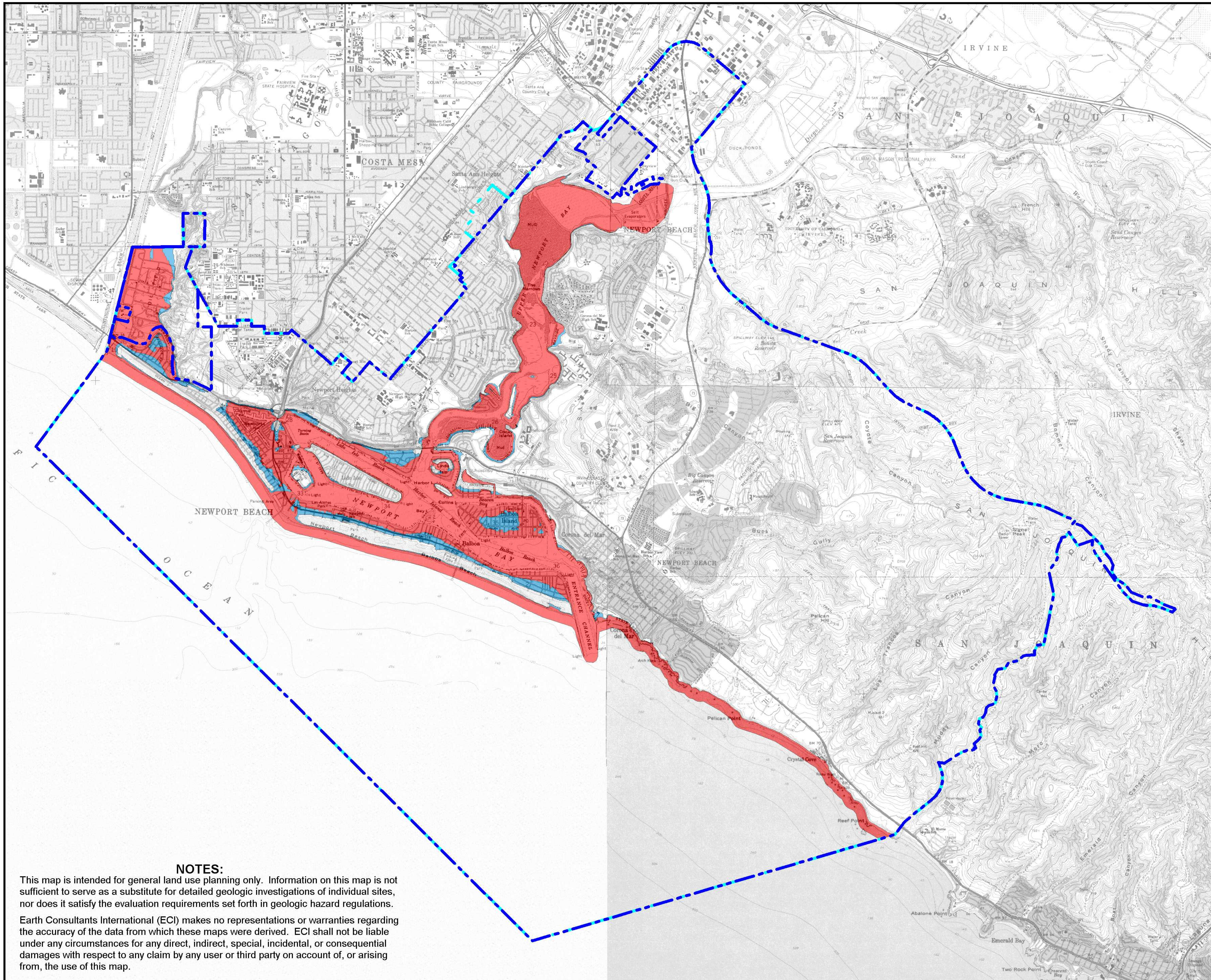
CITY OF NEWPORT BEACH CALIFORNIA

Plate 1-3



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Scenario 2: Tsunami Inundation at Mean Higher High Water

Newport Beach, California

EXPLANATION

Tsunami Hazard Zones

- 100-year Zone (Inundation Elevation = 7.47 feet)
- 500-year Zone (Inundation Elevation = 9.07 feet)
- Newport Beach City Boundary
- Sphere of Influence

Tsunami Inundation Elevations: Mean Higher High Water (2.57 feet)+Tsunami Height (100-year = 4.9 feet; 500-year = 6.5 feet)

Scale: 1:60,000

0.5 0 0.5 1 1.5 Miles

1 0 1 2 3 Kilometers

Base Map: USGS Topographic Map from Sure!MAPS RASTER

Source: Houston,1980; USGS 10-m Digital Elevation Model

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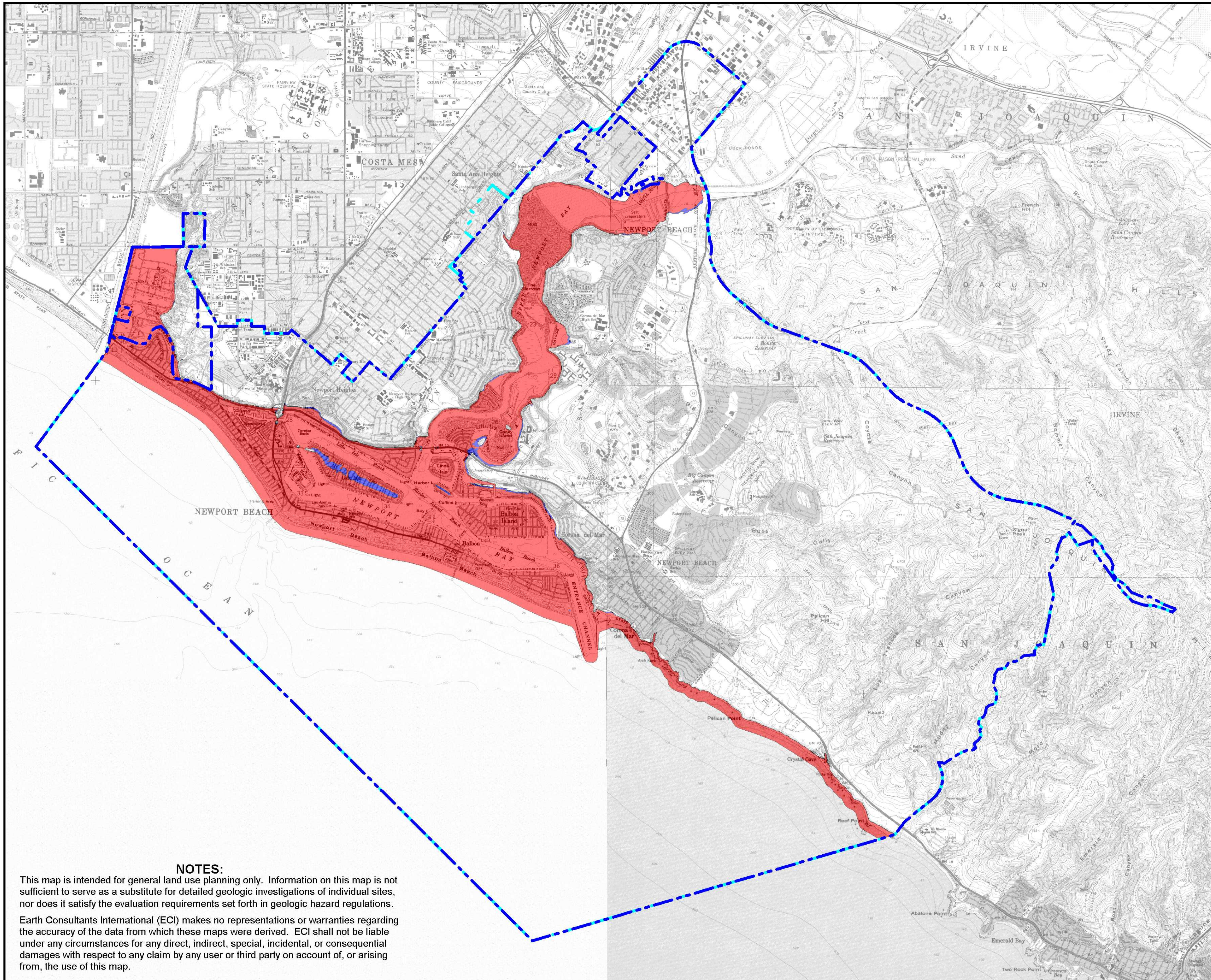
Plate 1-4

Scenario 3: Tsunami Inundation at Extreme High Tide

Newport Beach, California



NOTES:
This map is intended for general land use planning only. Information on this map is not sufficient to serve as a substitute for detailed geologic investigations of individual sites, nor does it satisfy the evaluation requirements set forth in geologic hazard regulations.

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EXPLANATION

Tsunami Hazard Zones

- 100-year Zone (Inundation Elevation = 13.64 feet)
- 500-year Zone (Inundation Elevation = 15.24 feet)
- Newport Beach City Boundary
- Sphere of Influence

Tsunami Inundation Elevations: Highest Recorded Tide (8.74 feet) +Tsunami Height (100-year= 4.9 feet, 500-year = 6.5 feet)

Scale: 1:60,000

0.5 0 0.5 1 1.5 Miles

1 0 1 2 3 Kilometers

Base Map: USGS Topographic Map from Sure!MAPS RASTER

Source: Houston,1980; USGS 10-m Digital Elevation Model

Earth Consultants International

Project Number: 2112
Date: July, 2003

CITY OF NEWPORT BEACH CALIFORNIA

Plate 1-5

1.4 Storm Surges and Seiches

Coastal flooding can occur as a result of several processes other than the tsunami and rogue waves discussed above. Two common coastal flooding processes include storm surges and seiches. A **storm surge** is an abnormal rise in sea water level associated with hurricanes and other storms at sea. Surges result from strong on-shore winds and/or intense low-pressure cells associated with ocean storms. Water level is controlled by wind, atmospheric pressure, existing astronomical tide, waves and swell, local coastal topography and bathymetry, and the storm's proximity to the coast. Flooding of deltas and other low-lying coastal areas is exacerbated by the influence of tidal action, storm waves, and frequent channel shifts.

Most often, destruction by storm surge is attributable to:

- Wave impact and the physical shock on objects associated with the *passing* of the wave front. The water may lift and carry objects to different locations.
- *Direct impact* of waves on fixed structures. This tends to cause most of the damage.
- *Indirect impacts,* such as flooding and the undermining of major infrastructure (such as highways and railroads).

For example, unusually severe storms in June, July and August of 1920 caused extensive damage to the west jetty in Newport Beach. Tidal currents swept the sand from beneath the toes of the jetty’s slopes, and the rocks sank into the ocean floor, which lowered the crest of the jetty so that two large gaps appeared in it at times of high tide. Storm-generated swells, especially when combined with tidal action also have the potential to cause damage. In the southern California area, including Newport Beach, localized flooding and accelerated rates of coastal erosion have occurred when storms are combined with high tides. This occurred during the 1977-1978 storms, when the combination of high waves, local storm surges and high tides damaged several coastal structures in southern California. According to Walker et al. (1984), however, the piers and jetties at Newport Beach were not damaged by this storm. During the storms in 1988, the high water extended to the first row of houses behind the groin field at Newport Beach causing minor flood damage to these structures (Pipkin et al., 1992).

A **seiche** is defined as a standing wave oscillation in an enclosed or semi-enclosed, shallow to moderately shallow water body or basin, such as lake, reservoir, bay or harbor. Seiches continue (in a pendulum fashion) after the cessation of the originating force, which can be tidal action, wind action, or a seismic event. Seiches are often described by the period of the waves (how quickly the waves repeat themselves), since the period will often determine whether or not adjoining structures will be damaged. The period of a seiche varies depending on the dimensions of the basin. Whether an earthquake will create seiches depends upon a number of earthquake-specific parameters, including the earthquake location (a distant earthquake is more likely to generate a seiche than a local earthquake), the style of fault rupture (e.g., dip-slip or strike-slip), and on the configuration (length, width and depth) of the basin.

Amplitudes of seiche waves associated with earthquake ground motion are typically less than 0.5 m (1.6 feet high), although some have exceeded 2 m (6.6 ft). A seiche in Hebgen Reservoir, caused by an earthquake in 1959 near Yellowstone National Park, repeatedly overtopped the dam, causing considerable damage to the dam and its spillway (Stermitz, 1964). The 1964 Alaska earthquake produced seiche waves 0.3 m (1 ft) high in the Grand Coulee Dam reservoir, and seiches of similar magnitude in fourteen bodies of water in the state of Washington (McGarr and Vorhis, 1968).

Upper Newport Bay, the harbor and some of the reservoirs in Newport Beach could be susceptible to seiches, however, due to the small surface area of Newport Bay and Upper Newport Bay, the probability that damaging seiches would develop in these bodies of water was considered low in the 1975 Newport Beach Safety Element, and no new information has been found to change that conclusion. Seiches in reservoirs will be discussed further in Chapter 4.

1.5 Hurricanes and Tropical Storms

Tropical **cyclones** are great masses of warm, humid, rotating air that occur between 10° and 25° latitude on both sides of the equator. Large tropical cyclones, those with wind speeds greater than 119 km/hr (74 mi/hr), are referred to as **hurricanes** in the North Atlantic and the Eastern Pacific Oceans (Garrison, 2002). Hurricane season, the time of the year when most hurricanes are generated, runs from June to the end of November, with peak activity from mid-August to late October (http://hurricanes.noaa.gov). Most hurricanes that affect the southern California region are generated in the southern portion of the Gulf of California. Though hurricane-strength storms have not been reported in southern California, tropical storms, those with wind speeds less than 119 km/hr (74 mi/hr), have caused damage to southern California in the past.

The main hazards associated with tropical cyclones, and especially hurricanes, are storm surge, high winds, heavy rain, flooding, and tornadoes. The greatest potential for loss of life related to a hurricane for coastal communities is from the storm surge, which if combined with normal tides can increase the mean water level by 4.6 m (15 ft) or more (http://hurricanes.noaa.gov). Waves that high would breach or extend over the Balboa Peninsula and impact all development adjacent to the coastline, including areas along Corona del Mar and Crystal Cove.

Tropical storm-force winds and waves are strong enough to be dangerous to those caught in them. Water weighs approximately 1,700 pounds per cubic yard; therefore, extended pounding by frequent waves can demolish any structure not designed to withstand such forces. Hurricane and tropical-force winds can easily destroy poorly constructed buildings and mobile homes. Debris such as signs, roofing material, and small items left outside become flying missiles in hurricanes. Extensive damage to trees, towers, underground utility lines (from uprooted trees), and fallen poles cause considerable disruption. High-rise buildings are also vulnerable to hurricane-force winds, particularly the upper floors, since wind speed tends to increase with height. It is not uncommon for high-rise buildings to suffer a great deal of damage, typically due to windows being blown out. Consequently, the areas around these buildings can be very dangerous.

Widespread rainfall of 6 to 12 in (15 to 30 cm) is common during the landfall of a hurricane, frequently producing deadly and destructive floods. Such floods have been the primary cause of tropical cyclone-related fatalities over the past 30 years worldwide (http://hurricanes.noaa.gov). Hurricanes can also produce tornadoes that add to the storm's destructive power. In general, tornadoes associated with hurricanes are less intense than those that occur in the plains area of the United States. Interestingly, some hurricanes produce no tornadoes, while others produce multiple ones. Either way, the effects of tornadoes, added to the larger area of hurricane-force winds, can produce substantial damage (http://hurricanes.noaa.gov).

Though no hurricane-strength storms have reportedly hit the Los Angeles basin area in modern times, damage from wave swell and weather related to hurricanes that develop in the Baja California area has been reported throughout southern California. Swells caused by offshore storms and hurricanes in Baja California can cause localized flooding and erosion of the southern California coastline. Only one tropical-strength storm has ever been recorded as actually hitting California (http://www.usatoday.com/weather/whhcalif.htm). Near the end of September 1939, a tropical storm with sustained winds of 80.5 km/hr (50 mi/hr) came ashore at Long Beach. The storm generated five inches of rain in the Los Angeles basin on September 25th, and between 6 and 12 inches (15 and 30.5 cm) of rain in the surrounding mountains. In Newport Beach, this storm produced 30-foot high waves (as high as a three-story building) that tore away half of Newport Pier and destroyed most of Balboa Pier, damaged portions of the jetties, several homes and small vessels, and caused numerous drownings (P. Alford, personal communication, 2002). Other less severe but still significant storms that impacted the southern California coastline occurred during 1927, 1938-1939, 1941, 1969, 1977-1978, 1983, 1988 (Kuhn and Sheppard, 1984; Walker et al., 1984; Pipkin et al., 1992), and even more recently in 1995, and 1997-1998. Many of these wet winters have been associated with ENSO (El Niño Southern Oscillation) events.

1.6 Sea Level Rise

1.6.1 Sea Level Change

The level of the oceans has always fluctuated with changes in global temperatures. During the last ice age, when global temperatures were 5ºC (9ºF) lower than today, much of the ocean's water was tied up in glaciers, sea level was as much as 130 meters (430 feet) lower than today (Oldale, 1985; Lajoie et al., 1991), and the California coast was 5 to 15 mi (8 to 25 km) farther offshore than its present position (Department of Boating and Waterways and State Coastal Conservancy, 2002). The last ice age ended approximately eighteen thousand years ago, and since then the world has been experiencing global warming - most of the ice caps have melted, most of the glaciers have retreated, and the sea level has risen. Until about 5,000 years ago, sea level rose rapidly at an average rate of nearly 0.4 in (1 cm) a year. Since then, sea levels have continued to rise but at a slower pace. We are currently in an interglacial period, meaning "between glacial" periods, and as a result, sea levels are relatively high. However, during the previous last major interglacial period (approximately 100,000 years ago), temperatures were about 1ºC (2ºF) warmer that today and sea level was approximately 6 meters (20 feet) higher than today (Mercer, 1970). The changes in sea level over the last about three hundred thousand years are shown on Figure 1-1.

When discussing shorter periods of time, one must distinguish worldwide (eustatic) sea level rise from relative sea level rise, which includes land subsidence. Although climate impacts sea level worldwide, the rate of sea level rise relative to a particular coast has more practical importance and is all that current monitoring stations can measure. Because some coastal areas are sinking while others are rising, relative sea level rise in the United States varies from more than one meter (3 feet) per century in Louisiana and parts of California and Texas, to 30 centimeters (1 foot) per century along most of the Atlantic and Gulf Coasts, to a slight drop in much of the Pacific Northwest (Titus et al., 1991; Knuuti, 2002). Large variations can occur locally. For example, in San Francisco, the Presidio gauge near the entrance to the Golden Gate has measured a relative sea level rise of 1.41 mm/yr in the last nearly 150 years. Across the bay, however, the 60-year-long gauge record at Alameda shows a relative mean sea level rise of only 0.89 mm/yr. Closer to home, in Los Angeles, the relative mean sea level trend for 77 years of record is 0.84 mm/yr, while in San Diego the 94-year-long record shows a linear trend in relative sea level rise of 2.15 mm/yr (Knuuti, 2002, based on unpublished data by C. Zervas). For a comparison of the relative sea level rise measured at the San Francisco, Los Angeles, and San Diego gauges, refer to Figure 1-2. These numbers briefly show that quantifying sea level changes worldwide is not a simple task.

Figure 1-1:
Worldwide Sea Level Curve for the Last Three Hundred Thousand Years
Using Current Sea Level as the Reference Point

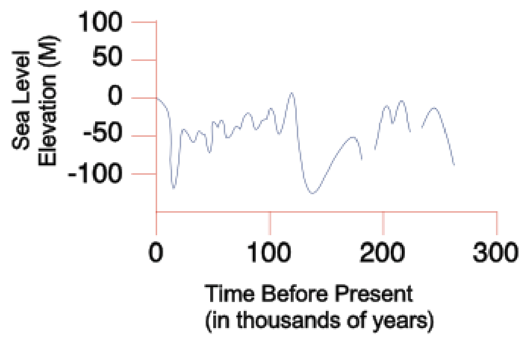
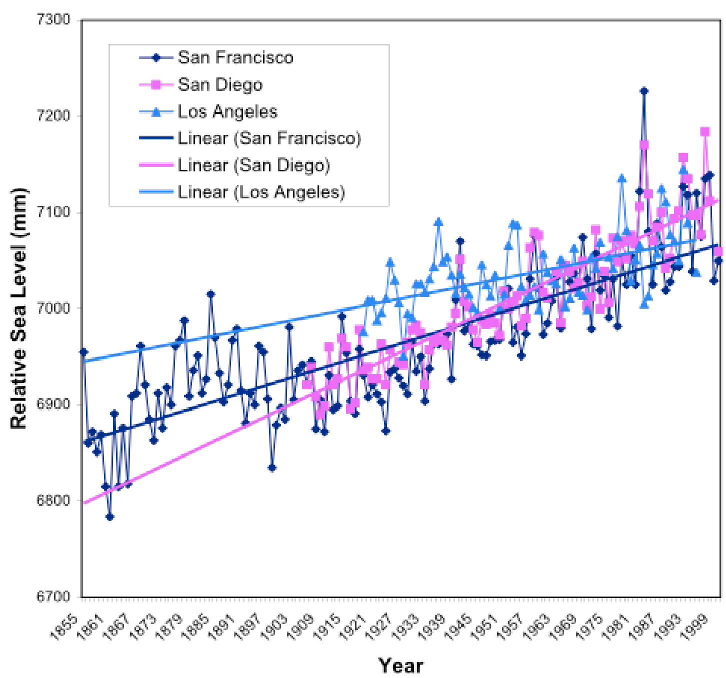


Figure 1-2: Historical Relative Sea Level Rise at
Three Locations along the Pacific Coast of the United States
(San Francisco, Los Angeles and San Diego)



Linear Trends at each Location are shown by the Straight Lines
Source: Based on data obtained at http://www.nbi.ac.uk/psmsl/psmsl_individual_stations.html

1.6.2 Effects of Sea Level Rise

Global sea level trends, therefore, have generally been estimated by combining the trends at tidal stations around the world. These records suggest that during the last century, worldwide sea level has risen 10 to 25 cm (4 to 10 inches) (Peltier and Tushingham, 1989), much of which has been attributed to global warming (Meier, 1984). Although sea level rise by itself does not cause substantial changes in the landform, several processes associated with sea level rise can have dramatic effects on our environment. For example, a significant rise in sea level would inundate coastal wetlands and lowlands, and the increased surges and swells associated with this rise in sea level would accelerate coastal erosion and exacerbate coastal flooding, thereby threatening local structures and habitat. Other related processes include higher water tables, increased sea-water intrusion into fresh water aquifers, and increased salinity of rivers, bays, and aquifers (Titus et al., 1991). The warmer climate may also result in a much higher probability of extremely warm years with increased precipitation in some areas, and drought in other areas. It is clear that global changes in climate will occur, but the local impacts are still being debated. In fact, recent studies have moved away from the global doomsday predictions to predictions at the local scale. Much work yet needs to be done in this area.

Previous studies suggest that a 1 m (~39 in) rise in sea level would generally cause beaches to erode 200 to 400 m (650 to 1,300 ft) along the California coast (Wilcoxen, 1986). Given that the width of the beaches in Newport Beach varies between 15 and 190 m (50 and 600 ft), a sea level rise of as little as 15 cm (6 in) could have a negative impact on the low lying areas around Newport Bay that are not protected by bulkheads and seawalls. Sea level rise would also cause increased sea-cliff retreat in the southern portion of the City where the beaches are narrow, and the surf pounds at the base of the bluffs, eroding away the soft bedrock that forms the cliffs (see Sections 1.7.1 and 1.7.2).

How long would it take for sea level to rise 15 cm (6 in) in Newport Beach at the current rate? Given that a long-term record of sea-level measurements is not available for the Newport Beach area, sea level rise in the City needs to be estimated from regional records. Using the San Diego and Los Angeles gauge records mentioned above, it could take anywhere between 70 and 180 years for sea level in Newport Beach to rise 15 cm, assuming that global warming is not exacerbated in the next decades. Obviously, local measurements of relative sea level change are necessary to better quantify these estimates and make more realistic predictions.

1.6.3 Potential Human Actions in Response to Sea Level Change

Human response to sea level changes include: 1) no action, 2) use of barriers, such as levees, to protect the built areas, 3) raising the coastline by placing sand on the beach and raising the buildings and supporting infrastructure, and 4) retreat (Titus, 1990; Nordstrom, 2000). Problems resulting from the no-action option include loss of recreational beaches due to accelerated erosion, loss of bayside property through erosion and inundation of low-lying areas, and stranding of buildings and infrastructure on the beach. As residents move inland, there is increased competition for land and living space, and natural resources in the backbays become increasingly threatened. Eventually, abandonment of the barrier reefs or peninsulas, and islands in the bays could become necessary. This option however, is not likely to happen in the near future in areas like Newport Beach, where there is a strong social, economic, and cultural need to maintain the integrity of the beaches, harbors and islands, and there are economic resources available to implement other options.

The second option involves construction of seawalls and other flood protection structures around the threatened areas. The most significant advantage of this option is that major institutional changes in land use are not required (Titus, 1990; Nordstrom, 2000). Lots, houses and roads would not have to be raised or moved. However, the increased water levels around the bulkheads, seawalls and other artificial structures would result in increased breaking wave energy, higher storm runup, and increased beach loss. Structures would have to be designed or improved to withstand these environmental assaults. Beaches could be maintained by artificial nourishment, but at a great cost and frequency.

The third option is probably cost-prohibitive in most areas. This would require placing sand on the beach to raise the ground surface, and raising the buildings and supporting infrastructure. Borrowing the large volumes of sand required would no doubt trigger environmental issues that would prohibit implementation of this option. Even if this were accomplished at the local level, raising the beach could increase the likelihood of bayshore erosion (Titus, 1990).

Retreat is the most environmentally sensitive option, but it involves new legislation that allows for land acquisition by public authorities, use of setback lines and prohibition of reconstruction after damage. The economic and social costs of land loss and compensation issues make this option unpalatable to most; strong political and public opposition can be expected. In intensely developed, premium real estate areas like Newport Beach, implementation of this option is very unlikely. Nevertheless, if sea levels do rise, this may ultimately prove to be the most cost-effective option.

1.7 Coastal Erosion Assessment

1.7.1 Geomorphology of the Coastline

As discussed in Section 1.1, in the last one hundred years, the Newport Beach coastline has been modified extensively by both natural processes and humans. The wide sandy beaches that we associate with West Newport Beach are actually the result of shoreline stabilization programs that began as early as the 1920s, and beach sand nourishment programs that began in earnest in the 1960s. The "natural" beaches that characterized the southern California coastline prior to significant anthropogenic intervention were narrow strips of dry beaches on a sand-starved coast (Department of Boating and Waterways and State Coastal Conservancy, 2002). These beaches would be unable to support the present-day demands for coastal access and recreation.

In an undeveloped area, the availability of sand to replenish the beaches is dependent on floodwaters that bring sediment down from the mountains and into the littoral drift zone offshore. However, with the increase in dams and other flood control structures upstream, significantly less quantities of sediment reach the coast. Therefore, the sediments lost by natural near-shore processes are not being replaced. This is certainly the case in southern California, where most of the major streams have been dammed, or are lined in concrete, significantly reducing their sediment load. In the Newport Beach area, sand was historically delivered to the local beaches by the San Gabriel and Santa Ana Rivers, and to a limited extent, as a result of coastal bluff erosion. With the construction of dams and channelization of portions of the Santa Ana and San Gabriel Rivers, there was a substantial reduction in the volume of sediment reaching the coastline. Construction of harbors, jetties, and other coastal barriers further reduced the amount of sand moved by along-shore currents. By the early 1940s, beach erosion was particularly severe along the Surfside-Sunset and West Newport beaches.

Beach nourishment operations were begun in 1945, with nearly 2.3 million cubic yards of sediment used to replenish the Surfside-Sunset shoreline between 1945 and 1956. Then, in 1964, the Corps, in cooperation with the State of California and the County of Orange began the Orange County Beach Erosion Control Project to mitigate erosion along that portion of the Orange County coastline between Surfside-Sunset and Newport Harbor. In Newport Beach, the project included beach nourishment and construction of the groin field (see Section 1.1). Approximately 495,000 cubic yards of sediment borrowed from the Santa Ana River and the Balboa Peninsula were placed on West Newport Beach in 1968. An additional 874,000 cubic yards were placed in 1970, and another 358,000 cubic yards were placed in 1973. In 1992, nearly 1.3 million cubic yards of beach-quality sediment were placed in a near-shore sand bar off the coast of Newport Beach. The sediment placed in 1970, 1973 and 1992 was taken from the Santa Ana River (Department of Boating and Waterways and State Coastal Conservancy, 2002). As a result of these beach nourishment and beach protection operations, since the early 1960s the beaches in the entire project area have increased in width at an average rate of 4.1 ft/yr. The resultant wide-sloped beaches provide a protective barrier to the homes and businesses near to and along the beach, in addition to increased area for recreational purposes.

South of the channel entrance to Newport Bay, to the south of the beach nourishment project area, the coastline is defined by steep coastal bluffs with a narrow basal wavecut platform that is covered by a thin veneer of beach sand. The bluffs form steep cliffs, especially at points. The Newport Beach coastal bluffs consist of marine sandstone and siltstone of the Monterey Formation. The sandstone beds are resistant and cliff forming, while the siltstone beds are less resistant and form steep talus-covered slopes.

The bedrock of the Monterey Formation is folded, and dips primarily to the east, away from the bluff face. Overlying the Monterey Formation are Pleistocene marine terrace deposits. These deposits are massive to crudely bedded, consist of medium to coarse sand with a trace of pebble-sized gravel, and are friable and locally loose. A resistant shell bed marks the base of the terrace deposits.

At the base of the bluffs is a mantle of colluvium. It consists of angular, pebble- to boulder-size clasts of sandstone and siltstone. In some areas, this colluvial cover buries the bluffs almost to the top, and in some areas, the material is reworked and forms a low terrace with weak soil development. The colluvium is heavily vegetated and appears to protect the base of the cliffs against normal wave action.

1.7.2 Susceptibility of the Coastal Sediments to Erosion

As noted previously, Newport Beach has a variety of coastal features ranging from replenished beach sands in West Newport, to steep bluffs comprised of sandstone and siltstone to the south of Corona del Mar. Significant coastal bluff retreat, bluff-top erosion, gullying, and beach erosion are occurring along the southern Newport shoreline, but the rates of erosion are dependent in great measure on the underlying geologic units.

Plate 1-6 shows four distinct lithological (rock or sediment) zones along the shoreline, each of which responds differently to the weathering effects of water (including rain and waves), gravity and wind. The following section describes the inherent problems associated with each lithologic zone as it pertains to coastal erosion. It should be noted that during a field review of the coastal bluffs of Newport Beach, only one possible landslide or slump block was identified, approximately 1,400 feet north of Pelican Point.

1) Beach sands occur from south of the Santa Ana River to the north entrance to Newport channel. Some of these deposits support dune vegetation, especially the sands forming the Balboa and Newport beaches. When the dune vegetation is well established, erosion of these sediments is minimal. However, foot or vehicular traffic and the burrowing action of rodents can easily compromise the health of this vegetation cover, exposing the near-surface sediments to erosion. Sand is easily transported during storms and can erode quickly if up-drift sand sources are cut off.

   The narrow beaches south of the channel entrance are especially vulnerable to high waves caused by tsunamis or storm surge. Beach erosion may be a problem south of the channel entrance due to the impedance of sediment redistribution via longshore flow by seawalls and rocky bluffs to the north. The area north of the jetties is also vulnerable to inundation due to low beach relief and erosion of coastal dunes.

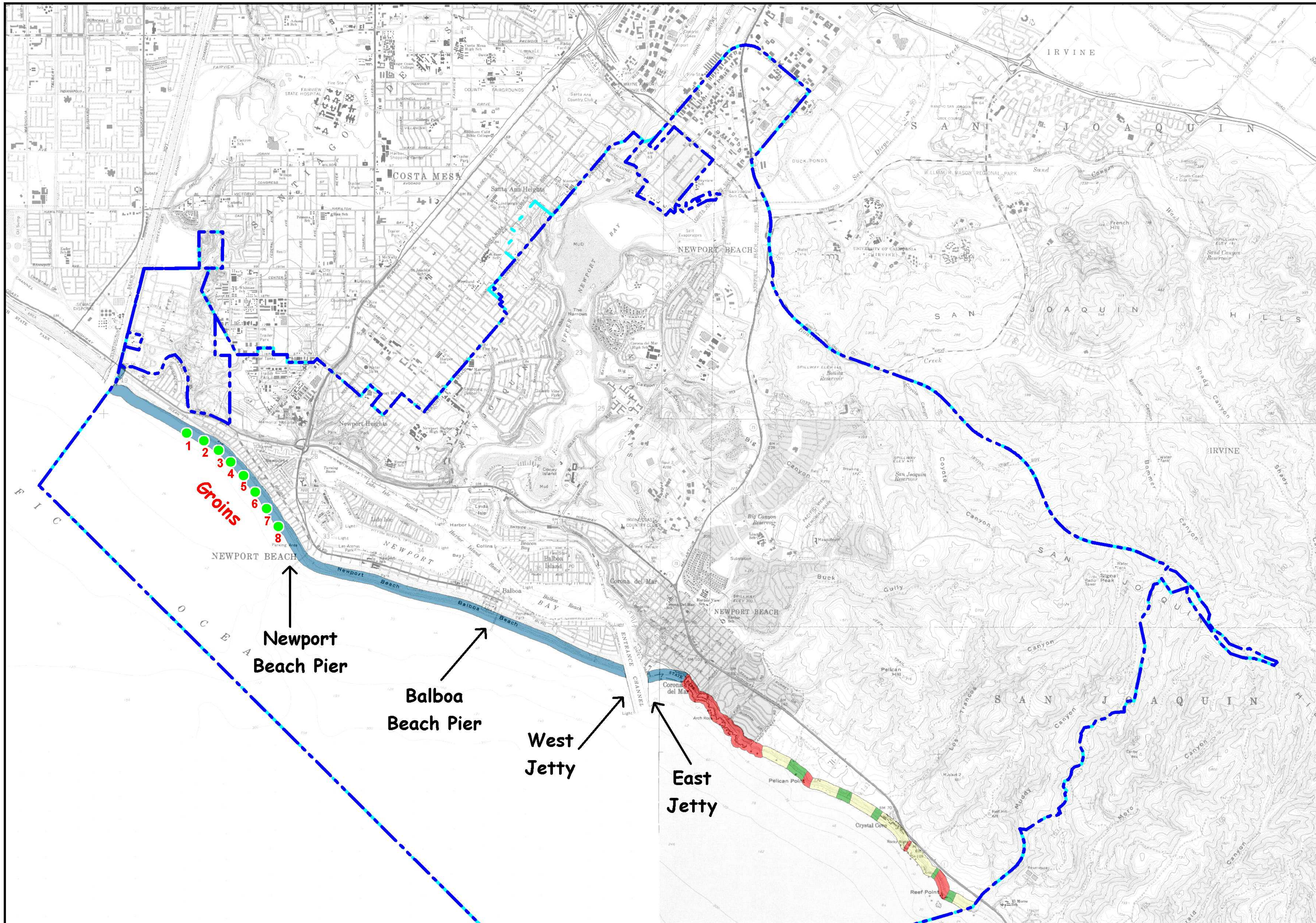
2) The elevated 100,000-year old marine terrace deposits are prone to landslides along steep cuts (such as those along Highway 1) and are susceptible to significant erosion by stream incision, including rilling and gullying along bluff tops. Several streams are cutting through the coastal bluffs, forming steep narrow gorges and undermining the bluffs where they emerge along the coastline. The cap of marine terrace deposits overlying bedrock of the Monterey Formation (see Nos. 3 and 4 below) is heavily rilled along stream cuts and along the face of the bluffs; so it is retreating faster than the underlying bedrock.

3) The siltstone member of Monterey Formation is very fissile and fractured. Sliding and slumping of this unit appears to be the primary mechanism for current bluff retreat, with these processes occurring primarily along slopes that have been oversteepened by wave action (along rocky bluffs) or stream incisions.

   The sandstone member of the Monterey Formation is the most resistant bluff-forming unit in the area. This geologic unit is prone to landsliding or mass wasting where undercut by wave action, especially at rocky bluffs or points, failing primarily as large blocks. Several rocky bluffs along the coastline, including Pelican, Reef and Abalone Points are subject to strong wave action that undermines the cliffs in these areas. Bluffs between these points are armored against ordinary wave action by the mantle of colluvium that has accumulated at their base and been stabilized by vegetation. High waves may remove this basal material from time to time, but there is no evidence (such

Coastal Erosion Hazard Map

Newport Beach, California



NOTES:

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EXPLANATION

- Sandstone member of Monterey Formation; most resistant bluff-forming unit. Prone to landsliding or mass wasting where undercut by wave action, especially at points. Fails as large blocks.
- Siltstone member of Monterey formation; very fissile and fractured; tends to form an apron of talus at the base of slopes.
- Pleistocene marine terrace deposits; prone to landsliding along steep cuts (i.e. Highway 1), and to erosion by rilling and gullying along blufftops.
- Beach and eolian sand covering the gently sloping to level beaches. Continuously reworked by wave and wind action.
- Newport Beach City Boundary
- Sphere of Influence

Scale: 1:60,000

0.5 0 0.5 1 1.5 Miles

1 0 1 2 3 Kilometers

Base Map: USGS Topographic Map from Sure!MAPS RASTER
Mapping by Earth Consultants International

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CITY OF NEWPORT BEACH CALIFORNIA

Project Number: 2112
Date: July, 2003

Plate 1-6

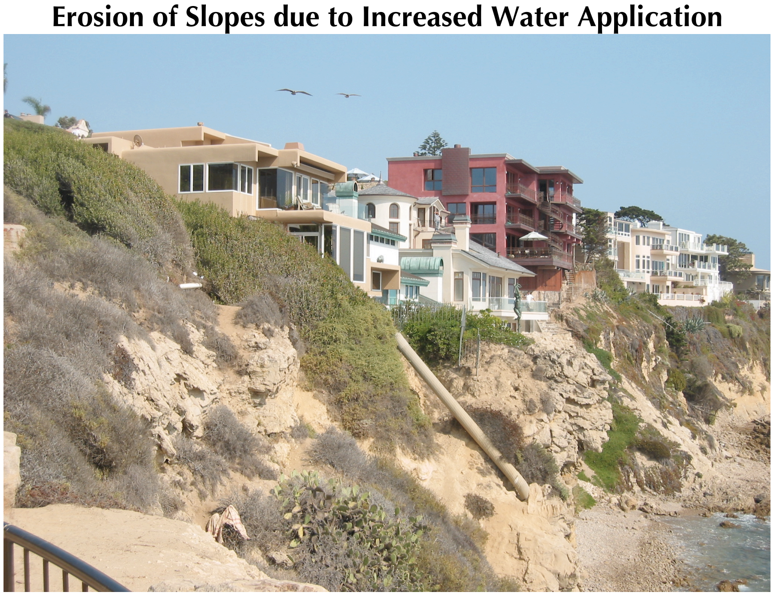
as notches at the base of exposed cliffs) to suggest that undercutting of the bedrock is currently occurring in these areas.

South of the City limits, in the Crystal Cove area, houses are built on the beach at the base of the coastal bluffs. This area is subject to mass wasting and/or landsliding. The potential for impact from tsunami runup or storm surge is great in this area. Small cliffs in Crystal Cove State Park are also being undermined by differential erosion of the siltstone bedrock (the lower 10 to 15 feet of the bluff), which has eroded back farther than the sandstone at the top of the bluff.

The City of Newport Beach has regulations regarding development in bluff areas (Planned Community District Chapter 20.51). Grading, cutting and filling of natural bluff faces or bluff edges is prohibited in order to preserve the scenic value of bluff areas, except for the purpose of performing emergency repairs, or for the installation of erosion preventive devices or other measures necessary to assure the stability of the bluffs. The City ordinance also states that a property line cannot be located closer than 40 feet from the edge of the bluffs. In addition, no part of a proposed development can be located closer than 20 feet to the bluffside property line. These regulations are applied to all new developments in the City, but are not retroactive. Therefore, in some areas, existing, older developments are closer to the edge of the bluff than the current regulations allow (see Figure 1-3).

A concern with urbanization of the bluff areas is that the bluff-forming materials become saturated when shallow ground water rises in response to the increased watering of lawns, generally in an attempt to grow non-native vegetation. Agricultural irrigation, septic tanks and leach lines also contribute to the increased water content of these deposits. This over-watering increases the weight of the sediments, lubricates any joints or fractures that can act as planes of weakness, and increases the chemical dissolution of the underling rocks. All of these processes can contribute to slope instability along the bluffs (see Figure 1-3).

Figure 1-3: Near-Bluff Development and Erosion of Slopes due to Increased Water Application



1.7.3 Artificial Coastal Protection

The use of artificial coastal protection structures was favored 30 to 50 years ago, when the groin field in West Newport was constructed. Other structures intended to protect the coast, such as concrete and wooden seawalls and bulkheads, riprap and rock aprons are located in and around Newport Harbor and the adjacent shoreline. However, it has been long observed that where such protective structures extend seaward beyond adjacent unprotected lots, immediate erosion and notching may occur down drift (Kuhn and Shepard, 1985), especially during large storms and periods of high tide. As beach sand levels fall, storm waves tend to converge on projecting structures (i.e. groins) and the waves refract toward unprotected areas of the beach. Therefore given that improperly located artificial protective devices can have negative impacts that far outweigh their benefits, beach nourishment has emerged as the preferred method of shoreline stabilization in recent decades.

Structures built perpendicular to the shoreline tend to slow the long-shore drift of sediments and thus starve the down-drift area of beach-nourishing sediments. This is seen on a larger scale at the Newport Beach jetty area. The area east of the jetties has an erosional notch due to the blockage of littoral drift from the north. On a smaller scale, groins can have the same effect. In the case of West Newport Beach, eight rock groins were installed in the late 1960s and early 1970s to help maintain the beach (see Table 1-2, Plate 1-6 and Figure 1-4). The effect of this groin field on the width of the beach is readily apparent – the beach on the northwest side of the groin field is wider than the beach where the groins are located. Southeast of the groin field, sand is being trapped by the west jetty, which stabilizes the Balboa Peninsula. The effect of these structures is complemented and augmented by regular beach sand replenishment. The protection of the beaches provides more than just a wider beach for recreational purposes and real-estate development; it serves as a buffer zone that provides protection from tsunami runup or storm surges, especially in areas where there are no dune deposits in front of residential or commercial development.

Table 1-2: Existing Rock Groins along Newport Beach
(described from North to South; refer to Plate 1-6 for their location)

	Length in Feet	Width in Feet
1	340	45
2	185	45
3	200	45
4	300	45
5	335	45
6	370	45
7	390	45
8	445	45

Erosion stabilizations measures that have been implemented in the Corona Del Mar area include concrete covering on one unstable slope, vegetation along the tops and bases of bluffs, boulders at the base of bluffs, where no colluvial cover exists, and channelization of the streams to prevent further downcutting of the terrace and bedrock units.

South of the City, Crystal Cove State Park has implemented an aggressive planting program aimed at stabilizing coastal bluffs. This includes planting vegetation on colluvium at the base of bluffs, on highly erosive terrace deposits, on blufftops, and within the channels that have cut into the bluffs.

Figure 1-4: Artificial Coastal Protection; Rock Groin along Newport Beach

1.8 Policy Recommendations for Reducing Coastal Hazards

Newport Beach is world famous for the quality of its sand beaches. Its citizens have built a lifestyle around beach access, and visitors come from all over southern California and the world to participate in that beach experience. With continued pressures from normal beach erosion, and with those pressures increased as sea level rises, the challenge to maintain the public beaches will ultimately run into the challenge to maintain the private properties that surround the beaches. In short, Newport Beach must develop long-range strategies to protect and maintain its beaches, or it will lose them.

Newport Beach is also susceptible to low-probability but high-risk events like tsunamis and earthquakes. Ignoring these issues will not make them go away or reduce their probability of occurrence. Therefore, it is to the City's benefit to develop tsunami preparedness policies and programs that can be implemented to reduce these hazards, and having a post-tsunami recovery plan that can be implemented "off-the-shelf" immediately after the disaster occurs.

1.8.1 Tsunamis

1.8.1.1 Hazard Assessment

The Channel Islands and Point Arguello protect Newport Beach from most distantly generated tsunamis (teletsunamis) spawned in the Pacific Ocean, except for those generated in the Aleutian Islands, off the coast of Chile, and possibly off the coast of Central America. Nevertheless, since the early 1800s, more than 30 tsunamis have been recorded in southern California, and at least six of these caused damage in the area, although not necessarily in Newport Beach. Tsunamis generated in the Alaskan region take approximately 6 hours to make it to the southern California area, while tsunamis generated off the Chilean coast take 12 to 15 hours to reach southern California. Given those time frames, coastal communities in southern California can receive adequate warning, allowing them to implement evacuation procedures. Alternatively, very little warning time, if any, can be expected from locally generated tsunamis. Locally generated tsunamis caused by offshore faulting or landsliding (including earthquake-induced landsliding) immediately offshore from Newport Beach are possible, and these tsunamis have the potential to be worst-case scenarios for the coastal communities in Orange County. Modeling off the Santa Barbara coast suggests that locally generated tsunamis can cause waves between 2 and 20 m (6 to 60 feet) high, and that these could impact the coastline with almost no warning, within minutes of the causative earthquake or slump.

1.8.1.2 Hazard Mitigation

As local and distant tsunami inundation maps for the local coastal communities are developed using internationally accepted mathematical models, the City of Newport Beach should review and adopt them. These maps should be GIS-based so they can be easily maintained and edited as local land uses change. Inundation (flooding) maps are useful because they provide all stakeholders with the information needed to make educated decisions about the risk of living and working in potential tsunami runup inundation areas. The maps presented herein provide a preliminary assessment of the tsunami hazard in Newport Beach, but these emphasize the hazard from distantly generated sources rather than the potentially more damaging local tsunami sources. The inundation models show that the low-lying areas around the harbor, including the Balboa Peninsula, Newport Bay, Balboa Island, and to some extent Lido Isle, can be impacted by tsunami runup. As a result of tsunami inundation, these areas would be cut off from the rest of the mainland, so warning systems and evacuation plans for these areas should be developed and implemented. Residents in these areas need to be especially aware that an earthquake, even a distant one, has the potential to trigger offshore submarine landslides that could cause a local tsunami that would impact the coastline with little warning.

Educational programs that emphasize evacuation of low-lying areas immediately after an earthquake is felt, in response to an unusual retreat of the ocean past the low tide mark, or in response to unusual seiching of the water surface, should help reduce the loss of life. This is especially true if individuals act upon these lessons without waiting for or requiring an official notification to evacuate, which might come in too late if the tsunami is generated locally. Regardless of the comments above, an early warning system for local tsunamis and an emergency plan to evacuate residents should be prepared. Given the need to evacuate low-lying areas as quickly as possible, exit routes to higher ground should be clearly posted.

To summarize, mitigation measures that can be implemented to reduce the hazard of tsunamis in the Newport Beach area include:

- Develop workable response plans that the City's emergency services can adopt immediately for evacuation in the case of a tsunami warning.
- Deploy a system of tsunami detection and early warning systems. This can be accomplished through existing systems and agencies, but planning and emergency

personnel need to be aware of them and have an action plan to follow in such an emergency.

- Place tsunami evacuation signs in threatened coastal areas. Evacuation routes off of the peninsula and islands in the Bay should be clearly posted. An evacuation route traffic monitoring system that provides real-time information on the traffic flow at critical roadways should be considered.
- Continue projects like the Surfside-Sunset/West Newport Beach Replenishment program to maintain beach width. Wide beaches provide critical protection against tsunami runup for structures along the oceanfront. Regular measurements of beach width and elevation can dictate the frequency and quantity of sand for replenishment projects.
- Develop and implement a tsunami educational program for residents and people who work in the susceptible areas. The program should provide the community with specific information about what a tsunami precursor looks like at the beach, and what appropriate actions to take in the event of a tsunami.
- Encourage the local school district to include in their earthquake-preparedness curriculum information specifically related to the natural hazards that Newport Beach's citizens could face, and what to do about them. Particularly important is the educational awareness of what an impending tsunami looks like while at the beach [sea level retreat, seiching, etc.], especially if in response to a local earthquake.
- Newport Beach should consider supplementing the State's funding for the University of Southern California Tsunami Research Group to complete its work in the Newport Beach offshore area, and to conduct more detailed studies in the Newport Bay area.

1.8.2 Storm Surge

1.8.2.1 Hazard Assessment

This hazard affects primarily ocean front property, and the low-lying areas of Newport Bay just inland from the jetties. Newport Bay is less affected by storm surge. Unlike tsunamis, which can occur anytime, storm surges are associated with bad weather. Given that during bad weather a lot less people are expected to be at the beach, storm surges are more likely to impact residents than tourists, and the potential number of casualties can be expected to be significantly less.

The most common problem associated with storm surges is flooding of low-lying areas, including structures. This is often compounded by intense rainfall and strong winds. If a storm surge occurs during high tide, the flooded area can be significant. Coastal flooding in Newport Beach occurred in the past when major storms, many of these ENSO (El Niño Southern Oscillation) events, impacted the area. Storm surging associated with a tropical storm has been reported only once in the history of Newport Beach, in 1939. This suggests that the hazard of cyclone-induced storm surges has a low probability of occurrence. Nevertheless, the one incident in 1939 caused millions of dollars in damage to Newport Beach.

1.8.2.2 Hazard Mitigation

Surge-induced flood protection involves maintaining a continuous barrier that is higher than the level of inundation expected. Typically this is accomplished with sand dunes, seawalls, and bulkheads. The height of these protective structures is often a compromise between the need for protection, the need to accommodate buildings and other infrastructure, and the need or desire to maintain views of the ocean (Nordstrom, 2000). In some areas, dunes are seen as temporary features that can be modified as needed using earth-moving equipment. In other areas, dunes are protected features that provide habitat for various native plant and animal species. Environmental reason dictates that vegetated dunes are preferable, however, in some areas raked and level beaches are considered to have a greater value due to their recreational potential. In Newport Beach, where both types of beaches occur, it seems appropriate to compromise. In the heavily used beaches where vegetation cannot be established due to intense foot and vehicular traffic, if a storm threatens, bulldozers can be used to build a temporary protective dune. This requires access to equipment in short notice. In the more natural beaches, where vegetated sand dunes are promoted, habitable structures should be located inland from the sand dunes using the setback distance as a protective measure. Beach nourishment programs help maintain the protective wide beaches and sand dunes. Newport Beach must develop a long-range plan to ensure that adequate (and increasingly larger) volumes of sand are available to the City for beach replenishment.

In low-lying areas, storm drains should be maintained and cleaned out regularly, as necessary, so that flood waters can be effectively conveyed away from structures. In some areas near sea level, pumping may be required to manage flood waters.

Relocating an oceanfront structure farther inland can be less expensive than rebuilding the structure if it is destroyed. However, in Newport Beach there is little opportunity for this option to be seriously considered. Under the California Coastal Act, a coastal development permit is not required for the re-construction of any property destroyed by a natural disaster if the replacement structure footprint remains substantially the same (no more than 10% change from the original structure). Therefore, redevelopment after a natural disaster can include the same design or location that contributed to the first episode of property loss. Nevertheless, there are specific measures that can be taken to reduce the damage to structures caused by coastal conditions like storms. The Federal Emergency Management Agency (FEMA) publishes the Coastal Construction Manual that provides specific guidelines designed to safely site, design, construct and maintain coastal residential structures. The more recent version of this manual was issued in July 2000. Implementation of these guidelines above and beyond the requirements of the Building Code adopted by the City should be considered.

Newport Beach could also develop a policy dealing with housing remodels in flood-prone zones that requires raising the floor elevations by at least 3 feet. The City should continue to enforce policies that prohibit the construction of seawalls, groins, or other hard devices to protect private property from tsunami, storm surge, or sea level rise. In addition, the City should consider policies that specify that if a structure is damaged as a result of coastal hazards, it should be subject to the floor-level raise requirements mentioned above, and that if a property is eroded away, the development right to that lot should be rescinded.

1.8.3 Seiches

1.8.3.1 Hazard Assessment

Seiches are not considered a significant hazard in Newport Beach, primarily because there is no record of seiches impacting the area after both local and distant earthquakes. Wind-generated seishes in Newport Bay have also not been reported. If a seiche developed in Newport Bay, the waves are expected to be low, impacting primarily moored boats.

1.8.3.2 Hazard Mitigation

Mitigation designed specifically to reduce the hazard of seiches is not warranted. Mitigation measures implemented to reduce the hazards of tsunami, storm surge, and sea level rise, such as limiting construction along the waterfront of Newport Bay, are expected to mitigate the hazard of seiche.

1.8.4 Sea Level Rise

1.8.4.1 Hazard Assessment

Sea level rise due to climate warming is expected to amplify coastal hazards such as storm surges, beach erosion, loss of wetlands, and degradation of fresh water quality due to seawater intrusion. A sea level rise of as little as 15 cm (6 inches) could negatively impact the Newport Beach area by flooding and eroding the narrow beaches south of the jetty area, which would result in increased erosion of the bluffs. The record of sea level rise in the last century is poorly constrained in this region, however. Gauge records up and down the Pacific Coast show substantial variations in relative sea level rise. Based on the historical records from the two gauges closest to Newport Beach, in Los Angeles and San Diego, a 15-cm rise in sea level in the Newport Beach area may take anywhere between 70 and 180 years, assuming that global warming does not accelerate in the next few decades. These estimates are too poorly constrained to engender policy changes and development of appropriate mitigation strategies. However, sea level rise would lead to the permanent inundation of low-lying areas, with potentially significant changes in land use, so it is not too soon to develop longer-term strategies that can be implemented to cope with these changes.

1.8.4.2 Hazard Mitigation

To better constrain the trend in relative sea level change and predict sea level rise in the Newport Beach area, long-term sea-level gauges should be installed and operated on a continuous basis. These measuring devices should also measure tide variations, storm surges and other temporary changes in sea level that occur in response to weather conditions. All data recorded with these gauges should be archived in a format that can be easily retrieved for studies and monitoring of sea-level rise, and to evaluate the impact from storm surge and other coast flooding events. Better predictions of local sea level rise should be developed as these data are obtained.

Beach nourishment requirements would increase to compensate for enhanced beach erosion resulting from sea level rise. In areas where beaches are narrow, artificial protection devices at the base of the bluffs, such as rock riprap aprons, may be required to reduce the effect of wave impact and storm surge on the exposed sea cliffs. This would temporarily protect the structures at the top of the bluffs, but at the expense of the beach. In the low-lying areas in Newport Bay, structures and infrastructure may have to be elevated. The potential adverse effects that mitigation measures may pose on adjoining properties and on the protected estuaries should be considered and evaluated over the next 20 to 30 years. The financial impact that sea level rise will pose on the community and individual property owners should also be addressed. A GIS-based database of all properties in low-lying areas in the City, including the elevation of each structure, type of construction, age, and value (based on monetary, historical, or other intrinsic criteria) should be considered. These data can then be used to perform a risk assessment study that can be used to identify those properties at greater risk, and to develop and prioritize mitigation alternatives best suited to the area. In many cases, the most cost-effective solution might be to simply allow the structure to be destroyed.

1.8.5 Coastal Erosion

1.8.5.1 Hazard Assessment

Coastal erosion occurs and will continue to occur as a result of natural processes such as long-shore drift, storm surge and sea level rise. The Department of Boating and Waterways and the State Coastal Conservancy (2002) have jointly conducted a study that concluded that California beaches provide numerous benefits to the state and its residents, and these benefits are so valuable that it merits the State to invest a significant amount of money to restore and maintain its beaches. Specifically, the Department of Boating and Waterways estimates that California needs to spend $120 million in one-time beach restoration costs, and $27 million in annual beach maintenance costs. The preferred method of beach restoration is beach sand replenishment. As discussed previously, with increased erosion due to sea level rise and climatic changes associated with global warming, the need for sand replenishment will increase. Finding and obtaining adequate sources of beach sand material not impacted with foreign materials, such as glass and construction debris, may become a challenge. Increased environmental concerns associated with the mining and placement of these deposits along the coastline can also be anticipated.

Sea bluff erosion occurs as a result of processes that impact both the bottom and top of the cliffs. Pounding of the waves during high tide and storm surges causes considerable damage to the bottom of the bluffs. If the sediments exposed in this zone are soft and highly erodible, eventual collapse of the bluff can occur as it is undercut by wave action. Uncontrolled surface runoff, if allowed to flow over the top of the bluffs, can cause extensive erosion in the form of rills and gullies. During wet years, large canyons can develop quickly, often as a result of a single storm. Unchecked foot and vehicular traffic and rodent burrowing can also cause significant damage at the top of the bluffs. Increased irrigation associated with agricultural and residential watering can lubricate fine-grained layers in the sediments or bedrock forming the cliffs, leading to failure as a result of landsliding.

1.8.5.2 Hazard Mitigation

There is a strong interest in preserving the width and elevation of the beaches and protecting the beaches from erosion by natural coastal processes because beaches act as a buffer zone to low-lying areas immediately inland that may be inundated by tsunami runup or storm surge. Continued beach replenishment will help maintain this buffer. Beaches are also a signature feature of Newport Beach, and generate substantial visitor income. The existing groin field and jetties should be maintained, as these structures are a part of the current stable system, and their removal is likely to trigger increased erosion in the area. Sand dunes, dikes and berms should also be maintained in good condition as these provide protection from coastal inundation. The City of Newport Beach currently monitors the width and elevation of its beaches twice annually.

"Hard" protective devices, such as revetments, bulkheads, seawalls, or breakwaters have historically been the most common approach to reducing shoreline erosion and protecting private or public structures. These structures reduce wave attack and backshore erosion and are often used to protect infrastructure serving the public. For example, the 6,000-foot seawall in Carlsbad protects a utility corridor and is the only north-south thoroughfare along that portion of the coastline, other than Interstate 5. The 54-year old O'Shaughnessy seawall at Ocean Beach in San Francisco, which protects Highway 1, is a similar example. In general, these structures provide greater public safety by protecting infrastructure and improving public access to the shore. If not designed properly, however, these structures can do more harm than good. Therefore, the potential negative impacts of these structures must be considered. Adverse impacts may include limiting public access to the shoreline, increasing erosion down coast, restricting sand input from protected bluffs, and disrupting the ocean view from the shore. In eroding beaches, a seawall will actually accelerate the destruction of the beach. Many structures of this kind are built on an emergency basis during heavy storm activity without proper engineering or appropriate materials, leading to their eventual failure and increased damage to the coastline.

Raising existing bulkheads has been proposed to protect structures from sea level rise, however, this should also not be done without consideration of local conditions. For example, along the oceanfront, increasing bulkhead heights can cause deepening of the ocean bottom. This results in increased wave energy impacting the bulkhead, which can lead to the potential failure of the structure or nearby structures. Raised bulkheads along the oceanfront are not recommended. On the other hand, bulkheads in the lower energy environment of Newport Bay would protect structures from rising sea levels.

While protective structures may be built to protect existing development or coastal-dependent facilities, the California Coastal Act requires that new, non-coastal dependent developments not be built if it is known that the development will require a protective structure in the future. This is an appropriate policy, as avoidance would reduce costs associated with future disaster relief, construction of protective devices, and government disaster assistance.

The City of Newport Beach has policies in place limiting development adjacent to bluffs. Enforcement of these policies should be continued. Subsurface drains installed below the effective root line of most landscaping plants should be considered in areas near the bluffs to collect the extra rainwater and irrigation water not utilized by plants. This will prevent a rise in the local groundwater level that can lead to increased erosion or failure of the bluffs. Landscaping areas near the bluffs with drought-resistant plants that require little or no watering should also be encouraged.

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CHAPTER 2: SEISMIC HAZARDS

2.1 Introduction

While Newport Beach is at risk from many natural and man-made hazards, an earthquake is the event with the greatest potential for far-reaching loss of life or property, and economic damage. This is true for most of southern California, since damaging earthquakes are frequent, affect widespread areas, trigger many secondary effects, and can overwhelm the ability of local jurisdictions to respond. Earthquake-triggered geologic effects include ground shaking, surface fault rupture, landslides, liquefaction, subsidence and seiches, all of which are discussed below. Earthquakes can also lead to urban fires, dam failures, and toxic chemical releases. These man-related hazards are also discussed in this document.

In California, recent earthquakes in or near urban environments have caused relatively few casualties. This is due more to luck than design. For example, when a portion of the Nimitz Freeway in Oakland collapsed at rush hour during the 1989, M_W 7.1 Loma Prieta earthquake, the traffic was uncommonly light because so many were watching the World Series. The 1994, M_W 6.7 Northridge earthquake occurred before dawn, when most people were home safely in bed. Despite such good luck, California's urban earthquakes have resulted in significant losses. The moderate-sized Northridge earthquake caused 54 deaths and nearly $30 billion in damage. Newport Beach is at risk from earthquakes that could release more than 10 times the seismic energy of the Northridge earthquake.

Although it is not possible to prevent earthquakes, their destructive effects can be minimized. Comprehensive hazard mitigation programs that include the identification and mapping of hazards, prudent planning, public education, emergency exercises, enforcement of building codes, and expedient retrofitting and rehabilitation of weak structures can significantly reduce the scope of an earthquake's effects and avoid disaster. Local government, emergency relief organizations, and residents must take action to develop and implement policies and programs to reduce the effects of earthquakes.

2.2 Earthquake and Mitigation Basics

2.2.1 Definitions

The outer 10 to 70 kilometers of the Earth consist of enormous blocks of moving rock, called tectonic plates. There are about a dozen major plates, which slowly collide, separate, and grind past each other. In the uppermost brittle portion of the plates, friction locks the plate edges together, while plastic movement continues at depth. Consequently, the near-surface rocks bend and deform near plate boundaries, storing strain energy. Eventually, the frictional forces are overcome and the locked portions of the plates move. The stored strain energy is then released in seismic waves.

By definition, the break or fracture between moving blocks of rock is called a fault, and such differential movement produces a fault rupture. The point where the fault rupture originates is called the focus (or hypocenter). The released energy radiates out in all directions from the rupture surface causing the Earth to vibrate and shake as the waves travel through. This shaking is what we feel in an earthquake.

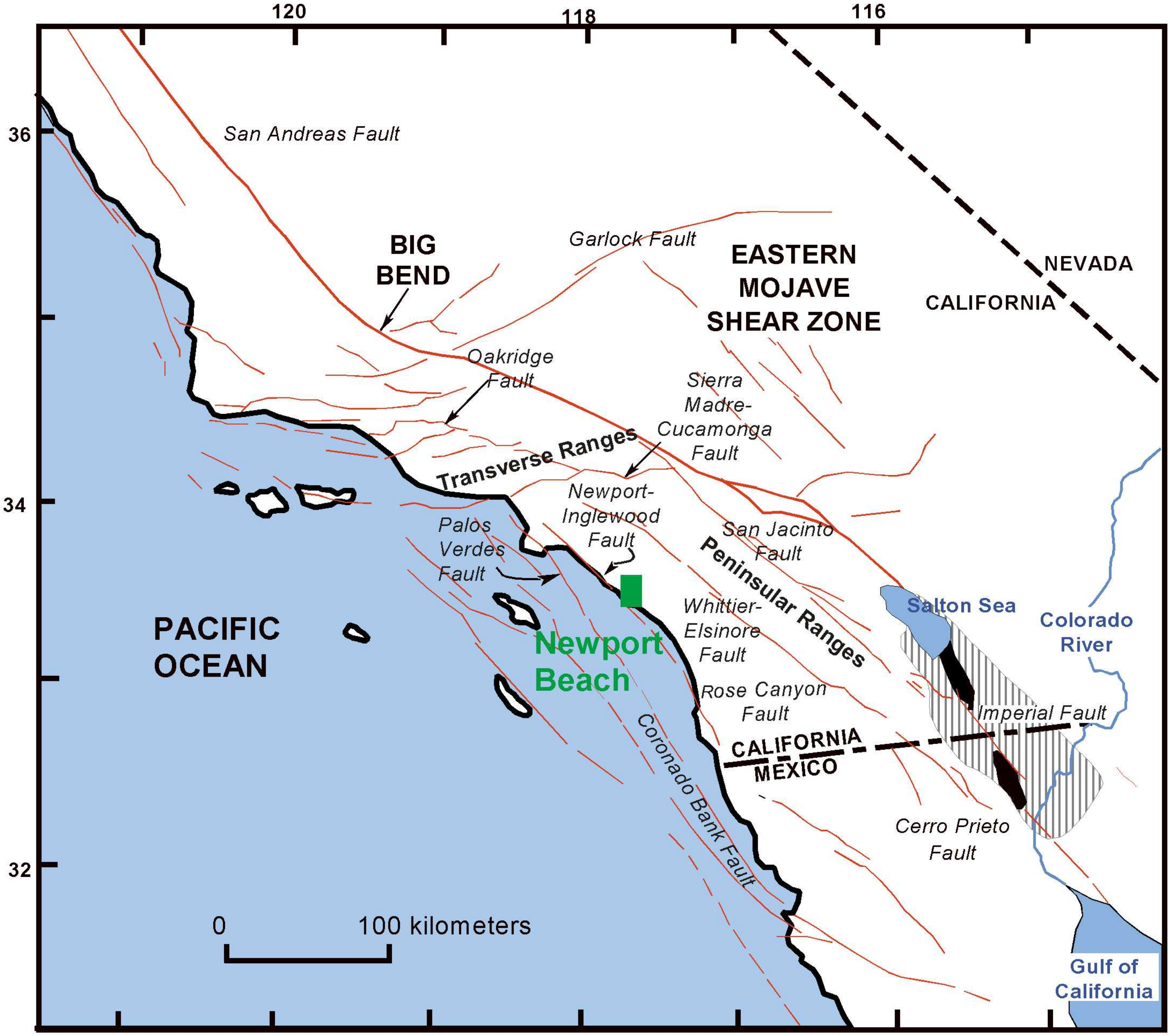
Although faults exist everywhere, most earthquakes occur on or near plate boundaries. Thus, southern California has many earthquakes, because it straddles the boundary between the North American and Pacific plates, and fault rupture accommodates their motion. Newport Beach is riding on the Pacific Plate, which is moving northwesterly (relative to the North American Plate), at about 50 mm/yr. This is about the rate at which fingernails grow, and seems unimpressive. However, it is enough to accumulate enormous amounts of strain energy over dozens to thousands of years. Despite being locked in place most of the time, in another 15 million years (a short time in the context of the Earth's history), due to plate movements, Newport Beach will be hundreds of kilometers north of San Francisco.

Although the San Andreas fault marks the actual separation between the Pacific and North American plates, only about 70 percent of the plate motion actually occurs on this fault. The rest is distributed along other faults of the San Andreas system, including the San Jacinto, Whittier-Elsinore, Newport-Inglewood, Palos Verdes, and several offshore faults. To the east of the San Andreas fault, slip is distributed among faults of the Eastern Mojave Shear Zone, including those responsible for the 1992, M_W 7.3 Landers and 1999 M_W 7.1 Hector Mine earthquakes. (M_W stands for moment magnitude, a measure of earthquake energy release, discussed below.) Thus, the zone of plate-boundary earthquakes and ground deformation covers an area that stretches from Nevada to the Pacific Ocean (Figure 2-1).

Because the Pacific and North American plates are sliding past each other, with relative motions to the northwest and southeast, respectively, all of the faults mentioned above trend northwest-southeast, and are strike-slip faults. On average, strike-slip faults are nearly vertical breaks in the rock, and when a strike-slip fault ruptures, the rocks on either side of the fault slide horizontally past each other.

However, there is a kink in the San Andreas fault commonly referred to as the "Big Bend". The northwest corner of the Big Bend is located about 75 miles north of Newport Beach (Figure 2-1). Near the Big Bend, the two plates do not slide past each other. Instead, they collide, causing localized compression, which then results in folding and thrust faulting. Thrust faults meet the surface of the Earth at a low angle, dipping 25 to 35 degrees from horizontal. Thrusts are a type of dip-slip fault where rocks on opposite sides of the fault move up or down relative to each other. When a thrust fault ruptures, the top block of rock moves up and over the rock on the opposite side of the fault.

In southern California, ruptures along thrust faults have built the Transverse Ranges geologic province, a region with an east-west trend to its landforms and underlying geologic structures. This orientation is anomalous, virtually unique in the western United States, and is a direct consequence of the plates colliding at the Big Bend. Many of southern California's most recent damaging earthquakes have occurred on thrust faults that are uplifting the Transverse Ranges, including the 1971 M_W 6.7 San Fernando, the 1987 M_W 5.9 Whittier Narrows, the 1991 M_W 5.8 Sierra Madre, and the 1994 M_W 6.7 Northridge earthquakes.



Source: Modified from Fuis and Mooney, 1990

MAP EXPLANATION

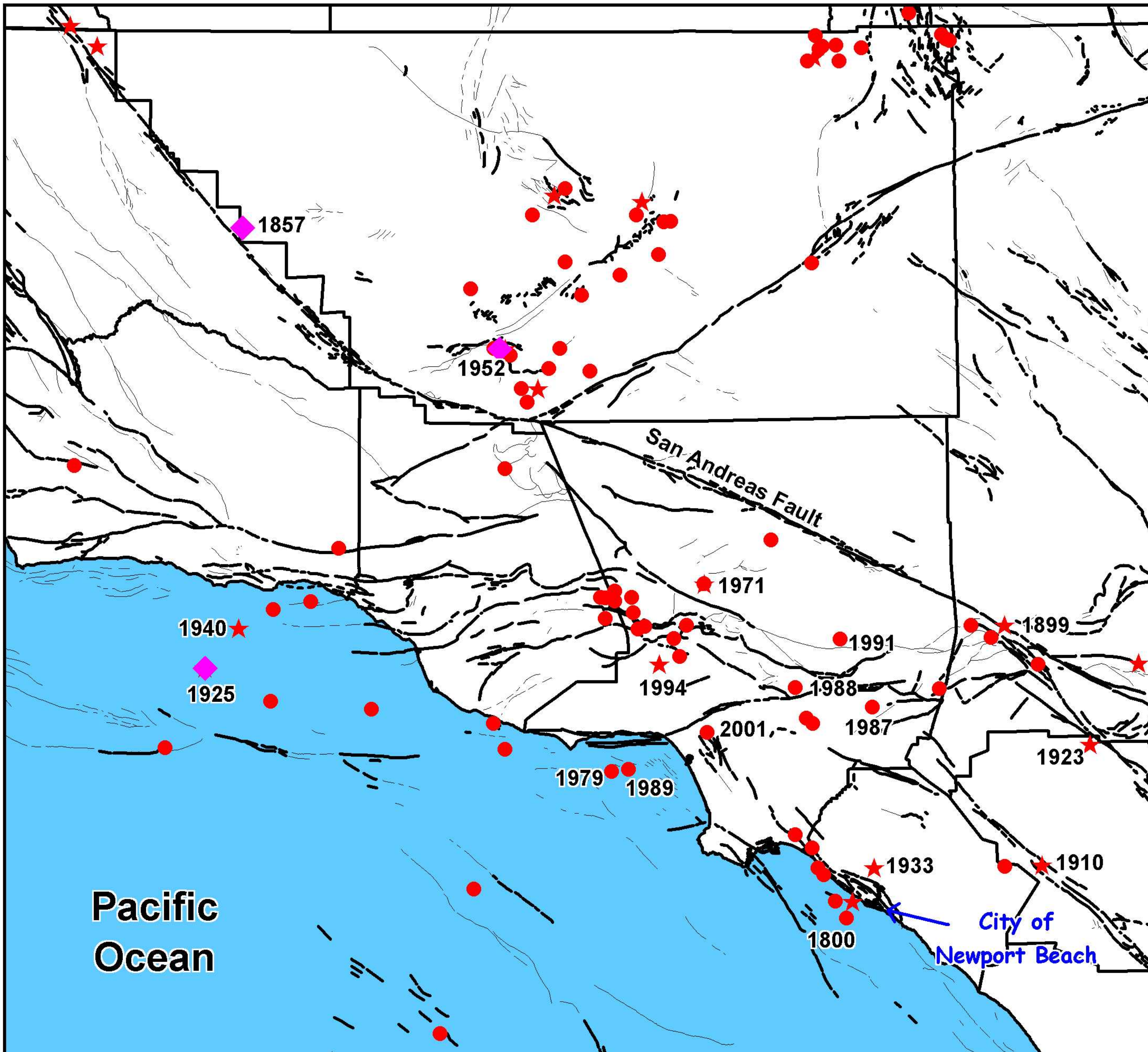
- Fault
- Onshore Spreading Center
- New Crust (late Cenozoic)

Earth Consultants International

Project Number: 2112
Date: January, 2003

Regional Fault Map

Figure 2-1



Source: Jennings, 1994; SCEC earthquake catalog; NEIC earthquake catalog

Map Explanation

Magnitude 7+ | Magnitude 5 - 6

Magnitude 6 - 7 | Quaternary faults

Earth Consultants International

Project Number: 2112
Date: January, 2003

Regional Seismicity Map

Figure 2-2

Thrust faults can be particularly hazardous because many are "blind" thrust faults, that is, they do not extend to the surface of the Earth. These faults are extremely difficult to detect before they rupture. Some of the most recent earthquakes, like the 1987 Whittier Narrows earthquake and the 1994 Northridge earthquake, occurred on previously unknown blind thrust faults.

The city of Newport Beach is situated in the northern part of the Peninsular Ranges Province, an area that is exposed to risk from multiple earthquake fault zones. The highest risks originate from the Newport-Inglewood (strike-slip, right-lateral) fault zone, the Whittier (strike-slip, right-lateral) fault zone, the San Joaquin Hills (blind thrust) fault, and the Elysian Park (blind thrust) fault zone. Each one of these faults will be discussed in more detail in Section 2-5.

2.2.2 Evaluating Earthquake Hazard Potential

When comparing the sizes of earthquakes, the most meaningful feature is the amount of energy released. Thus scientists most often consider seismic moment, a measure of the energy released when a fault ruptures. We are more familiar, however, with scales of magnitude, which measure amplitude of ground motion. Magnitude scales are logarithmic. Each one-point increase in magnitude represents a ten-fold increase in amplitude of the waves as measured at a specific location, and a 32-fold increase in energy. That is, a magnitude 7 earthquake produces 100 times (10 x 10) the ground motion amplitude of a magnitude 5 earthquake. Similarly, a magnitude 7 earthquake releases approximately 1,000 times more energy (32 x 32) than a magnitude 5 earthquake. Recently, scientists have developed the moment magnitude (M_w) scale to relate energy release to magnitude.

An early measure of earthquake size still used today is the seismic intensity scale, which is a qualitative assessment of an earthquake's effects at a given location. Although it has limited scientific application, intensity is still widely used because it is intuitively clear and quick to determine. The most commonly used measure of seismic intensity is called the Modified Mercalli Intensity (MMI) scale, which has 12 damage levels (Table 2-1).

A given earthquake will have one moment and, in principle, one magnitude, although there are several methods of calculating magnitude, which give slightly different results. However, one earthquake will produce many levels of intensity because intensity effects vary with the location and the perceptions of the observer.

Few faults are simple, planar breaks in the Earth. They more often consist of smaller strands, with a similar orientation and sense of movement. A strand is mappable as a single, fairly continuous feature at a scale of about 1:24,000. Sometimes geologists group strands into segments, which are believed capable of rupturing together during a single earthquake. The more extensive the fault, the bigger the earthquake it can produce. Therefore, multi-strand fault ruptures produce larger earthquakes.

Table 2-1: Abridged Modified Mercalli Intensity Scale

Intensity Value and Description		Average Peak Velocity (cm/sec)	Average Peak Acceleration (g = gravity)
I.	Not felt except by a very few under especially favorable circumstances (I Rossi-Forel scale). Damage potential: None.	<0.1	<0.0017
II.	Felt only by a few persons at rest, especially on upper floors of high-rise buildings. Delicately suspended objects may swing. (I to II Rossi-Forel scale). Damage potential: None.	0.1 – 1.1	0.0017 – 0.014
III.	Felt quite noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing automobiles may rock slightly. Vibration like passing of truck. Duration estimated. (III Rossi-Forel scale). Damage potential: None.		
IV.	During the day felt indoors by many, outdoors by few. At night some awakened. Dishes, windows, doors disturbed; walls make creaking sound. Sensation like a heavy truck striking building. Standing automobiles rocked noticeably. (IV to V Rossi-Forel scale). Damage potential: None. Perceived shaking: Light.	1.1 – 3.4	0.014 - 0.039
V.	Felt by nearly everyone; many awakened. Some dishes, windows, and so on broken; cracked plaster in a few places; unstable objects overturned. Disturbances of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop. (V to VI Rossi-Forel scale). Damage potential: Very light. Perceived shaking: Moderate.	3.4 – 8.1	0.039-0.092
VI.	Felt by all; many frightened and run outdoors. Some heavy furniture moved, few instances of fallen plaster and damaged chimneys. Damage slight. (VI to VII Rossi-Forel scale). Damage potential: Light. Perceived shaking: Strong.	8.1 - 16	0.092 -0.18
VII.	Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving cars. (VIII Rossi-Forel scale). Damage potential: Moderate. Perceived shaking: Very strong.	16 - 31	0.18 - 0.34
VIII.	Damage slight in specially designed structures; considerable in ordinary substantial buildings with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, and walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving cars disturbed. (VIII+ to IX Rossi-Forel scale). Damage potential: Moderate to heavy. Perceived shaking: Severe.	31 - 60	0.34 - 0.65
IX.	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken. (IX+ Rossi-Forel scale). Damage potential: Heavy. Perceived shaking: Violent.	60 - 116	0.65 – 1.24
X.	Some well-built wooden structures destroyed; most masonry and frame structures destroyed; ground badly cracked. Rails bent. Landslides considerable from river banks and steep slopes. Shifted sand and mud. Water splashed, slopped over banks. (X Rossi-Forel scale). Damage potential: Very heavy. Perceived shaking: Extreme.	> 116	> 1.24
XI.	Few, if any, (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.		
XII.	Damage total. Waves seen on ground surface. Lines of sight and level distorted. Objects thrown into air.		

Modified from Bolt (1999); Wald et al. (1999)

The bigger and closer the earthquake, the greater the damage it may generate. Thus fault dimensions and proximity are key parameters in any hazard assessment. In addition, it is important to know a fault's style of movement (i.e., is it dip-slip or strike-slip, discussed above), the age of its most recent activity, its total displacement, and its slip rate (all discussed below). These values allow an estimation of how often a fault produces damaging earthquakes, and how big an earthquake should be expected the next time the fault ruptures.

Total displacement is the length, measured in kilometers (km), of the total movement that has occurred along the fault over as long a time as the geologic record reveals. It is usually estimated by measuring distances between geologic features that have been split apart and separated (offset) by the cumulative movement of the fault over many earthquakes. Slip rate is a speed, expressed in millimeters per year (mm/yr). Slip rate is estimated by measuring an amount of offset accrued during a known amount of time, obtained by dating the ages of geologic features. Slip rate data also are used to estimate a fault's earthquake recurrence interval. Sometimes referred to as "repeat time" or "return interval", the recurrence interval represents the average amount of time that elapses between major earthquakes on a fault. The most specific way to derive the recurrence interval for a given fault is to excavate a trench across the fault to obtain paleoseismic evidence of earthquakes that have occurred during prehistoric time.

Paleoseismic studies show that faults with higher slip rates often have shorter recurrence intervals between major earthquakes. This makes sense because a high slip rate indicates rocks that, at depth, are moving relatively quickly. Thus the locked, surficial rocks are storing more strain energy, so the forces of friction will be exceeded more often, releasing the strain energy in more frequent, large earthquakes.

Faults have formed over millions of years, usually in response to regional stresses. Shifts in these stress regimes do occur over millennia. As a result, some faults change in character. For example, a thrust fault in a compressional environment may become a strike-slip fault in a transpressive (oblique compressional) environment. Other faults may be abandoned altogether. Consequently, the State of California, under the guidelines of the Alquist-Priolo Earthquake Fault Zoning Act of 1972 (Hart and Bryant, 1999), classifies faults according to the following criteria:

- ***Active***: faults showing proven displacement of the ground surface within about the last 11,000 years (within the Holocene Epoch), that are thought capable of producing earthquakes;

- ***Potentially Active***: faults showing evidence of movement within the last 1.6 million years, but that have not been shown conclusively whether or not they have moved in the last 11,000 years; and

- ***Not active***: faults that have conclusively NOT moved in the last 11,000 years.

The Alquist-Priolo classification is used primarily for residential subdivisions. Different definitions of activity are used by other agencies or organizations depending on the type of facility being planned or developed. For example, longer periods of inactivity may be required for dams or nuclear power plants. An important subset of active faults are those with historical earthquakes. In California, that means faults that have ruptured since 1769, when the Spanish first settled in the area.

The underlying assumption in this classification system is that if a fault has not ruptured in the last 11,000 years, it is not likely to be the source of a damaging earthquake in the future. In reality, however, most potentially active faults have been insufficiently studied to determine their hazard level. Also, although simple in theory, the evidence necessary to determine whether a fault has or has not moved during the last 11,000 years can be difficult to obtain. For example, some faults leave no discernable evidence of their earthquakes, while other faults stop rupturing for millennia, and then are "reactivated" as the tectonic environment changes.

2.2.3 Causes of Earthquake Damage

Causes of earthquake damage can be categorized into three general areas: strong shaking, various types of ground failure that are a result of shaking, and ground displacement along the rupturing fault. The State definition of an active fault is designed to gauge the surface rupture potential of a fault, and is used to prevent development from being sited directly on an active fault. This helps to reduce damage from the third category. Below, the three categories are discussed in order of their likelihood to occur extensively:

1) Strong ground shaking causes the vast majority of earthquake damage. Horizontal ground acceleration is frequently responsible for widespread damage to structures, so it is commonly estimated as a percentage of g, the acceleration of gravity. Full characterization of shaking potential, though, requires estimates of peak (maximum) ground displacement and velocity, the duration of strong shaking, and the periods (lengths) of waves that will control each of these factors at a given location. We look to the recorded effects of damaging earthquakes worldwide to understand what might happen in similar environments here in the future. In general, the degree of shaking can depend upon:

Source effects. These include earthquake size, location, and distance, as discussed above. In addition, the exact way that rocks move along the fault can influence shaking. For example, the 1995, M_W 6.9 Kobe, Japan earthquake was not much bigger than the 1994, M_W 6.7 Northridge, California earthquake, but the city of Kobe suffered much worse damage. During the Kobe earthquake, the fault's orientation and movement directed seismic waves into the city. During the Northridge earthquake, the fault's motion directed waves away from populous areas.

Path effects. Seismic waves change direction as they travel through the Earth's contrasting layers, just as light bounces (reflects) and bends (refracts) as it moves from air to water. Sometimes seismic energy gets focused into one location and causes damage in unexpected areas. Focusing of 1989's M_W 7.1 Loma Prieta earthquake waves caused damage in San Francisco's Marina district, some 62 miles (100 km) distant from the rupturing fault.

Site effects. Seismic waves slow down in the loose sediments and weathered rock at the Earth's surface. As they slow, their energy converts from speed to amplitude, which heightens shaking. This is like the behavior of ocean waves – as the waves slow down near shore, their crests grow higher. The Marina District of San Francisco also serves as an example of site effects. Earthquake motions were greatly amplified in the deep, sediment-filled basin underlying the District compared to the surrounding bedrock areas. Seismic waves can get trapped at the surface and reverberate (resonate). Whether resonance will occur depends on the period (the length) of the incoming waves. Waves, soils and buildings all have resonant periods. When these coincide, tremendous damage can occur.

We keep talking about periods. What do we mean? Waves repeat their motions with varying frequencies. Slow-to-repeat waves are called long-period waves. Quick-to-repeat waves are called short-period waves. Long-period seismic waves, which are created by large earthquakes, are most likely to reverberate and cause damage in long-period structures, like bridges and high-rises. ("Long-period structures" are those that respond to long-period waves.) Shorter-period seismic waves, which tend to die out quickly, will most often cause damage fairly near the fault, and they will cause most damage to shorter-period structures such as one- to three-story buildings. Very short-period waves are most likely to cause near-fault, interior damage, such as to equipment.

2) Liquefaction and slope failure are very destructive secondary effects of strong seismic shaking.

Liquefaction typically occurs within the upper 50 feet of the surface, when saturated, loose, fine- to medium-grained soils (sand and silt) are present. Earthquake shaking suddenly increases pressure in the water that fills the pores between soil grains, causing the soil to lose strength and behave as a liquid. This process can be observed at the beach by standing on the wet sand near the surf zone. Standing still, the sand will support your weight. However, when you tap the sand with your feet, water comes to the surface, the sand liquefies, and your feet sink.

When soils liquefy, the structures built on them can sink, tilt, and suffer significant structural damage. Liquefaction-related effects include loss of bearing strength, ground oscillations, lateral spreading and flow failures or slumping. The excess water pressure is relieved by the ejection of material upward through fissures and cracks. A water-soil slurry bubbles onto the ground surface, resulting in features called "sand boils", "sand blows" or "sand volcanoes". Site-specific geotechnical studies are the only practical, reliable way to determine the liquefaction potential of a site.

Landslides and Rockfall (Mass Wasting). Gravity inexorably pulls hillsides down and earthquake shaking enhances this on-going process. Slope stability depends on many factors and their interrelationships. Rock type and pore water pressure are arguably the most important factors, as well as slope steepness due to natural or human-made undercutting. Where slopes have failed before, they may fail again.

Thus, it is essential to map existing landslides and soil slumps. Furthermore, because there are predictable relationships between local geology and the likelihood that mass wasting will occur, field investigations can be used to identify failure-prone slopes before an earthquake occurs. Combined with GIS-based analyses of slope gradient, land use, and bedrock or soil materials, this information can be used to identify high-risk areas where mitigation measures would be most effective.

3) Primary ground rupture due to fault movement typically results in a relatively small percentage of the total damage in an earthquake, yet being too close to a rupturing fault can result in extensive damage. It is difficult to safely reduce the effects of this hazard through building and foundation design. Therefore, the primary mitigation measure is to avoid active faults by setting structures back from the fault zone. Application of this measure is subject to requirements of the Alquist-Priolo Earthquake Fault Zoning Act and guidelines prepared by the California Geological Survey – previously known as the California Division of Mines and Geology (CDMG Note 49). The final approval of a fault setback lies with the local reviewing agency.

Earthquake damage also depends on the characteristics of human-made structures. The interaction of ground motion with the built environment is complex. Governing factors include a structure's height, construction, and stiffness, which determine the structure's resonant period; the underlying soil's strength and resonant period; and the periods of the incoming seismic waves. Other factors include architectural design, condition, and age of the structure.

2.2.4 Choosing Earthquakes for Planning and Design

It is often useful to create a deterministic or design earthquake scenario to study the effects of a particular earthquake on a building or a community. Often, such scenarios consider the largest earthquake that is believed possible to occur on a fault or fault segment, referred to as the maximum magnitude earthquake (M_{max}). Other scenarios consider the Maximum Probable Earthquake (M_{PE}) or Design Basis Earthquake (DBE) (1997 Uniform Building Code – UBC; 2001 California Building Code - CBC). The DBE is defined as the earthquake with a statistical return period of 475 years (with ground motion that has a 10 percent probability of being exceeded in 50 years). For public schools, hospitals, and other critical facilities, the California Building Code (2001 defines the Upper Bound Earthquake (UBE), which has a statistical return period of 949 years and a ground motion with a 10 percent probability of being exceeded in 100 years. As the descriptions above suggest, which earthquake scenario is most appropriate depends on the application, such as the planned use, expected lifetime of a structure, or importance of a facility. The more critical the structure, the longer the time period used between earthquakes and the larger the design earthquake should be. Seismic design parameters define what kinds of earthquake effects a structure must be able to withstand. These include peak ground acceleration, duration of strong shaking, and the periods of incoming strong motion waves.

Geologists, seismologists, engineers, emergency response personnel and urban planners typically use maximum magnitude and maximum probable earthquakes to evaluate seismic hazard. The assumption is that if we plan for the worst-case scenario, we establish safety margins. Then smaller earthquakes that are more likely to occur can be dealt with effectively.

As is true for most earthquake-prone regions, many potential earthquake sources pose a threat to Newport Beach. Thus, it is also important to consider the overall likelihood of damage from a plausible suite of earthquakes. This approach is called probabilistic seismic hazard analysis (PSHA), and typically considers the likelihood of exceeding a certain level of damaging ground motion that could be produced by any or all faults within a 62-mile (100-km) radius of the project site, or in this case, the City. PSHA is utilized by the U.S. Geological Survey to produce national seismic hazard maps that are used by the Uniform Building Code (ICBO, 1997).

Regardless of which fault causes a damaging earthquake, there will always be aftershocks. By definition, these are smaller earthquakes that happen close to the mainshock (the biggest earthquake of the sequence) in time and space. These smaller earthquakes occur as the Earth adjusts to the regional stress changes created by the mainshock. As the size of the mainshock increases, there typically is a corresponding increase in the number of aftershocks, the size of the aftershocks, and the size of the area in which they might occur.

On average, the largest aftershock will be 1.2 magnitude units less than the mainshock. Thus, a M_W 6.9 earthquake will tend to produce aftershocks up to M_w 5.7 in size. This is an average, and there are many cases where the biggest aftershock is larger than the average predicts. The key point is this: any major earthquake will produce aftershocks large enough to cause additional damage, especially to already-weakened structures. Consequently, post-disaster response planning must take damaging aftershocks into account.

2.3 Laws To Mitigate Earthquake Hazard

2.3.1 Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Special Studies Zones Act was signed into law in 1972 (in 1994 it was renamed the Alquist-Priolo Earthquake Fault Zoning Act). The primary purpose of the Act is to mitigate the hazard of fault rupture by prohibiting the location of structures for human occupancy across the trace of an active fault (Hart and Bryant, 1999). This State law was passed in direct response to the 1971 San Fernando earthquake, which was associated with extensive surface fault ruptures that damaged numerous homes, commercial buildings and other structures. Surface rupture is the most easily avoided seismic hazard.

The Act requires the State Geologist (Chief of the California Geological Survey) to delineate "Earthquake Fault Zones" along faults that are "sufficiently active" and "well defined." These faults show evidence of Holocene surface displacement along one or more or their segments (sufficiently active) and are clearly detectable by a trained geologist as a physical feature at or just below the ground surface (well defined). The boundary of an "Earthquake Fault Zone" is generally about 500 feet from major active faults, and 200 to 300 feet from well-defined minor faults. The Act dictates that cities and counties withhold development permits for sites within an Earthquake Fault Zone until geologic investigations demonstrate that the sites are not threatened by surface displacements from future faulting (Hart and Bryant, 1999).

The Alquist-Priolo maps are distributed to all affected cities and counties for their use in planning and controlling new or renewed construction. Local agencies must regulate most development projects within the zones. Projects include all land divisions and most structures for human occupancy. State law exempts single-family wood-frame and steel-frame dwellings that are less than three stories and are not part of a development of four units or more. However, local agencies can be more restrictive than State law requires. Alquist-Priolo Earthquake Fault Zone mapping has been completed by the State Geologist for the quadrangle that covers the western part of Newport Beach (Newport Beach quadrangle; CDMG, 1986). This map shows the Alquist-Priolo Earthquake Fault Zone for the Newport-Inglewood fault terminating about two miles northwest of the City limits. Consequently, there are no Alquist-Priolo zones in the City at this time.

2.3.2 Seismic Hazards Mapping Act

The Alquist-Priolo Earthquake Fault Zoning Act only addresses the hazard of surface fault rupture and is not directed toward other earthquake hazards. Recognizing this, in 1990, the State passed the Seismic Hazards Mapping Act (SHMA), which addresses non-surface fault rupture earthquake hazards, including strong ground shaking, liquefaction and seismically induced landslides. The California Geological Survey (CGS) is the principal State agency charged with implementing the Act. Pursuant to the SHMA, the CGS is directed to provide local governments with seismic hazard zone maps that identify areas susceptible to liquefaction, and earthquake-induced landslides and other ground failures. The goal is to minimize loss of life and property by identifying and mitigating seismic hazards. The seismic hazard zones delineated by the CGS are referred to as “zones of required investigation.” Site-specific geological hazard investigations are required by the SHMA when construction projects fall within these areas.

The CGS, pursuant to the 1990 SHMA, has been releasing seismic hazards maps since 1997. In the Newport Beach area, the CGS has mapped all three quadrangles that encompass the City: Newport Beach, Laguna Beach, and Tustin (CDMG, 1997a, b, c). These maps indicate that liquefaction and earthquake-induced landslides are hazards present locally in the Newport Beach area.

2.3.3 Real Estate Disclosure Requirements

Since June 1, 1998, the Natural Hazards Disclosure Act has required that sellers of real property and their agents provide prospective buyers with a "Natural Hazard Disclosure Statement" when the property being sold lies within one or more State-mapped hazard areas. If a property is located in a Seismic Hazard Zone as shown on a map issued by the State Geologist, the seller or the seller's agent must disclose this fact to potential buyers. The law specifies two ways in which this disclosure can be made. One is to use the Natural Hazards Disclosure Statement as provided in Section 1102.6c of the California Civil Code. The other way is to use the Local Option Real Estate Disclosure Statement as provided in Section 1102.6a of the California Civil Code. The Local Option Real Estate Disclosure Statement can be substituted for the Natural Hazards Disclosure Statement only if the Local Option Statement contains substantially the same information and substantially the same warning as the Natural Hazards Disclosure Statement.

California State law also requires that when houses built before 1960 are sold, the seller must give the buyer a completed earthquake hazards disclosure report, and a copy of the booklet entitled "The Homeowner's Guide to Earthquake Safety." This publication was written and adopted by the California Seismic Safety Commission. The most recent edition of this booklet is available from the web at www.seismic.ca.gov/. The booklet contains a sample of a residential earthquake hazards report that buyers are required to fill in, and it provides specific information on common structural weaknesses that can fail, damaging homes during earthquakes. The booklet further describes specific actions that can be taken by homeowners to strengthen their home.

The Alquist-Priolo Earthquake Fault Zoning Act and the Seismic Hazards Mapping Act also ☆ require that real estate agents, or sellers of real estate acting without an agent, disclose to prospective buyers that the property is located in an Earthquake Fault or Seismic Hazard Zone.

2.3.4 California Environmental Quality Act

The California Environmental Quality Act (CEQA) was passed in 1970 to insure that local governmental agencies consider and review the environmental impacts of development projects within their jurisdictions. CEQA requires that an Environmental Impact Report (EIR) be prepared for projects that may have significant effects on the environment. EIRs are required to identify geologic and seismic hazards, and to recommend potential mitigation measures, thus giving the local agency the authority to regulate private development projects in the early stages of planning.

2.3.5 Uniform Building Code and California Building Code

The International Conference of Building Officials (ICBO) was formed in 1922 to develop a uniform set of building regulations; this led to the publication of the first Uniform Building Code (UBC) in 1927. In keeping with the intent of providing a safe building environment for the community, the technical provisions of the City's building codes have been updated on a regular basis as new editions of the UBC have been published. In addition to updating the regulations concerning fire and life, this has also kept Newport Beach current with the latest provisions for the seismic design of buildings.

Recognizing that many building code provisions are not affected by local conditions, like exiting from a building, and to facilitate the concept that industries working in California should have some uniformity in building code provisions throughout the State, in 1980 the legislature amended the State's Health and Safety Code to require local jurisdictions to adopt the latest edition of the Uniform Building Code (UBC). The law states that every local agency, City and County, enforcing building regulations must adopt the provisions of the California Building Code (CBC) within 180 days of its publication. The publication date of the CBC is established by the California Building Standards Commission and the code is known as Title 24 of the California Code of Regulations. Based upon the publication cycle of the UBC, the CBC has been updated and republished every three years since the initial action by the legislature.

To further the concept of uniformity in building design, in 1994 the ICBO joined with the two other national building code publishers, the Building Officials and Code Administrators International, Inc. (BOCA) and the Southern Building Code Congress International, Inc. (SBCCI), to form a single organization, the International Code Council, (ICC). In the year 2000, the group published the first International Building Code (IBC) as well as an entire family of codes, (i.e. building, mechanical, plumbing and fire) that were coordinated with each other. As a result, the last (and final) version of the UBC was issued in 1997.

Since the formation of the ICC and the publication of the IBC, the California legislature has not addressed the matter of updating the CBC with a building code other than the UBC. Therefore, even though the seismic design provisions have not been brought up to the current standards of the IBC, the California Building Standards Commission, after careful review, has chosen to continue to adopt the old 1997 UBC for the CBC through the 2004 cycle. In addition to adopting the provisions of the CBC, local jurisdiction may adopt more restrictive amendments provided that they are based upon local geographic, topographic or climatic conditions.

It should be noted that the Building Codes are the minimum requirements. In some cases these requirements may not adequate, particularly in the area of faulting and seismology, where the pool of knowledge is rapidly growing and evolving. Consequently, it is important that geotechnical consultants working in the City, as well as reviewers of their work, keep up to date on current research.

2.3.6 Unreinforced Masonry Law

Enacted in 1986, the Unreinforced Masonry Law (Section 8875 et seq. of the California Government Code) required all cities and counties in Seismic Zone 4 (zones near historically active faults) to identify potentially hazardous unreinforced masonry (URM) buildings in their jurisdictions, establish a URM loss reduction program, and report their progress to the State by 1990. The owners of such buildings were to be notified of the potential earthquake hazard these buildings pose. The loss reduction program to be implemented, however, was left to each local jurisdiction, although the law recommends that local governments adopt mandatory strengthening programs by ordinance and that they establish seismic retrofit standards. Some jurisdictions did implement mandatory retrofit programs, while others established voluntary programs. A few cities only notified the building owners, but did not adopt any type of strengthening program.

The Newport Beach area lies entirely within Seismic Zone 4. Therefore, and in compliance with the Unreinforced Masonry Law, the City inventoried their URMs. In the year 2000, the City reported to the Seismic Safety Commission that 127 URMs had been identified. Of these, only 3 buildings were considered of historical significance. By 2000, all 127 building owners had been notified about the hazards of URM construction, and 125 of the URMs were in compliance with the provisions of the URM Law. One building had been demolished and one more was unoccupied and slated for demolition as of 2000.

2.4 Notable Earthquakes in the Newport Beach Area

Figure 2-2 shows the approximate epicenters of earthquakes that have resulted in significant ground shaking in the southern California area, including Newport Beach, since the late 1700s. The most significant of these events are summarized below. Plate 2-1 shows the approximate epicentral locations of historical earthquakes in the study area. The locations and magnitudes of pre-1932 earthquakes are approximate since there were no instruments available to measure these parameters before 1932.

2.4.1 Unnamed Earthquake of 1769

On July 28, 1769 the first recorded earthquake in southern California was noted by the Spanish explorers traveling north with Gaspar de Portola. At the time of the earthquake, the explorers were camped about 10 miles north of present-day Newport Beach, on the east bank of the Santa Ana River. Father Juan Crespo, who kept a daily account of the expedition, reported a strong mainshock followed by five days of moderate aftershocks; an estimated magnitude of at least 6.0 has been assigned to the event based on the explorers' account (Teggart, 1911). Recent studies of coastal uplift attributed to the earthquake suggest it may have had a magnitude as high as 7.3 and occurred on a blind fault beneath the San Joaquin Hills (Grant et al., 2002). The nearby Elsinore and Newport-Inglewood faults are also considered possible sources for the earthquake.

2.4.2 Unnamed Earthquake of 1800

An earthquake with an estimated magnitude of 6.5 occurred on November 22, 1800 in the coastal region of southern California. Based on the distribution of damage attributed to the earthquake, the epicenter is thought to have been between Newport Beach and San Diego, and was possibly located offshore (Ellsworth, 1990). The earthquake damaged the mission at San Juan Capistrano, located less than 20 miles from present-day Newport Beach and collapsed a barracks in San Diego (www.sfmuseum.org/alm/quakeso.html).

2.4.3 Wrightwood Earthquake of December 12, 1812

This large earthquake occurred on December 8, 1812 and was felt throughout southern California. Based on accounts of damage recorded at missions in the earthquake-affected area, an estimated magnitude of 7.5 has been calculated for the event (Toppozada et al., 1981). Subsurface investigations and tree ring studies show that the earthquake likely ruptured the Mojave Section of the San Andreas fault near Wrightwood, and may have been accompanied by a significant surface rupture between Cajon Pass and Tejon Pass (Jacoby, Sheppard and Sieh, 1988; www.scecdc.scec.org/quakedex.html). The worst damage caused by the earthquake occurred significantly west of the San Andreas fault at San Juan Capistrano Mission, where the roof of the church collapsed, killing 40 people. The earthquake also damaged walls and destroyed statues at San Gabriel Mission and damaged missions in the Santa Barbara area. Strong aftershocks caused earthquake-damaged buildings to collapse for several days after the mainshock.

2.4.4 Unnamed Earthquake of December 21, 1812

The Wrightwood earthquake was followed by a strong earthquake on December 21st that caused widespread damage in the Santa Barbara area. The effects of this second earthquake are sometimes attributed to the December 12th event, giving the impression that a single large earthquake caused significant damage from Santa Barbara to San Diego. The second earthquake had an estimated magnitude of 7 and was likely located offshore within the Santa Barbara Channel, although it could have occurred inland in Santa Barbara or Ventura Counties (www.scecdc.scec.org/quakedex.html). The earthquake destroyed the church at the Mission in Santa Barbara, the Mission de Purisima Concepcion near present day Lompoc, and the Mission at Santa Inez (www.johnmartin.com/eqs/00000077.htm). The earthquake also caused a tsunami that may have traveled up to 1/2 mile inland near Santa Barbara (see Chapter 1 – Coastal Hazards).

2.4.5 Unnamed Earthquake of 1855

This earthquake occurred on July 11, 1855 and was felt across southern California from Santa Barbara to San Bernardino. Light to moderate damage was reported in the Los Angeles area, where 26 houses experienced cracked walls and the bell tower of the San Gabriel Mission was knocked down (www.sfmuseum.org/alm/quakeso.html). Because damage was limited primarily to the Los Angeles area, this earthquake is postulated to have occurred on a local fault such as the Hollywood-Raymond, Whittier or Newport-Inglewood faults, or on one of the many blind thrust faults in the area.

2.4.6 San Jacinto Earthquake of 1899

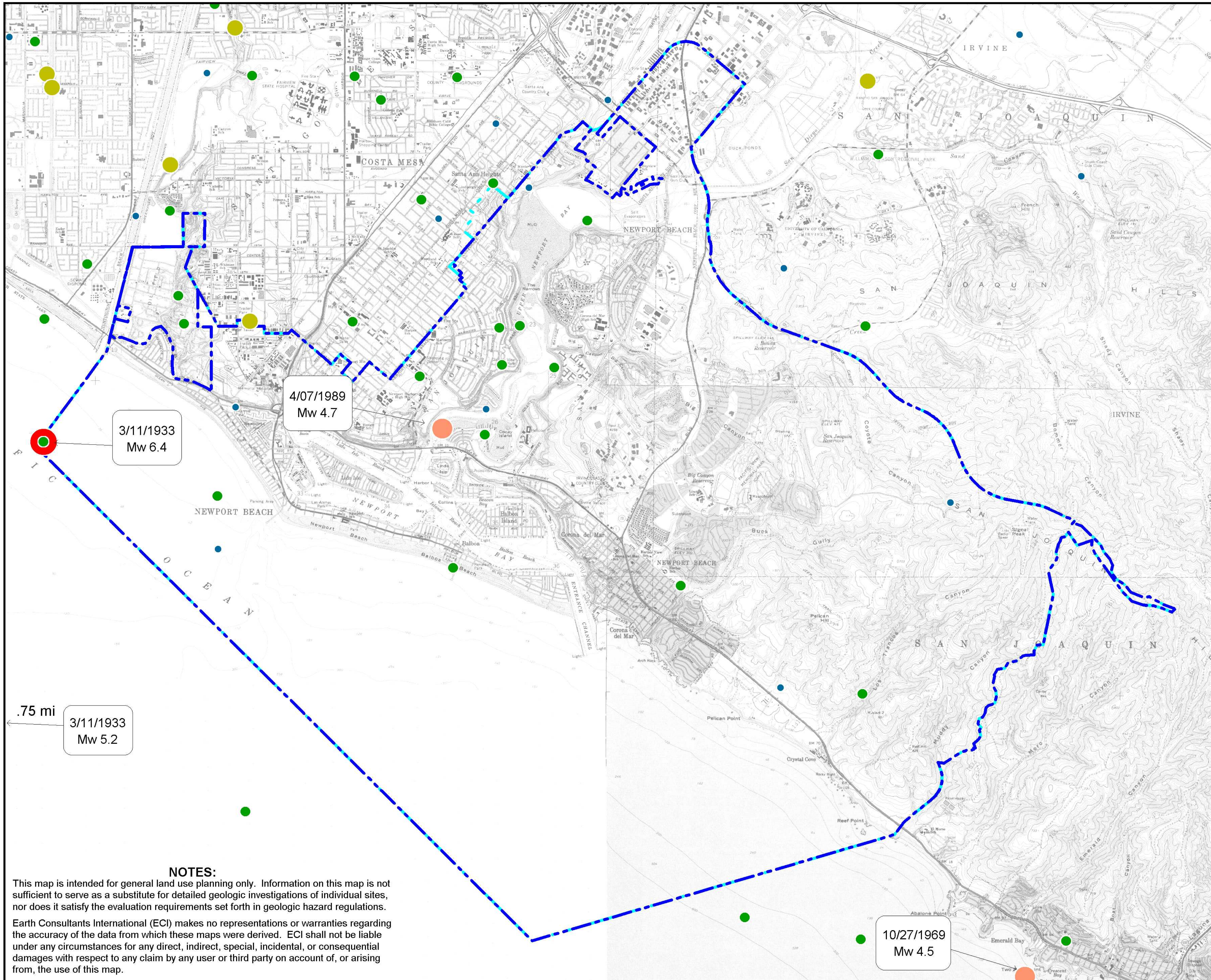
This earthquake occurred at 4:25 in the morning on Christmas Day, in 1899. The main shock is estimated to have had a magnitude of 6.5. Several smaller aftershocks followed the main shock, and in the town of San Jacinto, as many as thirty smaller tremors were felt throughout the day. The epicenter of this earthquake is not well located, but damage patterns suggest the location shown on Figure 2-2, near the town of San Jacinto, with the causative fault most likely being the San Jacinto fault. Both the towns of San Jacinto and Hemet reported extensive damage, with nearly all brick buildings either badly damaged or destroyed. Six people were killed in the Soboba Indian Reservation as a result of falling adobe walls. In Riverside, chimneys toppled and walls cracked (Claypole, 1900). The main earthquake was felt over a broad area that included San Diego to the southwest, Needles to the northeast, and Arizona to the east. No surface rupture was reported, but several large "sinks" or subsidence areas were reported about 10 miles to the southeast of San Jacinto.

2.4.7 Elsinore Earthquake of 1910

This magnitude 6 earthquake occurred on May 15, 1910 at 7:47 A.M. Pacific Standard Time, following two moderate tremors that occurred on April 10 and May 12, 1910. The Elsinore fault is thought to have caused the earthquake, although no surface rupture along this fault was reported. Damage as a result of this earthquake was minor; toppled chimneys were reported in the Corona, Temescal and Wildomar areas. The epicentral location of this earthquake is very poorly defined.

2.4.8 San Jacinto Earthquake of 1918

The magnitude 6.8 San Jacinto earthquake occurred on April 21, 1918 at 2:32 P.M. Pacific Standard Time, near the town of San Jacinto. The earthquake caused extensive damage to the business districts of San Jacinto and Hemet, where many masonry structures collapsed, but because it occurred on a Sunday, when these businesses were closed, the number of fatalities and injuries was low. Several people were injured, but only one death was reported. Minor damage as a result of this earthquake was reported outside the San Jacinto area, and the earthquake was felt as far away as Taft (west of Bakersfield), Seligman (Arizona), and Baja California.



NOTES:

This map is intended for general land use planning only. Information on this map is not sufficient to serve as a substitute for detailed geologic investigations of individual sites, nor does it satisfy the evaluation requirements set forth in geologic hazard regulations.

Earth Consultants International (ECI) makes no representations or warranties regarding the accuracy of the data from which these maps were derived. ECI shall not be liable under any circumstances for any direct, indirect, special, incidental, or consequential damages with respect to any claim by any user or third party on account of, or arising from, the use of this map.

Historical Seismicity (1855-2002)

Newport Beach, California

EXPLANATION

Earthquake Magnitude

- 5 to 6.4
- 4 to 5
- 3 to 4
- 2 to 3
- 1 to 2

Newport Beach City Boundary

Sphere of Influence

Scale: 1:60,000

0.5 0 0.5 1 1.5 **Miles**

1 0 1 2 3 **Kilometers**

Base Map: USGS Topographic Map from Sure!MAPS RASTER

Sources: Southern California Earthquake Center (January 1932 to August 22, 2002); National Earthquake Information Center (1855 to 1931).

Earth Consultants International

Project Number: 2112

Date: July, 2003

CITY OF NEWPORT BEACH CALIFORNIA

Plate 2-1

Strong shaking cracked the ground, concrete roads, and concrete irrigating canals, but none of the cracks are thought to have been caused directly by surface fault rupture. The shaking also triggered several landslides in mountain areas. The road from Hemet to Idyllwild was blocked in several places where huge boulders rolled down slopes. Two men in an automobile were reportedly swept off a road by a landslide, and would have rolled several hundred feet down a hillside had they not been stopped by a large tree. Two miners were trapped in a mine near Winchester, but they were eventually rescued, uninjured. The earthquake apparently caused changes in the flow rates and temperatures of several springs. Sand craters (due most likely to liquefaction) were reported on one farm, and an area near Blackburn Ranch "sunk" approximately three feet (one meter) during the quake (/www.scecdc.scec.org/quakedex.html).

2.4.9 1933 Long Beach Earthquake

The Mw 6.4 Long Beach earthquake occurred on March 10, at 5:54 P.M. Pacific Standard Time, following a strong foreshock the day before. The earthquake ruptured the Newport-Inglewood fault, and was felt from the San Joaquin Valley to Northern Baja. The epicenter was located on the boundary between Huntington Beach and Newport Beach, although the earthquake was called "The Long Beach Earthquake" because the worst damage was focused in the city of Long Beach. In the Newport Beach area, the earthquake produced Modified Mercalli Intensities of VII-VIII (http://pasadena.wr.usgs.gov/shake/ca/). The earthquake killed 115 people and caused $40-50 million in property damage (www.scecdc.scec.org/quakedex.html). Primary ground rupture of the Newport-Inglewood fault was not observed, although secondary cracking, minor slumping, and lateral movement of unconsolidated sediments occurred throughout the region. Road surfaces along the shore between Long Beach and Newport Beach were damaged by settlement of road fills that had been placed on marshy land. In urban areas, unreinforced masonry buildings were most severely damaged, especially in areas of artificial fill or water-soaked alluvium. In one part of Compton, most buildings built on unconsolidated sediments and artificial fill were destroyed. In Long Beach, many buildings collapsed, were pushed off their foundations, or had walls or chimneys knocked down. In Newport Beach, 800 chimneys were knocked down at the roofline and hundreds of houses were destroyed (www.anaheimcocom.com/quake.htm). Damage to school buildings was especially severe and led to the passage of the Field and Riley Acts by the State legislature. The Field Act regulates school construction and the Riley Act regulates the construction of buildings larger than two-family dwellings. Many strong aftershocks occurred through March 16th.

2.4.10 Torrance-Gardena Earthquakes of 1941

In 1941, two small earthquakes struck the southern Los Angeles basin, affecting surrounding communities. Although these earthquakes were relatively minor, they occurred close to the surface and caused significant, although localized damage. The magnitude 4.8 Torrance earthquake occurred on October 21st at 10:57 P.M., Pacific Standard Time and was located east of Carson near the present-day interchange of the 405 and 710 freeways. Shaking up to intensity level VII was reported in the communities of Wilmington, Gardena, Lynwood, Hynes and Signal Hill where walls were cracked and chimneys damaged. In some cases, houses that had not been adequately repaired after the 1933 Long Beach earthquake were damaged again (www.johnmartin.com/eqpapers/00000077.htm). No injuries were reported and damage estimates totaled $100,000 (www.scecdc.scec.org/quakedex.html).

A second earthquake occurred less than a month later, on November 14 at 12:42 A.M. Pacific Standard Time, near Wilmington. Shaking during the second earthquake was reportedly stronger than the first, locally reaching intensity level VIII (Table 2-1) and felt as far away as Cabazon, Carpinteria, and San Diego. Gas and water mains burst near the epicenter and storefronts in the business districts of Torrance and Gardena collapsed, crushing parked cars. Damage to local oilfields was significant - well casings and equipment were damaged and a 55,000 gallon oil tank ruptured, flooding nearby streets with oil. Production of several wells was lowered or stopped. No injuries were reported, although damage attributed to the second event totaled one million dollars. (www.scecdc.scec.org/quakedex.html).

2.4.11 San Jacinto Fault Earthquake of 1954

This M_W 6.4 earthquake occurred on March 19, 1954, at 1:54 A.M. Pacific Standard Time, on the Clark fault segment of the San Jacinto fault, about 30 miles south of Indio. It caused minor damage throughout southern California including cracked plaster walls in San Diego and falling ceiling plaster at Los Angeles City Hall. In the Palm Springs area, a water pipe was damaged and the walls of several swimming pools were cracked. Parts of San Bernardino experienced temporary blackouts because the shaking caused power lines to snap. The earthquake was felt as far away as Ventura County, Baja California, and Las Vegas.

2.4.12 Borrego Mountain Earthquake of 1968

This M_w 6.5 earthquake occurred on the evening of April 8, 1968 at 6:29 P.M. Pacific Standard Time. The epicenter was located about 40 miles south of Indio on the Coyote Creek fault, which is a branch of the San Jacinto fault. The earthquake was felt throughout southern California, and as far away as Las Vegas, Fresno and the Yosemite Valley. The earthquake produced minor surface rupture near Ocotillo Wells and triggered minor slip on the Superstition Hills, Imperial and Banning-Mission Creek faults (www.scecdc.scec.org/quakedex.html). Damage was reported throughout southern California, most notably in the Imperial Valley, where several buildings collapsed, and in Anza-Borrego Desert State Park where landslides damaged several vehicles. The earthquake also severed power lines in San Diego, knocked plaster from ceilings in Los Angeles, and the Queen Mary II, which was dry-docked at Long Beach, rocked back and forth on its keel blocks for five minutes. No injuries were reported.

2.4.13 San Fernando (Sylmar) Earthquake of 1971

This magnitude 6.6 earthquake occurred on the San Fernando fault zone, the westernmost segment of the Sierra Madre fault, on February 9, 1971, at 6:00 in the morning. The surface rupture caused by this earthquake was nearly 12 miles long, and occurred in the Sylmar-San Fernando area, approximately 55 miles (88 km) northwest of Newport Beach. The maximum slip measured at the surface was nearly six feet. The earthquake caused over $500 million in property damage and 65 deaths. Most of the deaths occurred when the Veteran's Administration Hospital collapsed. Several other hospitals, including the Olive View Community Hospital in Sylmar suffered severe damage. Newly constructed freeway overpasses also collapsed, in damage scenes similar to those that occurred 23 years later in the 1994 Northridge earthquake. Loss of life could have been much greater had the earthquake struck at the busier time of the day. As with the Long Beach earthquake, legislation was passed in response to the damage caused by the 1971 earthquake. In this case, the building codes were strengthened and the Alquist-Priolo Special Studies (now call the Earthquake Fault Zone) Act was passed in 1972.

2.4.14 Oceanside Earthquake of 1986

This magnitude 5.4 earthquake occurred on the morning of July 13, 1986 at 6:47 A.M. Pacific Daylight Time. The epicenter was about 32 miles offshore from Oceanside and occurred on an unidentified fault that may be related to the San Diego Trough or the Palos Verdes-Coronado Bank fault zones (www.scecdc.scec.org/quakedex.html). One death and at least 29 injuries are attributed to this relatively small earthquake, which was felt throughout the coastal communities of southern California. At least 50 buildings were damaged from Newport Beach to San Diego, with damage estimates totaling nearly one million dollars.

2.4.15 Whittier Narrows Earthquake of 1987

The Whittier Narrows earthquake occurred on October 1, 1987, at 7:42 in the morning, with its epicenter located approximately 27 miles (43 km) northwest of Newport Beach (Hauksson and Jones, 1989). This magnitude 5.9 earthquake occurred on a previously unknown, north-dipping concealed thrust fault (blind thrust) now called the Puente Hills fault (Shaw and Shearer, 1999). The earthquake caused eight fatalities, over 900 injured, and $358 million in property damage. Severe damage was confined mainly to communities east of Los Angeles and near the epicenter. Areas with high concentrations of URMs, such as the "uptown" district of Whittier, the old downtown section of Alhambra, and the "Old Town" section of Pasadena, were severely impacted. Several tilt-up buildings partially collapsed, including tilt-up buildings built after 1971, that were built to meet improved building standards, but were of irregular configuration, revealing seismic vulnerabilities not previously recognized. Residences that sustained damage usually were constructed of masonry, were not fully anchored to their foundations, or were houses built over garages with large openings. Many chimneys collapsed and in some cases, fell through roofs. Wood-frame residences, in contrast, sustained relatively little damage, and no severe structural damage to high-rise structures in downtown Los Angeles was reported.

2.4.16 Newport Beach Earthquake of 1989

A small, magnitude 4.7 earthquake struck the City of Newport Beach at 1:07 P.M. Pacific Daylight Time on April 7, 1989 (www.scecdc.scec.org/quakedex.html). The earthquake did not rupture the surface or cause any significant damage, but was notable because it occurred on the Newport-Inglewood fault system directly below the city of Newport Beach.

2.4.17 Landers Earthquake of 1992

On the morning of June 28, 1992, most people in southern California were awakened at 4:57 by the largest earthquake to strike California in 40 years. Named "Landers" after a small desert community near its epicenter, the earthquake had a magnitude of 7.3. More than 50 miles of surface rupture associated with five or more faults occurred as a result of this earthquake. The average right-lateral strike-slip displacement was about 10 to 15 feet, while a maximum of up to 18 feet was observed. Centered in the Mojave Desert, approximately 120 miles from Los Angeles, the earthquake caused relatively little damage for its size (Brewer, 1992). It released about four times as much energy as the very destructive Loma Prieta earthquake of 1989, but fortunately, it did not claim as many lives (one child died when a chimney collapsed). The power of the earthquake was illustrated by the length of the ground rupture it left behind. The earthquake ruptured five separate faults: Johnson Valley, Landers, Homestead Valley, Emerson, and Camp Rock faults (Sieh, 1992). Other nearby faults also experienced triggered slip and minor surface rupture. Modified Mercalli Intensities of III were reported in the Newport Beach area as a result of this earthquake (http://pasadena.wr.usgs.gov/shake/ca/).

2.4.18 Northridge Earthquake of 1994

On the morning of January 17th, 1994, at 4:31 Pacific Standard Time, a M_w 6.7 earthquake struck the San Fernando Valley. This moderate-sized tremor was the most expensive earthquake in United States history, due primarily to its proximity to the heavily populated northern Los Angeles area. The rupture occurred in the San Fernando Valley on the previously unidentified eastern continuation of the Oak Ridge fault, which is a blind thrust fault and thus does not break the surface. The earthquake produced widespread ground accelerations of 1.0 g, some of the highest ever recorded for an earthquake of its size. The earthquake caused 57 deaths, 1,500 injuries and damaged 12,500 structures, knocking several major freeways out commission for days to months. Although most damage was focused in the northern Los Angeles area, intensities of V-VI (Table 2-1) were recorded in the Newport Beach area, causing scattered light to moderate damage.

2.4.19 Hector Mine Earthquake of 1999

Southern California's most recent large earthquake was a widely felt magnitude 7.1. It occurred on October 18, 1999, in a remote region of the Mojave Desert, 47 miles east-southeast of Barstow. Modified Mercalli Intensities of IV (Table 2-1) were reported in the Newport Beach area (http://pasadena.wr.usgs.gov/shake/ca/). The Hector Mine earthquake is not considered an aftershock of the M 7.3 Landers earthquake of 1992, although Hector Mine occurred on similar, north-northwest trending strike-slip faults within the Eastern Mojave Shear Zone. Geologists documented a 25-mile (40-km) long surface rupture and a maximum right-lateral strike-slip offset of about 16 feet on the Lavic Lake fault.

2.5 Potential Sources of Seismic Ground Shaking

Seismic shaking is the geologic hazard that has the greatest potential to severely impact the Newport Beach area, given that the city is located on and near several significant seismic sources (faults) that have the potential to cause moderate to large earthquakes (see Table 2-2). As discussed in Section 2.4 above, some of these faults caused moderate-sized earthquakes in the last century; however, given their length, they are thought capable of generating even larger earthquakes in the future that would cause strong ground shaking in Newport Beach and nearby communities. The proximity of Newport Beach to these and other regionally more significant seismic sources should encourage the City of Newport Beach to diligently attend to seismic hazard mitigation.

In order to provide a better understanding of the shaking hazard posed by these faults, a deterministic seismic hazard analysis using industry standard software [EQFAULT, by Blake (2000a)] was performed. This analysis estimates the Peak Horizontal Ground Accelerations (PHGA) that could be expected at City Hall due to earthquakes occurring on any of the known active or potentially active faults within 62 miles (100 km). A probabilistic seismic hazard analysis using FRISKSP (Blake, 2000b) to estimate the median PHGA at City Hall was also conducted. The difference between these two approaches is that, while a deterministic hazard assessment addresses individual sources or scenario events, probabilistic assessments combine all seismic sources and consider the likelihood (or probability) of each source to generate an earthquake. In a probabilistic analysis, a mathematical equation is used to estimate the combined risk posed by all known faults within 62 miles (100 km), and for each fault, a suite of possible damaging earthquakes is considered, each weighed according to its likelihood of occurring in any particular year.

The fault database (including fault locations and earthquake magnitudes of the maximum magnitude and maximum probable earthquakes for each fault) used to conduct these seismic shaking analyses is that used by the California Geological Survey (CGS) and the US Geological Survey (USGS) for the National Seismic Hazard Maps (Peterson and others, 1996). PGHA depends on the size of the earthquake, the proximity of the rupturing fault, and local soil conditions. Effects of soil conditions are estimated by use of an attenuation relationship. To develop such a relationship, scientists analyze recordings of earthquake shaking on similar soils during earthquakes of various sizes and distances. The PHGA estimates obtained from these analyses provide a general indication of relative earthquake risk in the city of Newport Beach. For individual projects however, site-specific analyses that consider the precise distance from a given site to the various faults in the region, as well as the local near-surface soil types, should be conducted.

Newport Beach City Hall is built on soft, unconsolidated estuarine deposits, which can greatly amplify earthquake shaking. To quantify the degree of amplification, velocity measurements of earthquake shear-waves and other site-specific sub-surface analyses would be needed. However, to illustrate the effects of soil type at City Hall, the attenuation relationships of Boore and others (1997) were used to provide two PGHA estimates, one for soil with a near-surface shear-wave velocity of 250 meters per second (m/s); the other for a velocity of 150 m/s. The former velocity produces deterministic estimates of maximum PGHA around 0.58g. The second velocity yields a maximum PGHA of around 0.7g. Shaking at these levels can cause heavy damage even to newer buildings that are constructed with more stringent building standards than older structures.

Based on the ground shaking analyses described above, those faults that can cause peak horizontal ground accelerations of about 0.1g or greater (Modified Mercalli Intensities greater than VII) in the Newport Beach area are listed in Table 2-2. For a map showing most of these faults, refer to Figure 2-1. Those faults included in Table 2-2 that have the greatest impact on the Newport Beach area, or that are thought to have a higher probability of causing an earthquake, are described in more detail in the following pages. The locations of active faults nearby to the City are shown of Figure 2-3.

Table 2-2 shows:

- The distance, in kilometers and miles, between the fault and the Newport Beach City Hall;
- The maximum magnitude earthquake (M_{max}) each fault is estimated capable of generating;
- The peak ground acceleration (PGA), or intensity of ground motion expressed as a fraction of the acceleration of gravity (g), that could be experienced in the Newport Beach Area if the M_{max} occurs on one of these faults; and
- The Modified Mercalli seismic Intensity (MMI) values calculated for the City.

In general, peak ground accelerations and seismic intensity values decrease with increasing distance away from the causative fault. However, local site conditions, such as ridge tops, could amplify the seismic waves generated by an earthquake, resulting in localized higher accelerations than those listed here. The strong ground motion values presented here should therefore be considered as average values; higher values may occur locally in response to site-specific conditions.

The M_{max} reported here are based on the fault parameters published by the CGS (CDMG, 1996). The peak ground accelerations reported above were calculated using EQFAULT (Blake, 2000a), a software package that uses the CGS fault data and provides several peer-reviewed earthquake attenuation equations. However, as described further in the text, recent paleoseismic studies suggest that some of these faults, like the Whittier fault, can actually generate even larger earthquakes than those used in the table above. Furthermore, the CGS fault database does not yet include the San Joaquin Hills thrust fault that was recently proposed to underlie a large portion of Newport Beach. This fault, by its location relative to the City (see Figure 2-3), and its type (blind thrust fault) has the potential to generate even stronger ground shaking in Newport Beach than any of the faults that were used in the probabilistic and deterministic analyses reported herein. For additional data regarding the seismic hazard posed by this fault, refer to Sections 2.5.2 and 2.9.4.

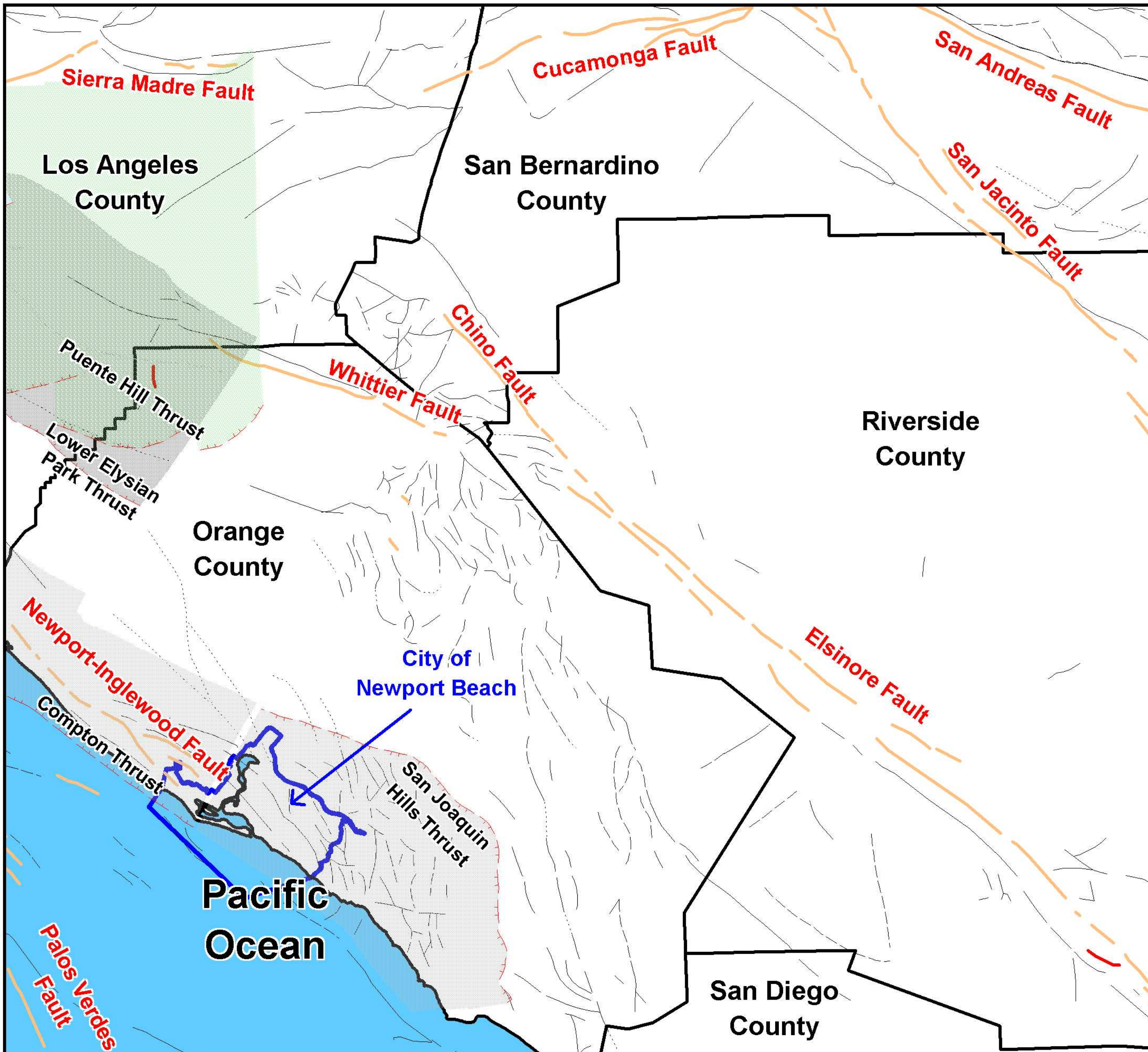
The probabilistic PGHA values calculated for City Hall using the two different local soil conditions are 0.43 and 0.52g. In other words, the Newport Beach area has a 10 percent chance of experiencing ground accelerations greater than 43 to 52 percent the force of gravity in 50 years. These probabilistic ground motion values for the City of Newport Beach are in the high to very high range for southern California, and are the result of the City's proximity to major fault systems with high earthquake recurrence rates. These levels of shaking can be expected to cause damage, particularly to older and poorly constructed buildings.

Differences between deterministic and probabilistic PGHA at this site are due to the long recurrence intervals of many of the faults in the analysis. Faults which cause damaging earthquakes at less frequent intervals yield a lower annual likelihood of a damaging earthquake, and thus a lower probabilistic hazard value when considering relatively short time periods such as the 475 years of this analysis. Since we do not know when the clock started ticking for most of these faults (i.e., when the last earthquake occurred, nor how close to failure the fault is today), the City cannot take comfort in the lower yearly likelihood of damage, but must be prepared for shaking of at least 0.7g.

Table 2-2
Estimated Horizontal Peak Ground Accelerations and Seismic Intensities in the Newport Beach Area

Fault Name	Distance to Newport Beach (km)	Distance to Newport Beach (mi)	Magnitude of M_{max} *	PGA (g) from M_{max}	MMI from M_{max}
Newport-Inglewood (LA Basin)	0.5	0.3	6.9	0.70	XI
Newport-Inglewood (Offshore)	3.1	1.9	6.9	0.64	X
Compton Thrust	14.3	9.0	6.8	0.37	IX
Palos Verdes	19.3	12.0	7.1	0.29	IX
Elysian Park Thrust	25.7	16.0	6.7	0.23	IX
Chino-Central Ave. (Elsinore)	33.6	20.9	6.7	0.19	VIII
Whittier	34.8	21.6	6.8	0.16	VIII
Elsinore-Glen Ivy	37.8	23.5	6.8	0.15	VIII
Coronado Bank	38.7	24.0	7.4	0.20	VIII
San Jose	47.2	29.3	6.5	0.13	VIII
Elsinore-Temecula	53.9	33.5	6.8	0.11	VII
Sierra Madre	58.3	36.2	7.0	0.15	VIII
Cucamonga	59.5	37.0	7.0	0.14	VIII
Raymond	59.8	37.2	6.5	0.11	VII
Verdugo	60.9	37.8	6.7	0.12	VII
Hollywood	62.5	38.8	6.4	0.10	VII
Clamshell-Sawpit	62.7	39.0	6.5	0.11	VII
Santa Monica	68.1	42.3	6.6	0.10	VII
Rose Canyon	71.5	44.4	6.9	0.10	VII
Malibu Coast	72.4	45.0	6.7	0.11	VII
Northridge (E. Oak Ridge)	78.6	48.8	6.9	0.11	VII
Sierra Madre (San Fernando)	81.0	50.3	6.7	0.10	VII
Anacapa-Dume	81.9	50.9	7.3	0.13	XII
San Andreas - Southern	85.1	52.9	7.4	0.11	VII
San Andreas – San Bernardino	85.1	52.9	7.3	0.10	VII
San Andreas – 1857 Rupture	85.6	53.2	7.8	0.14	VIII

Abbreviations used in Table 2-2:
mi – miles; **km** – kilometer; **M_{max}** – maximum magnitude earthquake; **PGA** – peak ground acceleration as a percentage of g, the acceleration of gravity; **MMI** – Modified Mercalli Intensity.



Modified from: Shaw et al., 2002; Dolan, Shaw, and Pratt, 2001; and Jennings, 1995

Map Explanation

Blind thrust fault ramp; red hatchures show surface projection or upper edge of thrust ramp, the thrust fault ramps are shown from deepest to shallowest by gray and green shading, respectively.

Fault Showing Evidence of Historic Rupture (Active).

Fault Showing Evidence of Holocene Rupture (Active).

Fault Showing Evidence of Quaternary and Late Quaternary Rupture (Potentially Active).

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Local Active and Potentially Active Faults

Figure 2-3

2.5.1 Newport-Inglewood Fault Zone

The northwest-trending Newport-Inglewood fault zone (NIFZ) is 145 miles long and extends from Santa Monica south to Newport Beach. At Newport Beach, the fault continues offshore and lines up with a deep submarine canyon (Fischer and Mills, 1991) known as the Newport Submarine Canyon. The offshore segment of the fault joins the Rose Canyon fault, which extends southeasterly through San Diego to the international border. The Newport-Inglewood fault zone is discontinuous, consisting of a series of left-stepping en echelon fault strands up to 4 miles long. Onshore, the fault zone is marked by a series of uplifts and anticlines including Newport Mesa, Huntington Mesa, Bolsa Chica Mesa, Alamitos Heights and Landing Hill, Signal Hill and Reservoir Hill, Dominguez Hills, Rosecrans Hills, and Baldwin Hills (Barrows, 1974). These anticlines are traps for oil and have been drilled successfully since the beginning of the last century.

The NIFZ extends across the westernmost portion of Newport Beach (see Figure 2-3 and Plate 2-2). In this area, the fault zone is over 1.5 miles wide and consists of many discontinuous primary fault stands and several short secondary fault traces. Several studies in the Newport Beach area have identified multiple strands of the NIFZ that have displaced Holocene-age terraces and sediments (Converse Consultants, 1994; Shlemon et al., 1995; Grant et al., 1997; Earth Consultants International, 1997).

The slip rate for the NIFZ is poorly constrained at between 0.3 to 3.5 mm/yr. A study by Woodward-Clyde Consultants in 1979 calculated a slip rate of 0.5 mm/yr for the southern onshore segment of the NIFZ. This is consistent with long-term slip rates of 0.31 – 0.52 mm/yr calculated by Freeman et al. (1992) by correlating stratigraphy on one side of the fault to a best match on the opposite side of the fault. More recent paleoseismic studies by Grant et al. (1997) also suggest a slip rate of between 0.34 to 0.55 mm/yr for the onshore segment. Fischer and Mills (1991) estimated a slightly higher slip rate of between 1.3 and 3.5 mm/yr for the offshore segment of the NIFZ between San Mateo Point and Newport Beach with an earthquake recurrence interval of between 200 and 800 years. Lindvall and Rockwell (1995) calculated a maximum slip rate of 2 mm/yr for the Rose Canyon fault, the southern continuation of the NIFZ.

Paleoseismic studies by Grant et al. (1997) and Shlemon et al. (1995) have shown that the onshore segment of the NIFZ has had three to five ground rupturing earthquakes in the last 11,700 (+/-700 years). This is consistent with the recurrence interval calculated by Fischer and Mills (1991) for the offshore segment of the NIFZ. The last significant earthquake on the NIFZ was the magnitude 6.3 Long Beach earthquake. This earthquake did not break the ground surface.

PGHA calculations suggest that Newport Beach has a ten percent chance of experiencing ground accelerations exceeding between 0.29g and 0.52g in the next 50 years. These values were calculated for ten locations around the Newport Beach area that are representative of the area as a whole, and reflect the fact that some areas of Newport Beach are farther away from the regional faults than others. These estimates are also a statistical average that take into account earthquakes on all faults in the region, and include an assessment of the probability of an earthquake occurring on each of the faults considered. A deterministic analysis, on the other hand, indicates that a maximum earthquake of magnitude 6.9 on the onshore segment of the NIFZ has the potential to generate stronger ground motions with peak horizontal ground accelerations of between 0.58g and 0.71g in the Newport Beach area. Similarly, a 6.9 earthquake on the offshore segment of the NIFZ could generate peak horizontal ground acceleration in the Newport Beach area of between 0.53g and 0.64g.

2.5.2 San Joaquin Hills Fault

Analysis of uplifted marine terraces between Huntington Beach and San Juan Capistrano suggests the presence of a southwest-dipping blind thrust beneath the San Joaquin Hills (see Figure 2-3), adjacent to the Newport-Inglewood fault zone (Grant et al., 1999). Based on structural modeling of dated marine terraces, Grant et al. (1999) calculated a slip rate of about 0.42-0.79 mm/yr and a minimum average recurrence interval of about 1,600 to 3,100 years for moderate size earthquakes on this fault. Uplift of late Holocene shorelines and marsh deposits above the active shoreline are attributed to a relatively recent earthquake larger than magnitude 7 on the San Joaquin Hills fault (Grant et al., 2002). Radiocarbon dating and pollen analyses suggest this earthquake occurred between 1635 and 1855 AD. Rivero et al. (2000) consider this fault to be part of a larger structure that extends offshore to the south. This fault is not yet included in the CGS fault database used for shaking analyses, however a moderate earthquake on this fault would cause significant peak horizontal ground accelerations in the City, stronger than those caused by any of the other faults considered. An earthquake on the San Joaquin Hills faults is therefore the worst-case scenario for Newport Beach. This is illustrated further in Section 2.9.4.

2.5.3 Palos Verdes Fault Zone

The 80 to 115 km-long Palos Verdes fault zone is located primarily offshore and extends in a southeasterly direction from Santa Monica Harbor to the southern San Pedro Channel (Figure 2-1). The short onshore segment of the fault extends for nine miles (15 km) from Redondo Beach to San Pedro and follows the northeastern flank of the Palos Verdes Hills. Offshore, to the southeast, the fault trends across Los Angeles Harbor, and onto the continental shelf where it splays into two discontinuous sub-parallel strands and continues southeast as the Coronado Bank fault zone. Northwest of Redondo Beach, the fault is thought to end in a horsetail splay in Santa Monica Bay, although some scientists suggest the fault continues northwesterly and joins the Dume fault (Stephenson et al., 1995). The fault is located about 12 miles west of Newport Beach at its nearest point.

Davis et al. (1989) and Shaw and Suppe (1994) modeled the Palos Verdes fault as a southwest-dipping back thrust above a blind thrust. Calculated vertical rates of deformation for the fault based on uplifted marine terraces range from 0.2 to 0.7 mm/yr (Clarke et al., 1985) to 3 mm/yr (Ward and Valensise, 1994). Recent geomorphic studies, however, indicate the fault has a significant right lateral component. McNeilan et al. (1996) used an offset channel in the Los Angeles Harbor to derive a right-lateral slip rate of 3 mm/yr.

Based on its length and uplift rate, the Palos Verdes fault could produce an earthquake of magnitude 7.1 and cause peak horizontal ground accelerations of 0.24g to 0.29g in Newport Beach.

2.5.4 Coronado Bank Fault

The 55-mile (90 –km) long offshore Coronado Bank fault zone is the principal southern continuation of the Palos Verdes fault, extending from the southeast flank of the Lausen Knoll in the southern San Pedro Channel (about 24 miles south of Newport Beach) to the La Jolla submarine channel. Bathymetric data show that the fault is well defined by alternating pop-up structures and broad transtensional sags (Legg, 1985; Legg and Kennedy; 1991; M. Legg and C. Goldfinger, 2001). Right lateral motion has been inferred from uplift at left bends in the fault trace and sags at right bends. Little is known about the slip rate or return time of large events on the fault, although a roughly estimated slip rate of 2-3 mm/yr for the Coronado Bank fault zone is based on rates derived on the offshore segment of the Palos Verdes fault. The Coronado Bank fault zone could rupture together with the Palos Verdes fault, producing a magnitude 7.4 earthquake, that would result in peak ground accelerations in Newport Beach of about 0.2g.

2.5.5 Compton Thrust Fault

The Compton Thrust fault is an inferred blind thrust fault in the southwestern portion of the Los Angeles basin. The fault is part of the Compton-Los Alamitos fault system, postulated to extend over 50 miles from Western Santa Monica Bay southeast into northwestern Orange County. Little is known about this fault because it does not break the surface. However, Shaw and Suppe (1996) calculated a slip rate of 1.4 +/- 0.4 mm/yr based on modeling of deep seismic data. More recently, Mueller (1997) showed that geologic structures and units overlying the fault are not deformed, including a 1,900 year-old peat deposit and a 15,000 to 20,000 year-old aquifer, indicating that the fault may not be active. Nevertheless, the fault databases still include the Compton thrust as a potential seismic source. If the fault is active, it has the potential to generate a magnitude 6.8 earthquake that would cause peak horizontal ground accelerations of between 0.30g and 0.37g in the city of Newport Beach. An event of this size has an estimated average recurrence interval of 676 years based on the 1.4 mm/yr slip rate.

2.5.6 Elysian Park Thrust

The Whittier Narrows earthquake of October 1, 1987 occurred on a previously unknown blind thrust fault underneath the eastern part of the Los Angeles basin. Davis et al. (1989) used oil field data to construct cross-sections showing the subsurface geology of the basin, and concluded that the Whittier Narrows earthquake occurred on a 12- to 24-mile (20 to 38-km) long thrust ramp they called the Elysian Park thrust fault. They modeled the Elysian Park as a shallow-angle, reverse fault 6 to 10 miles below the ground surface, generally located between the Whittier fault to the southeast and the Hollywood fault to the west-northwest. Although blind thrusts do not extend to the Earth's surface, they are typically expressed at the surface by a series of hills or mountains. Davis et al. (1989) indicated that the Elysian Park thrust ramp is expressed at the surface by the Santa Monica Mountains, and the Elysian, Repetto, Montebello and Puente Hills.

Davis et al. (1989) estimated a long-term slip rate on the Elysian Park fault of between 2.5 and 5.2 mm/yr. Dolan et al. (1995) used a different approach to estimate a slip rate on the Elysian Park fault, arriving at a rate of about 1.7 mm/yr with a recurrence interval of about 1,475 years. In 1996, Shaw and Suppe re-interpreted the subsurface geology of the Los Angeles basin and proposed a new model for what they call the Elysian Park trend. They estimated a slip rate on the thrust ramp beneath the Elysian Park trend of 1.7±0.4 mm/yr.

More recently, Shaw and Shearer (1999) relocated the main shock and aftershocks of the 1987 Whittier Narrows earthquake, and showed that the earthquake sequence occurred on an east-west trending buried thrust they called the Puente Hills thrust (rather than the northwest-trending Elysian Park thrust).

Given the enormous amount of research currently underway to better characterize the blind thrust faults that underlie the Los Angeles basin, the Elysian Park thrust fault will most likely undergo additional significant re-interpretations. In fact, Shaw and Shearer (1999) suggest that the Elysian Park thrust fault is no longer active. However, since this statement is under consideration, and the Elysian Park thrust is still part of the active fault database for southern California (CDMG, 1996), this fault is still considered to be a potential seismic source that can affect the region. If this fault caused a magnitude 6.7 earthquake, it is estimated that Newport Beach would experience peak ground accelerations of about 0.23g.

2.5.7 Elsinore Fault Zone

The 125-mile (200 –km) long Elsinore fault is part of the San Andreas fault system in southern California and accommodates about ten percent of the motion between the Pacific and North American plates (WGCEP, 1995). The fault extends northwesterly from the US-Mexico border to north of the of the Santa Ana Mountains and is divided, from south to north, into the Coyote Mountain, Julian, Temecula, and Glen Ivy segments. North of the Santa Ana Mountains the fault splits into the Whittier and Chino faults. The fault has historically produced a ~M 6 earthquake on the Glen Ivy Segment (Toppozada and Parke, 1982; Rockwell et al., 1986) and a M>6.9 event on the Laguna Salada fault, the southern extension of the Elsinore fault in Mexico (Rockwell, 1989; Mueller and Rockwell, 1995) indicating the fault is active and capable of producing destructive earthquakes.

Three-dimensional paleoseismic studies across the Wildomar strand of the Temecula segment yielded minimum late Holocene slip rates of about 4.2 mm/yr (Bergmann et al., 1993). This is roughly consistent with slip rates of about 5 mm/yr derived from dated offset alluvial fan deposits on the Glen Ivy segment to the north (Millman and Rockwell, 1986), and the Julian segment to the south (Vaughan and Rockwell, 1986). Although no individual earthquakes have been directly dated on the Wildomar fault, paleoseismic studies on the Murrieta Creek fault, an oblique-slip fault secondary to the Temecula segment, suggest an average recurrence interval of 300 to 700 years for the Elsinore fault in the Murrieta area. This is broadly consistent with a calculated average recurrence of about 240 years based on segment length and empirical relations of Wells and Coppersmith (1994). Using this recurrence interval, and a minimum 175 years of historical quiescence on the fault, the Working Group on California Earthquake Probabilities (WGCEP, 1995) suggests that the Temecula segment has a 16 percent chance of rupturing by the year 2024. Recent paleoseismic studies on the southeastern end of the Temecula segment, near Agua Tibia Mountain, however, suggest a longer average recurrence interval of 550 to 600 years for the segment, making the likelihood of an earthquake on the Temecula segment less than five percent in the next 50 years (Vaughan et al., 1999).

The deterministic analysis for the Newport Beach City Hall area estimates peak ground accelerations of about 0.19g for a magnitude 7.6 earthquake on the Chino segment, and about 0.15g, based on a magnitude 6.8 earthquake on the Glen Ivy segment of the Elsinore fault.

2.5.8 Sierra Madre Fault

The Sierra Madre fault zone is a north-dipping reverse fault zone approximately 47 miles (75 km) long that extends along the southern flank of the San Gabriel Mountains from San Fernando to San Antonio Canyon, where it continues southeastward as the Cucamonga fault. The Sierra Madre fault has been divided into five segments, each with a different rate of activity.

The northwestern-most segment of the Sierra Madre fault (the San Fernando segment) ruptured in 1971, causing the M_w 6.7 San Fernando (or Sylmar) earthquake. As a result of this earthquake, the Sierra Madre fault has been known to be active. In the 1980s, Crook and others (1987) studied the Transverse Ranges using general geologic and geomorphic mapping, coupled with a few trenching locations. Based on this work, they suggested that segments of the Sierra Madre fault east of the San Fernando segment have not generated major earthquakes in several thousands of years, and possibly as long as 11,000 years. By California's definitions of active faulting, most of the Sierra Madre fault would therefore be classified as not active. Then, in the mid- 1990s, Rubin et al. (1998) trenched a section of the Sierra Madre fault in Altadena and determined that this segment had ruptured at least twice in the last 15,000 years, causing magnitude 7.2 to 7.6 earthquakes. This suggests that the Los Angeles area is susceptible to infrequent, but large near-field earthquakes on the Sierra Madre fault. Rubin et al.'s (1998) trenching data show that during the last earthquake, the ground was displaced along the fault as much as 13 feet (4 meters) at the surface, and that total displacement in the last two events adds up to more than 34 feet (10.5 meters)!

Although the fault apparently slips at a slow rate of between 0.5 and 1 mm/yr (Walls et al., 1998), over time, it can accumulate a significant amount of strain. The paleoseismic data obtained at the Altadena site were insufficient to estimate the recurrence interval and the age of the last surface-rupturing event on this segment of the fault. However, Tucker and Dolan (2001) trenched the east Sierra Madre fault at Horsethief Canyon and obtained data consistent with Rubin et al.'s (1998) findings. At Horsethief Canyon, the Sierra Madre fault last ruptured about 8,000 to 9,000 years ago. A recurrence interval of about 8,000 years was calculated using a slip rate of 0.6 mm/yr and a slip per event of 15 feet (5 meters). Therefore, if the last event occurred more than 8,000 years ago, it is possible that these segments of the Sierra Madre fault are near the end of their cycle, and are likely to generate an earthquake in the not too distant future.

The deterministic analysis for the Newport Beach City Hall area estimates peak ground accelerations of about 0.15g, based on a magnitude 7.0 earthquake on the central segment of the Sierra Madre fault. A larger earthquake on this fault, of magnitude between 7.2 and 7.6, could generate significantly stronger peak ground accelerations.

2.6 Potential Sources of Fault Rupture

2.6.1 Primary Fault Rupture

Primary fault rupture refers to fissuring and offset of the ground surface along a rupturing fault during an earthquake. Primary ground rupture typically results in a relatively small percentage of the total damage in an earthquake, but being too close to a rupturing fault can cause severe damage to structures. As discussed previously, development constraints within active fault zones were implemented in 1972 with passage of the California Alquist-Priolo Earthquake Fault Zoning Act. The Alquist-Priolo Act prohibits the construction of new habitable structures astride an active fault and requires special geologic studies to locate and evaluate whether a fault has ruptured the ground surface in the last about 11,000 years. If an active fault is encountered, structural setbacks from the fault are defined.

The Newport-Inglewood fault is the only fault with the potential to generate primary surface rupture in the city of Newport Beach. The North Branch of the Newport-Inglewood fault as mapped by Morton (1999) comes on shore (from the south) near the intersection of Balboa Boulevard and 15th Street, then crosses the Newport Channel and continues through the Pacific Coast Highway-Balboa Boulevard intersection (Plate 2-2). The fault trace then continues through the foot of the bluffs, across the old Newport-Banning oil field, and into the city of Huntington Beach. The South Branch comes on shore in Huntington Beach, just up the coast from the Santa Ana River (Plate 2-2). However, in Newport Beach, the North Branch is not considered sufficiently active and well defined by the CGS, and as a result, the fault in the Newport Beach area has not been zoned under the guidelines of the Alquist-Priolo Earthquake Fault Zoning Act (Plate 2-2). Farther north, the fault is better defined, which is why Alquist-Priolo Earthquake Fault Zones have been defined for the North Branch in Huntington Beach.

The lowland area of West Newport that is thought to be underlain by the North Branch of the fault (see Plate 2-2) was developed extensively prior to recognition of the Newport-Inglewood fault as a surface rupture hazard. Therefore, there are no studies of the fault zone in the West Newport and Balboa Peninsula areas. Furthermore, the sediments in these areas are too young, and ground water is too close to the ground surface for trenching to be used as a successful fault study method. Subsurface studies using other techniques such as cone penetrometer testing (CPTs, see Grant et al., 1997) or geophysics could be used along the beach, but this has not been tried in this area.

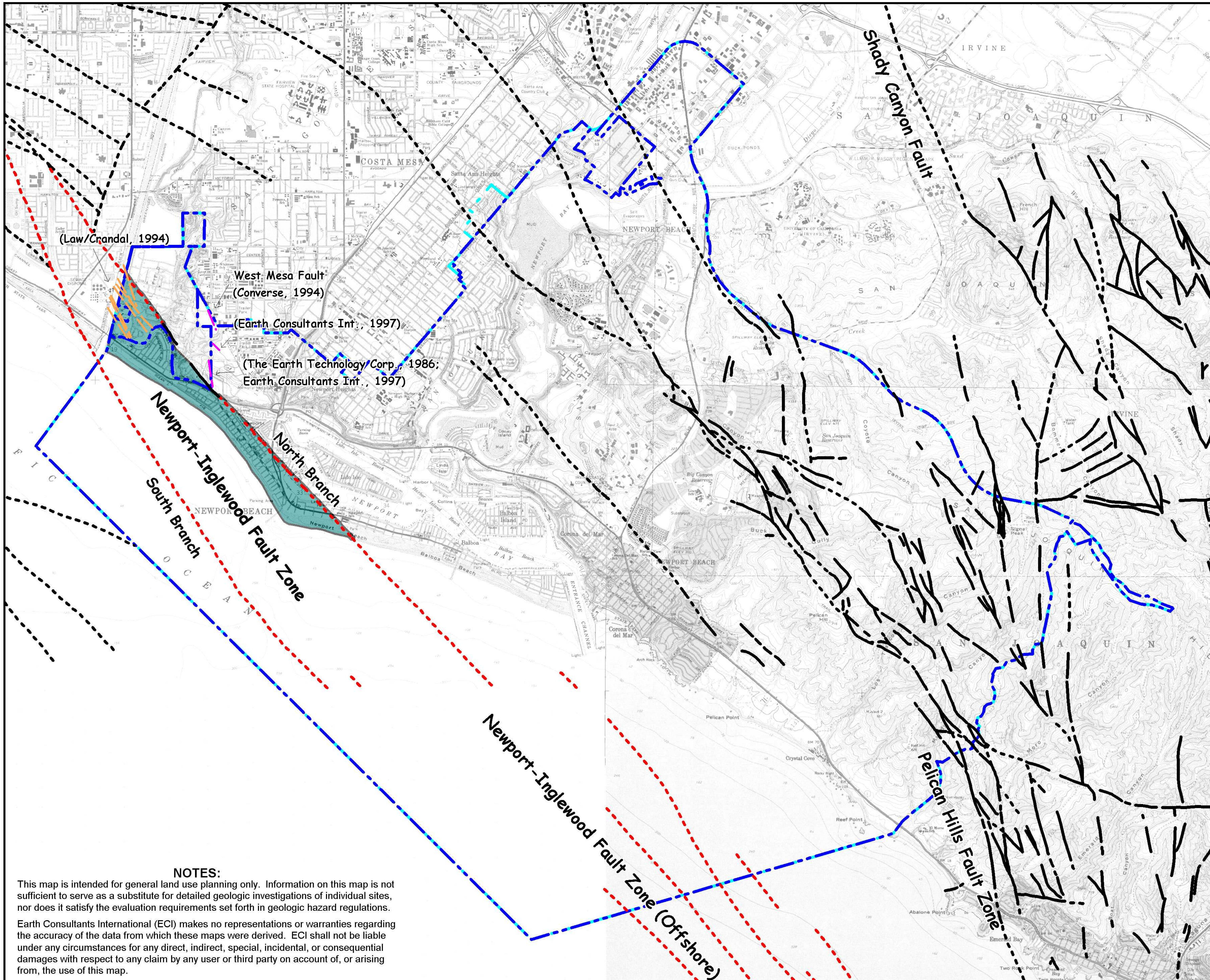
On the elevated terrace of Newport Mesa, however, several fault studies have been conducted looking for the active strands of the fault. The first studies to identify faults at or near the surface in the Newport Banning area were reportedly conducted jointly by Woodward-Clyde Consultants and the West Newport Oil Company in 1981 and 1985. Additional studies have been conducted by The Earth Technology Corporation (1986) and by Earth Consultants International (1997). The results of the 1981 study were published (Guptill and Heath, 1981) because one of the exposures reviewed – located approximately 600 feet northwest of the intersection of Pacific Coast Highway and Superior Avenue – suggested that the 1933 earthquake had actually ruptured the ground surface. This finding was not confirmed by The Earth Technology Corporation 1986 study who reported that the fault does not offset a well-developed soil profile estimated to be about 100,000 years old (Bryant, 1988).

The 1985 study (summarized by The Earth Technology Corporation, 1986) exposed a broad area of faulting in the western central and southeastern portion of the mesa. The faults in the western portion of the mesa are roughly coincident with the mapped trace of the North Branch of the fault (see Plate 2-2). However, the 1985 study did not resolve the length, width or age of the faults. Then in 1986, The Earth Technology Corporation found that the faults encountered were not active under the criteria of the Alquist-Priolo Act. With one exception in the southeastern portion of the mesa discussed further below, this finding was confirmed locally by Earth Consultants International in 1997. These studies combined, however, suggest that the North Branch of the Newport-Inglewood fault, as mapped, is not active, at least not in this area of Newport Beach.

Converse Consultants (1994) found a small fault, the West Mesa fault, near the western terminus of West 16th Street, while conducting a geologic study and grading for a filtration water plant (see Plate 2-2). The West Mesa fault trends between 5 and 30 degrees west of north, and is interpreted to have moved in the last 11,000 years, making it active. Earth Consultants International (1997) then trenched south of the Converse (1994) exposure in an attempt to find the southern continuation of this fault, but the fault was not found, suggesting that the fault is not laterally extensive. However, Earth Consultants International (1997) did find another small active fault about 600 feet to the south of the Converse study that strikes 50 degrees west of north, roughly parallel to the regional trend of the Newport-Inglewood fault. In the exposure, the fault had 12 to 18 inches of vertical separation, extended upward into the E and Bt soil horizons, and was therefore interpreted to have ruptured at least once in the last 11,000 years, probably co-seismically with movement on the main Newport-Inglewood fault.

Further, in reviewing previous work in the Newport Mesa area, Earth Consultants International (1997) concluded that a narrow fault zone mapped by The Earth Technology Corporation (1986) was not conclusively shown to be inactive. This fault zone trends 5 to 12 degrees west of north, similar to the orientation of the fault exposed by Converse (1994). All of these faults in the eastern portion of the mesa are not considered seismogenic (earthquake-producing) because of their small separations, narrow width, and non-ideal orientations. The separation seen on these faults probably resulted from co-seismic slip during an earthquake on a strand of the Newport-Inglewood fault farther to the south. Nevertheless, several inches of ground offset could cause severe damage to overlying structures. Consequently, although the hazard from primary surface rupture on these small faults is possibly low, building setbacks from these faults are appropriate.

Finally, two paleoseismic investigations, one near Bolsa Chica (Grant et al., 1997) and the other on the west bank of the Santa Ana River (Law/Crandall, Inc., 1994; Shlemon et al., 1995) found evidence for five surface rupturing earthquakes in the last ~11,000 years on the North Branch of the Newport-Inglewood fault. The Law/Crandall (1994) study identified several fault traces south of the mapped trace of the North Branch of the Newport-Inglewood that appear to have moved in the Holocene. In Plate 2-2, these fault traces are projected as straight lines from the west bank of the Santa Ana River southward into the Newport Beach area. This shows that the active faults appear to be located south of the North Branch, with active faulting spread over a broad area that most likely spans the area between the North and South branches. However, the location of these faults should be considered approximate at best, until further studies in this area are conducted.



NOTES:
This map is intended for general land use planning only. Information on this map is not sufficient to serve as a substitute for detailed geologic investigations of individual sites, nor does it satisfy the evaluation requirements set forth in geologic hazard regulations.

Earth Consultants International (ECI) makes no representations or warranties regarding the accuracy of the data from which these maps were derived. ECI shall not be liable under any circumstances for any direct, indirect, special, incidental, or consequential damages with respect to any claim by any user or third party on account of, or arising from, the use of this map.

Fault Map

Newport Beach, California

EXPLANATION

Fault: solid where location known, long dashed where approximate, dotted where inferred.

Faults that are not active.

Major fault traces as mapped by Morton, 1999. Presumed active, except where shown otherwise based on geological studies.

Southward projection of active fault traces based on a subsurface study on the west bank of the Santa Ana River.

Secondary fault traces that have been shown to have moved at least once during the Holocene.

Fault Hazard Management Zone for real-estate disclosure purposes (refer to text).

Newport Beach City Boundary

Sphere of Influence

Scale: 1:60,000

0.5 0 0.5 1 1.5 Miles

1 0 1 2 3 Kilometers

Base Map: USGS Topographic Map from Sure!MAPS RASTER

Source: Earth Technology Corp., 1986; Converse,1994; Law/Crandall, 1994; Earth Consultants Int., 1997; Morton, 1999.

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Plate 2-2

The activity and location of the North Branch, and the faults south of the North Branch farther southeast, along West Newport and the Balboa Peninsula are unknown. Ideally, geologic studies similar in scope to those required by the CGS in Alquist-Priolo Earthquake Fault Zones should be conducted if new development or redevelopment is proposed in these areas. In reality, such investigations are not likely to be successful due to the small lot sizes and very high building density in these portions of the City, combined with the underlying, geologically young beach and sand dune deposits and shallow ground water. Trenching in these areas could also negatively impact adjacent properties. It is herein recommended that a "fault disclosure zone" be placed along the area between the mapped alignments of the North and South branches of the Newport-Inglewood fault, in the area where recent studies suggest that the recently active traces of the fault are located. The purpose of this fault disclosure zone is to make the public aware of the potential hazard (Plate 2-2). If detailed geological investigations are conducted, the location and activity status (some of the splays may be proven to have not moved within the last 11,000 years) of the faults shown on Plate 2-2 may be refined or modified. The map should be amended as new data become available and are validated.

Although the San Joaquin Hills fault may generate very strong earthquakes, damage from primary surface rupture is low because this fault is "blind." By definition, a blind thrust is a reverse fault that does not break the surface during an earthquake. For example, the 1994 Northridge earthquake ruptured on the blind Oakridge fault and was the most costly earthquake in U.S. history, buy it did not break the surface. However, ground deformation resulting from uplifting of the landmass during a San Joaquin Hills fault quake could damage portions of Newport Beach.

Several other faults, such as the Pelican Hill fault, and the Shady Canyon fault (north of the City) have been mapped in the San Joaquin Hills (see Plate 2-2). These faults appear to be confined to the older bedrock units, with no impact on the younger, Holocene terrace and alluvial deposits, and are therefore not considered active. Special geological studies for these faults are not considered warranted.

MITIGATION OF PRIMARY FAULT RUPTURE

Geologic studies on the Newport-Inglewood fault suggest that slip per event on this fault typically exceeds 3 feet (1 m). Most engineered structures are not designed to withstand this amount of movement, so buildings that straddle a fault will most certainly be damaged beyond repair if and when the fault breaks the surface. Since it is impractical to reduce the damage potential to acceptable levels by engineering design, the most appropriate mitigation measure is to simply avoid placing structures on or near active fault traces. However, because of the complexity of most active fault zones, particularly at the surface where they may become braided, splayed or segmented, locating and evaluating the active traces is often not an easy task. A geologic investigation, which may include fault trenching, must be performed if structures designed for human occupancy are proposed within an Alquist-Priolo Earthquake Fault Zone. The study must evaluate whether or not an active segment of the fault extends across the area of proposed development. Based on the results of these studies, appropriate structural setbacks can be recommended. Specific guidelines for evaluating the hazard of fault rupture are presented in Note 49, published by the CGS, which is available on the world wide web at: www.consrv.ca.gov/DMG/pubs/notes/49/index.htm.

A common misperception regarding setbacks is that they are always 50 feet from the active fault trace. In actuality, geologic investigations are required to characterize the ground deformation associated with an active fault. Based on these studies, specific setbacks are recommended. If a fault trace is narrow, with little or no associated ground deformation, a setback distance less than 50 feet may be recommended. Conversely, if the fault zone is wide, with multiple splays, or is poorly defined, a setback distance greater than 50 feet may be warranted. State law allows local jurisdictions to establish minimum setback distances from a hazardous fault, and some communities have taken a prescriptive approach to this issue, establishing specific setbacks from a fault, rather than allowing for different widths depending on the circumstances. For example, the City of West Hollywood requires a 50-foot setback from the Hollywood fault for conventional structures, and 100-foot setback for critical and high-occupancy facilities.

2.6.2 Secondary Fault Rupture and Related Ground Deformation

Primary fault rupture is rarely confined to a simple line along the fault trace. As the rupture reaches the brittle surface of the ground, it commonly spreads out into complex fault patterns of secondary faulting and ground deformation. In the 1992 Landers earthquake, the zone of deformation around the main trace ranged up to hundreds of feet wide (Lazarte et al., 1994). Surface displacement and distortion associated with secondary faulting and deformation can be relatively minor or can be large enough to cause significant damage to structures.

Secondary fault rupture refers to ground surface displacements along faults other than the main traces of active regional faults. Unlike the regional faults, these subsidiary faults are not deeply rooted in the Earth's crust and are not capable of producing damaging earthquakes on their own. Movement along these faults generally occurs in response to movement on a nearby regional fault. The zone of secondary faulting can be quite large, even in a moderate-sized earthquake. For instance, in the 1971 San Fernando quake, movement along subsidiary faults occurred as much as 2 km from the main trace (Ziony and Yerkes, 1985).

Secondary faulting in thrust fault terrain is very complex, and numerous types of faulting have been reported. These include splays, branches, tear faults, shallow thrust faults, and back-thrusts, as well as faults that form in the shallow subsurface as a result of folding in sedimentary layers. Identified by Yeats (1982), fold-related types include flexural slip faults (slippage along bedding planes), and bending-moment faults (tensional or compressional tears in the axis of folding). A striking example of flexural slip along bedding planes occurred during the Northridge earthquake, when numerous bedding plane faults ruptured across the surface of newly graded roads and pads in a subdivision near Santa Clarita. The ruptures were accompanied by uplift and warping of the nearby ground (Treiman, 1995). Deformation of this type could occur in Newport Beach, particularly in the hillside areas, during the next moderate-sized earthquake on the San Joaquin Hills fault.

Secondary ground deformation includes fracturing, shattering, warping, tilting, uplift and/or subsidence. Such deformation may be relatively confined along the rupturing fault, or spread over a large region (such as the regional uplift of the Santa Susana Mountains after the Northridge earthquake). Deformation and secondary faulting can also occur without primary ground rupture, as in the case of ground deformation above a blind (buried) thrust fault.

MITIGATION OF SECONDARY FAULT RUPTURE AND GROUND DEFORMATION

Geotechnical investigations for future development and redevelopment should consider this hazard. The methodology for evaluating these features is similar to that used for evaluating primary fault rupture (CGS, previously CDMG Note 49).

Lazarte (1994) outlined three approaches to mitigation of fault rupture hazard, which could be applied to secondary deformation as well. The first is avoidance, by the use of structural setback zones. The second is referred to as "geotechnical engineering." This method consists of placing a compacted fill blanket, or a compacted fill blanket reinforced with horizontal layers of geogrid, over the top of the fault trace. This is based on observations that the displacement across a distinct bedrock fault is spread out and dissipated in the overlying fill, thus reducing the severity of the displacement at the surface. The third method is "structural engineering." This refers to strengthening foundation elements to withstand a limited amount of ground deformation. This is based on studies of foundation performance in the Landers earthquake showing that structures overlying major fault ruptures suffered considerable damage but did not collapse. Application of the second and third methods requires a thorough understanding of the geologic environment and thoughtful engineering judgment. This is because quantifying the extent of future displacement is difficult, and there are no proven engineering standards in place to quantify the amount of mitigation needed (for instance how thick a fill blanket is needed).

2.7 Geologic Hazards Resulting from Seismic Shaking

2.7.1 Liquefaction and Related Ground Failure

Liquefaction is a geologic process that causes various types of ground failure. Liquefaction typically occurs in loose, saturated sediments primarily of sandy composition, in the presence of ground accelerations over 0.2g (Borchardt and Kennedy, 1979; Tinsley and Fumal, 1985). When liquefaction occurs, the sediments involved have a total or substantial loss of shear strength, and behave like a liquid or semi-viscous substance. Liquefaction can cause structural distress or failure due to ground settlement, a loss of bearing capacity in the foundation soils, and the buoyant rise of buried structures. The excess hydrostatic pressure generated by ground shaking can result in the formation of sand boils or mud spouts, and/or seepage of water through ground cracks.

As indicated above, there are three general conditions that need to be met for liquefaction to occur. The first of these – strong ground shaking of relatively long duration – can be expected to occur in the Newport Beach area as a result of an earthquake on any of several active faults in the region (see Section 2.5 above). The second condition – loose, unconsolidated sediments consisting primarily of silty sand and sand - occurs along the coastline from West Newport to the tip of Balboa Peninsula, as well as in and around Newport Bay. Young alluvial sediments also occur along the larger drainages (e.g., Bonita Canyon) within the City. (see Plates 3-1 and 3-2 in Chapter 3 – Geologic Hazards). The third condition – water-saturated sediments within about 50 feet of the surface – occurs along the coastline, in and around Newport Bay and Upper Newport Bay, in the lower reaches of major streams in Newport Beach, and in the floodplain of the Santa Ana River.

Therefore, these are the areas with the potential to experience future liquefaction-induced ground displacements. The potentially liquefiable areas are shown on Plate 2-3, and are discussed further below.

Structures built on the sand dune deposits lining the coast from the mouth of the Santa Ana River to the end of Balboa Peninsula are highly susceptible to liquefaction during an earthquake because depth to the water table is less than 15 feet. Likewise, buildings on the estuary deposits within and around Newport Bay are equally at risk from seismically induced liquefaction because of the shallow water table (Plate 2-3). Areas along major stream channels, such as Bonita and Big Canyon, are also vulnerable to liquefaction, especially during wet climatic conditions/seasons. Liquefaction hazard is also mapped along Buck Gully, Los Trancos Canyon, Muddy Canyon, and the beach area from Corona del Mar to the eastern boundary of Newport Beach near Reef Point (Plate 2-3).

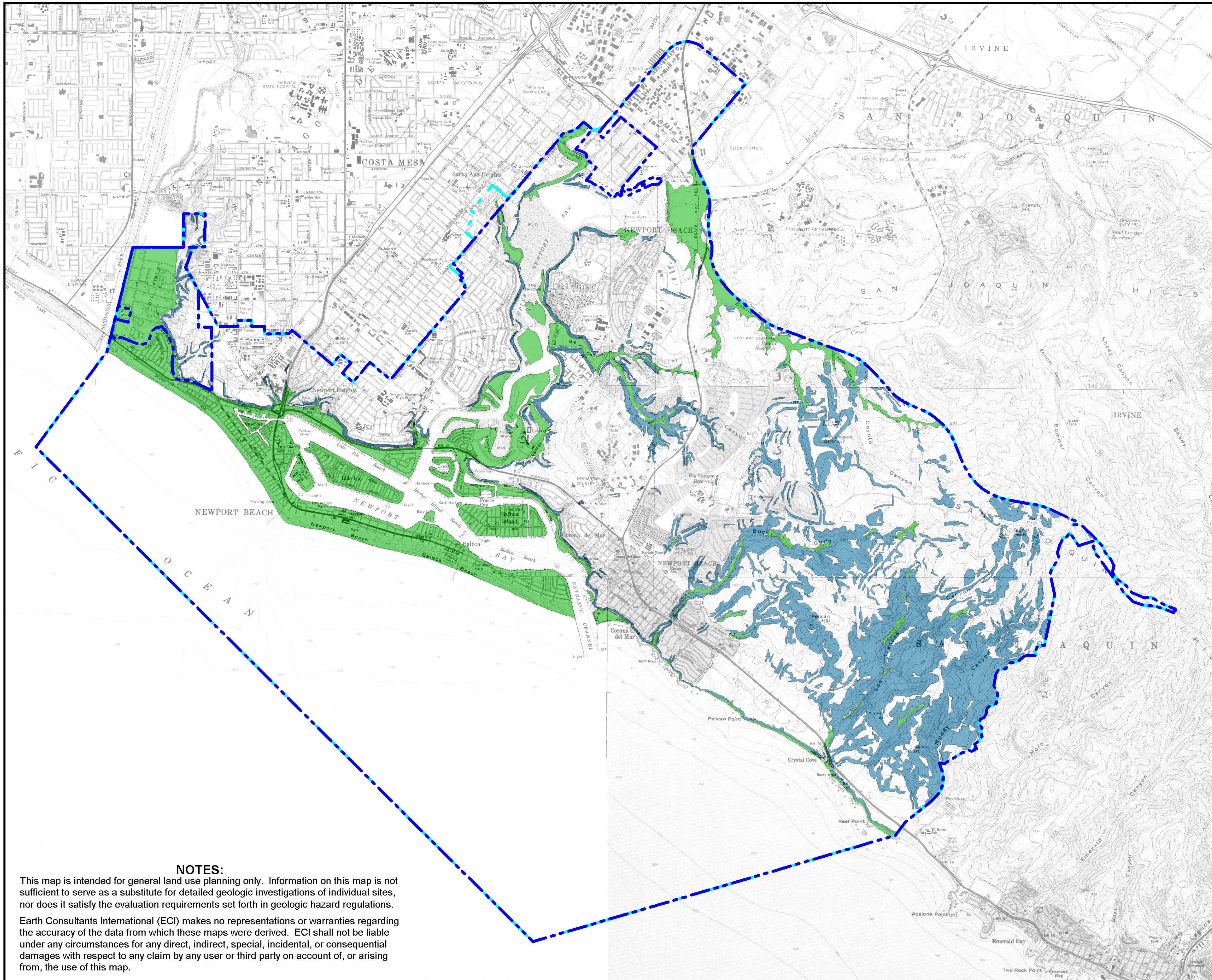
Although not mapped, shallow groundwater conditions may occur locally in smaller drainages throughout central and eastern Newport Beach. Since the bedrock that forms the San Joaquin Hills weathers to sand-sized particles, some of the canyons may contain sediments susceptible to liquefaction. For example, sediments lining streams flowing southwest off Pelican Hill may be susceptible to liquefaction. The potential for these areas to liquefy should be evaluated on a case-by-case basis. Additionally, areas of artificial fill that have been placed on liquefiable soils may also be at risk.

It is likely that residential or commercial development will never occur in many of the liquefiable areas, such as Upper Newport Bay, the Newport Coast beaches, and the bottoms of stream channels. However, other structures (such as bridges, roadways, major utility lines, and park improvements) that occupy these areas are vulnerable to damage from liquefaction if mitigation measures have not been included in their design. Construction planned for these areas should include liquefaction mitigation measures, weighing the factors of public safety, the impact to the environment, and the risk of economic loss. For instance, a parking lot at the beach may not warrant ground modification measures, especially if the mitigation measures would be destructive to the environment, but a bridge abutment for a busy roadway would.

A considerable part of the City's mapped liquefiable areas (West Newport, Balboa Peninsula, the harbor islands and vicinity) are already built upon, mostly with residential and commercial development. City Hall and a portion of the City's active oil field are also built on liquefiable soils. It is likely that a nearby moderate to strong earthquake will cause extensive damage to buildings and infrastructure in these areas. Since retrofitting mitigation measures are generally not feasible, the City should be prepared to respond to damage and disruption in the event of an earthquake.

Seismic Hazards Map

Newport Beach, California



EXPLANATION

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

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

Newport Beach City Boundary

Sphere of Influence

Scale: 1:60,000

0.5 0 0.5 1 1.5 Miles

1 0 1 2 3 Kilometers

Base Map: USGS Topographic Map from Sure!MAPS RASTER

Source: California Geological Survey, 1997; Revised 2001 (Newport, Tustin and Laguna Beach Quadrangles).

Earth Consultants International

CITY OF NEWPORT BEACH CALIFORNIA

Project Number: 2112
Date: July, 2003

Plate 2-3

NOTES:

This map is intended for general land use planning only. Information on this map is not sufficient to serve as a substitute for detailed geologic investigations of individual sites, nor does it satisfy the evaluation requirements set forth in geologic hazard regulations.

Earth Consultants International (ECI) makes no representations or warranties regarding the accuracy of the data from which these maps were derived. ECI shall not be liable under any circumstances for any direct, indirect, special, incidental, or consequential damages with respect to any claim by any user or third party on account of, or arising from, the use of this map.

The types of ground failure typically associated with liquefaction are explained below.

Lateral Spreading - Lateral displacement of surficial blocks of soil as the result of liquefaction in a subsurface layer is called lateral spreading. Even a very thin liquefied layer can act as a hazardous slip plane if it is continuous over a large enough area. Once liquefaction transforms the subsurface layer into a fluid-like mass, gravity plus inertial forces caused by the earthquake may move the mass downslope towards a cut slope or free face (such as a river channel or a canal). Lateral spreading most commonly occurs on gentle slopes that range between 0.3° and 3°, and can displace the ground surface by several meters to tens of meters. Such movement damages pipelines, utilities, bridges, roads, and other structures. During the 1906 San Francisco earthquake, lateral spreads with displacements of only a few feet damaged every major pipeline. Thus, liquefaction compromised San Francisco's ability to fight the fires that caused about 85 percent of the damage (Tinsley et al., 1985). Lateral Spreading damaged major roads, including Pacific Coast Highway, around Newport Beach during the 1933 Long Beach Earthquake (Coffman and Stover, 1993).

Flow Failure - The most catastrophic mode of ground failure caused by liquefaction is flow failure. Flow failure usually occurs on slopes greater than 3°. Flows are principally liquefied soil or blocks of intact material riding on a liquefied subsurface. Displacements are often in the tens of meters, but in favorable circumstances, soils can be displaced for tens of miles, at velocities of tens of miles per hour. For example, the extensive damage to Seward and Valdez, Alaska, during the 1964 Great Alaskan earthquake was caused by submarine flow failures (Tinsley et al., 1985).

Ground Oscillation - When liquefaction occurs at depth but the slope is too gentle to permit lateral displacement, the soil blocks that are not liquefied may separate from one another and oscillate on the liquefied zone. The resulting ground oscillation may be accompanied by the opening and closing of fissures (cracks) and sand boils, potentially damaging structures and underground utilities (Tinsley et al., 1985).

Loss of Bearing Strength - When a soil liquefies, loss of bearing strength may occur beneath a structure, possibly causing the building to settle and tip. If the structure is buoyant, it may float upward. During the 1964 Niigata, Japan earthquake, buried septic tanks rose as much as 3 feet, and structures in the Kwangishicho apartment complex tilted as much as 60° (Tinsley et al., 1985).

Ground Lurching - Soft, saturated soils have been observed to move in a wave-like manner in response to intense seismic ground shaking, forming ridges or cracks on the ground surface. At present, the potential for ground lurching to occur at a given site can be predicted only generally. Areas underlain by thick accumulation of colluvium and alluvium appear to be the most susceptible to ground lurching. Under strong ground motion conditions, lurching can be expected in loose, cohesionless soils, or in clay-rich soils with high moisture content. In some cases, the deformation remains after the shaking stops (Barrows et al., 1994).

LIQUEFACTION MITIGATION MEASURES

In accordance with the SHMA, all projects within a State-delineated Seismic Hazard Zone for liquefaction must be evaluated by a Certified Engineering Geologist and/or Registered Civil Engineer (this is typically a civil engineer with training and experience in soil engineering). Most often however, it is appropriate for both the engineer and geologist to be involved in the evaluation, and in the implementation of the mitigation measures. Likewise, project review by the local agency must be performed by geologists and engineers with the same credentials and experience. In order to assist project consultants and reviewers in the implementation of the SHMA, the State has published specific guidelines for evaluating and mitigating liquefaction (California Division of Mines and Geology, 1997). Furthermore, in 1999, a group sponsored by the Southern California Earthquake Center (SCEC, 1999) published recommended procedures for carrying out the CGS guidelines. In general, a liquefaction study is designed to identify the depth, thickness, and lateral extent of any liquefiable layers that would affect the project site. An analysis is then performed to estimate the type and amount of ground deformation that might occur, given the seismic potential of the area.

Mitigation measures generally fall in one of two categories: ground improvement or foundation design. Ground improvement includes such measures as removal and recompaction of low-density soils, removal of excess ground water, in-situ ground densification, and other types of ground improvement (such as grouting or surcharging). Special foundations that may be recommended range from deep piles to reinforcement of shallow foundations (such as post-tensioned slabs). Mitigation for lateral spreading may also include modification of the site geometry or inclusion of retaining structures. The type (or combinations of types) of mitigation depend on the site conditions and on the nature of the proposed project (CDMG, 1997).

It should be remembered that Seismic Hazard Zone Maps may not show all areas that have the potential for liquefaction, nor is information shown on the maps sufficient to serve as a substitute for detailed site investigations.

2.7.2 Seismically Induced Settlement

Under certain conditions, strong ground shaking can cause the densification of soils, resulting in local or regional settlement of the ground surface. During strong shaking, soil grains become more tightly packed due to the collapse of voids and pore spaces, resulting in a reduction of the thickness of the soil column. This type of ground failure typically occurs in loose granular, cohesionless soils, and can occur in either wet or dry conditions. Unconsolidated young alluvial deposits are especially susceptible to this hazard. Artificial fills may also experience seismically induced settlement. Damage to structures typically occurs as a result of local differential settlements. Regional settlement can damage pipelines by changing the flow gradient on water and sewer lines, for example.

Those portions of the Newport Beach area that may be susceptible to seismically induced settlement are those underlain by late Quaternary unconsolidated sediments (similar to the liquefaction-susceptible areas shown on Plate 2-3).

MITIGATION OF SEISMICALLY INDUCED SETTLEMENT

Mitigation measures for seismically induced settlement are similar to those used for liquefaction. Recommendations are provided by the project's geologist and soil engineer, following a detailed geotechnical investigation of the site. Overexcavation and recompaction is the most commonly used method to densify soft soils susceptible to settlement. Deeper overexcavation below final grades, especially at cut/fill, fill/natural or alluvium/bedrock contacts may be recommended to provide a more uniform subgrade. Overexcavation should also be performed so that large differences in fill thickness are not present across individual lots. In some cases, specially designed deep foundations, strengthened foundations, and/or fill compaction to a minimum standard that is higher than that required by the UBC may be recommended.

2.7.3 Seismically Induced Slope Failure

Strong ground motions can worsen existing unstable slope conditions, particularly if coupled with saturated ground conditions. Seismically induced landslides can overrun structures, people or property, sever utility lines, and block roads, thereby hindering rescue operations after an earthquake. Over 11,000 landslides were mapped shortly after the 1994 Northridge earthquake, all within a 45-mile radius of the epicenter (Harp and Jibson, 1996). Although numerous types of earthquake-induced landslides have been identified, the most widespread type generally consists of shallow failures involving surficial soils and the uppermost weathered bedrock in moderate to steep hillside terrain (these are also called disrupted soil slides). Rock falls and rock slides on very steep slopes are also common. The 1989 Loma Prieta and Northridge earthquakes showed that reactivation of existing deep-seated landslides also occurs (Spittler et al., 1990; Barrows et al., 1995). Numerous landslides have been mapped in the San Joaquin Hills in eastern Newport Beach (Plates 3-1 and 3-4, Chapter 3).

A combination of geologic conditions leads to landslide vulnerability. These include high seismic potential; rapid uplift and erosion resulting in steep slopes and deeply incised canyons; highly fractured and folded rock; and rock with inherently weak components, such as silt or clay layers. The orientation of the slope with respect to the direction of the seismic waves (which can affect the shaking intensity) can also control the occurrence of landslides.

Much of the area in eastern Newport Beach has been identified as vulnerable to seismically induced slope failure. Approximately 90 percent of the land from Los Trancos Canyon to State Park boundary is mapped as susceptible to landsliding by the California Geologic Survey (Plate 2-3). The occurrence of numerous Holocene to latest Pleistocene (recent to about 20,000 years ago) landslides indicate that slope failures have been common over a relatively short geologic time period and thus, without mitigation, pose a significant hazard to developments in these areas. Additionally, the sedimentary bedrock that crops out in the San Joaquin Hills is locally highly weathered. In steep areas, strong ground shaking can cause slides or rockfalls in this material. Rupture along the Newport-Inglewood Fault Zone and other faults in southern California could reactivate existing landslides and cause new slope failures throughout the San Joaquin Hills. The least vulnerable areas are those located along the major ridgelines and other isolated areas with low angle slopes (Plate 2-3). Slope failures can also be expected to occur along stream banks and coastal bluffs, such as Big Canyon, around San Joaquin Reservoir, Newport and Upper Newport Bays, and Corona del Mar.

Ground water conditions at the time of the earthquake play an important role in the development of seismically induced slope failures. For instance, the 1906 San Francisco earthquake occurred in April, after a winter of exceptionally heavy rainfall, and produced many large landslides and mudflows, some of which were responsible for several deaths. The 1987 Loma Prieta earthquake however, occurred in October during the third year of a drought, and slope failures were limited primarily to rock falls and reactivation of older landslides that was manifested as ground cracking in the scarp areas but with very little movement (Griggs et al., 1991).

MITIGATION OF SEISMICALLY INDUCED SLOPE FAILURE

Existing slopes that are to remain adjacent to or within developments should be evaluated for the geologic conditions mentioned above. In general, slopes steeper than about 15 degrees are most susceptible, however failures can occur on flatter slopes if unsupported weak rock units are exposed in the slope face. For suspect slopes, appropriate geotechnical investigation and slope stability analyses should be performed for both static and dynamic (earthquake) conditions. For deeper slides, mitigation typically includes such measures as buttressing slopes or regrading the slope to a different configuration. Protection from rockfalls or surficial slides can often be achieved by protective devices such as barriers, rock fences, retaining structures, catchment areas, or a combination of the above. The runout area of the slide at the base of the slope, and the potential bouncing of rocks must also be considered. If it is not feasible to mitigate the unstable slope conditions, building setbacks should be imposed.

In accordance with the SHMA, all development projects within a State-delineated Seismic Hazard Zone for seismically induced landsliding must be evaluated and reviewed by State-licensed engineering geologists and/or civil engineers (for landslide investigation and analysis, this typically requires both). In order to assist in the implementation of the SHMA, the State has published specific guidelines for evaluating and mitigating seismically induced landslides (CDMG, 1997). More recently, the Southern California Earthquake Center (SCEC, 2002) sponsored the publication of the "Recommended Procedures for Implementation of DMG Special Publication 117." These procedures are expected to be adopted by the Los Angeles and Riverside Counties and other cities and counties in California in the next year or so, pending some slight revisions and further discussions among the geotechnical community.

2.7.4 Deformation of Sidehill Fills

Sidehill fills are artificial fill wedges typically constructed on natural slopes to create roadways or level building pads. Deformation of sidehill fills was noted in earlier earthquakes, but this phenomenon was particularly widespread during the 1994 Northridge earthquake. Older, poorly engineered road fills were most commonly affected, but in localized areas, building pads of all ages experienced deformation. The deformation was usually manifested as ground cracks at the cut/fill contacts, differential settlement in the fill wedge, and bulging of the slope face. The amount of displacement on the pads was generally about three inches or less, but this resulted in minor to severe property damage

(Stewart et al., 1995). This phenomenon was most common in relatively thin fills (about 27 feet or less) placed near the tops or noses of narrow ridges (Barrows et al., 1995).

MITIGATION OF SIDEHILL FILL DEFORMATION

Hillside grading designs should be evaluated during site-specific geotechnical investigations to determine if there is a potential for this hazard. There are currently no proven engineering standards for mitigating sidehill fill deformation, consequently current published research on this topic should be reviewed by project consultants at the time of their investigation. It is thought that the effects of this hazard on structures may be reduced by the use of post-tensioned foundations, deeper overexcavation below finish grades, deeper overexcavation on cut/fill transitions, and/or higher fill compaction criteria.

2.7.5 Ridgetop Fissuring and Shattering

Linear, fault-like fissures occurred on ridge crests in a relatively concentrated area of rugged terrain in the Santa Cruz Mountains during the Loma Prieta earthquake. Shattering of the surface soils on the crests of steep, narrow ridgelines occurred locally in the 1971 San Fernando earthquake, but was widespread in the 1994 Northridge earthquake. Ridgetop shattering (which leaves the surface looking as if it was plowed) by the Northridge earthquake was observed as far as 22 miles away from the epicenter. In the Sherman Oaks area, severe damage occurred locally to structures located at the tops of relatively high (greater than 100 feet), narrow (typically less than 300 feet wide) ridges flanked by slopes steeper than about 2.5:1 (horizontal:vertical). It is generally accepted that ridgetop fissuring and shattering is a result of intense amplification or focusing of seismic energy due to local topographic effects (Barrows et al., 1995).

Ridgetop shattering can be expected to occur in the topographically steep portions of the San Joaquin Hills. These areas are rapidly being developed so the hazard associated with ridgetop shattering is increasing. In addition, above ground storage tanks, reservoirs and utility towers are often located on top of ridges, and during strong ground shaking, these can fail or topple over, with the potential to cause widespread damage to development downslope (storage tanks and reservoirs), or disruptions to the lifeline systems (utility towers).

MITIGATION OF RIDGETOP FISSURING AND SHATTERING

Projects located in steep hillside areas should be evaluated for this hazard by a Certified Engineering Geologist. Although it is difficult to predict exactly where this hazard may occur, avoidance of development along the tops of steep, narrow ridgelines is probably the best mitigation measure. For large developments, recontouring of the topography to reduce the conditions conducive to ridgetop amplification, along with overexcavation below finish grades to remove and recompact weak, fractured bedrock might reduce this hazard to an acceptable level.

2.7.6 Seiches

Reservoirs, lakes, ponds, swimming pools and other enclosed bodies of water are subject to potentially damaging oscillations (sloshing) called seiches. This hazard is dependent upon specific earthquake parameters (e.g. frequency of the seismic waves, distance and direction from the epicenter), as well as site-specific design of the enclosed bodies of water, and is thus difficult to predict. Areas of the City that may be vulnerable to this hazard are primarily improvements located next to waterways, such as Newport Harbor, and the southern part of Upper Newport Bay, however, as discussed previously in Chapter 1, the risk of seiching in the area is considered low. The San Joaquin and Big Canyon Reservoirs would also be subject to seiches. This is discussed further in Section 4.2 of Chapter 4 –Flooding Hazards). Minor seiching in pools can also occur.

MITIGATION OF SEICHES

The degree of damage to small bodies of water, such as to swimming pools, would likely be minor. However, property owners downslope from pools that could seiche during an earthquake should be aware of the potential hazard to their property should a pool lose substantial amounts of water during an earthquake. Site-specific design elements, such as baffles, to reduce the potential for seiches are warranted in tanks and in open reservoirs or ponds where overflow or failure of the structure may cause damage to nearby properties. Damage to water tanks in recent earthquakes, such as the 1992 Landers-Big Bear sequence and the 1994 Northridge, resulted from seiching. As a result, the American Water Works Association (AWWA) Standards for Design of Steel Water Tanks (D-100) provide new criteria for seismic design (Lund, 1994). Damage to watercraft and boat docking facilities, and potentially to waterfront homes and businesses, is likely in the event of seiches in Newport Harbor.

2.8 Vulnerability of Structures to Earthquake Hazards

This section assesses the general earthquake vulnerability of structures and facilities common in the Newport Beach area. This analysis is based on past earthquake performance of similar types of buildings in the U.S. The effects of design earthquakes on particular structures within the City are beyond the scope of this study. However, utilizing a recent standardized methodology developed for the Federal Emergency Management Agency (FEMA), general estimates of losses are provided in Section 2.9 of this report.

Although it is not possible to prevent earthquakes from occurring, their destructive effects can be minimized. Comprehensive hazard mitigation programs that include the identification and mapping of hazards, prudent planning and enforcement of building codes, and expedient retrofitting and rehabilitation of weak structures can significantly reduce the scope of an earthquake disaster.

With these goals in mind, the State Legislature passed Senate Bill 547, addressing the identification and seismic upgrade of Unreinforced Masonry (URM) buildings. In addition, the law encourages identification and mitigation of seismic hazards associated with other types of potentially hazardous buildings, including pre-1971 concrete tilt-ups, soft-stories, mobile homes, and pre-1940 homes.

2.8.1 Potentially Hazardous Buildings and Structures

Most of the loss of life and injuries due to an earthquake are related to the collapse of hazardous buildings and structures. FEMA (1985) defines a hazardous building as "any inadequately earthquake resistant building, located in a seismically active area, that presents a potential for life loss or serious injury when a damaging earthquake occurs." Building codes have generally been made more stringent following damaging earthquakes.

Building damage is commonly classified as either structural or non-structural. Structural damage impairs the building's support. This includes any vertical and lateral force-resisting systems, such as frames, walls, and columns. Non-structural damage does not affect the integrity of the structural support system, but includes such things as broken windows, collapsed or rotated chimneys, unbraced parapets that fall into the street, and fallen ceilings.

During an earthquake, buildings get thrown from side to side and up and down. Given the same acceleration, heavier buildings are subjected to higher forces than lightweight buildings. Damage occurs when structural members are overloaded, or when differential movements between different parts of the structure strain the structural components. Larger earthquakes and longer shaking duration tend to damage structures more. The level of damage can be predicted only in general terms, since no two buildings undergo the exact same motions, even in the same earthquake. Past earthquakes have shown us, however, that some types of buildings are far more likely to fail than others.

<u>Unreinforced Masonry Buildings</u> – Unreinforced masonry buildings (URMs) are prone to failure due to inadequate anchorage of the masonry walls to the roof and floor diaphragms, lack of steel reinforcing, the limited strength and ductility of the building materials, and sometimes, poor construction workmanship. Furthermore, as these buildings age, the bricks and mortar tend to deteriorate, making the buildings even weaker.

In response to the 1986 URM Law, the City of Newport Beach inventoried their URMs. In the year 2000, the City reported to the Seismic Safety Commission that 127 URMs had been identified. Of these, only 3 buildings were considered of historical significance. By 2000, all 127 building owners had been notified about the hazards of URM construction, and 125 of the URMs were in compliance with the provisions of the URM Law. One building had been demolished and one more was unoccupied and slated for demolition as of 2000.

<u>Soft-Story Buildings</u> - Of particular concern are soft-story buildings (buildings with a story, generally the first floor, lacking adequate strength or toughness due to too few shear walls). Apartments above glass-fronted stores, and buildings perched atop parking garages are common examples of soft-story buildings. Collapse of a soft story and “pancaking” of the remaining stories killed 16 people at the Northridge Meadows apartments during the 1994 Northridge earthquake (EERI, 1994). There are many other cases of soft-story collapses in past earthquakes. To date, the City of Newport Beach has reportedly not conducted a survey of their soft-story construction (Mr. Faisal Jurdi, Newport Beach Building Department, personal communication).

<u>Wood-Frame Structures</u> - Structural damage to wood-frame structures often results from an inadequate connection between the superstructure and the foundation. These buildings may slide off their foundations, with consequent damage to plumbing and electrical connections. Unreinforced masonry chimneys may also collapse. These types of damage are generally not life threatening, although they may be costly to repair. Wood frame buildings with stud walls generally perform well in an earthquake, unless they have no foundation or have a weak foundation constructed of unreinforced masonry or poorly reinforced concrete. In these cases, damage is generally limited to cracking of the stucco,

which dissipates much of the earthquake's induced energy. The collapse of wood frame structures, if it happens, generally does not generate heavy debris, but rather, the wood and plaster debris can be cut or broken into smaller pieces by hand-held equipment and removed by hand in order to reach victims (FEMA, 1985).

Pre-Cast Concrete Structures - Partial or total collapse of buildings where the floors, walls and roofs fail as large intact units, such as large pre-cast concrete panels, cause the greatest loss of life and difficulty in victim rescue and extrication (FEMA, 1985). These types of buildings are common not only in southern California, but abroad. Casualties as a result of collapse of these structures in past earthquakes, including Mexico (1985), Armenia (1988), Nicaragua (1972), El Salvador (1986 and 2001), the Philippines (1990) and Turkey (1999) add to hundreds of thousands. In southern California, many of the parking structures that failed during the Northridge earthquake, such as the Cal-State Northridge and City of Glendale Civic Center parking structures, consisted of pre-cast concrete components (EERI, 1994).

Collapse of this type of structure generates heavy debris, and removal of this debris requires the use of heavy mechanical equipment. Consequently, the location and extrication of victims trapped under the rubble is generally a slow and dangerous process. Extrication of trapped victims within the first 24 hours after the earthquake becomes critical for survival. In most instances, however, post-earthquake planning fails to quickly procure equipment needed to move heavy debris. The establishment of Heavy Urban Search and Rescue teams, as recommended by FEMA (1985), has improved victim extrication and survivability. Buildings that are more likely to fail and generate heavy debris need to be identified, so that appropriate mitigation and planning procedures are defined prior to an earthquake.

Tilt-up Buildings - Tilt-up buildings have concrete wall panels, often cast on the ground, or fabricated off-site and trucked in, that are tilted upward into their final position. Connections and anchors have pulled out of walls during earthquakes, causing the floors or roofs to collapse. A high rate of failure was observed for this type of construction in the 1971 San Fernando and 1987 Whittier Narrows earthquakes. Tilt-up buildings can also generate heavy debris.

Reinforced Concrete Frame Buildings - Reinforced concrete frame buildings, with or without reinforced infill walls, display low ductility. Earthquakes may cause shear failure (if there are large tie spacings in columns, or insufficient shear strength), column failure (due to inadequate rebar splices, inadequate reinforcing of beam-column joints, or insufficient tie anchorage), hinge deformation (due to lack of continuous beam reinforcement), and non-structural damage (due to the relatively low stiffness of the frame). A common type of failure observed following the Northridge earthquake was confined column collapse (EERI, 1994), where infilling between columns confined the length of the columns that could move laterally in the earthquake.

Multi-Story Steel Frame Buildings - Multi-story steel frame buildings generally have concrete floor slabs. However, these buildings are less likely to collapse than concrete structures. Common damage to these types of buildings is generally non-structural, including collapsed exterior curtain wall (cladding), and damage to interior partitions and equipment. Overall, modern steel frame buildings have been expected to perform well in earthquakes, but the 1994 Northridge earthquake broke many welds in these buildings, a previously unanticipated problem.

Older, pre-1945 steel frame structures may have unreinforced masonry such as bricks, clay tiles and terra cotta tiles as cladding or infilling. Cladding in newer buildings may be glass, infill panels or pre-cast panels that may fail and generate a band of debris around the building exterior (with considerable threat to pedestrians in the streets below). Structural damage may occur if the structural members are subject to plastic deformation which can cause permanent displacements. If some walls fail while others remain intact, torsion or soft-story problems may result.

<u>Mobile Homes</u> - Mobile homes are prefabricated housing units that are placed on isolated piers, jackstands, or masonry block foundations (usually without any positive anchorage). Floors and roofs of mobile homes are usually plywood, and outside surfaces are covered with sheet metal. Mobile homes typically do not perform well in earthquakes. Severe damage occurs when they fall off their supports, severing utility lines and piercing the floor with jackstands.

<u>Combination Types</u> - Buildings are often a combination of steel, concrete, reinforced masonry and wood, with different structural systems on different floors or different sections of the building. Combination types that are potentially hazardous include: concrete frame buildings without special reinforcing, precast concrete and precast-composite buildings, steel frame or concrete frame buildings with unreinforced masonry walls, reinforced concrete wall buildings with no special detailing or reinforcement, large capacity buildings with long-span roof structures (such as theaters and auditoriums), large un-engineered wood-frame buildings, buildings with inadequately anchored exterior cladding and glazing, and buildings with poorly anchored parapets and appendages (FEMA, 1985). Additional types of potentially hazardous buildings may be recognized after future earthquakes.

In addition to building types, there are other factors associated with the design and construction of the buildings that also have an impact on the structures' vulnerability to strong ground shaking. Some of these conditions are discussed below:

<u>Building Shape</u> - A building's vertical and/or horizontal shape can also be important. Simple, symmetric buildings generally perform better than non-symmetric buildings. During an earthquake, non-symmetric buildings tend to twist as well as shake. Wings on a building tend to act independently during an earthquake, resulting in differential movements and cracking. The geometry of the lateral load-resisting systems also matters. For example, buildings with one or two walls made mostly of glass, while the remaining walls are made of concrete or brick, are at risk. Asymmetry in the placement of bracing systems that provide a building with earthquake resistance can result in twisting or differential motions.

<u>Pounding</u> - Site-related seismic hazards may include the potential for neighboring buildings to "pound", or for one building to collapse onto a neighbor. Pounding occurs when there is little clearance between adjacent buildings, and the buildings "pound"

against each other as they deflect during an earthquake. The effects of pounding can be especially damaging if the floors of the buildings are at different elevations, so that, for example, the floor of one building hits a supporting column of the other. Damage to a supporting column can result in partial or total building collapse.

2.8.2 Essential Facilities

Essential facilities are those parts of a community's infrastructure that must remain operational after an earthquake. Buildings that house essential services include schools, hospitals, fire and police stations, emergency operation centers, and communication centers. Plate 2-4 shows the locations of the City's fire stations, police stations, schools, and other essential facilities. A vulnerability assessment for these facilities involves comparing their locations to hazardous areas identified in the City, including active and potentially active faults (Plate 2-2), liquefaction-susceptible areas (Plate 2-3), unstable slope areas (Plates 3-1 and 3-4), potential flood areas due to either storm events or coastal processes (Plates 1-3 through 1-5 and 4-2), dam failure inundation areas (Plate 4-3), fire hazard zones (Plates 5-2 and 5-3), and sites that generate hazardous materials (Plate 6-1).

High-risk facilities, if severely damaged, may result in a disaster far beyond the facilities themselves. Examples include power plants, dams and flood control structures, and industrial plants that use or store explosives, toxic materials or petroleum products.

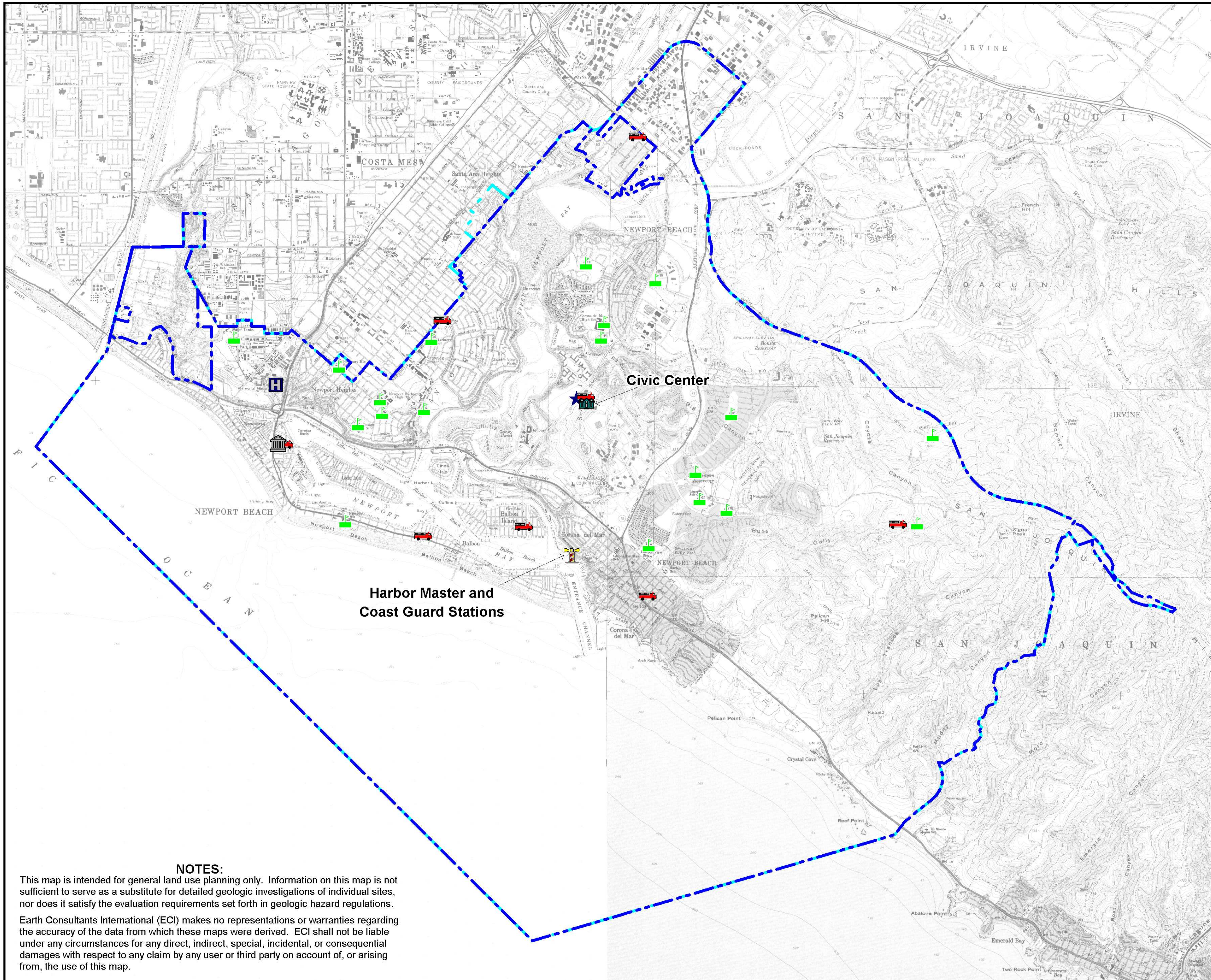
High-occupancy facilities have the potential of resulting in a large number of casualties or crowd-control problems. This category includes high-rise buildings, large assembly facilities, and large multifamily residential complexes.

Dependent-care facilities, such as preschools and schools, rehabilitation centers, prisons, group care homes, and nursing homes, house populations with special evacuation considerations.

Economic facilities, such as banks, archiving and vital record-keeping facilities, airports, and large industrial or commercial centers, are those facilities that should remain operational to avoid severe economic impacts.

It is crucial that essential facilities have no structural weaknesses that can lead to collapse. For example, the Federal Emergency Management Agency (FEMA, 1985) has suggested the following seismic performance goals for health care facilities:

- The damage to the facilities should be limited to what might be reasonably expected after a destructive earthquake and should be repairable and not be life-threatening.
- Patients, visitors, and medical, nursing, technical and support staff within and immediately outside the facility should be protected during an earthquake.
- Emergency utility systems in the facility should remain operational after an earthquake.
- Occupants should be able to evacuate the facility safely after an earthquake.
- Rescue and emergency workers should be able to enter the facility immediately after an earthquake and should encounter only minimum interference and danger.
- The facility should be available for its planned disaster response role after an earthquake.



NOTES:
This map is intended for general land use planning only. Information on this map is not sufficient to serve as a substitute for detailed geologic investigations of individual sites, nor does it satisfy the evaluation requirements set forth in geologic hazard regulations.

Earth Consultants International (ECI) makes no representations or warranties regarding the accuracy of the data from which these maps were derived. ECI shall not be liable under any circumstances for any direct, indirect, special, incidental, or consequential damages with respect to any claim by any user or third party on account of, or arising from, the use of this map.

Essential Services Buildings

Newport Beach, California

EXPLANATION

- Public Schools
- Police Station
- Fire Station
- City Hall
- Hospital
- Harbor Master and Coast Guard Stations
- Civic Center
- Newport Beach City Boundary
- Sphere of Influence

Scale: 1:60,000

0.5 0 0.5 1 1.5
Miles

1 0 1 2 3
Kilometers

Base Map: USGS Topographic Map from Sure!MAPS RASTER
Source: City of Newport Beach

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CITY OF NEWPORT BEACH CALIFORNIA

Plate 2-4

2.8.3 Lifelines

Lifelines are those services that are critical to the health, safety and functioning of the community. They are particularly essential for emergency response and recovery after an earthquake. Furthermore, certain critical facilities designed to remain functional during and immediately after an earthquake may be able to provide only limited services if the lifelines they depend on are disrupted. Lifeline systems include water, sewage, electrical power, communication, transportation (highways, bridges, railroads, and airports), natural gas, and liquid fuel systems. The improved performance of lifelines in the 1994 Northridge earthquake, relative to the 1971 San Fernando earthquake, shows that the seismic codes upgraded and implemented after 1971 have been effective. Nevertheless, the impact of the Northridge quake on lifeline systems was widespread and illustrates the continued need to study earthquake impacts, to upgrade substandard elements in the systems, to provide redundancy in systems, to improve emergency response plans, and to provide adequate planning, budgeting and financing for seismic safety.

Water supply facilities, such as dams, reservoirs, pumping stations, water treatment plants, and distribution lines are especially critical after an earthquake, not only for drinking water, but to fight fires. Failure of dams and reservoirs during an earthquake is discussed further in Chapter 4.

Some of the observations and lessons learned from the Northridge earthquake are summarized below (from Savage, 1995; Lund, 1996).

- Several electrical transmission towers were damaged or totally collapsed. Collapse was generally due to foundation distress in towers that were located near ridge tops where amplification of ground motion may have occurred. One collapse was the result of a seismically induced slope failure at the base of the tower.
- Damage to above ground water tanks typically occurred where piping and joints were rigidly connected to the tank, due to differential movement between the tank and the piping. Older steel tanks not seismically designed under current standards buckled at the bottom (called "elephant's foot"), in the shell, and on the roof. Modern steel and concrete tanks generally performed well.
- The most vulnerable components of pipeline distribution systems were older threaded joints, cast iron valves, cast iron pipes with rigid joints, and older steel pipes weakened by corrosion. In the case of broken water lines, the loss of fire suppression water forced fire departments to utilize water from swimming pools and tanker trucks.
- Significant damage occurred in water treatment plants due to sloshing in large water basins.
- A number of facilities did not have an emergency power supply or did not have enough power supply capacity to provide their essential services.
- Lifelines within critical structures, such as hospitals and fire stations, may be vulnerable. For instance, rooftop mechanical and electrical equipment is not generally designed for seismic forces. During the Northridge quake, rooftop equipment failed causing malfunctions in other systems.
- A 70-year old crude oil pipeline leaked from a cracked weld, spreading oil for 12 miles down the Santa Clara River.

The above list is by no means a complete summary of the earthquake damage, but it does highlight some of the issues pertinent to the Newport Beach area. All lifeline providers should make an evaluation of the seismic vulnerability within their systems a priority. The evaluation should include a plan to fund and schedule the needed seismic mitigation.

2.9 HAZUS Earthquake Scenario Loss Estimations for the City of Newport Beach

HAZUS-99™ is a standardized methodology for earthquake loss estimation based on a geographic information system (GIS). A project of the National Institute of Building Sciences, funded by the Federal Emergency Management Agency (FEMA), it is a powerful advance in mitigation strategies. The HAZUS project developed guidelines and procedures to make standardized earthquake loss estimates at a regional scale. With standardization, estimates can be compared from region to region. HAZUS is designed for use by state, regional and local governments in planning for earthquake loss mitigation, emergency preparedness, response and recovery. HAZUS addresses nearly all aspects of the built environment, and many different types of losses. The methodology has been tested against the experience of several past earthquakes, and against the judgment of experts. Subject to several limitations noted below, HAZUS can produce results that are valid for the intended purposes.

Loss estimation is an invaluable tool, but must be used with discretion. Loss estimation analyzes casualties, damage and economic loss in great detail. It produces seemingly precise numbers that can be easily misinterpreted. Loss estimation's results, for example, may cite 4,054 left homeless by a scenario earthquake. This is best interpreted by its magnitude. That is, an event that leaves 4,000 people homeless is clearly more manageable than an event causing 40,000 homeless people; and an event that leaves 400,000 homeless would overwhelm a community's resources. However, another loss estimation that predicts 7,000 people homeless should probably be considered equivalent to the 4,054 result. Because HAZUS results make use of a great number of parameters and data of varying accuracy and completeness, it is not possible to assign quantitative error bars. Although the numbers should not be taken at face value, they are not rounded or edited because detailed evaluation of individual components of the disaster can help mitigation agencies ensure that they have considered all the important options.

The more community-specific the data that are input to HAZUS, the more reliable the loss estimation. HAZUS provides defaults for all required information. These are based on best-available scientific, engineering, census and economic knowledge. The loss estimations in this report have been tailored to Newport Beach by using a map of soil types for the City. HAZUS relies on 1990 Census data, but for the purposes of this study, we replaced the population by census tract data that came with the software with the 2000 Census data. Other modifications made to the data set before running the analyses include:

- updated the database of critical facilities, including the number and location of the fire and police stations in the City,
- revised the number of beds available in the one major hospital in Newport Beach to better represent its current patient capacity, and
- upgraded the construction level for most unreinforced masonry buildings in the City to better represent the City's retrofitting efforts of the last decade.

As useful as HAZUS seems to be, the loss estimation methodology has some inherent uncertainties. These arise in part from incomplete scientific knowledge concerning earthquakes and their effect upon buildings and facilities, and in part from the approximations and simplifications necessary for comprehensive analyses.

Users should be aware of the following specific limitations:

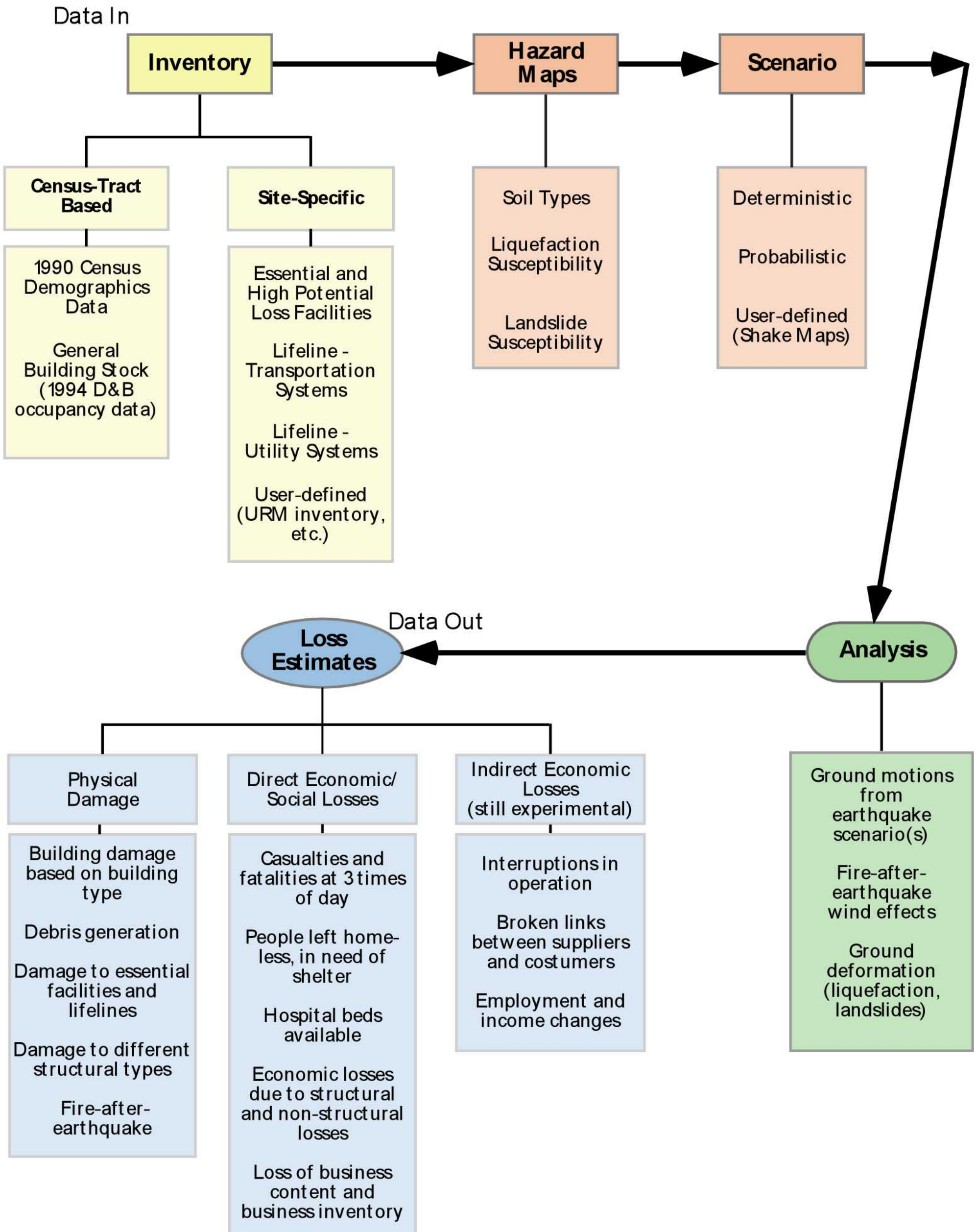
- HAZUS is driven by statistics, and thus is most accurate when applied to a region, or a class of buildings or facilities. It is least accurate when considering a particular site, building or facility.
- Losses estimated for lifelines may be less than losses estimated for the general building stock.
- Losses from smaller (less than M 6.0) damaging earthquakes may be overestimated.
- Pilot and calibration studies have not yet provided an adequate test concerning the possible extent and effects of landsliding.
- The indirect economic loss module is new and experimental. While output from pilot studies has generally been credible, this module requires further testing.
- The databases that HAZUS draws from to make its estimates are often incomplete or outdated (as discussed above, efforts were made to improve some of the datasets used for the analysis, but for some estimates, the software still relies on 1990 census tracts data and 1994 Dunn & Bradstreet economic reports). This is another reason the loss estimates should not be taken at face value.

2.9.1 Methodology, Terminology and Input Data Used in the Earthquake Loss Estimations for the City

The flow chart in Figure 2-4 illustrates the modules (or components) of a HAZUS analysis. The HAZUS software uses population data by census tract and general building stock data from Dunn & Bradstreet (DNB).

Essential facilities and lifeline inventory are located by latitude and longitude. However, the HAZUS inventory data for lifelines and utilities were developed at a national level and where specific data are lacking, statistical estimations are utilized. Specifics about the site-specific inventory data used in the models are discussed further in the paragraphs below. Other site-specific data used include soil types and liquefaction susceptible zones. The user then defines the earthquake scenario to be modeled, including the magnitude of the earthquake, and the location of the epicenter. Once all these data are input, the software calculates the loss estimates for each scenario.

The loss estimates include physical damage to buildings of different construction and occupancy types, damage to essential facilities and lifelines, number of after-earthquake fires and damage due to fire, and the amount of debris that is expected. The model also estimates the direct economic and social losses, including casualties and fatalities for three different times of the day, the number of people left homeless and number of people that will require shelter, number of hospital beds available, and the economic losses due to damage to the places of businesses, loss of inventory, and (to some degree) loss of jobs. The indirect economic losses component is still experimental; the calculations in the software are checked against actual past earthquakes, such as the 1989 Loma Prieta and



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Date: July, 2003

Generalized Flow Chart Summarizing the HAZUS Methodology

Figure 2-4

1994 Northridge earthquake, but indirect losses are hard to measure, and it typically takes years before these monetary losses can be quantified with any degree of accuracy. Therefore, this component of HAZUS is still considered experimental.

Critical Facilities: HAZUS breaks critical facilities into two groups: essential facilities and high potential loss (HPL) facilities. Essential facilities provide services to the community and should be functional after an earthquake. Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. The essential facility module in HAZUS determines the expected loss of functionality for these facilities. The damage probabilities for essential facilities are determined on a site-specific basis (i.e., at each facility).

Economic losses associated with these facilities are computed as part of the analysis of the general building stock. Data required for the analysis include occupancy classes (current building use) and building structural type, or a combination of essential facilities building type, design level and construction quality factor. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

Transportation and Utility Lifelines: HAZUS divides the lifeline inventory into two systems: transportation and utility lifelines. The transportation system includes seven components: highways, railways, light rail, bus, ports, ferry and airports. The utility lifelines include potable water, wastewater, natural gas, crude and refined oil, electric power and communications. If site-specific lifeline utility data are not provided for these analyses, HAZUS performs a statistical calculation based on the population served.

General Building Stock Type and Classification: HAZUS provides damage data for buildings based on these structural types:

- Concrete
- Mobile Home
- Precast Concrete
- Reinforced Masonry Bearing Walls
- Steel
- Unreinforced Masonry Bearing Walls
- Wood Frame

and based on these occupancy (usage) classifications:

- Residential
- Commercial
- Industrial
- Agriculture
- Religion
- Government and
- Education

Building Damage Classification - Loss estimation for the general building stock is averaged for each census tract. Building damage classifications range from slight to complete. As an example, the building damage classification for wood frame buildings is provided below. Wood-frame structures comprise the City's most numerous building type.

Wood, Light Frame:

- *Slight Structural Damage*: Small cracks in the plaster or gypsum-board at corners of door and window openings and wall-ceiling intersections; small cracks in masonry chimneys and masonry veneer.
- *Moderate Structural Damage*: Large cracks in the plaster or gypsum-board at corners of door and window openings; small diagonal cracks across shear wall panels exhibited by small cracks in stucco and gypsum wall panels; large cracks in brick chimneys; toppling of tall masonry chimneys.
- *Extensive Structural Damage*: Large diagonal cracks across shear wall panels or large cracks at plywood joints; permanent lateral movement of floors and roof; toppling of most brick chimneys; cracks in foundations; splitting of wood sill plates and/or slippage of structure over foundations; partial collapse of "room-over-garage" or other "soft-story" configurations; small foundations cracks.
- *Complete Structural Damage*: Structure may have large permanent lateral displacement, may collapse, or be in imminent danger of collapse due to cripple wall failure or failure of the lateral load resisting system; some structures may slip and fall off the foundations; large foundation cracks.

Incorporation of Historic Building Code Design Functions - Estimates of building damage are provided for "High", "Moderate" and "Low" seismic design criteria. Buildings of newer construction (e.g., post-1973) are best designated by "High." Buildings built after 1940, but before 1973, are best represented by "Moderate." If built before about 1940 (i.e., before significant seismic codes were implemented), "Low" is most appropriate. A large percentage of buildings in the City of Newport Beach fall in the "Moderate" and "High" seismic design criteria, but in some sections of the City, such as in West Newport, the Balboa Peninsula and Corona del Mar, many of the buildings fall in the "Low" category.

Fires Following Earthquakes - Fires following earthquakes can cause severe losses. In some instances, these losses can outweigh the losses from direct damage, such as collapse of buildings and disruption of lifelines. Many factors affect the severity of the fires following an earthquake, including but not limited to: ignition sources, types and density of fuel, weather conditions, functionality of water systems, and the ability of fire fighters to suppress the fires.

A complete fire-following-earthquake model requires extensive input about the readiness of local fire departments and the types and availability (functionality) of water systems. The fire following earthquake model presented here is simplified. With better understanding of fires that will be garnered after future earthquakes, forecasting capability will undoubtedly improve. For additional information regarding this topic, refer to the Fire Hazards Chapter (Chapter 5).

Debris Generation - HAZUS estimates two types of debris. The first is debris that falls in large pieces, such as steel members or reinforced concrete elements. These require special treatment to break into smaller pieces before they are hauled away. The second type of debris is smaller and more easily moved with bulldozers and other machinery and tools. This type includes brick, wood, glass, building contents and other materials.

Estimating Casualties - Casualties are estimated based on the assumption that there is a strong correlation between building damage (both structural and non-structural) and the number and severity of casualties. In smaller earthquakes, non-structural damage will most likely control the casualty estimates. In severe earthquakes where there will be a large number of collapses and partial collapses, there will be a proportionately larger number of fatalities. Data regarding earthquake-related injuries are not of the best quality, nor are they available for all building types. Available data often have insufficient information about the type of structure in which the casualties occurred and the casualty-generating mechanism. HAZUS casualty estimates are based on the injury classification scale described in Table 2-3.

Table 2-3: Injury Classification Scale

Injury Severity Level	Injury Description
Severity 1	Injuries requiring basic medical aid without requiring hospitalization.
Severity 2	Injuries requiring a greater degree of medical care and hospitalization, but not expected to progress to a life-threatening status.
Severity 3	Injuries which pose an immediate life-threatening condition if not treated adequately and expeditiously. The majority of these injuries are the result of structural collapse and subsequent entrapment or impairment of the occupants.
Severity 4	Instantaneously killed or mortally injured.

In addition, HAZUS produces casualty estimates for three times of day:

- Earthquake striking at 2:00 A.M. (population at home)
- Earthquake striking at 2:00 P.M. (population at work/school)
- Earthquake striking at 5:00 P.M. (commute time).

Displaced Households/Shelter Requirements - Earthquakes can cause loss of function or habitability of buildings that contain housing. Displaced households may need alternative short-term shelter, provided by family, friends, temporary rentals, or public shelters established by the City, County or by relief organizations such as the Red Cross. Long-term alternative housing may require import of mobile homes, occupancy of vacant units, net emigration from the impacted area, or, eventually, the repair or reconstruction of new public and private housing. The number of people seeking short-term public shelter is of most concern to emergency response organizations. The longer-term impacts on the housing stock are of great concern to local governments, such as cities and counties.

Economic Losses - HAZUS estimates structural and nonstructural repair costs caused by building damage and the associated loss of building contents and business inventory. Building damage can cause additional losses by restricting the building's ability to function properly. Thus, business interruption and rental income losses are estimated. HAZUS divides building losses into two categories: (1) direct building losses and (2) business interruption losses. Direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. Business interruption losses are associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

Earthquakes may produce indirect economic losses in sectors that do not sustain direct damage. All businesses are forward-linked (if they rely on regional customers to purchase their output) or backward-linked (if they rely on regional suppliers to provide their inputs) and are thus potentially vulnerable to interruptions in their operation. Note that indirect losses are not confined to immediate customers or suppliers of damaged enterprises. All of the successive rounds of customers of customers and suppliers of suppliers are affected. In this way, even limited physical earthquake damage causes a chain reaction, or ripple effect, that is transmitted throughout the regional economy.

2.9.2 HAZUS Scenario Earthquakes for the Newport Beach Area

Four specific scenario earthquakes were modeled using the HAZUS loss estimation software available from FEMA: earthquakes on the San Joaquin Hills, Newport-Inglewood, Whittier, and San Andreas faults (see Table 2-4).

The four earthquake scenarios modeled for this study are discussed in the following sections. An earthquake on the San Andreas fault is discussed because it has the highest probability of occurring in the not too distant future, even though the loses expected from this earthquake are not the worst possible for Newport Beach. An earthquake on the San Andreas fault has traditionally been considered the “Big One,” the implication being that an earthquake on this fault would be devastating to southern California. However, there are several other seismic sources that, given their location closer to coastal Orange County, would be more devastating to the region, even if the causative earthquake is smaller in magnitude than an earthquake on the San Andreas fault.

The San Joaquin Hills Blind Thrust was only discovered in the late 1990s and its geometry and behavior are not well constrained. However, an earthquake on this fault, due to its blind thrust geometry and location has the potential to be more damaging to Newport Beach than rupture of the Newport-Inglewood fault. Typically, earthquakes on thrust faults produce greater vertical accelerations than comparably sized strike-slip earthquakes (such as one on the Newport-Inglewood fault) and vertical motions are more damaging to structures. Scientists have suggested the San Joaquin Hills blind thrust fault could produce a magnitude 6.8 to 7.3 earthquake. We took an average and used M 7.1 for our modeling because further research is needed to better understand the seismic character of the San Joaquin Hills fault.

Prior to the discovery of the San Joaquin Hills fault, the Newport-Inglewood fault was thought to pose the greatest threat to Newport Beach because of its close proximity to the

City, its historic activity, and its recurrence interval. Plate 2-2 shows that the northern trace of the Newport-Inglewood fault is 2 miles offshore of Reef Point, comes onshore about 1/2 mile southeast of Newport Pier, and crosses directly beneath downtown and West Newport. The Newport-Inglewood fault is also active; it generated the 1933 M_w 6.4 earthquake. The epicenter was located only a mile from Newport Beach on the western side of the Santa Ana River. This earthquake did not rupture the surface, but substantial liquefaction-induced damage was reported from Long Beach to Huntington Beach. The earthquake caused 120 deaths, and over $50 million in property damage (Wood, 1933). The Newport-Inglewood fault is also thought to have generated as many as five surface rupturing earthquakes in the last about 11,700 years (Grant et al., 1997; Shlemon et al., 1995).

Table 2-4: HAZUS Scenario Earthquakes for the City of Newport Beach

Fault Source	Magnitude	Description
San Joaquin Hills	7.1	Worst-case scenario for Newport Beach. This fault's blind thrust geometry would produce greater vertical accelerations than a comparable strike-slip event (e.g. Newport-Inglewood) and vertical motions are more damaging to structures. Note that the San Joaquin Hills fault properties are not well understood (because it was recently discovered) and therefore HAZUS results should be interpreted with caution.
Newport-Inglewood	6.9	Previous worst-case scenario for the City of Newport Beach area because of the close proximity of this fault. The Newport-Inglewood fault parallels the coast only a few miles offshore of southern Newport Beach and comes onshore directly beneath West Newport.
Whittier	6.8	This fault lies about 20 miles north of the City and could cause significant damage in Newport Beach. The 6.8 magnitude earthquake modeled is in the middle of the size range of earthquakes that researchers now believe this fault is capable of generating.
San Andreas 1857 earthquake	7.8	A large earthquake that ruptures multiple segments of the San Andreas fault is modeled because of its high probability of occurrence, even though the epicenter would be relatively far from the City.

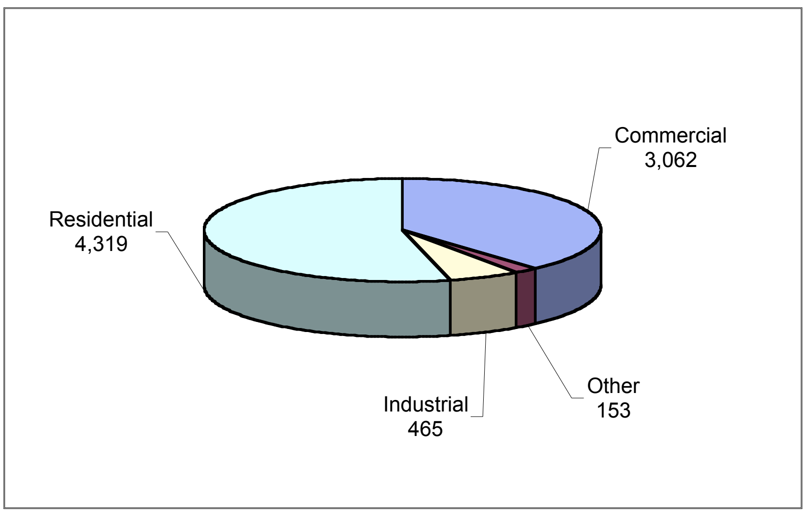
The Whittier fault is the northern extension of the Elsinore fault and is located approximately 20 miles north of the city of Newport Beach (Figure 2-1). No major historical earthquakes have been attributed to the Whittier fault. However, trenching studies have documented recurrent movement of this fault in the last 17,000 years (Gath et al., 1992; Patterson and Rockwell, 1993). Based on these studies, the Whittier fault is thought to be moving at a rate of about 2.5 +/- 1 mm/yr. The Southern California Earthquake Center (1995) determined there is a five percent chance of an earthquake occurring on the Whittier fault by 2024. The Whittier fault is thought capable of producing a magnitude 6.8 maximum magnitude earthquake, although some investigators propose an even larger magnitude 7.1 quake. We used the more conservative magnitude 6.8 earthquake in the HAZUS model.

We used data from the historic 1857 Fort Tejon earthquake to model the effects of a very large San Andreas earthquake on Newport Beach. Although the 1857 quake nucleated on the Carrizo segment, we place our modeled M 7.8 epicenter closest to Newport Beach (on the southern part of the Mojave segment) because this will yield the maximum possible damage caused by a San Andreas earthquake.

2.9.3 Inventory Data Used in the HAZUS Loss Estimation Models for Newport Beach

As mentioned previously, the population data used for the analyses were modified using the recently available 2000 Census data. The general building stock and population inventory data conform to census tract boundaries, and the census tract boundaries generally conform to City limits, with some exceptions. The region studied is 54 square miles in area and contains 21 census tracts. There are over 35,000 households in the region, with a total population of 80,000 (based on 2000 Census Bureau data). There are an estimated 29,000 buildings in the region with a total building replacement value (excluding contents) of $8 billion (1994 dollars). Approximately 93 percent of the buildings (and 54 percent of the building value) are associated with residential housing (see Figure 2-5). In terms of building construction types found in the region, wood-frame construction makes up 88 percent of the building inventory. The remaining percentage is distributed between the other general building types. The replacement value of the transportation and utility lifeline systems in the City of Newport Beach is estimated to be nearly $1.72 billion and $224 million (1994 dollars), respectively.

Figure 2-5
Building Inventory, by Occupancy Type, in the Newport Beach Area
(values shown are in millions of dollars)



The HAZUS inventory of unreinforced masonry (URM) buildings included 125 structures, whereas the 2000 Seismic Safety Commission data indicate 126 URMs in Newport Beach. These numbers are in close agreement; therefore we used the URM numbers that HAZUS supplies. However, we did change the seismic design criteria for all of the URMs in the City from low to moderate to reflect the retrofitting efforts that have been accomplished in the late 1990s and early 2000s. It is important to note, however, that retrofitting is typically designed to keep buildings from collapsing, but that structural damage to the building is still possible and expected. We also made changes to the HAZUS hospital inventory for Newport Beach. The number of beds at Hoag Memorial Hospital was increased from 355 to 403 (number of beds at the hospital as reported by Ms. Alison Taylor of the Hoag Hospital Engineering Department).

Regarding critical facilities, the HAZUS database for Newport Beach includes 38 schools, 1 fire station, 1 police station, and no emergency operations center. We modified the school data to include 26 schools or school facilities, including school district offices, private schools, and community colleges that fall within City limits. HAZUS reports a larger number of schools because its data come from the census tracts, which extend beyond the Newport Beach City limits. The City's emergency operations center in the auditorium of the police station was also added. The database was further modified to include the eight fire stations that serve the City. The locations of these facilities are shown on Plate 2-4.

2.9.4 Estimated Losses Associated with the Earthquake Scenarios

HAZUS loss estimations for the City of Newport Beach based on the modeled earthquake scenarios are presented concurrently below. These scenarios include earthquakes on the San Joaquin Hills, Newport-Inglewood, Whittier, and San Andreas faults. Of the four earthquake scenarios modeled for the City, the results indicate that the San Andreas fault poses the least damage to the Newport Beach area, although this fault may have the highest probability of rupturing in the near-future.

Given its proximity, fault type and magnitude of its maximum earthquake, the San Joaquin Hills fault has the potential to cause the worst-case scenario for the City. The San Joaquin Hills structure is a reverse fault that is thought to be responsible for uplift of the San Joaquin Hills. It may have caused the greater than magnitude 7 earthquake reported by the Portola expedition in 1769 (Grant et al., 2002). In general, reverse earthquakes generate stronger ground accelerations that are distributed over broader geographic areas than similar-magnitude strike-slip earthquakes. The Newport-Inglewood earthquake scenario is the next worst-case scenario; it has the potential to cause significant damage in the city of Newport Beach. The losses anticipated as a result of the Whittier fault causing an earthquake are an order of magnitude lower than the scenario just discussed.

Building Damage - HAZUS estimates that between approximately 450 and 13,000 buildings will be at least moderately damaged in response to the earthquake scenarios presented herein, with the lower number representative of damage as a result of an earthquake on the San Andreas fault, and the higher number representing damage as a result of an earthquake on the San Joaquin Hills fault. These figures represent about 2 to 44 percent of the total number of buildings in the study area. An estimated 0 to 933 buildings will be completely destroyed. Table 2-5 summarizes the expected damage to buildings by general occupancy type, while Table 2-6 summarizes the expected damage to buildings in Newport Beach, classified by construction type.

The data presented in Tables 2-5 and 2-6 show that most of the buildings damaged will be residential, with wood-frame structures experiencing mostly slight to moderate damage.

The San Joaquin Hills fault earthquake scenario has the potential to cause at least slight damage to more than 82 percent of the residential structures in Newport Beach, and moderate to complete damage to as much as 43 percent of the residential stock, whereas, the Newport-Inglewood scenario has the potential to cause at least slight damage to 65 percent of the residential structures in Newport Beach, and moderate to complete damage to approximately 26 percent of the residential stock. The distribution and severity of the damage caused by these earthquakes to the residential buildings in the City is illustrated in Plate 2-5. The Whittier fault has the potential to cause significant damage to the residential stock of Newport Beach, but the damage would not be as severe as that caused by either the San Joaquin Hills fault or the Newport-Inglewood fault. The San Andreas fault earthquake scenario is anticipated to cause slight to moderate damage to about 9 percent of the residential buildings in the City.

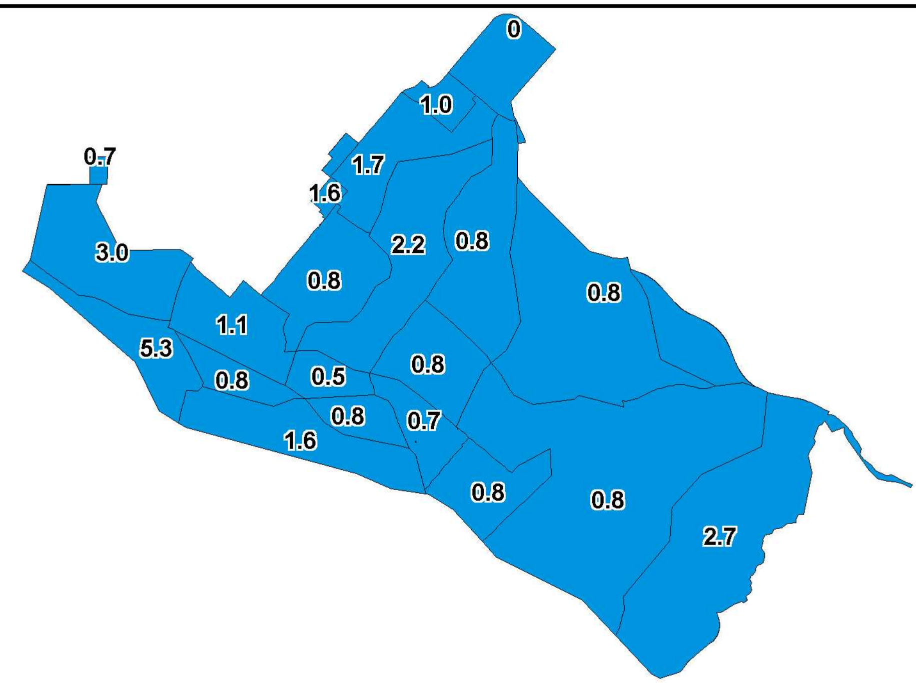
The commercial and industrial structures in Newport Beach will also be impacted (Table 2-5). The Newport-Inglewood and San Joaquin Hills earthquakes have the potential to damage about 68 percent and 91 percent of the commercial and industrial buildings, respectively, in the City. The distribution and severity of damage to the commercial structures in the City as a result of earthquakes on the San Joaquin Hills, Newport-Inglewood, and Whittier faults is illustrated in Plate 2-6. All three earthquakes shown on Plate 2-6 are anticipated to cause damage in the commercial district of the City, but an earthquake on the San Joaquin Hills fault would be the most severe, given the fault's type and location beneath the heart of Newport Beach.

The HAZUS output shows that URMs in Newport Beach will suffer slight to complete damage, with up to 26 percent likely to be completely destroyed during the worst case San Joaquin Hills earthquake scenario. At first glance this number seems high, however, it is likely that most of the URMS would have collapsed during this scenario if they had not been retrofitted. The results from the Newport-Inglewood scenario illustrate how resistant the retrofitted URMS are. Only 5 percent of the URMS are likely to be destroyed during the nearly magnitude 7 Newport-Inglewood earthquake. This is anticipated to reduce the number of casualties significantly. The numbers show that by retrofitting its URMs, Newport Beach has already reduced its vulnerability to seismic shaking.

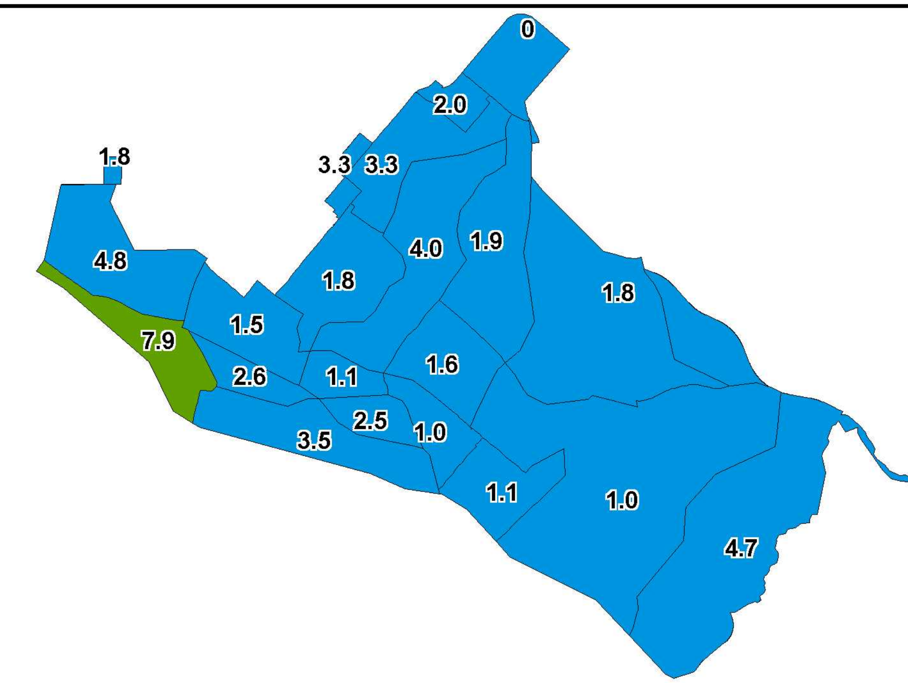
Significantly, reinforced masonry, concrete and steel structures are not expected to perform well, with hundreds of these buildings in Newport Beach experiencing at least moderate damage during an earthquake on the San Joaquin Hills or Newport-Inglewood faults. These types of structures are commonly used for commercial and industrial purposes, and failure of some of these structures explains the casualties anticipated during the middle of the day in the non-residential sector (see Table 2-7). These types of buildings also generate heavy debris that is difficult to cut through to extricate victims.

Table 2-5: Number of Buildings Damaged, by Occupancy Type

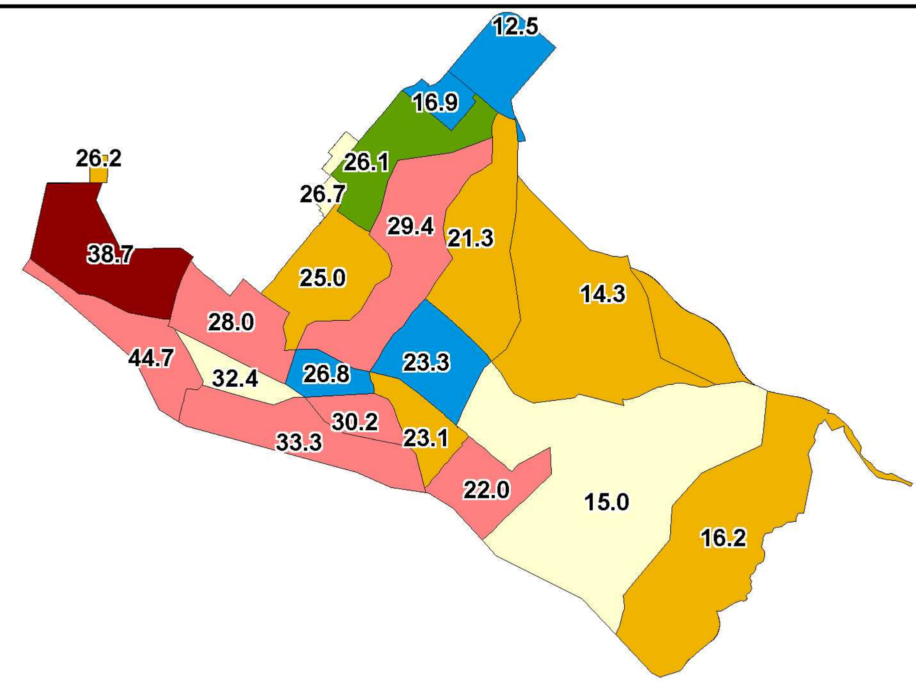
Scenario	Occupancy Type	Slight	Moderate	Extensive	Complete	Total
San Joaquin Hills	Residential	10,466	8,868	1,882	729	21,945
	Commercial	319	559	392	162	1,432
	Industrial	51	104	83	37	275
	Agriculture	3	3	1	1	8
	Religion	10	12	10	2	34
	Government	1	1	0	0	2
	Education	8	9	5	2	24
	Total	**10,858**	**9,556**	**2,373**	**933**	**23,720**
Newport-Inglewood	Residential	10,527	5,678	913	256	17,374
	Commercial	435	455	166	23	1,079
	Industrial	77	89	36	5	207
	Agriculture	3	1	0	0	4
	Religion	11	11	6	0	28
	Government	1	0	0	0	1
	Education	8	6	1	0	15
	Total	**11,062**	**6,240**	**1,122**	**284**	**18,708**
Whittier	Residential	3,593	668	40	0	4,301
	Commercial	223	99	10	0	332
	Industrial	43	22	3	0	68
	Agriculture	1	0	0	0	1
	Religion	3	1	0	0	4
	Government	0	0	0	0	0
	Education	4	1	0	0	5
	Total	**3,867**	**791**	**53**	**0**	**4,711**
San Andreas	Residential	1,938	352	33	1	2,324
	Commercial	125	47	2	0	174
	Industrial	24	13	2	0	39
	Agriculture	1	0	0	0	1
	Religion	2	0	0	0	2
	Government	0	0	0	0	0
	Education	2	1	0	0	3
	Total	**2,092**	**413**	**37**	**1**	**2,543**



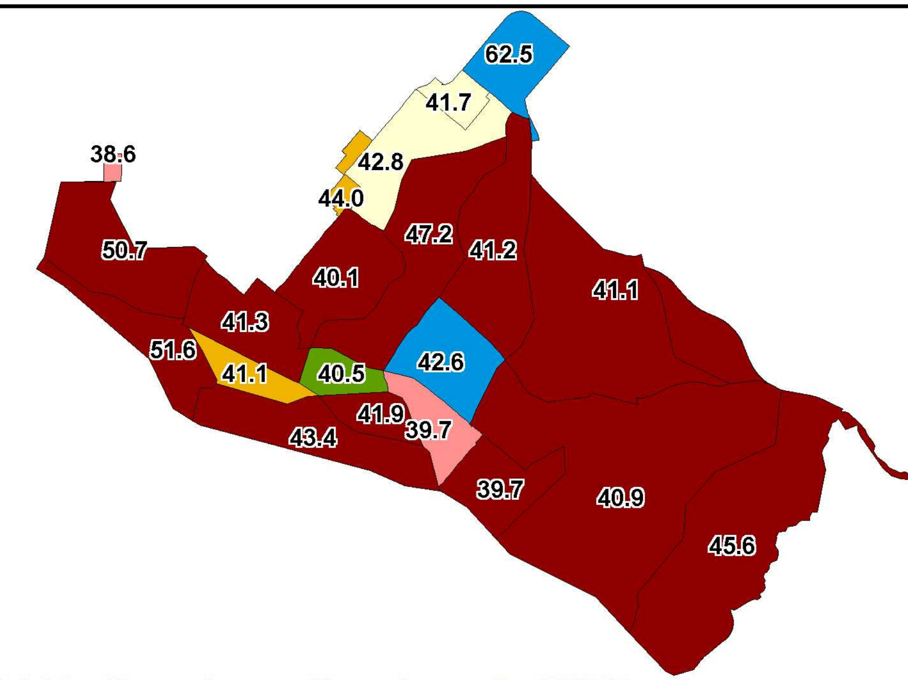
Magnitude 7.8 Earthquake on San Andreas Fault



Magnitude 6.8 Earthquake on Whittier Fault



Magnitude 6.8 Earthquake on Newport-Inglewood Fault



Magnitude 7.1 Earthquake on San Joaquin Hill Fault

EXPLANATION

Number of Buildings Damaged by Census Tract
(labeled with percentage of damaged buildings in census tract)

- 0-100
- 101-200
- 201-300
- 301-400
- 401 - 600
- 601 and greater

Sources: Federal Emergency Management Agency, HAZUS 99-SR2

*more than 50% of the residential structure has undergone moderate, extensive and/or complete damage

Earth Consultants International

Project Number: 2112
Date: July, 2003

Residential Buildings With At Least Moderate Damage > 50%*

(Based on Four Earthquake Scenarios)

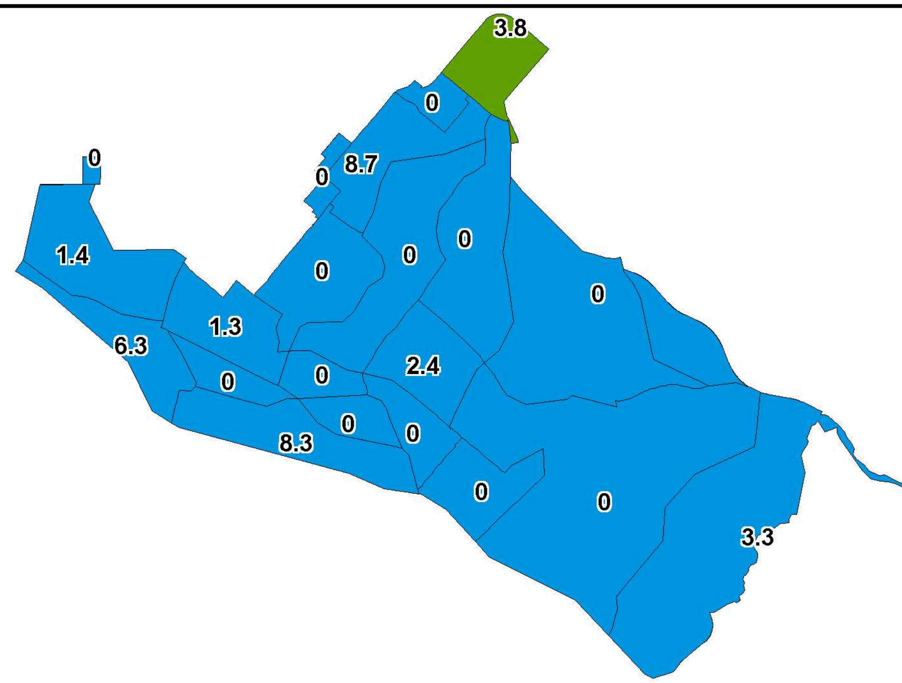
Newport Beach, California

Plate 2-5

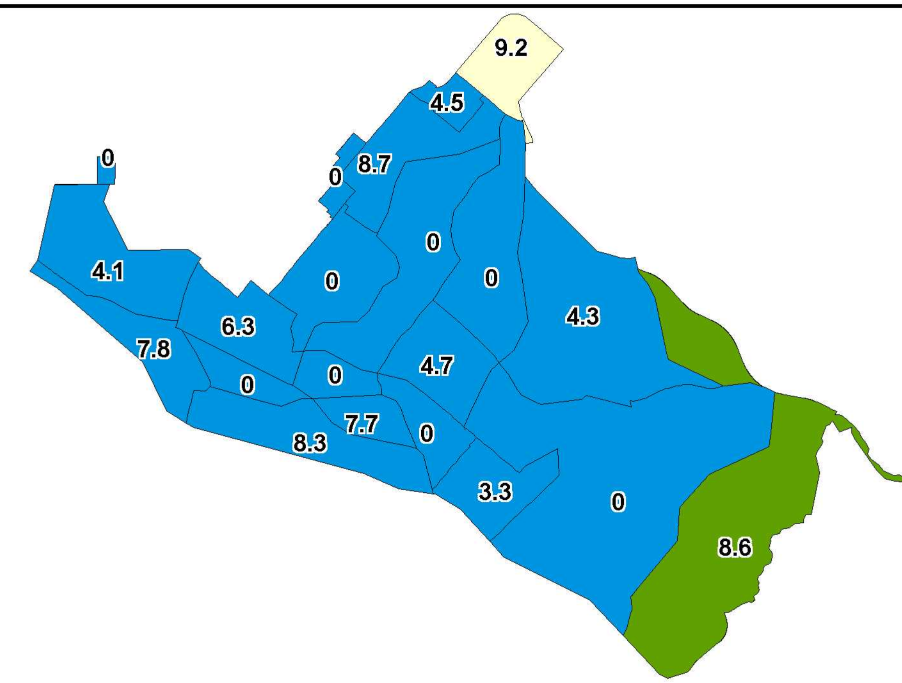
Table 2-6: Number of Buildings Damaged, by Construction Type

Scenario	Structure Type	Slight	Moderate	Extensive	Complete	Total
San Joaquin Hills	Concrete	86	122	84	36	328
	Mobile Homes	103	411	543	297	1,354
	Precast Concrete	53	138	113	50	354
	Reinforced Masonry	114	239	192	63	608
	Steel	44	132	105	39	320
	URM	10	36	44	32	122
	Wood	10,448	8,478	1,292	416	20,634
	Total	**10,858**	**9,556**	**2,373**	**933**	**23,720**
Newport-Inglewood	Concrete	101	108	34	3	246
	Mobile Homes	248	512	383	109	1252
	Precast Concrete	88	129	47	8	272
	Reinforced Masonry	148	191	91	8	438
	Steel	73	120	40	4	237
	URM	31	49	22	6	108
	Wood	10,373	5,131	505	146	16,155
	Total	**11,062**	**6,240**	**1,122**	**284**	**18,708**
Whittier	Concrete	45	18	2	0	65
	Mobile Homes	311	233	41	0	585
	Precast Concrete	49	28	5	0	82
	Reinforced Masonry	61	34	3	0	98
	Steel	39	17	1	0	57
	URM	31	16	1	0	48
	Wood	3331	445	0	0	3776
	Total	**3,867**	**791**	**53**	**0**	**4,711**
San Andreas	Concrete	20	8	1	0	29
	Mobile Homes	221	160	33	1	415
	Precast Concrete	27	13	1	0	41
	Reinforced Masonry	31	10	0	0	41
	Steel	28	16	1	0	45
	URM	19	7	0	0	26
	Wood	1746	196	0	0	1942
	Total	**2,092**	**410**	**36**	**1**	**2,539**

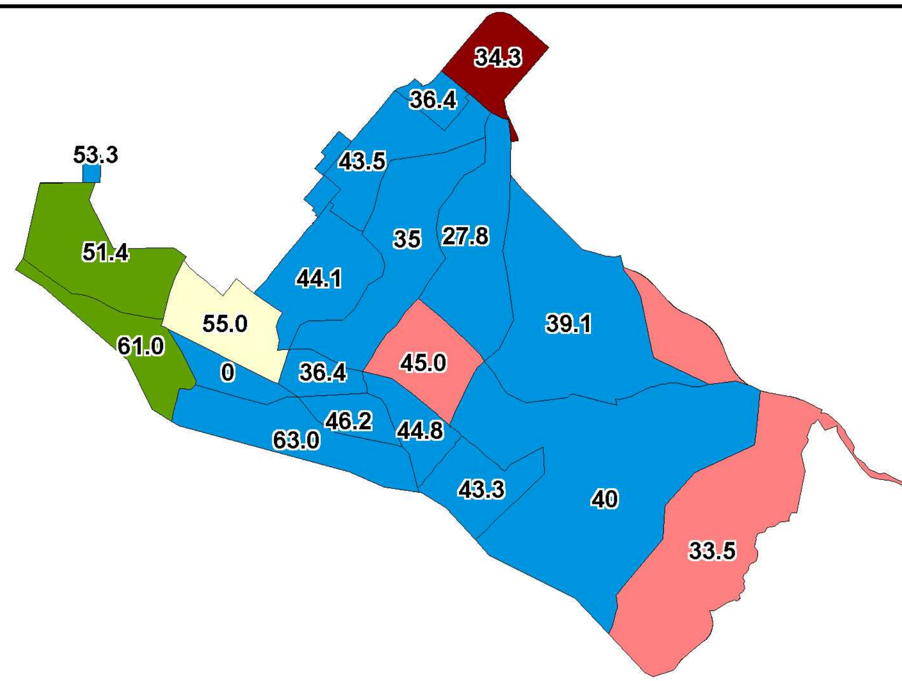
Casualties - Table 2-7 provides a summary of the casualties estimated for these scenarios. The analysis indicates that the worst time for an earthquake to occur in the city of Newport Beach is during maximum non-residential occupancy (at 2 o'clock in the afternoon, when most people are in their place of business and schools are in session). The San Joaquin Hills earthquake scenario is anticipated to cause the largest number of casualties, followed by an event on the Newport-Inglewood fault.



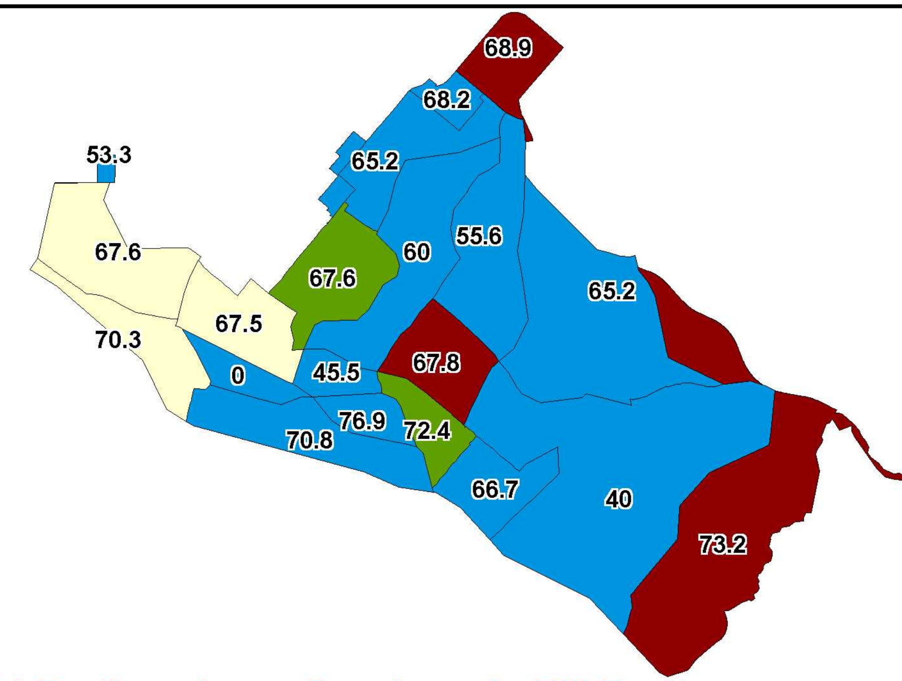
Magnitude 7.8 Earthquake on San Andreas Fault



Magnitude 6.8 Earthquake on Whittier Fault



Magnitude 6.8 Earthquake on Newport-Inglewood Fault



Magnitude 7.1 Earthquake on San Joaquin Hill Fault

EXPLANATION

Number of Buildings Damaged by Census Tract
(labeled with percentage of damaged buildings in census tract)

- 0-20
- 21-40
- 41-60
- 61-80
- 81 -100
- 101 and greater

Sources: Federal Emergency Management Agency, HAZUS 99-SR2

*more than 50% of the residential structure has undergone moderate, extensive and/or complete damage

Earth Consultants International

Project Number: 2112
Date: July, 2003

Commercial Buildings With At Least Moderate Damage > 50%*

(Based on Four Earthquake Scenarios)

Newport Beach, California

Plate 2-6

Table 2-7: Estimated Casualties

Type and Time of Scenario			Level 1: Medical treatment without hospitalization	Level 2: Hospitalization but not life threatening	Level 3: Hospitalization and life threatening	Level 4: Fatalities due to scenario event
San Joaquin Hills	2A.M. (max. residential occupancy)	Residential	295	61	6	11
		Non-Residential	61	17	3	5
		Commute	0	0	1	0
		Total	357	79	9	17
	2 P.M. (max educational, industrial, and commercial)	Residential	61	12	1	2
		Non-Residential	1,665	471	76	150
		Commute	1	1	3	0
		Total	1,727	485	80	152
	5 P.M. (peak commute time)	Residential	72	15	1	3
		Non-Residential	809	229	37	73
		Commute	4	5	8	2
		Total	884	248	46	77
Newport-Inglewood	2A.M. (max. residential occupancy)	Residential	141	24	2	4
		Non-Residential	17	4	1	1
		Commute	0	0	0	0
		Total	158	28	3	5
	2 P.M. (max educational, industrial, and commercial)	Residential	28	5	0	1
		Non-Residential	473	105	14	29
		Commute	0	0	2	0
		Total	502	110	16	29
	5 P.M. (peak commute time)	Residential	34	6	0	1
		Non-Residential	223	48	7	13
		Commute	1	2	3	1
		Total	258	56	10	15
Whittier	2A.M. (max. residential occupancy)	Residential	11	1	0	0
		Non-Residential	2	0	0	0
		Commute	0	0	0	0
		Total	13	1	0	0
	2 P.M. (max educational, industrial, and commercial)	Residential	2	0	0	0
		Non-Residential	47	5	0	0
		Commute	0	0	0	0
		Total	49	5	0	0
	5 P.M. (peak commute time)	Residential	3	0	0	0
		Non-Residential	23	2	0	0
		Commute	0	0	0	0
		Total	26	2	0	0
San Andreas	2A.M. (max. residential occupancy)	Residential	6	1	0	0
		Non-Residential	1	0	0	0
		Commute	0	0	0	0
		Total	7	1	0	0
	2 P.M. (max educational, industrial, and commercial)	Residential	1	0	0	0
		Non-Residential	26	3	0	0
		Commute	0	0	0	0
		Total	27	3	0	0
	5 P.M. (peak commute time)	Residential	1	0	0	0
		Non-Residential	13	2	0	0
		Commute	0	0	0	0
		Total	14	2	0	0

Essential Facility Damage - The loss estimation model calculates the total number of hospital beds in Newport Beach that will be available after each earthquake scenario.

A maximum magnitude earthquake on the San Joaquin Hills fault is expected to impact Hoag Hospital such that only 11 percent of the hospital beds (44 beds) would be available for use by existing patients and injured persons on the day of the earthquake. One week after the earthquake, about 26 percent of the beds are expected to be back in service. After one month, 56 percent of the beds are expected to be operational.

On the day of the Newport-Inglewood earthquake, the model estimates that only 85 hospital beds (21 percent) will be available for use by patients already in the hospital and those injured by the earthquake. After one week, 40 percent of the beds will be back in service. After thirty days, 69 percent of the beds will be available for use.

An earthquake on the Whittier fault is significantly better regarding the availability of hospital beds. The model estimates that only 330 hospital beds (82 percent) will be available on the day of the earthquake. After one week, 90 percent of the hospital beds are expected to be available for use, and after one month, 96 percent of the beds are expected to be operational.

An earthquake on the San Andreas fault is not expected to cause significant damage to Hoag Hospital. On the day of the earthquake, the model estimates that 89 percent of the beds will be available for use; after one week, 94 percent of the beds will be available for use; and after 30 days, 99 percent of the beds will be operational.

Given that the models estimate that about 565 people in the Newport Beach area will require hospitalization after an earthquake on the San Joaquin Hills fault (see Table 2-7), Hoag Hospital is not expected to have enough beds to meet the demand for medical care (the model estimates only 40 beds will be available at this hospital after the scenario earthquake). However, nearby cities, such as Irvine, Santa Ana, and Fountain Valley may sustain less damage and people requiring hospitalization could be treated at medical facilities in these cities.

HAZUS also estimates the damage to other critical facilities in the City, including schools, fire and police stations, and the emergency operations center. According to the model, earthquakes on the San Andreas and Whittier faults will cause only slight damage to the schools, fire and police stations, and the City's emergency operations center. All of these facilities would be greater than 80 percent functional the day after the earthquake.

An earthquake on the San Joaquin Hills fault is anticipated to cause at least moderate damage to all 26 schools in the City, and none of the schools and school district offices in Newport Beach are expected to be more than 50 percent operational the day after the earthquake. The model also indicates that Hoag Hospital, the police station, and all 8 fire stations will experience more than slight damage and none of these facilities will be more than 50 percent operational the day after the earthquake.

Less damaging, an earthquake on the Newport-Inglewood fault is anticipated to cause at least moderate damage to 7 schools in the City. The model also shows that Hoag Hospital and the 32nd Street fire station will experience more than slight damage and the hospital, emergency operation center, police, and all fire stations will be less than 50 percent operational the day after the earthquake. The modeled earthquakes on the Whittier and San Andreas faults will not damage or cause delays to any of the critical facilities in the City of Newport Beach.

Economic Losses - The model estimates that total building-related losses in the city of Newport Beach will range from $65 million for an earthquake on the San Andreas fault, to $2,082 million for an earthquake on the San Joaquin Hills fault. Approximately 25 percent of these estimated losses would be related to business interruption in the City. By far, the largest loss would be sustained by the residential occupancies that make up as much as 43 percent of the total loss. Table 2-8 below provides a summary of the estimated economic losses anticipated as a result of each of the earthquake scenarios considered herein.

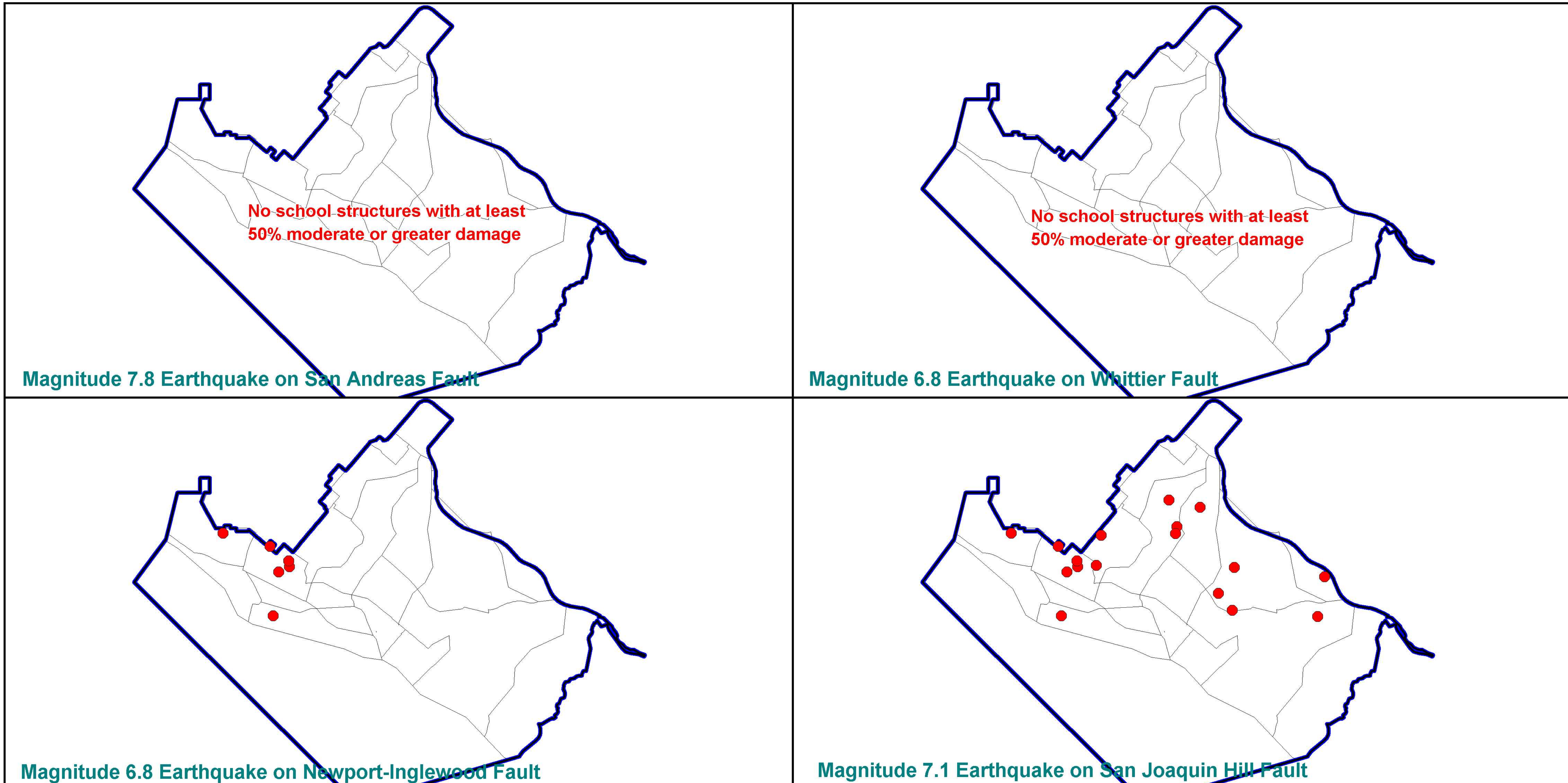
Table 2-8: Estimated Economic Losses

Scenario	Property Damage	Business Interruption	Total
San Joaquin Hills	$1,513 million	$568 million	$2,082 million
Newport-Inglewood	$799 million	$264 million	$1,063 million
Whittier	$117 million	$34 million	$151 million
San Andreas	$48 million	$17 million	$65 million

Shelter Requirement - HAZUS estimates that approximately 2,200 households in Newport Beach may be displaced due to the San Joaquin Hills earthquake modeled for this study (a household contains four people, on average). About 1,000 people will seek temporary shelter in public shelters. The rest of the displaced individuals are anticipated to seek shelter with family or friends. An earthquake on the Newport-Inglewood fault is anticipated to displace over 1,000 households, with approximately 500 people seeking temporary shelter. The San Andreas and Whittier earthquakes are not expected to displace any households.

Table 2-9: Estimated Shelter Requirements

Scenario	Displaced Households	People Needing Short-Term Shelter
San Joaquin Hills	2,159	987
Newport-Inglewood	1,021	461
Whittier	0	0
San Andreas	0	0



Sources: Federal Emergency Management Agency, HAZUS 99-SR2

EXPLANATION

● Location of school with at least moderate damage

*more than 50% of the school structures have undergone moderate, extensive and/or complete damage

Earth Consultants International

Project Number: 2112
Date: July, 2003

Schools With At Least Moderate Damage > 50%*

(Based on Four Earthquake Scenarios)

Newport Beach, California

Plate 2-7

Transportation Damage – Damage to transportation systems in the City of Newport Beach is based on a generalized inventory of the region, which includes areas outside of the City of Newport Beach since the transportation network extends beyond corporate boundaries. Road segments are assumed to be damaged by ground failure only; therefore, the numbers presented herein may be low given that, based on damage observed from the Northridge and San Fernando earthquakes, strong ground shaking can cause considerable damage to bridges. Economic losses to the region due to bridge damage are estimated at between $3.1 million (for an earthquake on the San Andreas fault) to $57.4 million for an earthquake on the San Joaquin Hills fault. It is important to note, however, that many of the bridges in the City have been upgraded in the last ten years, and that the HAZUS inventory is based on data that are nine to 13 years old (dating from 1990 to 1994). Therefore, the HAZUS results reported herein may overestimate the damage to bridges in the area. Based on discussions with the City of Newport Beach Engineering Department, those bridges that have not yet been modified are currently being analyzed. Based on the results of these analyses, seismic retrofitting will be performed (Mr. Lloyd Dalton, City of Newport Beach Engineering Department, personal communication).

Table 2-10: Expected Damage to Transportation Systems

Scenario	System		Segments in Inventory	Replacement Value for All Segments in Inventory	With At Least Moderate Damage	With Complete Damage	Economic Loss ($M)	>50 percent Functional after 1 Day
San Joaquin Hills	Highway	Major Roads	15	$1.3 Billion	0	0		15
		Bridges	78	$310 Million	38	16	57.4	41
	Airport	Facilities	4	$14 Million	3	0	5.5	4
Newport-Inglewood	Highway	Major Roads	15	$1.3 Billion	0	0	0	15
		Bridges	78	$310 Million	15	4	15.7	71
	Airport	Facilities	4	$14 Million	2	0	3.5	2
Whittier	Highway	Major Roads	15	$1.3 Billion	0	0	0	15
		Bridges	78	$310 Million	3	0	3.4	78
	Airport	Facilities	4	$14 Million	0	0	0.9	4
San Andreas	Highway	Major Roads	15	$1.3 Billion	0	0	0	15
		Bridges	78	$310 Million	3	0	3.1	78
	Airport	Facilities	4	$14 Million	4	0	0.2	4

The San Andreas fault earthquake scenario estimates that only 3 of the 78 bridges in the region will experience at least moderate damage, with none of these damaged bridges located within the City of Newport Beach. The impacted bridges in the region are expected to be more than 50 percent functional by the next day. The San Andreas earthquake scenario indicates that the airport facilities will experience small economic losses ($0.2 million), but airport functionality will not be impaired.

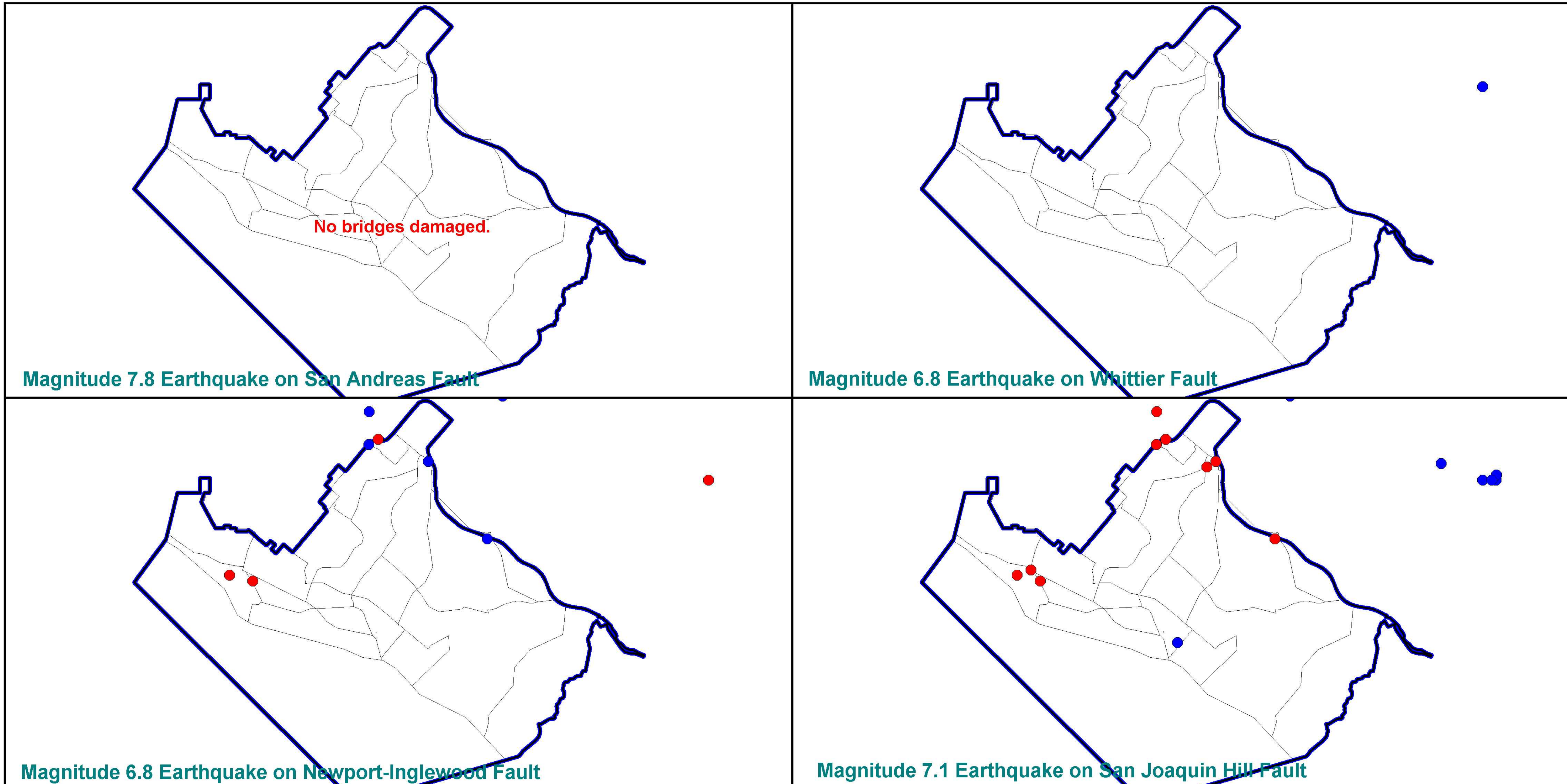
Alternatively, an earthquake on the San Joaquin Hills fault is expected to damage about 38 bridges in the region, with 16 of them considered to be completely damaged. Of the damaged bridges, nine of these are expected to be located within or at the City boundaries. Temporary repairs are expected to make 41 of the damaged bridges in the region more than 50 percent functional one day after the earthquake. Seven days after the earthquake, 51 out of the 78 bridges in the region would be more than 50 percent functional. John Wayne Airport is expected to incur losses of about $5.5 million, but the airport will be functional. The San Joaquin Hills fault earthquake scenario is the worst-case for the transportation system in the City. The damage to bridges as a result of all four earthquake scenarios is illustrated in Plate 2-8. The Whittier fault earthquake scenario models some damage to the regional transportation system, but much less than that caused by either the Newport-Inglewood or San Joaquin Hills earthquakes. None of the bridges in Newport Beach are expected to be experience at least moderate damage as a result of the scenario earthquake on the Whittier fault.

Utility Systems Damage - The HAZUS inventory for the Newport Beach area does not include specifics regarding the various lifeline systems in the City, therefore, the model estimated damage to the potable water and electric power using empirical relationships based on the number of households served in the area. The results of the analyses regarding the functionality of the potable water and electric power systems in the City for the four earthquakes discussed herein are presented in Table 2-11. According to the models, all of the earthquake scenarios will impact the electric power systems; thousands of households in the City are expected to not have electric power even three days after an earthquake on any of the faults discussed in this report. An earthquake on the San Joaquin Hills fault is anticipated to leave more than 14,000 households without electricity for more than one week.

Table 2-11: Expected Performance of Potable Water and Electricity Services

Scenario	Utility	Number of Households without Service*				
		Day 1	Day 3	Day 7	Day 30	Day 90
San Joaquin Hills	Potable Water	30,415	29,983	29,338	23,160	0
	Electricity	30,790	24,971	14,286	2,110	72
Newport-Inglewood	Potable Water	14,593	13,021	9,587	0	0
	Electricity	35,415	19,023	8,860	737	71
Whittier	Potable Water	7	0	0	0	0
	Electricity	8,099	1,710	201	72	71
San Andreas	Potable Water	17	0	0	0	0
	Electricity	2,919	309	78	71	71

*Based on Total Number of Households = 35,415.



Sources: Federal Emergency Management Agency, HAZUS 99-SR2

EXPLANATION

Bridge Damage

- ● At least Moderate Damage
- ● Complete Damage

Earth Consultants International

Project Number: 2112
Date: July, 2003

Bridge Damage

(Based on Four Earthquake Scenarios)

Newport Beach, California

Plate 2-8

The potable water system is anticipated to be significantly impacted, with nearly 30,000 households without water for at least 3 days after the earthquake. These results suggest that the City will have to truck in water into some of the residential neighborhoods until the damages to the system are repaired. Residents are advised to have drinking water stored in their earthquake emergency kits, enough to last all members of the household (including pets) for at least a week.

Fire Following Earthquake - HAZUS uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area as a result of an earthquake. For the earthquake scenarios ran for Newport Beach, HAZUS estimates between 12 and 1 ignitions immediately following an earthquake, with the San Andreas fault earthquake scenario triggering 1 ignitions, the Whittier fault causing 3 ignitions, the Newport-Inglewood igniting 9 fires and the San Joaquin Hills faults triggering 12 ignitions. The burnt area resulting from these ignitions will vary depending on wind conditions. Normal wind conditions of about 10 miles per hour (mph) are expected to result in burn areas of between 1.3 and 24.1 percent of the region's total area. If Santa Ana wind conditions are present at the time of the earthquake, the burnt areas can be expected to be significantly larger.

For example, the fire triggered by an earthquake on the San Andreas fault is not expected to displace any people (if the winds are low), but if winds as strong as 30 miles per hour (mph) are present at the time of the earthquake, about 300 people may be displaced. The model also estimates that the fire would cause about $20 million in building damage. As indicated in the paragraph above, an earthquake on the San Joaquin Hills fault may trigger 12 ignitions. If Santa Ana wind conditions are present at the time, the resultant fires may displace 1,900 people and cause about $130 million dollars of building damage. The other two earthquakes scenarios would cause fire damage in between these two extremes. Additional information regarding fires after earthquakes and the resultant losses estimated for the City of Newport Beach are provided in Chapter 5.

Debris Generation - The model estimates that a total of 30 to 1,610 thousand tons of debris will be generated. Of the total amount, brick and wood comprise 30 percent of the total, with the remainder consisting of reinforced concrete and steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 1,000 to 65,000 truckloads (assuming 25 tons/truck) to remove the debris generated by the earthquakes modeled.

2.10 Reducing Earthquake Hazards in the City of Newport Beach

This section identifies and discusses the opportunities available for seismic upgrading of existing development and capital facilities, including potentially hazardous buildings and other critical facilities. Many of the issues and opportunities available to the City apply to new development as well as redevelopment and infilling. Issues involving rehabilitation and strengthening of existing development are decidedly more complex given the economic and societal impacts inherent to these issues.

Prioritizing rehabilitation and strengthening projects requires that the City consider where its resources would be better spent to reduce earthquake hazards in the existing development, and how the proposed mitigation programs can be implemented so as not to cause undue hardship on the community.

Rehabilitation programs should target, on a priority basis, potentially hazardous buildings, critical facilities, and high-risk lifeline utilities. The City can best address rehabilitation issues. However, the hazard evaluation is intended to define the scope of the problem.

Recent earthquakes, with their relatively low loss of life, have demonstrated that the best mitigation technique in earthquake hazard reduction is the constant improvement of building codes with the incorporation of the lessons learned from past earthquakes. The most recent building codes (UBC 1997; CBC 2001) are prime examples of how incorporating past experience can further reduce of the devastating effects of an earthquake. However, while new building codes reduce the hazard, increases in population leading to building in vulnerable areas and the aging of the existing building stock work toward increasing the earthquake hazard of a given region.

2.10.1 1997 Uniform Building Code Impacts on the City of Newport Beach

Two significant changes were incorporated into the 1997 Uniform Building Code (UBC – which is the basis for the 2001 California Building Code) that impact the City of Newport Beach. The first change is a revision to soil types and amplification factors, and the second change is the incorporation of the proximity of earthquake sources in UBC Seismic Zone 4, which includes the City of Newport Beach. These changes represent the most significant increases in ground shaking criteria in the last 30 years. The new soil effects are based on observations made as a result of the Mexico City, Loma Prieta and other earthquakes, and impact all buildings in the City of Newport Beach. In addition, in the current code, soil effects impact buildings of short predominant period of ground shaking (low-rises), whereas in the past, only long-period structures (high-rises) were influenced by UBC requirements. The new ground-shaking basis for code design is now more complicated, however, because of the wide range of soil types and the close proximity of seismic sources. For the City of Newport Beach, these code changes are warranted. Due to the proximity of the Newport-Inglewood and San Joaquin Hills fault systems, the entire area is impacted by the near-source design factors. The 1997 UBC contains detailed descriptions of the incorporation of these new parameters; only a summary is provided below.

Soil Types and Soil Amplification Factors*:* The seismic design response spectra are defined in terms of two site seismic coefficients C_a and C_v. These coefficients are determined as a function of the following parameters:

- Seismic Zone
- Soil Type, and
- Near Source Factors (UBC Zone 4 only)

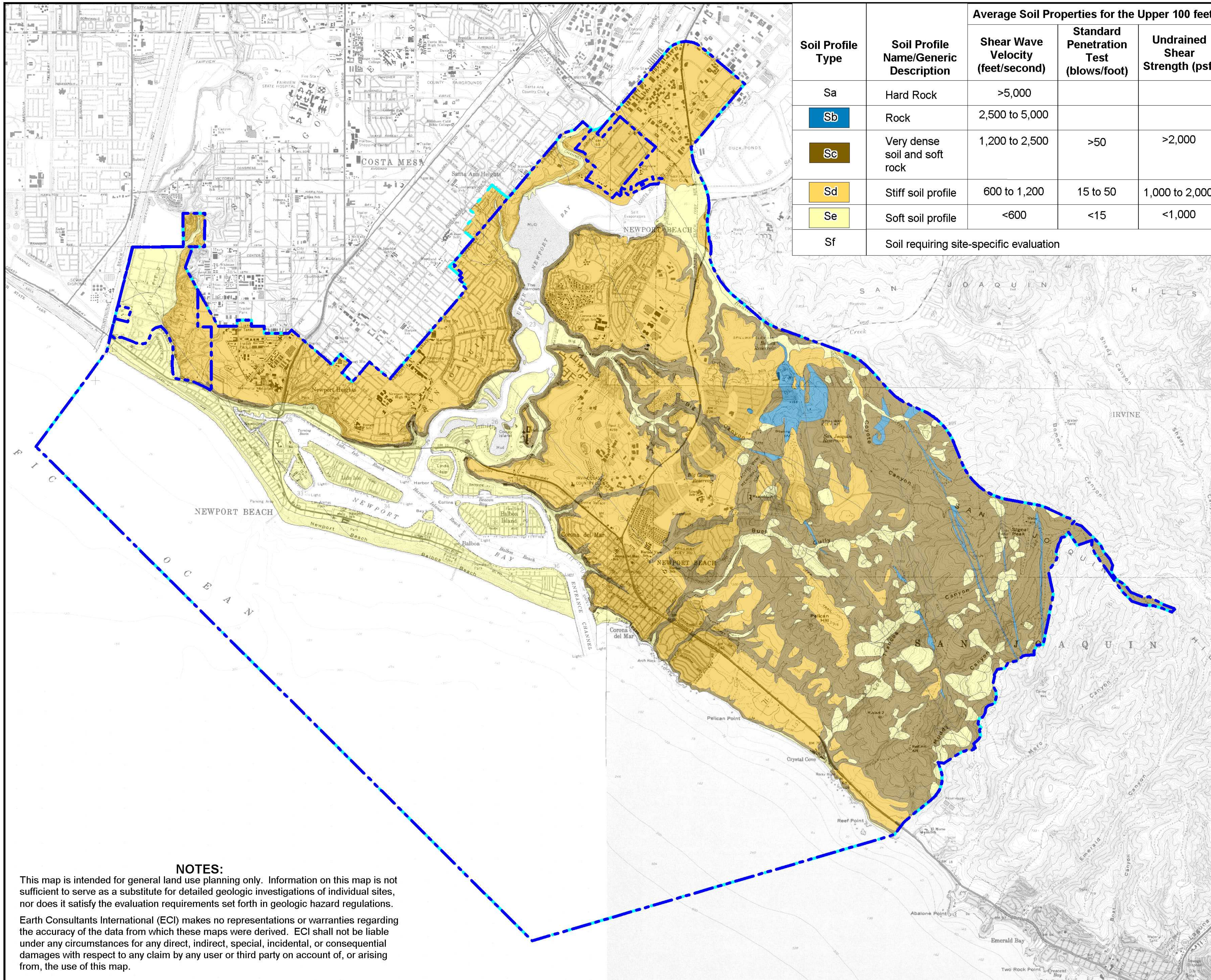
The UBC outlines six soil types based on the average soil properties for the top 100 feet of the soil profile. Site-specific evaluation by the project's geotechnical engineer is required to classify the soil profile underlying proposed projects. The soil type parameters are intended to be used by project engineers with Tables 16-S and 16-T of the 1997 UBC. A general description of the 1997 UBC soil types are outlined in Table 2-12, and the soil types in the city of Newport Beach are illustrated in Plate 2-9.

Table 2-12
UBC Soil Profile Types

Soil Profile Type	Soil Profile Name/ Generic Description	Average Soil Properties for the Upper 100 Feet		
		Shear Wave Velocity (feet/second)	Standard Penetration Test (blows/foot)	Undrained Shear Strength (psf)
S_A	Hard Rock	>5,000		
S_B	Rock	2,500 to 5,000		
S_C	Very dense soil and soft rock	1,200 to 2,500	>50	>2,000
S_D	Stiff soil profile	600 to 1,200	15 to 50	1,000 to 2,000
S_E	Soft soil profile	<600	<15	<1,000
S_F	Soil requiring site-specific evaluation.			

Near- Source Factors*:* The Newport Beach area is subject to near-source design factors given the proximity of several active fault systems. These parameters, new to the 1997 Uniform Building Code (UBC), address the proximity of potential earthquake sources (faults) to the site. These factors were present in earlier versions of the UBC for implementation into the design of seismically isolated structures, but are now included for all structures. The adoption into the 1997 code of all buildings in UBC zone 4 was a result of the observation of more intense ground shaking than expected near the fault ruptures at Northridge in 1994, and again one year later at Kobe, Japan. The 1997 UBC also includes a near-source factor that accounts for directivity of fault rupture. The direction of fault rupture was observed to play a significant role in distribution of ground shaking at Northridge and Kobe. For Northridge, much of the earthquake energy was released into the sparsely populated mountains north of the San Fernando Valley, while at Kobe, the rupture direction was aimed at the city and was a contributing factor in the extensive damage. However, the rupture direction of a given source cannot be predicted, and as a result, the UBC requires a general increase in estimating ground shaking of about 20 percent to account for directivity.

Seismic Source Type*:* Near source factors also include a classification of seismic sources based on slip rate and maximum magnitude potential. These parameters are used in the classification of three seismic source types (A, B and C) summarized on Table 2-13.



Soil Profile Type	Soil Profile Name/Generic Description	Average Soil Properties for the Upper 100 feet: Shear Wave Velocity (feet/second)	Standard Penetration Test (blows/foot)	Undrained Shear Strength (psf)
Sa	Hard Rock	>5,000		
Sb	Rock	2,500 to 5,000		
Sc	Very dense soil and soft rock	1,200 to 2,500	>50	>2,000
Sd	Stiff soil profile	600 to 1,200	15 to 50	1,000 to 2,000
Se	Soft soil profile	<600	<15	<1,000
Sf	Soil requiring site-specific evaluation			

NOTES:

This map is intended for general land use planning only. Information on this map is not sufficient to serve as a substitute for detailed geologic investigations of individual sites, nor does it satisfy the evaluation requirements set forth in geologic hazard regulations.

Earth Consultants International (ECI) makes no representations or warranties regarding the accuracy of the data from which these maps were derived. ECI shall not be liable under any circumstances for any direct, indirect, special, incidental, or consequential damages with respect to any claim by any user or third party on account of, or arising from, the use of this map.

Engineering Soil Types in Accordance with 1997 Uniform Building Code

Newport Beach, California

EXPLANATION

Newport Beach City Boundary

Sphere of Influence

Scale: 1:60,000

0.5 0 0.5 1 1.5 Miles

1 0 1 2 3 Kilometers

Base Map: USGS Topographic Map from Sure!MAPS RASTER
Sources: Based on data from Morton (1999).

Earth Consultants International

CITY OF NEWPORT BEACH CALIFORNIA

Project Number: 2112
Date: July, 2003

Plate 2-9

Table 2-13
Seismic Source Type

Seismic Source Type	Seismic Source Description	Seismic Source Definition	
		Maximum Moment Magnitude, M	Slip Rate, SR (mm/yr.)
A	Faults which are capable of producing large magnitude events and which have a high rate of seismicity.	$M \geq 7.0$ and	$SR \geq 5$
B	All faults other than Types A and C.		
C	Faults which are not capable of producing large magnitude earthquakes and which have a relatively low rate of seismic activity.	$M < 6.5$	$SR \leq 2$

Type A faults are highly active and capable of producing large magnitude events. Most segments of the San Andreas fault are classified as Type A. The Type A slip rate (>5 mm/yr) is common only to tectonic plate boundary faults. Type C seismic sources are considered to be sufficiently inactive and not capable of producing large magnitude events such that potential ground shaking effects can be ignored. Type B sources include most of the active faults in California and include all faults that are neither Type A nor C. The 1997 UBC requires that the locations and characteristics of these faults be established based on reputable sources such as the California Geological Survey (CGS – previously known as the California Division of Mines and Geology - CDMG) and the U.S. Geological Survey (USGS). The CGS classifies the Newport-Inglewood and Whittier faults as Type B faults. The San Joaquin Hills fault has not been classified by CGS, but work done by Grant et al. (2002) indicates it is a Type B fault.

To establish near-source factors for any proposed project in the City of Newport Beach, the first step is to identify and locate the known active faults in the region. The International Conference of Building Officials (ICBO) has provided an Atlas of the location of known faults for California to accompany the 1997 UBC. The rules for measuring distance from a fault are provided by the 1997 UBC. The criteria for determining distance to vertical faults, such as the Newport-Inglewood, are relatively straightforward. However, the distance to thrust faults and blind thrust faults is assumed as 0 for anywhere above the dipping fault plane to a depth of 10 kilometers. This greatly increases the areal extent of high ground shaking parameters, but is warranted based on observations of ground shaking at Northridge.

Summary: Seismic codes have been undergoing their most significant changes in history. These improvements are a result of experience in recent earthquakes, as well as extensive research under the National Earthquake Hazard Reduction Program (NEHRP). Inclusion of soil and near-field effects in the 1997 UBC represents a meaningful and impactive change put forth by the geoscience community. Seismic codes will continue to improve with new versions of the building code, and as new data are obtained from both past and future earthquakes.

2.10.2 Retrofit and Strengthening of Existing Structures

The UBC is not retroactive, and past earthquakes have shown that many types of structures are potentially hazardous. Structures built before the lessons learned from the 1971 Sylmar earthquake are particularly susceptible to damage during an earthquake, including unreinforced masonry (URM) structures, pre-cast tilt-up concrete buildings, soft-story structures, unreinforced concrete buildings, as well as pre-1952 single-family structures. Other potentially hazardous buildings include irregular-shaped structures and mobile homes. Therefore, while the earthquake hazard mitigation improvements associated with the current building codes address new construction, the retrofit and strengthening of existing structures requires the adoption of ordinances. The City of Newport Beach has adopted an ordinance aimed at retrofitting unreinforced masonry buildings (URMs).

Other potentially hazardous buildings, such as pre-1971 concrete tilt-up structures and soft-story buildings, can be inventoried next. Potentially hazardous buildings can be identified and inventoried following the recommendations set forth in publications such as "Rapid Visual Screening of Buildings for Potential Seismic Hazards: Handbook and Supporting Documentation" and "A Handbook for Seismic Evaluation of Existing Buildings and Supporting Documentation", both prepared by the Applied Technology Council in Redwood City, California, and supplied by the Federal Emergency Management Agency (FEMA publications 154 and 155, and 175 and 178, respectively).

The building inventory phase of a seismic hazard mitigation program should accurately record the potentially hazardous buildings in an area. To do so, a GIS system is invaluable. The data base should include information such as the location of the buildings, the date and type of construction, construction materials and type of structural framing system, structural conditions, number of floors, floor area, occupancy and relevant characteristics of the occupants (such as whether the building houses predominantly senior citizens, dependent care or handicapped residents, etc.), and information on structural elements or other characteristics of the building that may pose a threat to life.

Once buildings are identified as potentially hazardous, a second, more thorough analysis may be conducted. This step may be carried out by local officials, such as the City's building department, or building owners may be required to submit a review by a certified structural engineer that has conducted an assessment of the structural and non-structural elements and general condition of the building, and has reviewed the building's construction documents (if available). The nonstructural elements should include the architectural, electrical and mechanical systems of the structure. Cornices, parapets, chimneys and other overhanging projections should be addressed too, as these may pose a significant threat to passersby, and to individuals who, in fear, may step out of the building during an earthquake. State of repair of buildings should also be noted, including cracks, rot, corrosion, and lack of maintenance, as these conditions may decrease the seismic strength of a structure. Occupancy should be noted as this factor is very useful in prioritizing the buildings to be abated for seismic hazards.

For multi-story buildings, large occupancy structures, and critical facilities, the seismic analysis of the structure should include an evaluation of the site-specific seismic environment (e.g., response spectra, estimates of strong ground motion duration, etc.), and an assessment of the building's loads and anticipated deformation levels. The resulting data should be weighted against acceptable levels of damage and risk chosen by the City for that particular structure. Once these guidelines are established, mitigation techniques available (including demolition, strengthening and retrofitting, etc.) should be evaluated, weighted, and implemented.

With the inventory and analysis phases complete, a retrofit program can be implemented. Although retrofit buildings may still incur severe damage during an earthquake, the mitigation results in a substantial reduction of casualties by preventing collapse. The societal and economic implications of rehabilitating existing buildings are discussed in many publications, including "Establishing Programs and Priorities for the Seismic Rehabilitation of Buildings - A Handbook and Supporting Report", "Typical Costs for Seismic Rehabilitation of Existing Buildings: Summary and Supporting Documentation," (FEMA Publications 174 and 173, and 156 and 157, respectively). Another appropriate source is the publication prepared by Building Technology, Inc. entitled "Financial Incentives for Seismic Rehabilitation of Hazardous Buildings - An Agenda for Action (Report and Appendices).

The City of Newport Beach should set a list of priorities by which strengthening of the buildings identified as hazardous will be established and conducted. Currently, there are no Federal or State mandated criteria established to determine the required structural seismic resistance capacity of structures. Retrofitting to meet the most current UBC standards may be cost-prohibitive, and therefore, not feasible. The City may develop its own set of criteria, however, this task should be carried out following a comprehensive development and review process that involves experienced structural engineers, building officials, insurance representatives, and legal authorities. Selection of the criteria by which the structural seismic resistance capacity of structures will be measured may follow a review of the performance during an earthquake of similar types of buildings that had been retrofit prior to the seismic event. Upgrading potentially hazardous buildings to, for example, 1973 standards may prove inefficient if past examples show that similar buildings retrofit to 1973 construction codes performed poorly during a particular earthquake, and had to be demolished anyway. Issues to be addressed include justification for strengthening a building to a performance level less than the current code requirements, the potential liabilities and limitations on liability, and the acceptable damage to the structure after strengthening (FEMA, 1985).

The mitigation program established by the City could be voluntary or mandatory. Voluntary programs to encourage mitigation of potentially hazardous buildings have been implemented with various degrees of success in California. Incentives that have been used to engender support among building owners include tax waivers, tax credits, and waivers from certain zoning restrictions. Other cities have required a review by a structural engineer when the building is undergoing substantial improvements.

2.11 Summary

Since it is not possible to prevent an earthquake from occurring, local governments, emergency relief organizations, and residents are advised to take action and develop and implement policies and programs aimed at reducing the effects of earthquakes. Individuals should also exercise prudent planning to provide for themselves and their families in the aftermath of an earthquake.

Earthquake Sources:

- The City of Newport Beach is located in an area where several active faults have been mapped. At least two active faults extend through portions of the City: the Newport-Inglewood runs beneath Balboa Peninsula, the City Hall area, and West Newport; the San Joaquin Hills fault may extend under the much of eastern Newport Beach. Both fault zones are capable of causing severe damage to the City. Other faults such as the Palos Verdes, Compton and Elysian Park Thrusts, Whittier, and Chino segment of the Elsinore fault zone also have the potential to damage Newport Beach. Given the location of these faults in and near the City, the 1997 Uniform Building Code requires that Newport Beach incorporate near-source factors into the design of new buildings. In addition to the faults above, numerous other active faults, both onshore and offshore, have the potential to generate earthquakes that would cause strong ground shaking in Newport Beach.

- Geologists, seismologists, engineers and urban planners typically use maximum magnitude and maximum probable earthquakes to evaluate the seismic hazard of a region, the assumption being that if we plan for the worst-case scenario, smaller earthquakes that are more likely to occur can be dealt with more effectively.

- A number of historic earthquakes have caused strong ground shaking in Newport Beach. The 1933 Long Beach earthquake caused significant damage in the City.

Design Earthquake Scenarios:

- Both the Newport-Inglewood and the San Joaquin Hills faults have the potential to generate earthquakes that would be described as worst-case for the City of Newport Beach. The San Joaquin Hills fault is thought capable of generating an earthquake between magnitude 6.8 and 7.3. In this report, a magnitude 7.1 earthquake was modeled to obtain loss estimates for the City. A magnitude 7.3 earthquake would cause even higher losses than those presented here.

- A maximum magnitude earthquake on the San Andreas fault was also considered as a likely earthquake scenario given that this fault is thought to have a relatively high probability of rupturing in the not too distant future. The loss estimation model indicates that the damage caused by an earthquake on the San Andreas fault to the City of Newport Beach is small compared to the other earthquakes modeled, but not insignificant. Damages of about $65 million were estimated for Newport Beach if three segments of the San Andreas fault break in a magnitude 7.8 earthquake.

Fault Rupture and Secondary Earthquake Effects:

- Several active and potentially active faults have been mapped across or under the City, including the Newport-Inglewood fault and the San Joaquin Hills fault. An Alquist-Priolo Earthquake Fault Zone has not been proposed for the portion of the Newport-Inglewood fault that has been mapped within the City (Newport Mesa and Balboa Peninsula) as its location is not well defined. The San Joaquin Hills fault has not been zoned as it is a “blind” thrust fault that does not reach the surface. Because trenching studies for most redevelopment projects on the Peninsula are not likely (in most cases) to be successful, mandating these types of investigations is not recommended. However, the public should be made aware of the presence of the mapped fault by requiring disclosure when properties in this area are sold. Critical facilities should not be located on or near the active traces of the Newport-Inglewood fault.

Several small, discontinuous faults have been discovered in the eastern (relatively undeveloped) part of Newport Mesa. These faults are not considered to be large enough to generate earthquakes, but instead are most likely fractures that have accommodated small ground displacements in response to a nearly earthquake on the active strand of the Newport-Inglewood fault zone. Nevertheless, because they show indications of small displacements during the last 11,000 years, building setbacks have been recommended

- Currently, shallow ground water levels (< 50 feet from the ground surface) are known to occur along the coast, around Newport Bay, and along the major drainages in the Newport Beach area. Shallow ground water perched on bedrock may also be present seasonally in the canyons draining the San Joaquin Hills. Seasonal fluctuations in groundwater levels, and the introduction of residential irrigation requires that site-specific investigations be completed to support these generalizations in areas mapped as potentially susceptible to liquefaction.

- Those portions of the Newport Beach area that may be susceptible to seismically induced settlement are the alluvial surfaces and larger drainages that are underlain by late Quaternary alluvial sediments (similar to the liquefaction-susceptible areas). Sites in the San Joaquin Hills along the margins of the larger drainage channels and an area just west of the Santa Ana River outlet may be particularly vulnerable.

- The central and eastern portions of Newport Beach are most vulnerable to seismically induced slope failure, due to the steep terrain.

- The California Geological Survey (CGS) has completed mapping in the Newport Beach area under the Seismic Hazards Mapping Act. Geological studies in accordance with the guidelines prepared by the CGS should be followed in those areas identified as having a liquefaction or slope-instability hazard.

<u>Earthquake Vulnerability</u>:

- Most of the loss of life and injuries that occur during an earthquake are related to the collapse of hazardous buildings and structures, or from non-structural components (contents) of those buildings.

- Inventory of potentially hazardous structures, such as concrete tilt-ups, pre 1971-reinforced masonry, soft-story buildings, and pre-1952 wood-frame buildings, is recommended.

- Most damage in the City is expected to be to wood-frame residential structures, which amount to more than 57 percent of the building stock in the City. Two of the earthquake scenarios modeled for this study suggest that as much as 65 percent of the residential buildings in the City will experience at least some damage. However, the damage to residential structures, although costly, is not expected to cause a large number of casualties.

- The loss estimation models indicate that some of the school buildings in the City are likely to be damaged during an earthquake. The Newport-Mesa Unified School District in the process of a 5-year building modernization program that will include seismic upgrades and/or building replacement. The District has completed some surveys to identify problems, however the proposed construction work has not been started yet (Mr. Paul Reed, Newport-Mesa Unified School District, personal communication). Operators of private schools should conduct a structural assessment of their schools and prioritize structural strengthening based on the results of these analyses.

<u>Earthquake Hazard Reduction</u>:

- The best mitigation technique in earthquake hazard reduction is the constant improvement of building codes with the incorporation of the lessons learned from each past earthquake. This is especially true in areas not yet completely developed, such the Newport Coast Planned Community in the San Joaquin Hills of southeastern Newport Beach. In addition, current building codes should be adopted for re-development projects that involve more than 50 percent of the original cost of the structure. The recent building codes incorporate two significant changes that impact the City of Newport Beach. The first change is a revision to soil types and amplification factors, and the second change is the incorporation of the proximity of earthquake sources in UBC seismic zone 4. However, since the City of Newport Beach is mostly developed, and building codes are generally not retroactive, the adoption of the most recent building code is not going to improve the existing building stock, unless actions are taken to retrofit the existing structures. Retrofitting existing structures to the most current building code is in most cases cost-prohibitive and not practicable. However, specific retrofitting actions, even if not to the latest code, that are known to improve the seismic performance of structures should be attempted.

- All of the Newport Beach area is subject to near-source design factors because the City is traversed by two active fault systems, and is located near at least two other potentially significant seismic sources. These parameters, new to the 1997 Uniform Building Code (UBC) and the 2001 California Building Codes (CBC), address the proximity and the potential of earthquake sources (faults) to the site.

- While the earthquake hazard mitigation improvements associated with the 1997 UBC address new construction, the retrofit and strengthening of existing structures requires the adoption of ordinances. The City of Newport Beach has adopted an ordinance aimed at retrofitting unreinforced masonry buildings (URMs). Similar ordinances can be adopted for the voluntary or mandatory strengthening of wood-frame residential buildings, pre-cast concrete buildings, and soft-story structures, among others. Although retrofitted buildings may still incur severe damage during an earthquake, their mitigation results in a substantial reduction of casualties by preventing collapse.

- Adoption of new building codes does not mitigate local secondary earthquake hazards such as liquefaction and ground failure. Therefore, these issues are best mitigated at the local level. Avoiding areas susceptible to earthquake-induced liquefaction, settlement or slope instability is generally not feasible. The best alternative for the City is to require "special studies" within these zones for new construction, as well as for significant redevelopment, and require implementation of the subsequent engineering recommendations for mitigation.

- Effective management of seismic hazards in Newport Beach includes technical review of consulting reports submitted to the City. For projects within seismic hazard zones, State law requires that the City's reviewer be a licensed engineering geologist and/or civil engineer having competence in the evaluation and mitigation of seismic hazards (CCR Title 14, Section 3724). Because of the interrelated nature of geology, seismology, and engineering, most projects will benefit from review by both the geologist and civil engineer. The California Geological Survey has published guidelines to assist reviewers in evaluating site-investigation reports (CDMG, 1997).

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CHAPTER 3: GEOLOGIC HAZARDS

3.1 Physiographic Setting

The City of Newport Beach and its Sphere of Influence are located in an area of widely diverse terrain at the southern margin of the Los Angeles Basin. The City is bounded on the northwest by the broad, nearly flat-lying coastal plain of Orange County - the great outwash plain of the Santa Ana River. To the northeast lie the foothills of the Santa Ana Mountains and the smaller Tustin Plain. Rugged coastal mountains are present to the south.

The City's landscape can best be described by geographic area, each reflective of its distinct topographic features (see Figure 3-1). The central and northwestern portions of the City are situated on a broad mesa that extends southeastward to join the San Joaquin Hills. Commonly known as Newport Mesa, this upland has been deeply dissected by stream erosion, resulting in moderate to steep bluffs along the Upper Newport Bay estuary, one of the most striking and biologically diverse natural features in Orange County. The nearly flat-topped mesa rises from about 50 to 75 feet above mean sea level at the northern end of the estuary in the Santa Ana Heights area, to about 100 feet above sea level in the Newport Heights, Westcliff, and Eastbluff areas. Along the southwestern margin of the City, sediments flowing from the two major drainage courses that transect the mesa have formed the beaches, sandbars, and mudflats of Newport Bay and West Newport. These lowland areas were significantly modified during the last century in order to deepen channels for navigation and form habitable islands. Balboa Peninsula, a barrier beach that protects the bay, was once the site of extensive low sand dunes. In the southern part of the City, the San Joaquin Hills rise abruptly from the sea, separated from the present shoreline by a relatively flat, narrow shelf. Originally formed by wave abrasion, this platform (also called a terrace) is now elevated well above the water and is bounded by steep bluffs along the shoreline. Balboa Peninsula and the harbor islands generally range from about 5 to 10 feet above sea level. The coastal platform occupied by Corona Del Mar ranges from about 95 to 100 feet above sea level, and the San Joaquin Hills, site of the Newport Coast development area, rise to an elevation of 1,164 feet at Signal Peak.

The two major drainages that have contributed greatly to the development of the City's landforms are the Santa Ana River and San Diego Creek. At one time, the natural course of the Santa Ana River hugged the western side of Newport Mesa, carving steep bluffs and feeding sediment into Newport Bay. In an attempt to reduce flooding on the coastal plain, the river was confined to man-made levees and channels by the early 1920s. North of the City, numerous streams draining the foothills, including Peters Canyon Wash, Rattlesnake Wash, Hicks Canyon, Agua Chinon, and Serrano Creek, merged with San Diego Creek and collectively cut a wide channel through the mesa, later filling it with sediment (Upper Newport Bay and the harbor area). The collected drainages are now contained in the man-made San Diego Creek Channel, and directed into Upper Newport Bay near the intersection of Jamboree Road and University Drive. The Bay also receives water from the Santa Ana Delhi Channel near Irvine Avenue and Mesa Drive.

Figure 3-1: Aerial View of Newport Beach,
Showing Some of the Physiographic Features Discussed in the Text

(Photograph from R.J. Lung & Associates; permission to use photo being requested)

The portion of the San Joaquin Hills that lies within the City is drained 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 to the Pacific Ocean. Drainage courses on the north side of the hills, including Bonita and Coyote Creeks, are tributaries of San Diego Creek.

Development in the City began in the late 1800's with the arrival of the railroads and the McFadden (Newport) Pier. Development gradually spread outward from the rail lines and beaches, eventually covering most of Newport Mesa and the low hills to the south. More recently, residential developments and a major transportation corridor (State Route 73) have made significant advances into the rugged terrain of the San Joaquin Hills, and future hillside communities are in the planning and development stages. These types of projects require major earthwork activities, typically involving the movement of millions of cubic yards of earth. Because the severity of geologic hazards increases in the hills, corrective grading often accounts for a significant portion of the overall yardage.

3.2 Geologic Setting

The physical features described in the previous section are a reflection of the geologic and climatic processes that have played upon this region the last few million years. The City of Newport Beach lies at the northern end of 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 Orange 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 northwest across the Los Angeles Basin, leaving the coastline at the northwestern corner of the City, and continuing to the south offshore. 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).

The San Joaquin Hills are the westernmost range in the Peninsular Ranges province. The hills are structurally complex, consisted 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.

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 and 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 has 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 thrusts and associated folding southward from Los Angeles into the Newport Beach area (Grant et al., 1999).

3.3 Geologic Units

Alluvial sediments of late Holocene age are present in active and recently active stream channels throughout the City, in addition to 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. 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 general distribution of geologic units that are exposed at the surface are shown on the Geologic Map (Plates 3-1a and 3-1b). In the section that follows, the characteristics of each unit are discussed using nomenclature published by Morton and Miller (1981) and Morton (1999). Descriptions of the units, including some of their engineering characteristics, have been compiled from various sources including published regional geologic reports and papers, as well as unpublished consulting reports. The distribution of geologic units with respect to their general engineering characteristics is illustrated on Plate 3.2. The units are described in the next section, from youngest to oldest.

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.

3.3.1 Young Surficial Deposits

Holocene deposits within the City generally occupy the low-lying areas, including beaches, estuaries, and canyon-bottoms. Being geologically young and subject to active geologic processes, these deposits are typically unconsolidated and have very little, if any, soil development.

3.3.1.1 Beach Sediments (map symbol: Qm)

Late Holocene beach sand forms a narrow strandline along the outer portion of Balboa Peninsula, continuing northward along West Newport to the northern edge of the City. Beach deposits are also present below the Corona Del Mar bluffs and in Crystal Cove State Park. These sediments generally consist of light gray to tan, fine- to coarse-grained sand with infrequent gravel lenses. Near sea cliffs they are often pebbly and cobbly. Beach deposits typically slope gently towards the ocean. Due to the lack of cohesion and vegetation, beach sands are highly vulnerable to erosion and have poor slope stability characteristics. Permeability is high, and the expansion potential is low.

3.3.1.2 Dune Sediments (map symbol: Qe)

Behind the gently sloping tidal zone, Late Holocene aeolian (wind-blown) sands are present from West Newport to the tip of the Balboa Peninsula. Most of these deposits are now covered by development; however, a few low dunes still remain locally. These sediments are similar in composition and engineering characteristics to beach sands. Dunes often are covered with a sparse growth of iceplant, grasses, and low shrubs, which serve to stabilize the sand.

3.3.1.3 Estuarine Sediments (map symbol: Qes)

Late Holocene deposits within Upper Newport Bay consist of sand, silt, and clay that inter-finger with coarser stream-laid deposits at the mouths of San Diego Creek, Big Canyon, and several smaller channels that drain into the Bay. Estuarine deposits in the present-day tidal flats of Upper Newport Bay are typically saturated and have a high organic content. Prior to development, the area occupied by Newport Harbor and its various islands consisted of intertidal mudflats and sandbars similar to Upper Newport Bay (see Figure 3-2). From an engineering perspective, most estuarine deposits are highly unstable, being subject to settlement, erosion, and poor slope stability. Depending on the clay content, they may also be expansive.

Figure 3-2: Estuarine Setting of Upper Newport Bay

3.3.1.4 Young Alluvial Fan and Fluvial Channel Sediments (map symbol: Qyf and Qya)

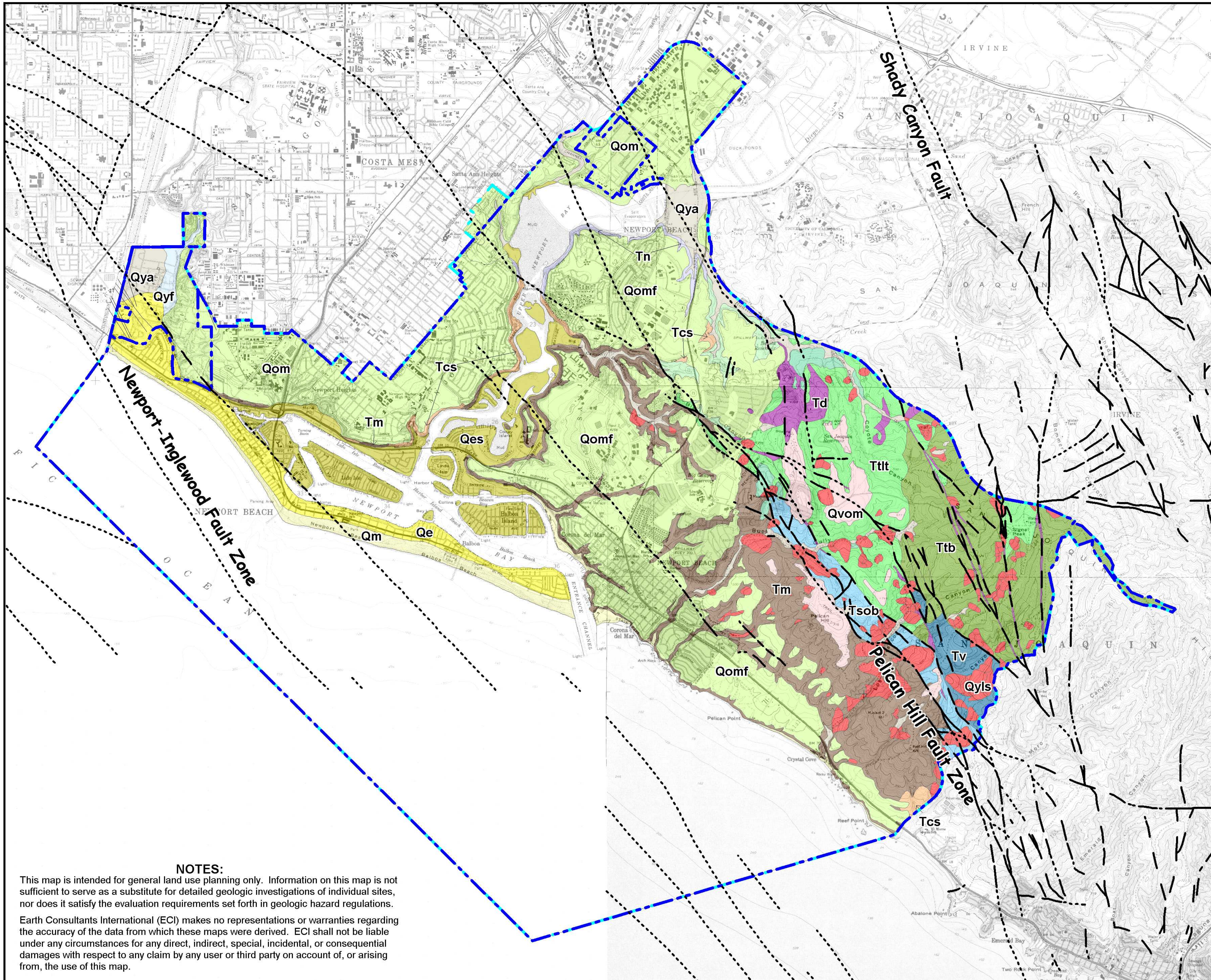
Holocene to latest Pleistocene in age, alluvial fan and fluvial (stream laid) deposits consisting of mixed sand, silt, clay, and gravel, are found lining active or recently active stream channels along the western edge of Newport Mesa, and within larger canyons draining the San Joaquin Hills. These deposits merge with coastal dune deposits west of the mesa, and mix with submerged estuarine deposits at the head of Upper Newport Bay. Such deposits are typically of low density, and contain organic debris. Consequently, they are subject to settlement under loading (with fill embankments or buildings), erosion, and poor slope stability. Peat layers are present near the coast. Due to the variation in grain size, the expansion characteristics can range from low to high.

3.3.1.5 Landslides (map symbol: Qyls)

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.

Geologic Map

Newport Beach, California



NOTES:
This map is intended for general land use planning only. Information on this map is not sufficient to serve as a substitute for detailed geologic investigations of individual sites, nor does it satisfy the evaluation requirements set forth in geologic hazard regulations.

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EXPLANATION

SYMBOLS

Fault: solid where location known, dashed where approximate, dotted where concealed.

Geologic Contact

Newport Beach City Boundary

Sphere of Influence

for the description of geologic units, refer to Plate 3-1b

Scale: 1:60,000

0.5 0 0.5 1 1.5 Miles

1 0 1 2 3 Kilometers

Base Map: USGS Topographic Map from Sure!MAPS RASTER
Source: Morton et al., 1976 and Morton, 1999

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CITY OF NEWPORT BEACH CALIFORNIA

Plate 3-1a

GEOLOGIC UNIT DESCRIPTIONS

Quaternary

Young Surficial Deposits

Qm	Marine sediments (late Holocene) - Unconsolidated, active or recently active beach sand deposits.
Qe	Eolian sediments (late Holocene) - Unconsolidated, active or recently active sand dune deposits.
Qes	Estuarine sediments (late Holocene) - Unconsolidated, active, or recently active, sandy, silty, and clayey organic-rich intertidal deposits.
Qya	Young fluvial channel sediments (Holocene and latest Pleistocene) - Unconsolidated sand, silt, clay, and gravel in active or recently active stream channels.
Qyf	Young alluvial fan sediments (Holocene and latest Pleistocene) - Unconsolidated sand, silt, and clay.
Qyls	Landslide (Holocene and latest Pleistocene) - Highly fragmented and broken to largely coherent bedrock blocks.

Older Surficial Deposits

Qom/Qomf	Old marine sediments (late to middle Pleistocene) - Light gray to brownish gray silty sand and fine-grained sand locally with gravel and shell fragments. East of Newport Bay, covered with veneer of younger alluvial fan sediments (Qomf).
Qvom	Very old marine sediments (middle to early Pleistocene) - Light gray to yellow fine- to medium-grained sand, locally clay-rich and reddish in color; gravelly near the base.
Qvoa	Very old channel sediments (middle to early Pleistocene) - Reddish brown to yellowish brown gravel, sand, silt and clay; typically poorly bedded, locally with cross-bedded lenses of sand and gravel; locally cemented.

Tertiary

Tertiary Sedimentary Rocks

Tn	Niguel Formation (Pliocene) - Light gray to grayish yellow sandstone interbedded with greenish siltstone and yellowish brown to pale reddish brown conglomerate and breccia.
Tcs	Capistrano Formation Siltstone Facies (late Miocene) - Yellowish to brownish gray concretionary siltstone and mudstone with lenses of whitish gray sandstone; sparse diatomaceous and tuffaceous beds.
Tm	Monterey Formation (middle to late Miocene) - White to yellowish gray siliceous and diatomaceous siltstone, shale, and clayey siltstone with interbedded fine-grained sandstone. Locally contains lenses and thin beds of water-laid tuff.
Tsob	San Onofre Breccia (middle Miocene) - Brown to yellowish brown breccia with interbedded conglomerate, sandstone, siltstone, and mudstone.
Tt	Topanga Formation (middle Miocene) - Marine sandstone, siltstone, and shale.
Ttb	Paularino Member - Pale gray, tuffaceous siltstone and sandstone with interbedded breccia. Contains andesite flows locally sandstones and breccia contain abundant andesite fragments.
Ttp	Los Trancos Member - Pale gray, brownish gray and olive-gray, siltstone and clayey siltstone with interbedded shale and medium- to coarse-grained sandstone.
Ttlt	Bommer Member - Yellowish brown to brownish gray, medium- to coarse-grained sandstone and silty sandstone. Minor siltstone and conglomerate.
Tv	Vaqueros Formation (early Miocene) - Yellowish brown fine-grained sandstone with interbedded siltstone, shale, mudstone, and minor conglomerate.

Intrusive Igneous Rocks

Ta	Andesitic intrusive rocks (middle Miocene) - Dark gray to olive gray intrusive rock primarily of andesitic composition.
Td	Diabase intrusive rocks (middle Miocene) - Diabasic textured shallow intrusive rocks.

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CITY OF NEWPORT BEACH CALIFORNIA

Explanation for Geologic Map

Plate 3-1b

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. Landslides are further discussed in the geologic hazards section (Section 3.4) below.

3.3.2 Older Surficial Deposits

Pleistocene marine deposits of various ages are preserved on the surface of Newport Mesa and on older marine terraces notched into the north and west flanks of the San Joaquin Hills. These deposits are deeply dissected, moderately consolidated, and have well-developed soil profiles.

3.3.2.1 Old Marine Sediments (map symbol: Qom and Qomf)

A large portion of the City, including the uplifted Newport Mesa and coastal platforms, are capped by brownish gray to light gray silty sand and fine-grained sand, locally with scattered gravel and lenses of coarse sand, gravel and shell fragments (Qom) (see Figure 3-3). Bedding ranges from massive to well developed, with cross-bedding. These sediments have moderate to high density, and are friable, similar to beach sand, below the soil horizon. A strongly developed argillic soil profile is present, and is locally more than 10 feet thick (see Figure 3-4). Except for the soil zone, permeability is high and the expansion potential is low. Due to a lack of cohesion, the erosion potential is high. The soil zone contains a higher clay content, resulting in lower permeability and erodibility, but with a higher potential for expansion. East of Newport Bay, the old marine deposits are covered with a veneer of younger alluvial fan sediments shed from the San Joaquin Hills (Qomf).

3.3.2.2 Very Old Marine Sediments (map symbol: Qvom)

This unit includes sediments of variable thickness deposited on prehistoric wave-eroded platforms. These deposits are now present as erosional remnants perched at higher elevations within the San Joaquin Hills. Several terrace platforms that increase in age with increasing elevation have been identified in the San Joaquin Hills (see Figure 3-5). The terrace deposits typically consist of light gray to yellow, silty fine- to medium-grained sand; they are locally clay-rich and reddish to orange-brown in color. Lenses and beds of gravel are commonly present in the lower section of the deposit, with concentrations of cobbles, pebbles and shell fragments at the base. These sediments are moderately well cemented and slightly to moderately jointed. The engineering characteristics of this unit are similar to those of the old marine sediments.

Figure 3-3: View to the Northwest of Newport Mesa (left-center), and Newport Bay (foreground)

Figure 3-4: Older Marine Terrace Sediments Exposed in Grading Cut
Notice reddish, clay-rich, well-developed soil profile at the top.

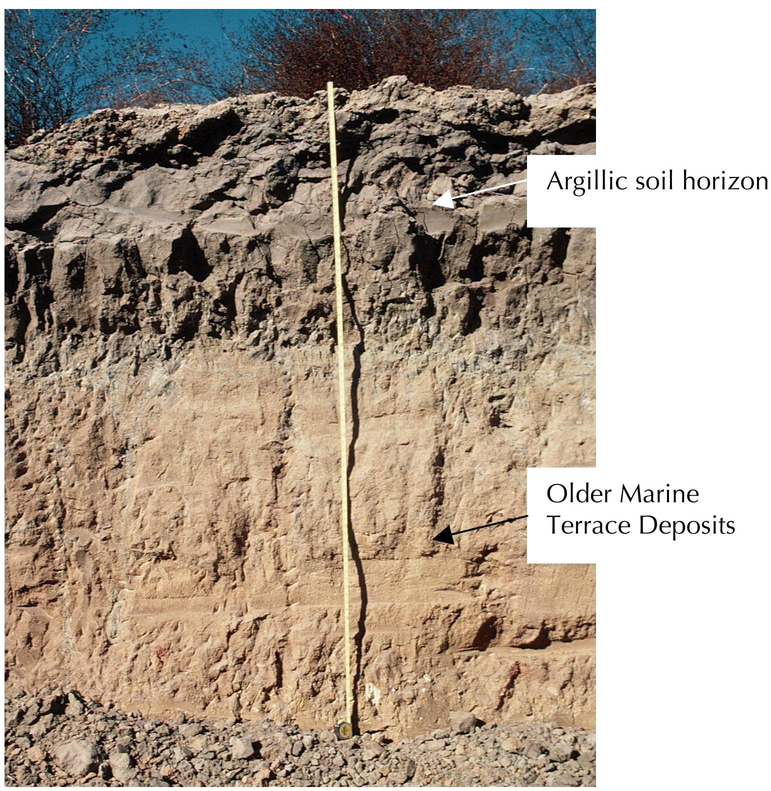
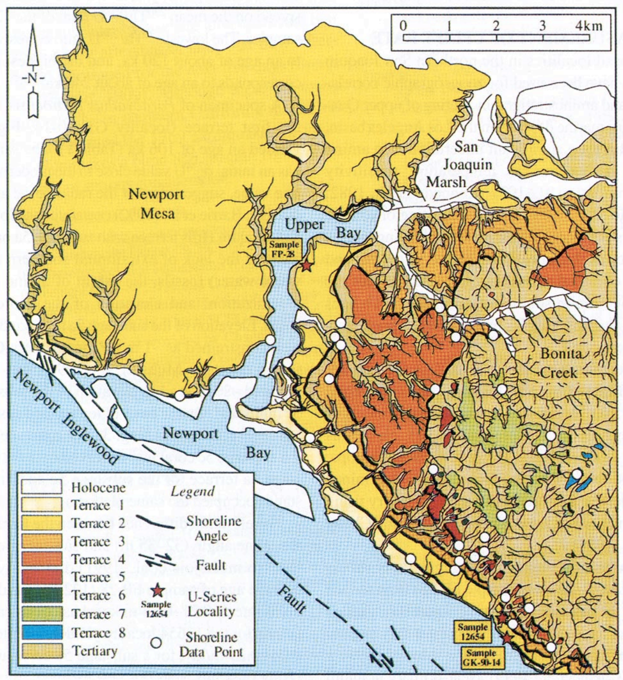


Figure 3-5: Detail Showing Older Marine Terraces Present at Various Elevations Within and Near the San Joaquin Hills

(from Grant et al., 1999)



3.3.2.3 Very Old Fluvial Channel Sediments (map symbol: Qvoa)

These sediments consist of gravel, sand, silt, and clay that are now present in elevated bench-like terraces flanking the modern stream channels. Within the Newport Beach area, older river terraces are present along Bonita Creek, on the northern side of the San Joaquin Hills. Typically reddish brown to yellowish brown and grayish brown, these deposits are poorly bedded, but locally have lenses of cross-bedded sand and gravel. Induration ranges from poor to well developed; the unit is locally cemented. Permeability and expansion potential are highly variable, depending on the composition and degree of soil development. Slope stability is generally good, with most slope failures consisting of slumping along the walls of active stream channels. Susceptibility to erosion is low in natural slopes with gentle gradients, and moderately high in steeper, graded slopes.

3.3.3 Tertiary Sedimentary Rocks

Within the City, areas of high relief are underlain primarily by a complex assemblage of sedimentary rocks created by multiple episodes of faulting and folding. All of these rocks are marine in origin, having formed from sediments deposited in a deep ocean embayment that encroached into the Orange County area prior to uplift of the region.

Figure 3-6: View of Newport Mesa showing the Older Marine Terrace Deposits
(coincident with the vegetation at the top of the bluffs)
Capping Deposits of the Capistrano Formation
(in the lower two-thirds of the bluffs)

3.3.3.1 Niguel Formation (map symbol: Tn)

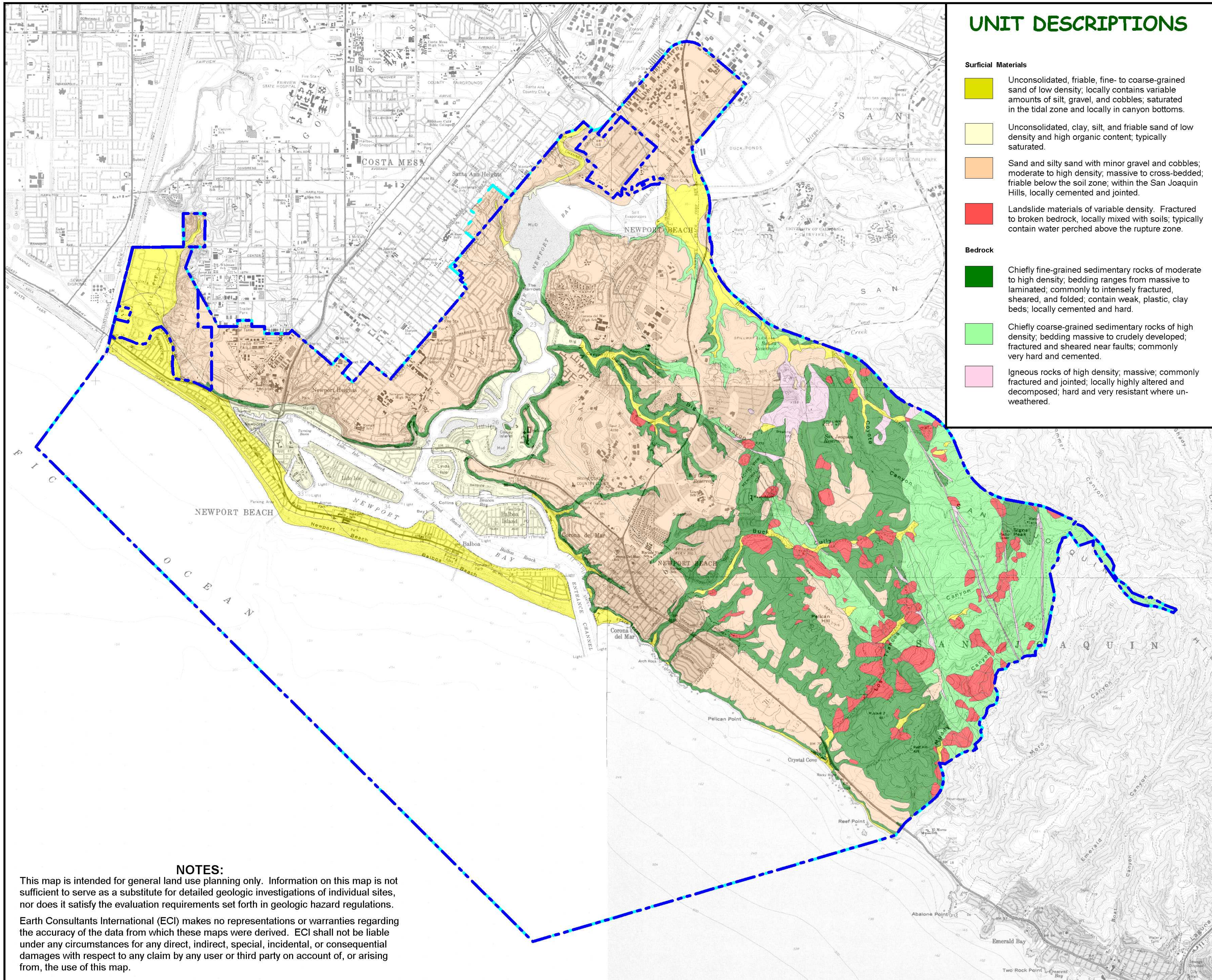
The Pliocene-age Niguel Formation is found only in the Eastbluff and Bonita Canyon areas, where stream erosion has cut down through the mesa to expose the bedrock underlying the old marine terrace deposits. This rock unit consists of light gray to grayish yellow sandstone, interbedded with greenish siltstone and yellowish brown to pale reddish brown conglomerate and breccia. Bedding is well developed in the sandstone, but is poor to massive in the conglomerate and siltstone sections. Sandstone beds are typically friable, whereas the conglomerate and breccia units are moderately indurated. Jointing is rare. Permeability ranges from low to high, and due to the mostly granular nature of the deposit, erodibility is also high. Slope stability is generally good, except for surficial slumping on bluffs during periods of heavy rainfall. The expansion potential is low except in clay-rich beds, which can be very highly expansive.

3.3.3.2 Capistrano Formation – Siltstone Facies (map symbol: Tcs)

The late Miocene to early Pliocene Capistrano Formation is exposed in bluffs along the western side of Upper Newport Bay, in the Westcliff area. This unit consists of massive to crudely bedded, yellowish gray to medium brownish gray concretionary siltstone and mudstone with lenses of whitish gray sandstone. Well-bedded diatomaceous and tuffaceous beds are present locally. This rock is highly jointed, and contains common low angle shears. Gypsum is frequently found filling joints and shear planes. Permeability of the rock is low, and the expansion potential is high to very high. Although resistant to erosion, slope stability is generally poor.

Engineering Materials Map

Newport Beach, California



UNIT DESCRIPTIONS

Surficial Materials

- Unconsolidated, friable, fine- to coarse-grained sand of low density; locally contains variable amounts of silt, gravel, and cobbles; saturated in the tidal zone and locally in canyon bottoms.
- Unconsolidated, clay, silt, and friable sand of low density and high organic content; typically saturated.
- Sand and silty sand with minor gravel and cobbles; moderate to high density; massive to cross-bedded; friable below the soil zone; within the San Joaquin Hills, locally cemented and jointed.
- Landslide materials of variable density. Fractured to broken bedrock, locally mixed with soils; typically contain water perched above the rupture zone.

Bedrock

- Chiefly fine-grained sedimentary rocks of moderate to high density; bedding ranges from massive to laminated; commonly to intensely fractured, sheared, and folded; contain weak, plastic, clay beds; locally cemented and hard.
- Chiefly coarse-grained sedimentary rocks of high density; bedding massive to crudely developed; fractured and sheared near faults; commonly very hard and cemented.
- Igneous rocks of high density; massive; commonly fractured and jointed; locally highly altered and decomposed; hard and very resistant where un-weathered.

EXPLANATION

Newport Beach City Boundary

Sphere of Influence

Scale: 1:60,000

0.5 0 0.5 1 1.5 Miles

1 0 1 2 3 Kilometers

Base Map: USGS Topographic Map from Sure!MAPS RASTER

Source: Based on data from Morton et al., 1976 and Morton, 1999

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City of Newport Beach California

Project Number: 2112
Date: July, 2003

Plate 3-2

NOTES:

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3.3.3.3 Monterey Formation (map symbol: Tm)

The Monterey Formation is widely exposed in the San Joaquin Hills south of the Pelican Hill fault zone. It also underlies the Pleistocene marine deposits that cap the mesa and coastal platform, and is therefore exposed in many of the bluffs and canyon sidewalls where stream dissection has been deep. This rock unit consists predominantly of thinly bedded to laminated siliceous siltstone, shale, and clayey siltstone with interbeds of clayey, diatomaceous siltstone and very fine-grained sandstone. Locally it contains irregular lenses and thin beds of water-laid tuff (volcanic ash) that is frequently altered to highly plastic clay.

Rock of the Monterey Formation is moderately to intensely fractured, particularly near the Pelican Hill fault. Cemented sandstones and siliceous shales are very hard, and can be difficult to excavate. Due to the fine-grained nature of the sediments, permeability is low, and resistance to erosion is generally good. Highly expansive clays are common, and slope stability is poor, as indicated by the numerous bedrock landslides within this unit, and the many surficial failures that occur on natural slopes during winters of heavy rainfall.

3.3.3.4 San Onofre Breccia (map symbol: Tsob)

The middle Miocene San Onofre Breccia is present in the San Joaquin Hills as a narrow, fault-bounded block within the Pelican Hill fault zone. This rock unit consists of brown to yellowish brown breccia (coarse-grained rock composed of angular broken rock fragments held together by a mineral cement or matrix) with interbedded conglomerate, sandstone, siltstone, and mudstone. Bedding structure is poor, especially in this area, due to shearing associated with the fault zone. This rock unit is commonly well indurated and cemented, making it difficult to excavate. Permeability is low, and expansion characteristics are generally low, except in clayey zones that can be highly expansive. Slope stability in this unit in normally good, but fracturing and shearing within the fault zone have weakened the rock fabric, and numerous slope failures are present as bedrock landslides, rockfalls, and surficial slumping on steep natural slopes.

3.3.3.5 Topanga Formation (map symbol: Tt, Ttp, Tlt, Ttb)

The **Paularino member** of the middle Miocene Topanga Formation (Ttp) has very limited exposure in canyon sidewalls in the Bonita Creek area, where it is capped by older marine deposits and younger fan sediments. This unit consists of pale gray tuffaceous (ash rich) siltstone and sandstone with interbedded breccia. Andesite flows are present locally, and the sandstones and breccias contain abundant andesite fragments. Bedding is generally massive except in the fine-grained fraction, which is thin-bedded. The rock is typically well indurated and cemented, resulting in low permeability and moderate to difficult excavation. Slope stability and resistance to erosion are moderately good. Expansion potential, for the most part, is in the low range.

North of the Pelican Hill fault zone, the hills are underlain predominantly by the **Los Trancos** and **Bommer members** of the Topanga Formation. The **Los Trancos member** (Ttlt) consists of light gray, brownish gray, and olive-gray siltstone and clayey siltstone with interbedded claystone and grayish brown sandstone. Bedding is typically well developed as thinly bedded to laminated strata, although intervals of thick to massive bedding occur. Permeability is low, and susceptibility to erosion ranges from low to high. Expansion characteristics are in the moderately high to high range. Slope stability is poor, as indicated by many bedrock and surficial failures, especially near the Pelican Hill fault zone.

The **Bommer member** (Ttb) consists of massive to thickly bedded, medium- to coarse-grained sandstone and silty sandstone, with a minor amount of interbedded conglomerate and siltstone. The color ranges from yellowish-brown to grayish-brown with orange iron-oxidation staining. The upper contact with the Los Trancos member is gradational. Rocks of the Bommer member are very dense and commonly cemented, making excavation difficult. Permeability and erodibility in this unit are moderately low. Expansion potential is low in the sandstone intervals, and moderate to high in the less frequent siltstone intervals. Slope stability is generally good except where faulting has weakened the rock fabric, resulting in numerous landslides.

3.3.3.6 Vaqueros Formation (map symbol: Tv)

The early Miocene Vaqueros Formation is present as a large, fault-bounded block in the southern part of the hills. Consisting of pale yellowish brown siltstone, fine-grained sandstone, mudstone, and shale, this unit is typically massive to thick bedded, with minor thin-bedded intervals of siltstone and shale. Permeability is moderately poor, and silty intervals are moderately expansive. Susceptibility to erosion ranges from low to high. Slope stability is very poor in this area, due to deformation from faulting, as indicated by large bedrock landslides that involve a significant portion of the rock exposed.

3.3.4 Tertiary Intrusive Rocks

3.3.4.1 Andesite and Diabase (map symbol: Ta and Td)

Middle Miocene andesite and diabase (rock of igneous origin) occur as dikes along faults or shear zones, and locally as irregular-shaped bodies, commonly near faults. These rocks typically form by intrusion of magma into fractures, joints and faults within the surrounding rock. Unweathered portions of these rocks are dense and very resistant to erosion, forming rocky ribs along faults and ridgelines. The color ranges from dark gray to olive gray in fresh rock, to light brownish gray, light brown, yellowish brown and yellowish orange if altered and decomposed. Fracturing and jointing are common. Permeability is moderate to low, and expansion characteristics are generally low. Unweathered rock may be very difficult to excavate. Slope stability is typically good. Rockfalls may pose a problem locally where hard, fractured outcrops are present.

3.4 Geologic Hazards in the Newport Beach Area

Geologic hazards are generally defined as surficial earth processes that have the potential to cause loss or harm to the community or the environment. The basic elements involved in the assessment of geologic hazards are climate, geology, soils, topography, and land use.

3.4.1 Landslides and Slope Instability

In Newport Beach, landslides have been and remain a significant risk, as development reaches higher elevations within the hills. Although an active landslide tends to affect a relatively small area (as compared to a damaging earthquake), and is generally a problem for only a short period of time, the dollar loss can be high. Insurance policies typically do not cover landslide damage, and this can add to the anguish of the affected property owners.

Careful land management in hillside areas can reduce the risk of economic and social losses from slope failures. This generally includes land use zoning to restrict development in unstable areas, grading codes for earthwork construction, geologic and soil engineering investigation and review, construction of drainage structures, and where warranted, placement of warning systems. Other important factors are risk assessments (including susceptibility maps), a concerned local government, and an educated public.

3.4.1.1 Types of Slope Failures

Slope failures occur in a variety of forms, and there is usually a distinction made between gross failures (sometimes also referred to as "global" failures) and surficial failures. Gross failures include deep-seated or relatively thick slide masses, such as landslides, whereas surficial failures can range from minor soil slips to destructive debris flows. Slope failures can occur on natural or man-made slopes. For man-made slopes, most failures occur on older slopes, many of which were built at slope gradients steeper than those allowed by today's grading codes. Although infrequent, failures can also occur on newer graded slopes, generally due to poor engineering or poor construction. Slope failures often occur as elements of interrelated natural hazards in which one event triggers a secondary event, such earthquake-induced landsliding, fire-flood sequences, or storm-induced mudflows.

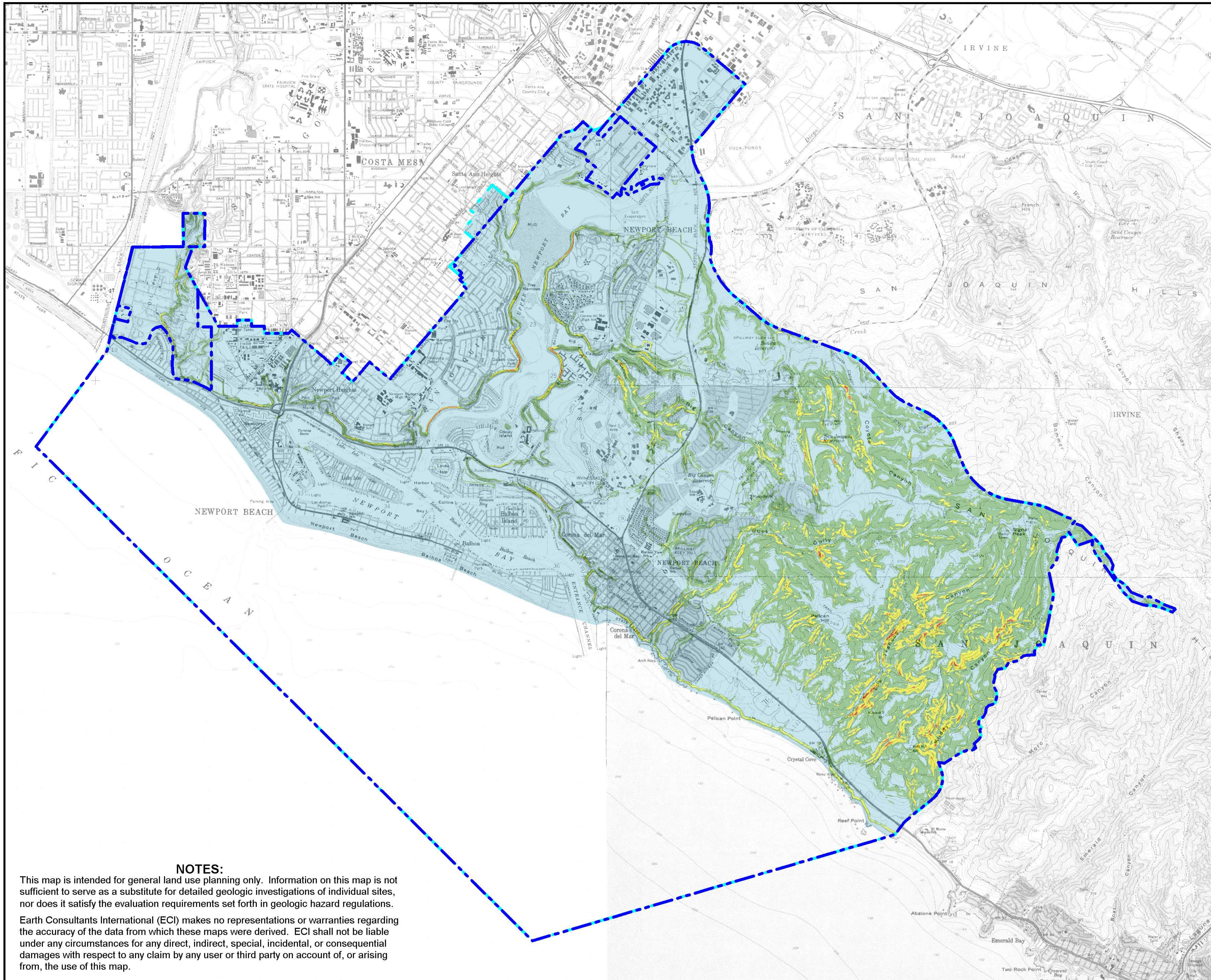
- **Gross Instability**

  Landslides - Landslides are movements of relatively large land masses, either as a nearly intact bedrock blocks, or as jumbled mixes of bedrock blocks, fragments, debris, and soils. The type of movement is generally described as translational (slippage on a relatively planar, dipping layer), rotational (circular-shaped failure plane) or wedge (movement of a wedge-shaped block from between intersecting planes of weakness, such as fractures, faults and bedding). The potential for slope failure is dependent on many factors and their interrelationships. Some of the most important factors include slope height, slope steepness, shear strength and orientation of weak layers in the underlying geologic unit, as well as pore water pressures. Joints and shears, which weaken the rock fabric, allow penetration of water leading to deeper weathering of the rock along with increasing the pore pressures, increasing the plasticity of weak clays, and increasing the weight of the landmass. For engineering of earth materials, these factors are combined in calculations to determine if a slope meets a minimum safety standard. The generally accepted standard is a factor of safety of 1.5 or greater (where 1.0 is equilibrium, and less than 1.0 is failure). Natural slopes, graded slopes, or graded/natural slope combinations must meet these minimum engineering standards where they impact planned homes, subdivisions, or other types of developments. Slopes adjacent to areas where the risk of economic losses from landsliding is small, such as parks and roadways, are often allowed, at the discretion of the local reviewing agency, a lesser safety factor.

  From an engineering perspective, landslides are generally unstable (may be subject to reactivation), and may be compressible, especially around the margins, which are typically highly disturbed and broken. The headscarp area above the landslide mass is also unstable, since it is typically oversteepened, cracked, and subject to additional failures.

Slope Distribution Map

Newport Beach, California



NOTES:

This map is intended for general land use planning only. Information on this map is not sufficient to serve as a substitute for detailed geologic investigations of individual sites, nor does it satisfy the evaluation requirements set forth in geologic hazard regulations.

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EXPLANATION

Slope (in degrees)

- 0 to 10
- 10 to 26
- 26 to 40
- 40 and greater

Newport Beach City Boundary

Sphere of Influence

Scale: 1:60,000

0.5 0 0.5 1 1.5 Miles

1 0 1 2 3 Kilometers

Base Map: USGS Topographic Map from Sure!MAPS RASTER

Source: Derived from USGS 10-m Digital Elevation Model

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CITY OF NEWPORT BEACH CALIFORNIA

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Date: July, 2003

Plate 3-3

- **Surficial Instability**

  Slope Creep - Slope creep in general involves deformation and movement of the outer soil or rock materials in the face of the slope, due to the forces of gravity overcoming the shear strength of the material. Soil creep is the imperceptibly slow and relatively continuous downslope movement of the soil layer on moderate to steep slopes. Creep occurs most often in soils that develop on fine-grained bedrock units. Rock creep is a similar process, and involves permanent deformation of the outer few feet of the rock face resulting in folding and fracturing. Rock creep is most common in highly fractured, fine-grained rock units, such as siltstone, claystone and shale.

  Creep also occurs in graded fill slopes. This is thought to be related to the alternate wetting and drying of slopes constructed with fine-grained, expansive soils. The repeated expansion and contraction of the soils at the slope face leads to loosening and fracturing of the soils, thereby leaving the soils susceptible to creep. While soil creep is not catastrophic, it can cause damage to structures and improvements located at the tops of slopes.

  Soil Slip **-** This type of failure is generated by strong winter storms, and is widespread in the steeper slope areas, particularly after winters with prolonged and/or heavy rainfall. Failure occurs on canyon sideslopes, and in soils that have accumulated in swales, gullies and ravines. Slope steepness has a strong influence on the development of soil slips, with most slips occurring on slopes with gradients of between about 27 and 56 degrees (Campbell, 1975). For the slope gradients in Newport Beach refer to Plate 3-3.

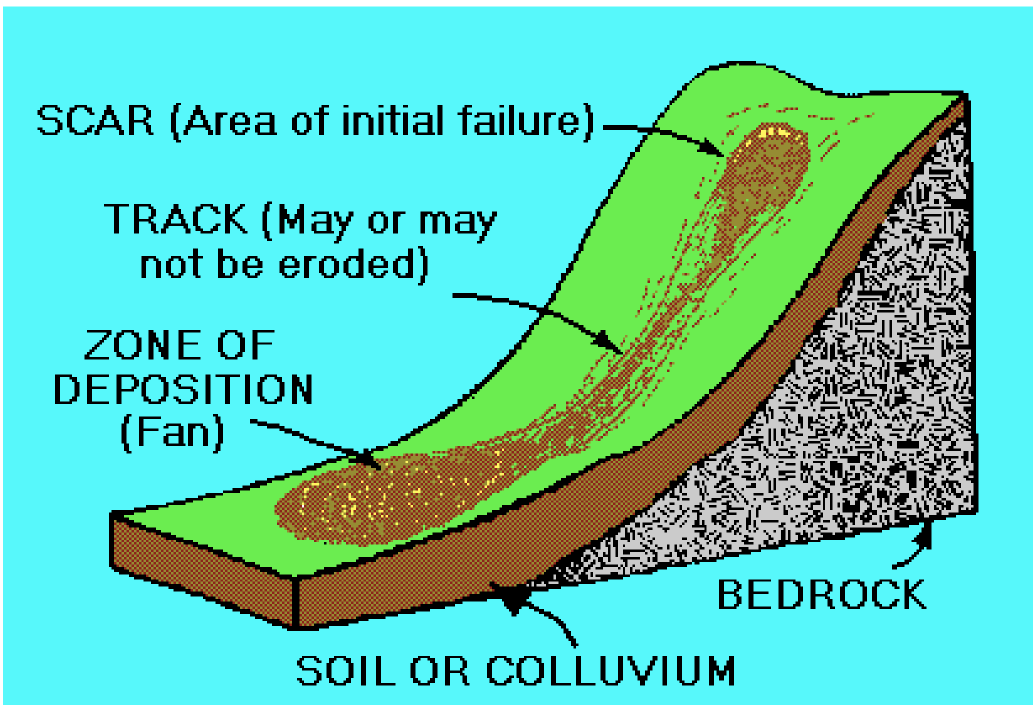
  Earth Flow **-** This type of slope failure is a persistent, slow-moving, lobe-shaped slump that typically comes to rest on the slope not far below the failure point. Earth flows commonly form in fine-grained soils (clay, silt and fine sand), and are mobilized by an increase in pore water pressure caused by infiltration of water during and after winter rains. Earth flows occur on moderate to steep slopes, typically in the range of about 15 to 35 degrees (Keefer and Johnson, 1983).

  Debris Flow **-** This type of failure is the most dangerous and destructive of all types of slope failure. A debris flow (also called mudflow, mudslide, and debris avalanche) is a rapidly moving slurry of water, mud, rock, vegetation and debris. Larger debris flows are capable of moving trees, large boulders, and even cars. This type of failure is especially dangerous as it can move at speeds as fast as 40 feet per second, is capable of crushing buildings, and can strike with very little warning. As with soil slips, the development of debris flows is strongly tied to exceptional storm periods of prolonged rainfall. Failure occurs during an intense rainfall event, following saturation of the soil by previous rains.

  A debris flow most commonly originates as a soil slip in the rounded, soil-filled "hollow" at the head of a drainage swale or ravine (see Figure 3-7). The rigid soil mass is deformed into a viscous fluid that moves down the drainage, incorporating into the flow additional soil and vegetation scoured from the channel. Debris flows also occur on canyon walls, often in soil-filled swales that do not have topographic expression. The velocity of the flow depends on the viscosity, slope gradient, height of the slope, roughness and gradient of the channel, and the baffling effects of vegetation. Even relatively small amounts of debris can cause damage from inundation and/or impact (Ellen and Fleming, 1987; Reneau and Dietrich, 1987). Recognition of this hazard led FEMA to modify its National Flood Insurance Program to include inundation by "mudslides" (FEMA, 2001).

Watersheds that have been recently burned typically yield greater amounts of soil and debris than those that have not burned. Erosion rates during the first year after a fire are estimated to be 15 to 35 times greater than normal, and peak discharge rates range from 2 to 35 times higher. These rates drop abruptly in the second year, and return to normal after about 5 years (Tan, 1998). In addition, debris flows in burned areas are unusual in that they can occur in response to small storms and do not require a long period of antecedent rainfall. These kinds of flows are common in small gullies and ravines during the first rains after a burn, and can become catastrophic when a severe burn is followed by an intense storm season (Wells, 1987).

Figure 3-7: Sketch of a Typical Debris Avalanche Scar and Track



From: http://www.consrv.ca.gov/cgs/information/publications/cgs_notes/note_33/index.htm. Original sketch by Janet K. Smith

***Rockfalls* –** Rockfalls are free-falling to tumbling masses of bedrock that have broken off steep canyon walls or cliffs. The debris from repeated rockfalls typically collects at the base of extremely steep slopes in cone-shaped accumulations of angular rock fragments called talus. Rockfalls can happen wherever fractured rock slopes are oversteepened by stream erosion or man's activities.

Most of the landslides in the San Joaquin Hills are pre-historic in age. The combination of low a sea level in Pleistocene time (when much of the Earth's water was trapped in great ice sheets) and regional tectonic uplift has resulted in the oversteepening of slopes facing small to large stream channels. This, along with the presence of weak bedrock materials, severe deformation associated with the numerous faults that traverse the hills, and a wetter prehistoric climate, have been the major factors contributing to the occurrence of the large number of landslides that cover the hills.

All the bedrock formations in the San Joaquin Hills have been involved in landsliding, however the most susceptible formations are those that are largely composed of siltstone, claystone, mudstone, and shale, such as the Monterey, Topanga (Los Trancos member), and Vaqueros Formations (see Plate 3-1a). These units are present in the central, southern, and western portions of the hills. The San Onofre Formation, normally resistant to landsliding, occurs as a sheared faulted block within the Pelican Hills fault zone, and as a consequence, has produced several large landslides.

The Capistrano siltstone is notorious for large landslides in southern Orange County, where it underlies vast areas of hillside terrain. In Newport Beach, this formation is limited to scattered outcrops along the western bluffs of Newport Bay, and is covered by a protective cap of marine terrace deposits. Consequently, large landslides are not present, and slope instability is generally limited to surficial failures.

Surficial slumps and slides are too small to map at the scale used in Plate 3-1, however they are common within the hills, typically occurring in the thick soils and deeply weathered bedrock near the base of steep slopes. Soil slips are common throughout the hills during winters of particularly heavy and prolonged rainfall.

Much of the accumulated sediment in canyon bottoms, as well as small sediment fans at the mouths of tributary drainages, was probably deposited in mud slurries or debris flows. Catastrophic debris flows, however, have not been reported for the Newport Beach area, probably because most development in the City occurs on elevated areas, rather than vulnerable locations at the base of natural slopes and in canyon bottoms.

Slopes that are the most susceptible to creep are those composed of weak, fine-grained geologic materials, similar to those that are susceptible to landsliding. Fills slopes constructed with materials excavated from these bedrock units may also show signs of creep over time.

3.4.1.2 Susceptibility to Slope Failure

Despite the abundance of landslides and recent spread of new development into the San Joaquin Hills, damage from slope failures in Newport Beach has been small compared to other hillside communities. This can probably be attributed to the development of strict hillside grading ordinances, sound project design that avoids severely hazardous areas, soil engineering practices that include detailed preliminary investigations and oversight during grading, and effective agency review of hillside grading projects. The recent trend toward saving biologically rich canyon habitats has the added benefit of keeping developments out of the path of potential slope failures.

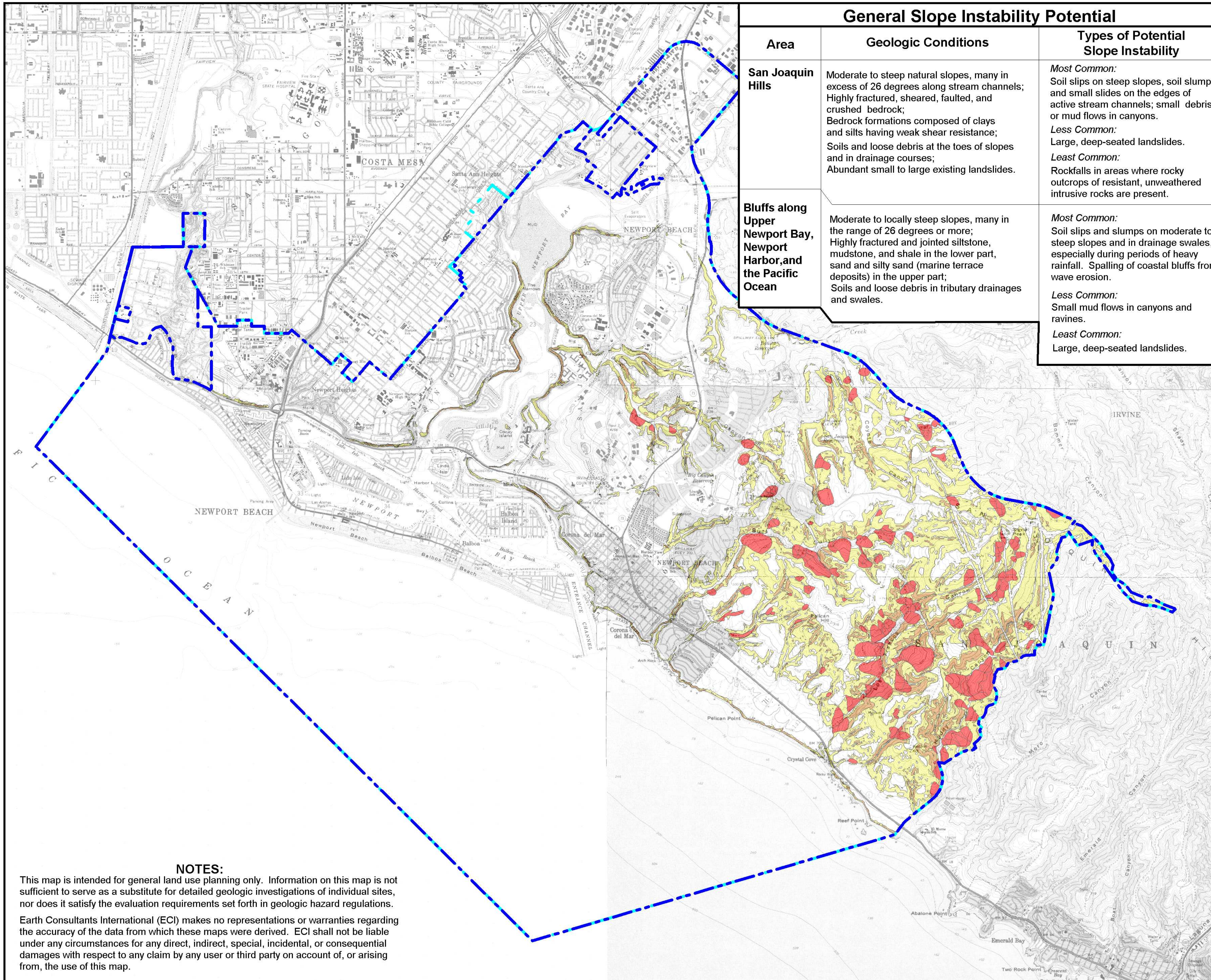
Nevertheless, developments at the top of natural slopes may also be impacted by slope failures. Even if a slope failure does not reach the properties above, the visual impact will generally cause alarm to homeowners. The City's remaining natural hillsides and coastal bluff areas are generally vulnerable to the types of slope instability mentioned above. Table 3-1 below is a summary of the geologic conditions in various parts of the City that provide the environment for slope instability to occur. These conditions usually include such factors as terrain steepness, rock or soil type, condition of the rock (such as degree of fracturing and weathering), internal structures within the rock (such as bedding, foliation, faults) and the prior occurrence of slope failures. Catalysts that ultimately allow slope failures to occur in vulnerable terrain are most often water (heavy and prolonged rainfall), erosion and undercutting by streams, man-made alterations to the slope, or seismic shaking. The summary in Table 3-1 was derived from the Geologic Map (Plate 3-1a), the Engineering Materials Map (Plate 3-2) and the Slope Distribution Map (Plate 3-3). The information in Table 3-1 has been compiled to make the Slope Instability Map (Plate 3-4).

Table 3-1: General Slope Instability Potential within the City of Newport Beach

Area	Geologic Conditions	Types of Potential Slope Instability
San Joaquin Hills	Moderate to steep natural slopes, many in excess of 26 degrees along stream channels; Highly fractured, sheared, faulted, and crushed bedrock; Bedrock formations com-posed of clays and silts having weak shear resistance; Soils and loose debris at the toes of slopes and in drainage courses; Abundant small to large existing landslides.	***Most Common***: Soil slips on steep slopes, soil slumps and small slides on the edges of active stream channels; small debris or mud flows in canyons. ***Less Common:*** Large, deep-seated land-slides. ***Least Common***: Rockfalls in areas where rocky outcrops of resistant, unweathered intrusive rocks are present.
Bluffs along Upper Newport Bay, Newport Harbor, and the Pacific Ocean	Moderate to locally steep slopes, many in the range of 26 degrees or more; Highly fractured and jointed siltstone, mudstone, and shale in the lower part, sand and silty sand (marine terrace deposits) in the upper part; Soils and loose debris in tributary drainages and swales.	***Most Common***: Soil slips and slumps on moderate to steep slopes and in drainage swales, especially during periods of heavy rainfall. Spalling of coastal bluffs from wave erosion. ***Less Common***: Small mud flows in canyons and ravines. ***Least Common:*** Large, deep-seated landslides.

Slope Instability Map

Newport Beach, California



General Slope Instability Potential

Area	Geologic Conditions	Types of Potential Slope Instability
San Joaquin Hills	Moderate to steep natural slopes, many in excess of 26 degrees along stream channels; Highly fractured, sheared, faulted, and crushed bedrock; Bedrock formations composed of clays and silts having weak shear resistance; Soils and loose debris at the toes of slopes and in drainage courses; Abundant small to large existing landslides.	*Most Common:* Soil slips on steep slopes, soil slumps and small slides on the edges of active stream channels; small debris or mud flows in canyons. *Less Common:* Large, deep-seated landslides. *Least Common:* Rockfalls in areas where rocky outcrops of resistant, unweathered intrusive rocks are present.
Bluffs along Upper Newport Bay, Newport Harbor,and the Pacific Ocean	Moderate to locally steep slopes, many in the range of 26 degrees or more; Highly fractured and jointed siltstone, mudstone, and shale in the lower part, sand and silty sand (marine terrace deposits) in the upper part; Soils and loose debris in tributary drainages and swales.	*Most Common:* Soil slips and slumps on moderate to steep slopes and in drainage swales, especially during periods of heavy rainfall. Spalling of coastal bluffs from wave erosion. *Less Common:* Small mud flows in canyons and ravines. *Least Common:* Large, deep-seated landslides.

NOTES:
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EXPLANATION

Slope Instability Rating

- Very High
- High
- Mapped Landslide

- Newport Beach City Boundary
- Sphere of Influence

Scale: 1:60,000

0.5 0 0.5 1 1.5 Miles

1 0 1 2 3 Kilometers

Base Map: USGS Topographic Map from Sure!MAPS RASTER

Source: Based on data from Morton et al., 1976 and Morton, 1999

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CITY OF NEWPORT BEACH CALIFORNIA

Plate 3-4

3.4.1.3 Mitigation of Slope Instability in Future Development

All proposed projects should require a site-specific geotechnical evaluation of any slopes that may impact the future use of the property. This includes existing slopes that are to remain, and any proposed graded slopes. The investigation typically includes borings to collect geologic data and soil samples, laboratory testing to determine soil strength parameters, and engineering calculations. Numerous soil-engineering methods are available for stabilizing slopes that pose a threat to development. These methods include designed buttresses (replacing the weak portion of the slope with engineered fill); reducing the height of the slope; designing the slope at a flatter gradient; and adding reinforcements such as soil cement or layers of geogrid (a tough polymeric net-like material that is placed between the horizontal layers of fill). Most slope stabilization methods include a subdrain system to remove excessive ground water for the slope area. If it is not feasible to mitigate the slope stability hazard, building setbacks are typically imposed.

Temporary slope stability is also a concern, especially where earthwork construction is taking place next to existing improvements. Temporary slopes are those made for slope stabilization backcuts, fill keys, alluvial removals, retaining walls, and utility lines. The risk of slope failure is higher in temporary slopes because they are generally cut at a much steeper gradient. In general, temporary slopes should not be cut steeper than 1:1 (horizontal:vertical), and depending on field conditions flatter gradients may be necessary. The potential for slope failure can also be reduced by cutting and filling large excavations in segments, and not leaving temporary excavations open for long periods of time. The stability of large temporary slopes should be analyzed prior to construction, and mitigation measures provided as needed.

For debris flows, assessment of this hazard for individual sites should focus on structures located or planned in vulnerable positions. This generally includes canyon areas; at the toes of steep, natural slopes; and at the mouth of small to large drainage channels. Mitigation of soil slips, earth-flows, and debris flows is usually directed at containment (debris basins), or diversion (impact walls, deflection walls, diversion channels, and debris fences). A system of baffles may be added upstream to slow the velocity of a potential debris flow. Other methods include removal of the source material, placing subdrains in the source area to prevent pore water pressure buildup, or avoidance by restricting building to areas outside of the potential debris flow path.

There are numerous methods for mitigating rock falls. Choosing the best method depends on the geological conditions (i.e., slope height, steepness, fracture spacing, bedding orientation), safety, type and cost of construction repair, and aesthetics. A commonly used method is to regrade the slope. This ranges from locally trimming hazardous overhangs, to completely reconfiguring the slope to a more stable condition, possibly with the addition of benches to catch small rocks. Another group of methods focuses on holding the fractured rock in place by draping the slope with wire mesh, or by installing tensioned rock bolts, tie-back walls, or even retaining walls. A third type of mitigation includes catchment devices at the toe of the slope, such as ditches, walls, or combinations of both. Designing the width of the catchment structure requires analysis of how the rock will fall. For instance, the slope gradient and roughness of the slope determines if rocks will fall, bounce, or roll to the bottom (Wyllie and Norrish, 1996).

3.4.1.4 Mitigation of Slope Instability in Existing Development

There are a number of options for management of potential slope instability in developed hillsides. Implementation of these options should reduce the hazard to an acceptable level, including reducing or eliminating the potential for loss of life or injury, and reducing economic loss to tolerable levels. Mitigation measures may include:

- Protecting existing development and population where appropriate by physical controls such as drainage, slope-geometry modification, protective barriers, and retaining structures;
- Posting warning signs in areas of potential slope instability;
- Encouraging homeowners to install landscaping consisting primarily of drought-resistant, preferably native vegetation that helps stabilize the hillsides;
- Incorporating recommendations for potential slope instability into geologic and soil engineering reports for building additions and new grading; and
- Providing public education on slope stability, including the importance of avoiding heavy irrigation and maintaining drainage devices. US Geological Survey Fact Sheet FS-071-00 (May, 2000) and California Geological Survey Note 33 (November, 2001) provide public information on landslide and mudslide hazards.

3.4.2 Compressible Soils

Compressible soils are typically geologically young (Holocene age) unconsolidated sediments of low density that may compress under the weight of proposed fill embankments and structures. The settlement potential and the rate of settlement in these sediments can vary greatly, depending on the soil characteristics (texture and grain size), natural moisture and density, thickness of the compressible layer(s), the weight of the proposed load, the rate at which the load is applied, and drainage. Areas of the City where compressible soils are most likely to occur are the active and recently active stream channels, estuary deposits, beach and dune deposits, and young alluvial fan deposits. In the San Joaquin Hills, compressible soils are commonly found in canyon bottoms, swales, and at the base of natural slopes. Landslide deposits may also be compressible, particularly at the head or graben area and along the margins. Deep fill embankments, generally those in excess of about 60 feet deep, will also compress under their own weight.

3.4.2.1 Mitigation of Compressible Soils

When development is planned within areas that contain compressible soils, a geotechnical soil analysis is required to identify the presence of this hazard. The analysis should consider the characteristics of the soil column in that specific area, and also the load of any proposed fills and structures that are planned, the type of structure (i.e. a road, pipeline, or building), and the local groundwater conditions. Removal and recompaction of the near-surface soils is generally the minimum that is required. Deeper removals may be needed for heavier loads, or for structures that are sensitive to minor settlement. Based on the location-specific data and analyses, partial removal and recompaction of the compressible soils is often performed, followed by settlement monitoring for a number of months after additional fill has been placed, but before buildings or infrastructure are constructed. Similar methods are used for deep fills. In cases where it is not feasible to remove the compressible soils, buildings can be supported on specially engineered foundations that may include deep caissons or piles.

3.4.3 Collapsible Soils

Hydroconsolidation or soil collapse typically occurs in recently deposited, Holocene-age soils that accumulated in an arid or semi-arid environment. Soils prone to collapse are commonly associated with wind-deposited sands and silts, and alluvial fan and debris flow sediments deposited during flash floods. These soils are typically dry and contain minute pores and voids. The soil particles may be partially supported by clay, silt or carbonate bonds. When saturated, collapsible soils undergo a rearrangement of their grains and a loss of cementation, resulting in substantial and rapid settlement under relatively light loads. An increase in surface water infiltration, such as from irrigation, or a rise in the groundwater table, combined with the weight of a building or structure, can initiate rapid settlement and cause foundations and walls to crack. Typically, differential settlement of structures occurs when landscaping is heavily irrigated in close proximity to the structure's foundation.

The Holocene sediments that underlie the Newport Beach area are generally not susceptible to this hazard due to the granular nature of the soils, and the lack of clay that is needed to form the dry strength bonds between grains. However, variation in grain size within alluvial deposits in common. Therefore, localized areas could support the conditions needed for collapse to occur.

3.4.3.1 Mitigation of Collapsible Soils

The potential for soils to collapse should be evaluated on a site-specific basis as part of the geotechnical studies for development. If the soils are determined to be collapsible, the hazard can be mitigated by several different measures or combination of measures, including excavation and recompaction, or pre-saturation and pre-loading of the susceptible soils in place to induce collapse prior to construction. After construction, infiltration of water into the subsurface soils should be minimized by proper surface drainage design, which directs excess runoff to catch basins and storm drains.

3.4.4 Expansive Soils

Fine-grained soils, such as silts and clays, may contain variable amounts of expansive clay minerals. These minerals can undergo significant volumetric changes as a result of changes in moisture content. The upward pressures induced by the swelling of expansive soils can have significant harmful effects upon structures and other surface improvements.

Most of the Newport Mesa and Corona Del Mar areas are underlain by marine terrace deposits and young alluvial fan sediments that are composed primarily of granular soils (silty sand, sand, and gravel). Such units are typically in the low to moderately low range for expansion potential. However, thick soil profiles developed on the older marine deposits exposed west of Newport Bay are typically clay-rich and will probably fall in the moderately expansive range. Areas underlain by beach and dune sands have very little expansion potential.

Potentially expansive bedrock may be exposed on natural slopes and ridges in the San Joaquin Hills, or may be uncovered by grading cuts made for developments. Topsoils developed on fine-grained bedrock formations will also be moderately to highly expansive.

In some cases, engineered fills may be expansive and cause damage to improvements if such soils are incorporated into the fill near the finished surface.

3.4.4.1 Mitigation of Expansive Soils

The best defense against this hazard in new developments is to avoid placing expansive soils near the surface. If this is unavoidable, building areas with expansive soils are typically "presaturated" to a moisture content and depth specified by the soil engineer, thereby "pre-swelling" the soil prior to constructing the structural foundation or hardscape. This method is often used in conjunction with stronger foundations that can resist small ground movements without cracking. Good surface drainage control is essential for all types of improvements, both new and old. Property owners should be educated about the importance of maintaining relatively constant moisture levels in their landscaping. Excessive watering or alternating wetting and drying can result in distress to improvements and structures.

3.4.5 Ground Subsidence

Ground subsidence is the gradual settling or sinking of the ground surface with little or no horizontal movement. Most ground subsidence is man-induced. In the areas of southern California where significant ground subsidence has been reported (such as Antelope Valley, Murrieta, and Wilmington, for example) this phenomenon is usually associated with the extraction of oil, gas or ground water from below the ground surface in valleys filled with recent alluvium.

Ground-surface effects related to regional subsidence can include earth fissures, sinkholes or depressions, and disruption of surface drainage. Damage is generally restricted to structures sensitive to slight changes in elevations, such as canals, levees, underground pipelines, and drainage courses; however, significant subsidence can result in damage to wells, buildings, roads, railroads, and other improvements. Subsidence has largely been brought under control in affected areas by good management of local water supplies, including reducing pumping of local wells, importing water, and use of artificial recharge (Johnson, 1998; Stewart et al., 1998).

No significant regional subsidence as a result of either groundwater pumping or oil extraction has been reported in the literature for the Newport Beach area. The San Joaquin Hills-Newport Mesa uplift is generally not considered to be a part of the regional ground water supply. Consequently, ground subsidence is not considered a concern in this area.

3.4.6 Erosion

Erosion is a significant concern in Newport Beach, especially along the shoreline, where beach sediments and coastal bluffs are highly susceptible to erosion by wave action, as discussed in Chapter 1, Coastal Hazards. Other parts of the City, including bluffs along Upper Newport Bay, canyon walls along tributary streams leading to the Bay, and slopes (both natural and man-made) within the San Joaquin Hills are also susceptible to the impacts from precipitation, stream erosion, and man's activities.

3.4.6.1 Mitigation of Erosion

Erosion will have an impact on those portions of the City located above and below natural and man-made slopes. Ridge-top homes above natural slopes should not be permitted at the head of steep drainage channels or gullies without protective mitigation. Although very limited development is present in canyons or major drainage channels, roadways and utility lines, out of necessity, must cross these areas and will need protection from erosion and sedimentation. This may include devices to collect and channel the flow, desilting basins, and elevating structures above the toe of the slope. Diversion dikes, interceptor ditches and slope down-drains are commonly lined with asphalt or concrete, however ditches can also be lined with gravel, rock, decorative stone, or grass.

There are many options for protecting manufactured slopes from erosion, such as terracing slopes to minimize the velocity attained by runoff, the addition of berms and v-ditches, and installing adequate storm drain systems. Establishing protective vegetation, and placing mulches, rock facings (either cemented on non-cemented), gabions (rock-filled galvanized wire cages), or building blocks with open spaces for plantings on the slope face. All slopes within developed areas should be protected from concentrated water flow over the tops of the slopes by the use of berms or walls. All ridge-top building pads should be engineered to direct drainage away from slopes.

Temporary erosion control measures should be provided during the construction phase of a development, as required by current grading codes. In addition, a permanent erosion control program should be implemented for new developments. This program should include proper care of drainage control devices, proper irrigation, and rodent control. Erosion control devices should be field-checked following periods of heavy rainfall to assure they are performing as designed and have not become blocked by debris.

3.5 Summary of Issues

The City of Newport Beach is highly diverse geologically. The central and northern parts of the City are situated on an elevated, relatively flat-topped mesa underlain by sands and gravel deposited on a prehistoric marine terrace. In contrast, the southern part of the City encompasses sedimentary bedrock now exposed in the steep slopes and narrow canyons of the San Joaquin Hills. During the latest period of glaciation and low sea levels, Upper Newport Bay was carved through the mesa by the collective downcutting of San Diego Creek and other streams emanating from the foothills to the northeast, while the Santa Ana River eroded the bluffs along the western edge of the mesa. As the sea level rose to its current level, the streams and rivers deposited their sediments, filling the Upper Newport Bay channel and forming beaches, dunes, sandbars and mudflats along the coast.

The diversity of the area is strongly related to tectonic movement along the San Andreas fault and its broad zone of subsidiary faults. This, along with sea level fluctuations related to changes in climate, has resulted in a landscape that is also diverse in geologic hazards. Of these hazards, slope instability poses one of the greatest concerns, especially along coastal bluffs and in the steep-sided canyons of the San Joaquin Hills. Although relatively stable in historic times, bluffs along the beaches and bays are susceptible to erosion, heavy precipitation, and more recently, the adverse effects of increased runoff and irrigation from development. The history of instability in the natural slopes of the San Joaquin Hills is recorded in the abundant landslides that have occurred in nearly every bedrock formation. In addition, smaller slides, slumps, and mudflow deposits are common throughout the hills, particularly during winters of heavy and prolonged rainfall. As large new residential communities encroach deeper into the hills, slope instability is a major focus of geotechnical investigations, and remedial grading can involve moving thousands of cubic yards of earth.

Compressible soils underlie a significant part of the City, typically in the lowland areas and in canyon bottoms. These are generally young sediments of low density with variable amounts of organic materials. Under the added weight of fill embankments or buildings, these sediments will settle, causing distress to improvements. Low-density soils, if sandy in composition and saturated with water, will also be susceptible of the effects of liquefaction during a moderate to strong earthquake (see Chapter 2).

Some of the geologic units in the Newport Beach area, including both surficial soils and bedrock, have fine-grained components that are moderate to highly expansive. These materials may be present at the surface or exposed by grading activities. Man-made fills can also be expansive, depending on the soils used to construct them.

Losses resulting from geologic hazards are generally not covered by insurance policies, causing additional hardship on property owners. The potential for damage can be greatly reduced by:

- Strict adherence to grading ordinances – many of which have been developed as a result of past disasters;
- Sound project design that avoids severely hazardous areas;
- Detailed, site-specific geotechnical investigations followed by geotechnical oversight during grading and during construction of foundations and underground infrastructures;
- Effective agency review of projects; and
- Public education that focuses on reducing losses from geologic hazards, including the importance of proper irrigation practices, and the care and maintenance of slopes and drainage devices.

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CHAPTER 4: FLOODING HAZARDS

Floods are natural and recurring events that only become hazardous when man encroaches onto floodplains, modifying the landscape and building structures in the areas meant to convey excess water during floods. Unfortunately, floodplains have been alluring to populations for millennia, since they provide level ground and fertile soils suitable for agriculture, and access to water supplies and transportation routes. Notwithstanding, these benefits come with a price – flooding is one of the most destructive natural hazards in the world, responsible for more deaths per year than any other geologic hazard. Furthermore, average annual flood losses (in dollars) have increased steadily over the last decades as development in floodplains has increased.

The City of Newport Beach and surrounding areas are, like most of southern California, subject to unpredictable seasonal rainfall. Most years, the scant winter rains are barely sufficient to turn the hills green for a few weeks, but every few years the region is subjected to periods of intense and sustained precipitation that result in flooding. Flood events that occurred in 1862, 1884, 1916, 1938, 1969, 1978, 1980, 1983, 1988, 1992, 1995, and 1998 have caused an increased awareness of the potential for public and private losses as a result of this hazard, particularly in highly urbanized parts of floodplains and alluvial fans. As the population in the area increases, there is an increased pressure to build on flood-prone areas, and in areas upstream of already developed areas. With increased development also comes an increase in impervious surfaces, such as asphalt. Water that used to be absorbed into the ground becomes runoff to downstream areas. If the storm drain systems are not designed or improved to convey these increased flows, areas that may have not flooded in the past may be subject to flooding in the future. This is especially true for developments at the base of the mountains and downstream from canyons that have the potential to convey mudflows.

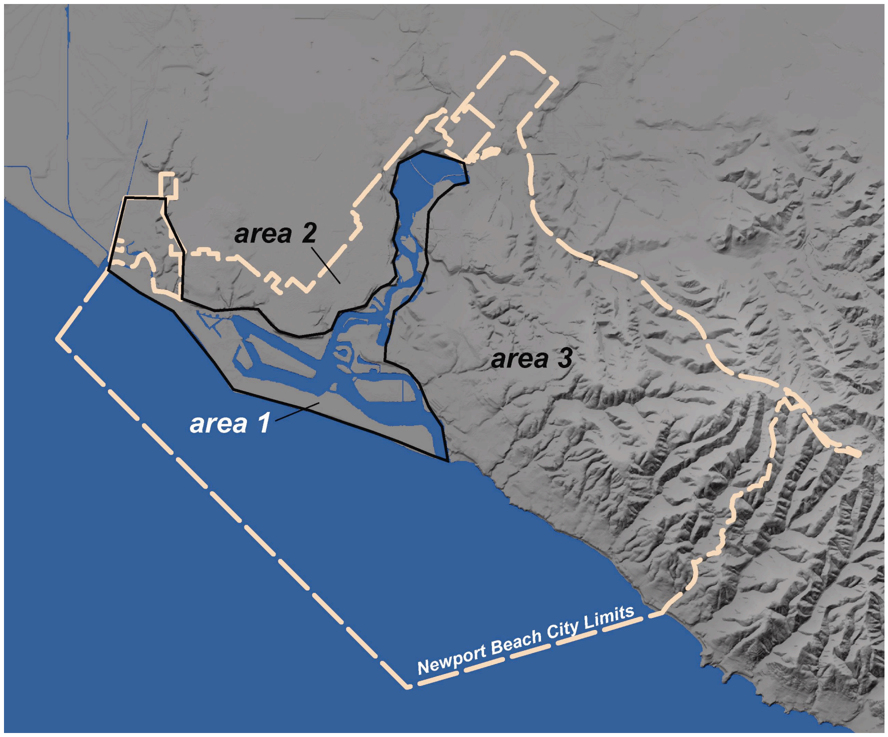
4.1 Storm Flooding

4.1.1 Hydrologic Setting

The City of Newport Beach can be divided into three geographic areas: 1) a low elevation area comprised of West Newport, Balboa Peninsula, and Newport Bay, 2) elevated marine terrace areas that include Newport Heights and Westcliff, and 3) high relief terrain of the San Joaquin Hills in the eastern portion of the City (these geographic areas are shown on Figure 4-1). The low elevation and terrace areas are generally drained by urbanized and relatively low relief streams that empty into Newport Bay. In contrast, rugged natural streams with steeper gradients drain the Newport Ridge and Newport Coast areas. For a map showing the landforms of Newport Beach, refer to Plate 4-1.

San Diego Creek is the main tributary to Newport Bay (see Figure 4-2). Its headwaters lie about a mile east of the I-5 — I-405 intersection, at an elevation of about 500 feet. The creek flows westerly from its headwaters and empties into Newport Bay one 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.

Figure 4-1: Shaded Relief Map Showing General Drainage Areas Within the City of Newport Beach

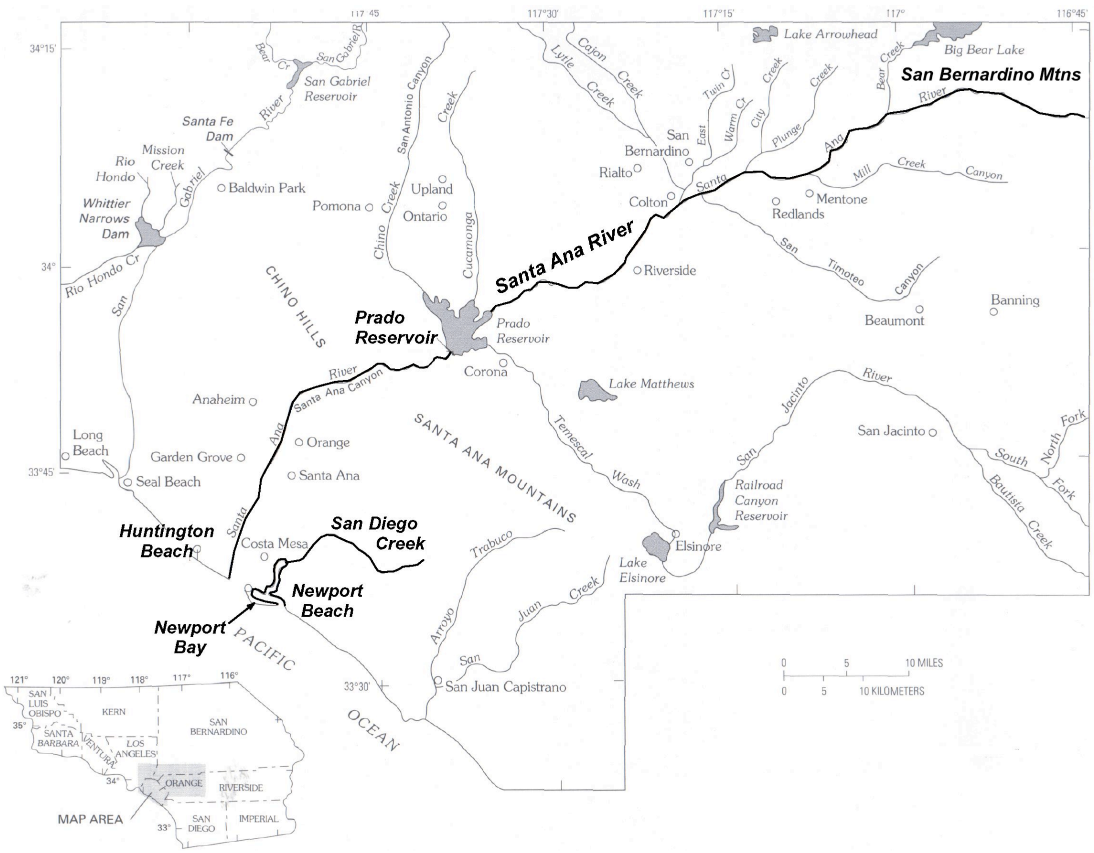


The largest coastal river in southern California, the Santa Ana River, empties into the Pacific Ocean near West Newport and forms the boundary between the cities of Huntington Beach and Newport Beach. It originates high in the San Bernardino Mountains and drains an area of about 2,470 square miles (Chin et al., 1991). Near the town of Corona, the Santa Ana River flows into Prado Reservoir (Figure 4-2).

Below Prado Dam, the river flows through Santa Ana Canyon, past highly urbanized cities in Orange County, and empties into the Pacific Ocean. Presently, 16.6 miles of the Santa Ana River, from its mouth to the city of Orange, are channelized for flood protection purposes. Prior to the extensive urbanization of Orange County (in ~1950s), the Santa Ana River was actively building a large alluvial fan with its apex located at the mouth of Santa Ana Canyon around the city of Anaheim. However, channelization of the river has restricted any further alluvial deposition as the alluvial sediment is now confined to a narrow corridor.

In addition to the Santa Ana River and San Diego Creek, the streams draining the San Joaquin Hills can also cause flooding potentially damaging to the City of Newport Beach. For example, flood hazards identified in Bonita Canyon, Big Canyon, Buck Gully, and Morning Canyon may impact new residential development along these streams (these streams are shown on Plate 4-1). Furthermore, a flood potential exists on smaller streams such as those draining Los Trancos Canyon and Muddy Canyon, albeit at a more localized scale. Flooding here is most likely restricted to the narrow floodplains along the channel margins.

Figure 4-2: Map Showing the Course of the Santa Ana River and Location of Newport Beach, Huntington Beach, Prado Dam, and the San Bernardino Mountains



(Figure adapted from Chin et al., 1991)

4.1.2 Meteorological Setting

Average yearly precipitation in the Newport Beach area is about 12 inches (see Table 4-1), whereas 14 inches of precipitation fall annually in Santa Ana (Table 4-2). These tables show that areas closer to the coast receive a little less precipitation, on average, than inland areas.

Table 4-1: Average Annual Rainfall by Month for the Newport Beach Harbor Area

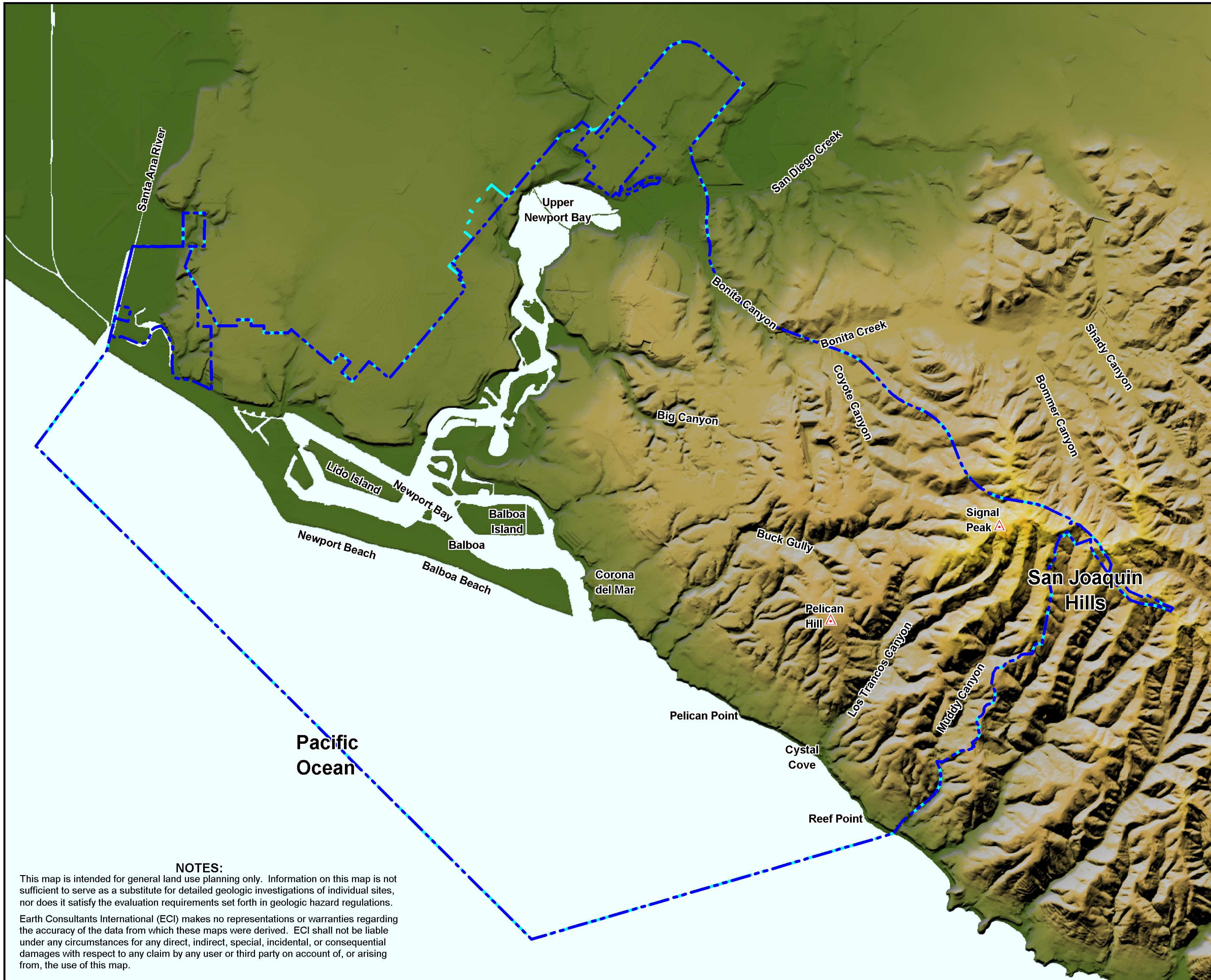
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Inches	2.5	2.4	1.9	1.1	0.2	0.1	0.0	0.1	0.3	0.3	1.2	2.0	**11.9**

Data based on 59 complete years between 1931 and 1995.

Table 4-2: Average Annual Rainfall by Month for the Santa Ana Area

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Inches	3.0	2.9	2.4	1.1	0.2	0.1	0.0	0.1	0.2	0.4	1.4	2.4	**14.1**

Data based on 64 complete years between 1931 and 1995.
Source: http://www.worldclimate.com/



NOTES:
This map is intended for general land use planning only. Information on this map is not sufficient to serve as a substitute for detailed geologic investigations of individual sites, nor does it satisfy the evaluation requirements set forth in geologic hazard regulations.

Earth Consultants International (ECI) makes no representations or warranties regarding the accuracy of the data from which these maps were derived. ECI shall not be liable under any circumstances for any direct, indirect, special, incidental, or consequential damages with respect to any claim by any user or third party on account of, or arising from, the use of this map.

Geomorphic Map

Newport Beach, California

EXPLANATION

0 250.0 500.0 750.0 1000.0

Elevation (m)

Newport Beach City Boundary

Sphere of Influence

Scale: 1:60,000

0.5 0 0.5 1 1.5 Miles

1 0 1 2 3 Kilometers

Source: US Geological Suvery 10 m Digital Elevation Model (DEM)

Earth Consultants International

Project Number: 2112
Date: July, 2003

Plate 4-1

Not only does rainfall vary from one location to the next, often within short distances, but rainfall in southern California is extremely variable from year to year, ranging from one-third the normal amount to more than double the normal amount. Data reviewed for this study also suggest that southern California has experienced more wet years in the last 20 to 30 years than in the 50 years prior.

There are three types of storms that produce precipitation in southern California: winter storms, local thunderstorms, and summer tropical storms. These are described below.

Winter storms are characterized by heavy and sometimes prolonged precipitation over a large area. These storms usually occur between November and April, and are responsible for most of the precipitation recorded in southern California. This is illustrated by the data on Tables 4-1 and 4-2. The storms originate over the Pacific Ocean and move eastward (and inland). The mountains, such as the Santa Ana, San Gabriel and San Bernardino Mountains, form a rain shadow, slowing down or stopping the eastward movement of this moisture. A significant portion of the moisture is dropped on the San Gabriel and San Bernardino Mountains as snow. If large storms are coupled with snowmelt from these mountains, large peak discharges can be expected in the main watersheds at the base of the mountains. Some of the severe winter storm seasons that have historically impacted the southern California area have been related to El Niño events.

El Niño is the name given to a phenomenon that starts every few years, typically in December or early January, in the southern Pacific, off the western coast of South America, but whose impacts are felt worldwide. Briefly, warmer than usual waters in the southern Pacific are statistically linked with increased rainfall in both the southeastern and southwestern United States, droughts in Australia, western Africa and Indonesia, reduced number of hurricanes in the Atlantic Ocean, and increased number of hurricanes in the Eastern Pacific. Two of the largest and most intense El Niño events on record occurred during the 1982-83 and 1997-98 water years. [A water year is the 12-month period from October 1 through September 30 of the second year. Often a water year is identified only by the calendar year in which it ends, rather than by giving the two years, as above.] These are also two of the worst storm seasons reported in southern California.

Local thunderstorms can occur at any time, but usually cover relatively small areas. These storms are usually prevalent in the higher mountains during the summer (FEMA, 1986). Tropical rains are infrequent, and typically occur in the summer or early fall. These storms originate in the warm, southern waters off Baja California, in the Pacific Ocean, and move northward into southern California.

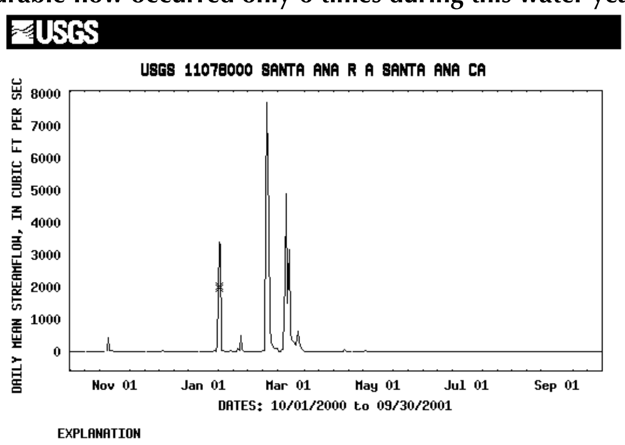
4.1.3 Stream Flow: Daily Mean and Past Floods

4.1.3.1 Daily Mean Flow

In coastal Orange County, including the Newport Beach area, flooding is difficult to predict, and thus plan for, because rainfall varies from year to year. The small streams in the Newport Beach area are typical of the majority of the streams in southern California. Streamflow is negligible other than during and immediately after rains because climate and basin characteristics are not conducive to continuous flow. Similarly, the Santa Ana River is dry most of the year, with small flows ranging from the 10s to 100s of cubic feet per second (cfs) occurring only a few times a year. Figure 4-3a shows the location of USGS stream gage 11078000 on the Santa Ana River where it flows through the City of Santa Ana. Figure 4-3b shows that measurable discharge at this gage location occurred only 6 times during the 2001 water year. More frequent flows would occur under natural conditions, however impoundment of the upper Santa Ana River at Prado dam for flood control purposes causes the current flow regime.

Figure 4-3a: Map Showing Location of the Santa Ana Gage on the Santa Ana River

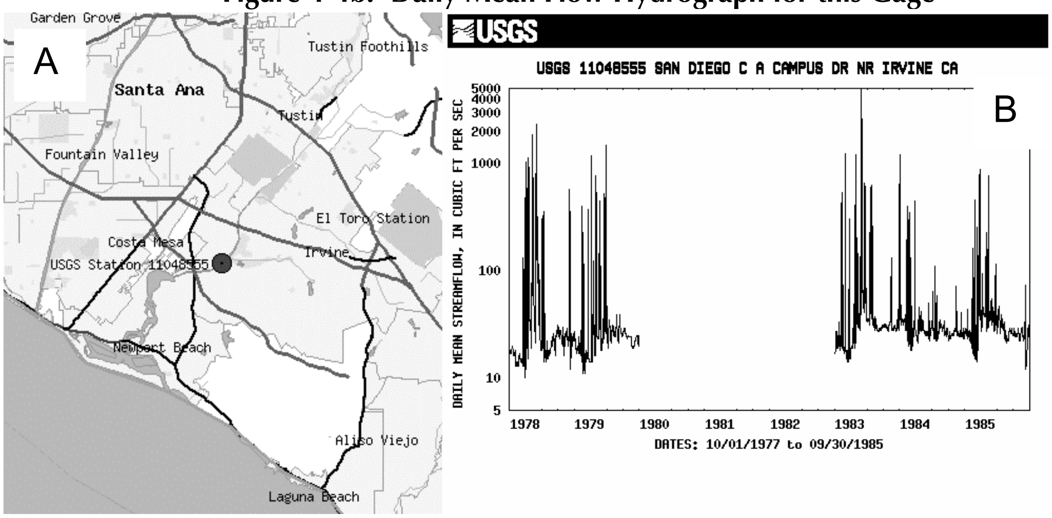
Figure 4-3b: Daily Mean Flow Hydrograph for the Santa Ana Gage for the 2001 Water Year (note that measurable flow occurred only 6 times during this water year)



Source: http://waterdata.usgs.gov

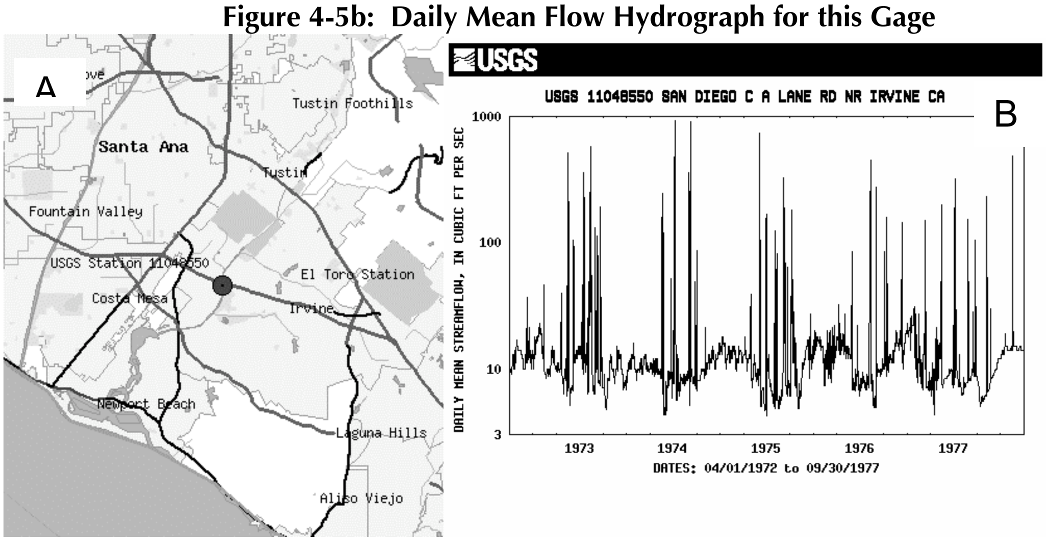
In contrast, San Diego Creek has more frequent moderate to large flows and maintains a regular base flow; a flow regime more typical of free-flowing streams. Mean daily flow data collected by stream gages maintained by the US Geological Survey (USGS) show that Lower San Diego Creek (near the University of California at Irvine campus) has maintained a baseflow of ~20 cfs from 1978-1980 and from 1983-1986 (Figure 4-4). At the Lane Road gage, the average baseflow is approximately 10 cfs for the period of record from 1972 to 1978 (Figure 4-5). A similar rate has been measured at the Culver Road gage (Figure 4-6). It should be noted that a significant portion of the base flow in Lower San Diego Creek could be the result of runoff from residential and commercial irrigation and effluent from storm drains, rather than from precipitation.

Figure 4-4a: Map Showing Location of the Campus Drive Gage
Figure 4-4b: Daily Mean Flow Hydrograph for this Gage



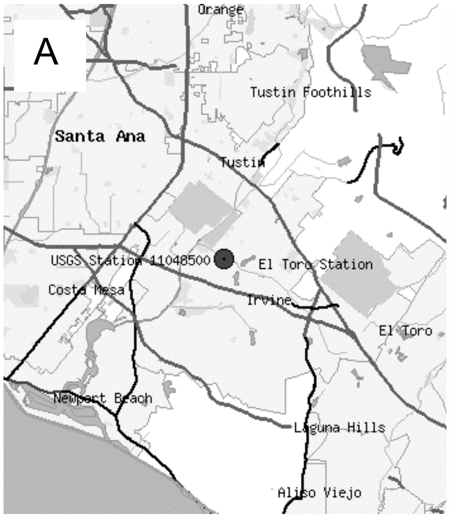
Source: http://waterdata.usgs.gov

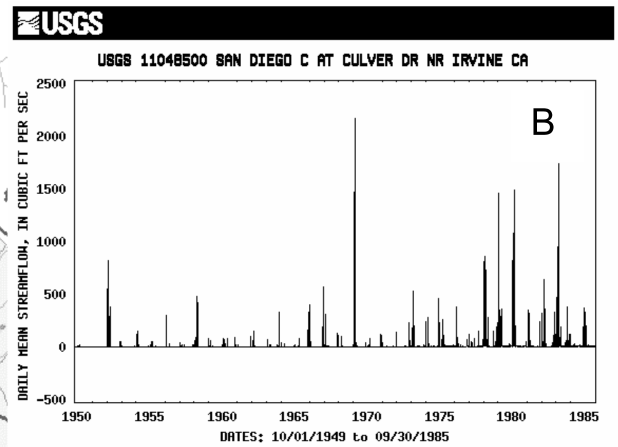
Figure 4-5a: Map Showing Location of the Lane Road Gage
Figure 4-5b: Daily Mean Flow Hydrograph for this Gage



Source: http://waterdata.usgs.gov

Figure 4-6a: Map Showing Location of the Culver Drive Gage
Figure 4-6b: Daily Mean Flow Hydrograph for this Gage





Source: http://waterdata.usgs.gov

4.1.3.2 Past Floods: Implications for Existing Flood Hazard

Flood hazards to the City of Newport Beach can be classified into two general categories: 1) flash flooding from small, natural channels and 2) more moderate and sustained flooding from the Santa Ana River and San Diego Creek.

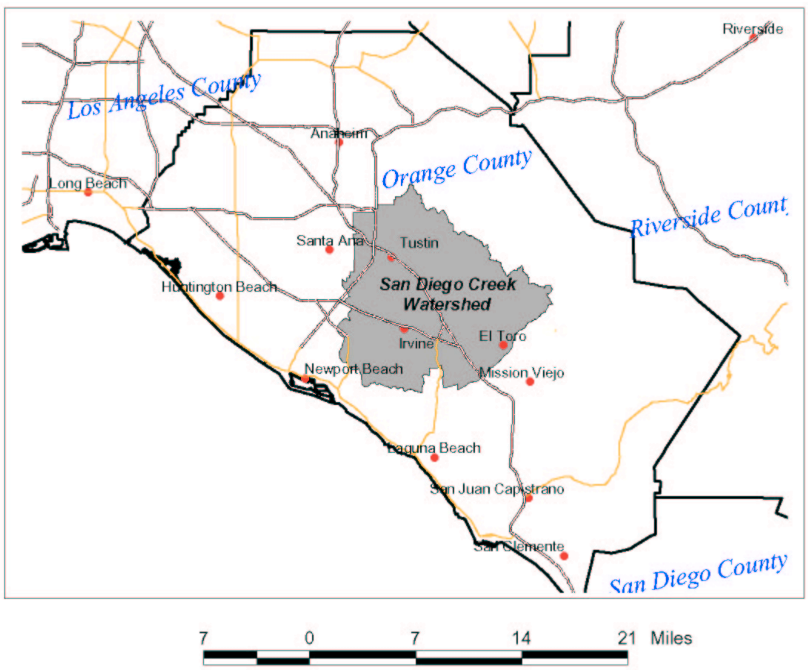
Flash floods are short in duration, but have high peak volumes and high velocities. This type of flooding occurs in response to the local geology and geography, and the built environment (human-made structures). The San Joaquin Hills in the eastern part of the City consist of sedimentary rock types that are fairly impervious to water so little precipitation infiltrates the ground; rainwater instead flows along the surface as runoff. When a major storm moves in, water collects rapidly and runs off quickly, making a steep, rapid descent from the hills into manmade and natural channels in the built environment and onto the marine terraces along the coast.

The major streams emanating from the San Joaquin Hills (Big Canyon, Coyote Canyon, Bonita Canyon, Buck Gully, Morning Canyon, Los Trancos Canyon, and Muddy Canyon) do not have stream gages (Plate 4-1). Therefore, peak discharge data are not available for these drainages. Additionally, the areas around these canyons only recently became populated, so historic accounts of flooding are also unavailable. However, flooding on these streams likely occurs during major floods. For example, a flash flood in 1941 caused up to 6 feet of downcutting and undermined foundations in Laguna Canyon, approximately 3 miles southeast of Newport Beach (OCFCD photos in Storm Water Runoff, Photos from: 1916, 1927, 1934, 1938, 1940, & 1941). Although Laguna Canyon has a larger drainage area, channels in eastern Newport Beach probably experienced similar flooding in 1941 since both basins have similar characteristics and the storm intensity was comparable in both areas given their proximity.

- **San Diego Creek**

  Flooding on San Diego Creek has historically caused significant damage in Newport Beach because it is the biggest stream, with a drainage area of 118 square miles, to flow through the City (Figure 4-7). Channelization of San Diego Creek also resulted in increased sediment flow into Upper Newport Bay, requiring extensive dredging projects to restore the ecosystem. As shown previously, the USGS maintained three stream gages along San Diego Creek. One of these, gage 111048500 on Culver Drive, was operated continuously from 10/01/1949 to 09/30/1985 (its location is shown on Figure 4-6a). These data provide a relatively long-term record of mean daily discharge and peak flows that can be used to describe the flooding history and future flooding potential of the Newport Beach area.

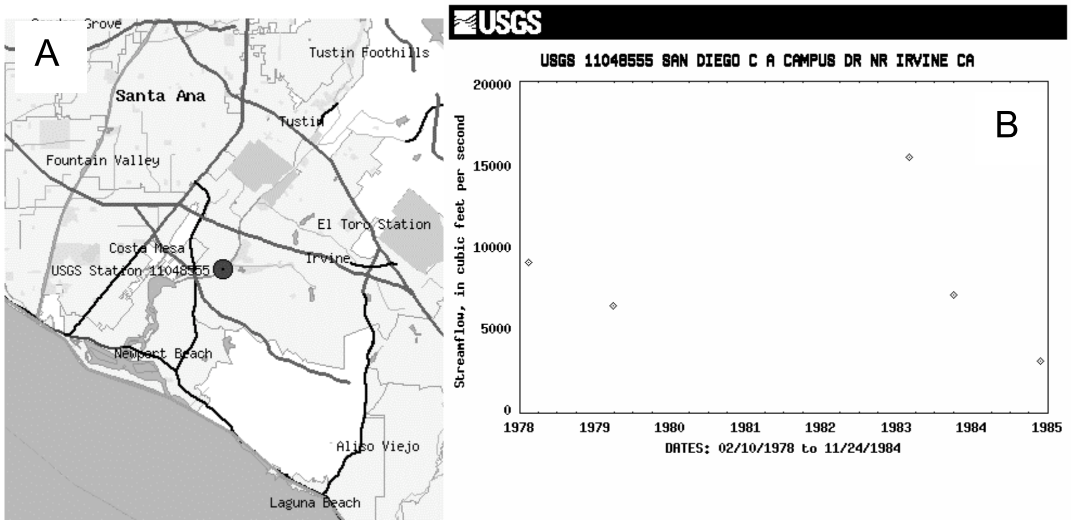
Figure 4-7: Location Map Showing the San Diego Creek Watershed



The largest flood measured during the 36-year period of record occurred in 1983, when the Campus Drive gage measured a peak discharge of more than 15,000 cfs (Figure 4-8). A peak discharge of approximately 10,000 cfs was recorded 5 miles upstream at the Culver Drive gage during the same flood event (Figure 4-9). The next highest peak flows measured in the area date from 1980 (see Figure 4-9b).

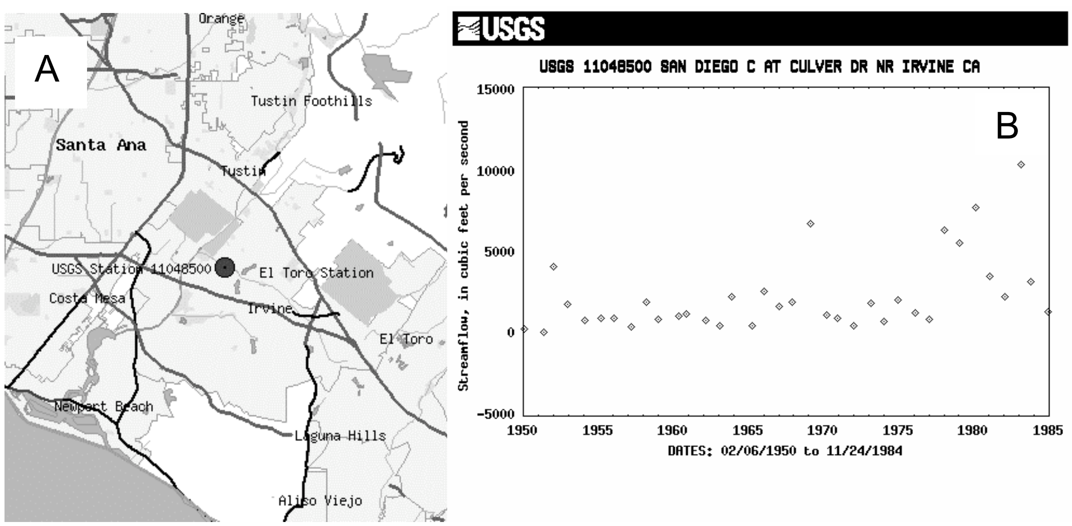
During the floods of February 24th, 1969 Orange County received more than 6 inches of rain (Orange County Register 1/13/95). The gage on San Diego Creek at Culver Drive, measured a peak flow of about 6,700 cfs (Figure 4-9b). Flooding in 1969 washed out MacArthur Boulevard when the existing storm drain at Jamboree Road was overwhelmed. High water also caused damage to Barranca Parkway near its intersection with Culver Road (Figure 4-10). Other roads and agricultural fields were also damaged by this event (Figure 4-11).

Figure 4-8a: Map Showing Location of the Campus Drive Gage
Figure 4-8b: Hydrograph Showing Peak Discharges at this Gage
(for the periods 1978-1979 and 1983-1985)



Source: http://waterdata.usgs.gov

Figure 4-9a: Map Showing Location of Culver Drive Gage
Figure 4-9b: Hydrograph Showing Peak Discharges at this Gage
(for the period 1950-1985)

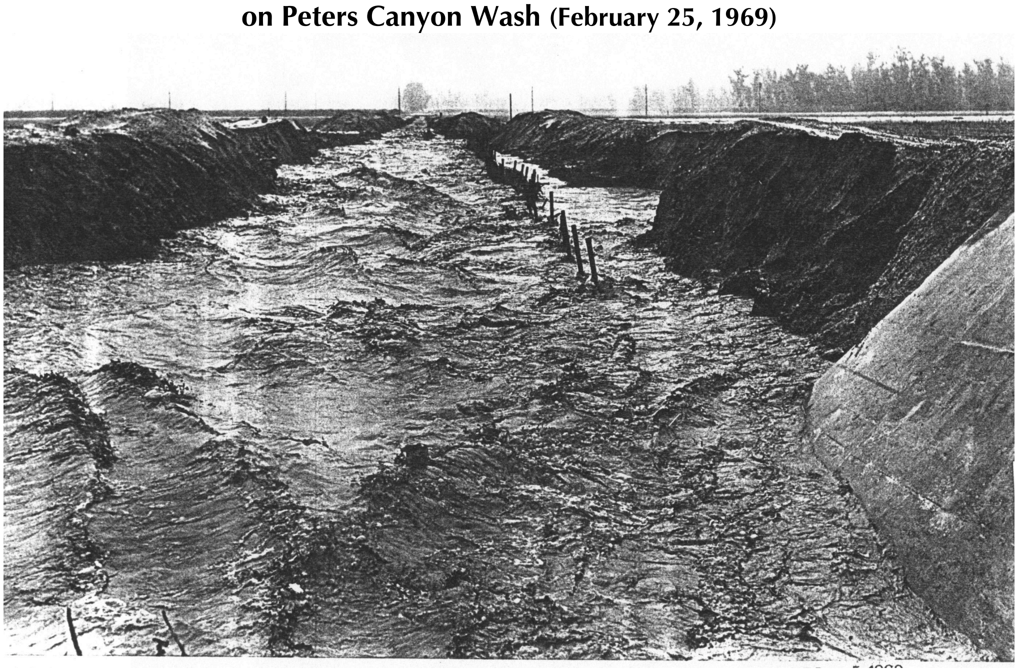


Source: http://waterdata.usgs.gov

Figure 4-10: Photograph Looking Upstream (northeast) at San Diego Creek at its Confluence with Barranca Parkway on February 25th, 1969

(Photograph used with permission from the
Orange County Flood Control District's Library)

Figure 4-11: Photograph Looking Downstream at Flooding on Peters Canyon Wash (February 25, 1969)



(Photograph used with permission from the
Orange County Flood Control District's Library)

- **Santa Ana River**

  The Santa Ana River is the largest drainage in southern California. The river has flooded historically many times, and the course of the river has changed, at times significantly, in response to these flooding events. For example, the river currently outlets into the Pacific Ocean near West Newport; however, between 1769, when the Spanish first arrived in southern California, and 1825, the Santa Ana River flowed out to sea through Alamitos Bay, near the present-day boundary between Los Angeles and Orange counties. In 1825, when severe storms caused extensive flooding in the area, the river resumed its ancient course through the Santa Ana Gap and around the toe of Newport Mesa to the ocean. Several other storms impacted the southern California area between 1770 and 1825 (in 1770, 1780, 1815, 1821, and 1822), but there are no records of flooding specific to the Santa Ana River.

  The largest documented flood in the Santa Ana River valley occurred in the winter of 1861-1862 when it rained nearly continuously for a month. Based on an account by Crafts (1906, as reported in Troxell et al., 1942), "the fall of 1861 was sunny, dry and warm until Christmas, which proved to be a rainy day. All through the holidays there continued what we would call a nice, pleasant rain, as it often rains in this section for days at a time. This . . . lasted until the 18^{th} of January, 1862, when there was a downpour for 24 hours or longer." This intense downpour destroyed settlements along the Santa Ana River from San Bernardino County to present day Santa Ana and created an inland sea, up to 4 feet deep in coastal Orange County. The river mouth swept as far to the southeast as the rock bluffs that today form the east side of the Newport Bay channel entrance. The peak discharge as a result of this storm was estimated at 320,000 cfs (City of Huntington Beach, 1974).

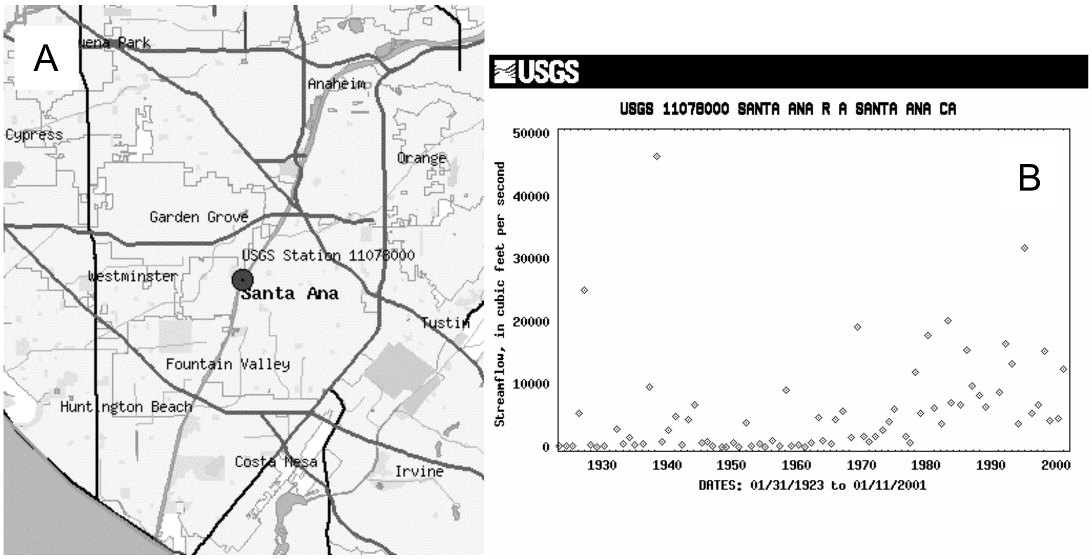
  In 1867-1868, the area again experienced sustained precipitation, but of less intensity than that in 1862; therefore there was less damage. Then, in 1884, there were two floods. The first storm occurred in the latter part of February, saturating the ground. The second storm, which came six to eight days later, caused extensive damage. The Santa Ana River cut a new channel to the sea starting from near its confluence with Santiago Creek, cutting through farmlands east of the old channel, and discharging into the ocean about 3 miles southeast of its previous outlet. As much as 40 inches of rain were recorded in the area for that season (Troxell et al., 1942). Floods were also reported in the Los Angeles area in 1886, 1889, 1891, and in 1909. The 1909 floods caused significant damage in the upper reaches of the Santa Ana River, in San Bernardino and Riverside counties.

  Until 1919, the river's outlet to the sea continued to migrate back and forth from the rock bluffs in Newport Bay (U.S. Corps of Engineers, 1993) to a point near the present day intersection of Beach Boulevard and Pacific Coast Highway in Huntington Beach. In 1919, a year after a local flood, local interests built a dam at Bitter Point (which appears to have been located 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.

  The most destructive flood in Orange County occurred in 1938. Intense storms brought heavy rainfall to Orange County and Newport Harbor. In the Santa Ana River drainage, the 1938 storms caused 34 deaths (nearly 100 deaths were reported throughout California), 1,159,000 acres of flooded land, more than 2,000 people homeless, and more than $14 million in damages (Feton, 1988; Troxell et al., 1942). Peak discharge in Santa Ana

Canyon was estimated at 100,000 cfs. By the time floodwaters reached the city of Santa Ana, the discharge had attenuated to ~46,000 cfs (Figure 4-12), which was still enough for the floodwaters to overtop the earthen levees and flood much of Huntington Beach and Newport Beach (Figure 4-13).

Figure 4-12: Location and peak discharge hydrograph for the Santa Ana gage



Source: http://waterdata.usgs.gov

The damage caused by the 1938 flood reinforced the need for an upstream flood control facility. Prado Dam was constructed near Corona in 1941 to greatly reduce the flooding hazard in coastal Orange County. Operation of the dam during large rain events has effectively limited flow in the lower Santa Ana River channel. In 1969, when the second largest storm of the 20th century swept through southern California, Prado Dam was used to manage the flow into the lower reaches of the river: During this event 77,000 cfs flowed into Prado Dam, but only 6,000 cfs were released downstream (City of Huntington Beach, 1974). When flow from downstream tributaries (e.g., Santiago Creek) was added to the dam release, discharge measured at the gage in Santa Ana was limited to 20,000 cfs (Figure 4-12). This is a significant decrease compared to ~46,000 cfs recorded at the same gage during the 1938 flood.

In January and February 1980, California and Arizona were struck by several storm systems that brought much higher than normal precipitation to these areas. Between February 12 and February 20, the Prado Dam Flood Control Reservoir filled with approximately 100 acre-feet of water; between February 17 and February 26, daily mean discharges of more than 4,400 cfs were being measured at the Santa Ana gage. These continuous high discharges scoured that portion of the riverbed between 17th Street and Harbor Avenue to depths of up to 20 feet, and undercut segments of the concrete lining along the banks (Chin et al., 1991). Six major bridges and numerous smaller bridges were impacted by severe scour. Extensive scour of the piles supporting the Fifth Street bridge necessitated closure of this bridge for nearly a year while repairs were made (see Figure 4-14). Even higher peak discharges were recorded at the Santa Ana gage during the winters of 1983 and 1995 (see Figure 4-12).

Figure 4-13. Oblique Aerial Photograph Looking West at the Mouth of the Santa Ana River During the 1938 Flood

(Note the breaks in the levees at Verano Street and Adams Street and the inundation of West Newport and most of Huntington Beach.)

MOUTH OF SANTA ANA RIVER, MARCH 3, 1938.
Figures along channel represent distance in miles from Pacific Ocean. Courtesy of Fairchild Aerial Surveys, Inc.

(Photograph from Troxell et al., 1942)

4.1.4 National Flood Insurance Program

The Federal Emergency Management Agency (FEMA) is mandated by the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973 to evaluate flood hazards. To promote sound land use and floodplain development, FEMA provides Flood Insurance Rate Maps (FIRMs) for local and regional planners. Flood risk information presented on FIRMs is based on historic, meteorological, hydrologic, and hydraulic data, as well as topographic surveys, open-space conditions, flood control works, and existing development. Rainfall-runoff and hydraulic models are utilized by the FIRM program to analyze flood potential, adequacy of flood protective measures, surface-water and groundwater interchange characteristics, and the variable efficiency of mobile (sand bed) flood channels. It is important to realize that FIRMs only identify potential flood areas based on the conditions at the time of the study, and do not consider the impacts of future development.

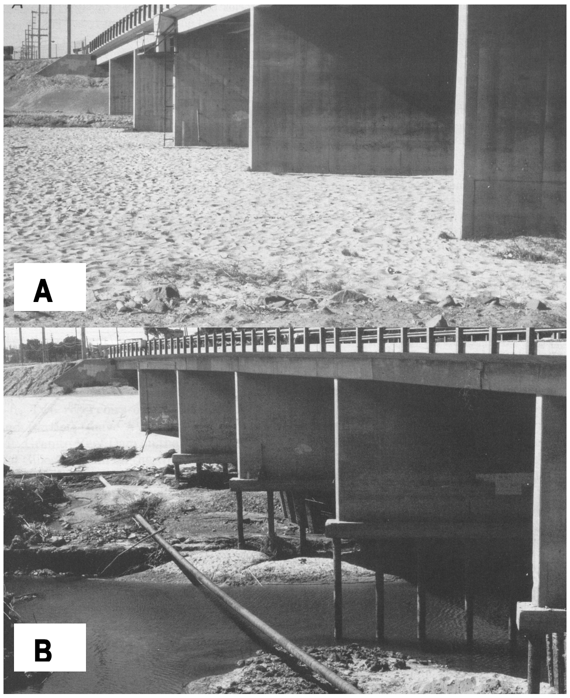


Figure 4-14: The Santa Ana River at the 5th Street Bridge in Santa Ana, showing the riverbed prior to the 1980 floods (A), and the channel after the 1980 floods (B). The channel was scoured 18 to 20 feet deep, exposing the piles supporting the bridge. The bridge was closed for almost a year for repairs. (From Chin et al., 1991).

To prepare FIRMs that illustrate the extent of flood hazards in a flood-prone community, FEMA conducts engineering studies referred to as Flood Insurance Studies (FISs). Using information gathered in these studies, FEMA engineers and cartographers delineate Special Flood Hazard Areas (SFHAs) on FIRMs. SFHAs are those areas subject to inundation by a "**base flood**" which FEMA sets as a 100-year flood. A **100-year flood** is defined by looking at the long-term average period between floods of a certain size, and identifying the size of flood that has a 1 percent chance of occurring during any given year. This base flood has a 26 percent chance of occurring during a 30-year period, the length of most home mortgages. However, a recurrence interval such as "100 years" represents only the long-term average period between floods of a specific magnitude; rare floods can in fact occur at much shorter intervals or even within the same year.

The base flood is a regulatory standard used by the National Flood Insurance Program (NFIP) as the basis for insurance requirements nationwide. The Flood Disaster Protection Act requires owners of all structures in identified SFHAs to purchase and maintain flood insurance as a condition of receiving Federal or federally related financial assistance, such as mortgage loans from federally insured lending institutions.

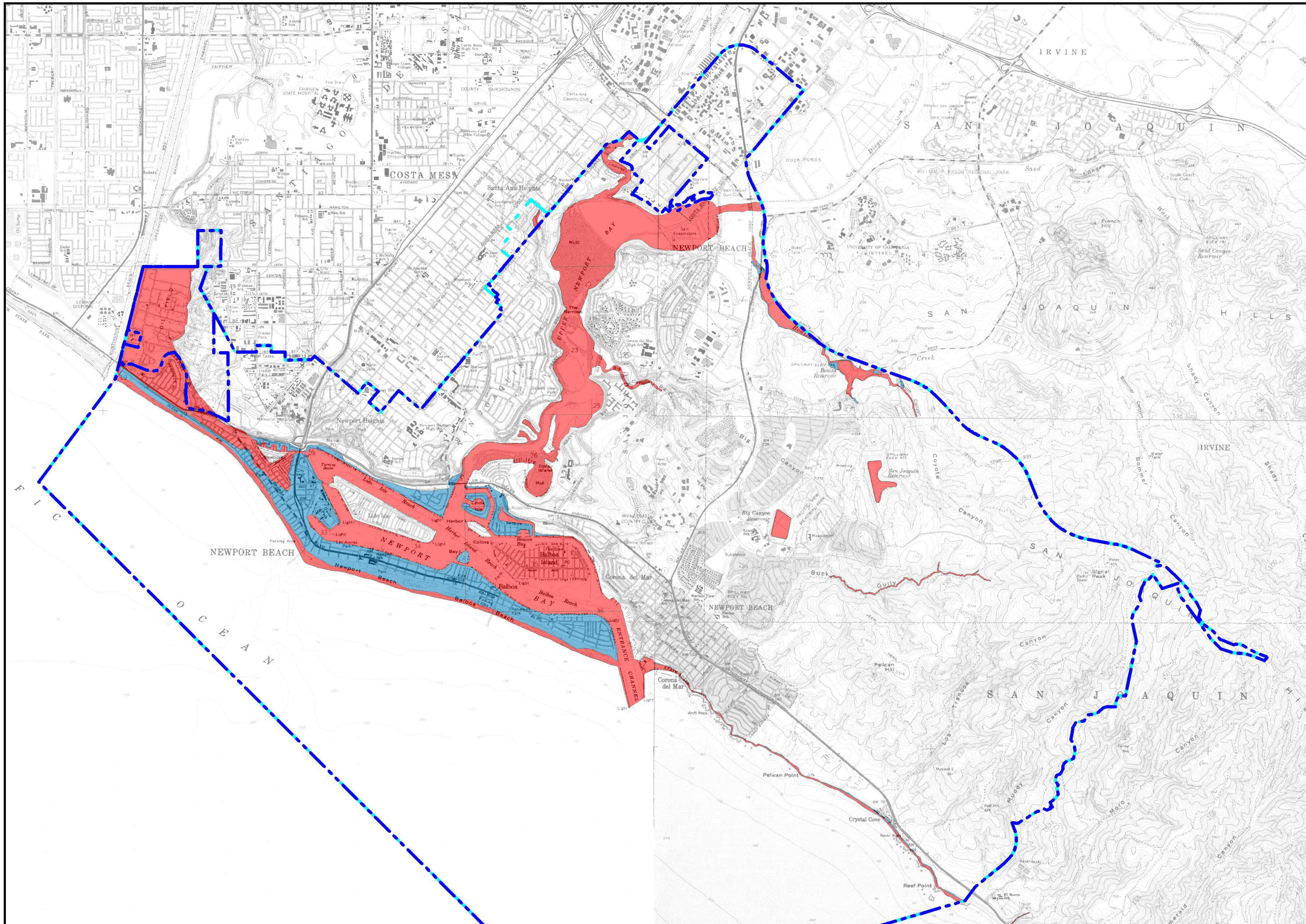
The base flood is also used by Federal agencies, as well as most county and State agencies to administer floodplain management programs. The goals of floodplain management are to reduce losses caused by floods while protecting the natural resources and functions of the floodplain. The basis of floodplain management is the concept of the "**floodway**". FEMA defines this as the channel of a river or other watercourse, and the adjacent land areas that must be kept free of encroachment in order to discharge the base flood without cumulatively increasing the water surface elevation more than a certain height. The intention is not to preclude development, but to assist communities in managing sound development in areas of potential flooding. The community is responsible for prohibiting encroachments into the floodway unless it is demonstrated by detailed hydrologic and hydraulic analyses that the proposed development will not increase the flood levels downstream.

The NFIP is required to offer federally subsidized flood insurance to property owners in those communities that adopt and enforce floodplain management ordinances that meet minimum criteria established by FEMA. The National Flood Insurance Reform Act of 1994 further strengthened the NFIP by providing a grant program for State and community flood mitigation projects. The act also established the Community Rating System (CRS), a system for crediting communities that implement measures to protect the natural and beneficial functions of their floodplains, as well as managing the erosion hazard. *The City of Newport Beach has participated as a regular member in the NFIP since September 1, 1978 (City ID No. – 060227). The City's most current effective FIRM map dates from January 3, 1997.* Since the City is a participating member of the NFIP, flood insurance is available to any property owner in the City. In fact, to get secured financing to buy, build, or improve structures in SFHAs, property owners are required to purchase flood insurance. Lending institutions that are federally regulated or federally insured must determine if the structure is located in a SFHA and must provide written notice requiring flood insurance. FEMA recommends that all property owners purchase and keep flood insurance. Keep in mind that approximately 25 percent of all flood claims occur in low to moderate risk areas. Flooding can be caused by heavy rains, inadequate drainage systems, failed protective devices such as levees, as well as by tropical storms and hurricanes (see Chapter 1).

4.1.5 Flood Zone Mapping

As mentioned above, the City of Newport Beach has participated in the National Flood Insurance Program since 1978. The extent of flooding on the Santa Ana River, San Diego Creek, and a few smaller streams within Newport Beach has been analyzed through Flood Insurance Studies. The potential flood zones in the City mapped by FEMA are presented in Flood Insurance Rate Maps (FIRMs). Plate 4-2 shows the FIRM inundation limits for both the 100-year (in red) and 500-year (in blue) flood events.

The 100-year Santa Ana River flood is anticipated to inundate the area from Beach Boulevard in Huntington Beach, to Fairview Park Bluffs in Costa Mesa and West Newport (Plate 4-2). Much of West Newport, from the Santa Ana River confluence to near City Hall will be flooded. The entire coastline will also be flooded. Only a narrow strip along Ocean Avenue will remain above water. The 100-year flood will be contained within the channel of San Diego Creek (Plate 4-2). However, floodwaters will overtop the channel banks in Bonita Canyon, on the Santa Ana Delhi Channel, and in the lower reaches of Big Canyon. Flooding will also occur along Buck Gully and within Buck Canyon, San Joaquin, and Bonita Reservoirs. Balboa Island will be underwater and property along the margins of Newport Bay will also be inundated. The 500-year flood event will inundate Ocean Avenue and flood all of West Newport up to the foot of the coastal bluffs that parallel Pacific Coast Highway.



NOTES:
This map is intended for general land use planning only. Information on this map is not sufficient to serve as a substitute for detailed geologic investigations of individual sites, nor does it satisfy the evaluation requirements set forth in geologic hazard regulations.

Earth Consultants International (ECI) makes no representations or warranties regarding the accuracy of the data from which these maps were derived. ECI shall not be liable under any circumstances for any direct, indirect, special, incidental, or consequential damages with respect to any claim by any user or third party on account of, or arising from, the use of this map.

Flood Zones Map

Newport Beach, California

EXPLANATION

- Special Flood Hazard Areas Inundated by 100-year flood.
- Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.
- Newport Beach City Boundary
- Sphere of Influence

Scale: 1:60,000

0.5 0 0.5 1 1.5 **Miles**

1 0 1 2 3 **Kilometers**

Base Map: USGS Topographic Map from Sure!MAPS RASTER

Source: Federal Emergency Management Agency, 1989a-f; 1997a-b.

Earth Consultants International

Project Number: 2112
Date: July, 2003

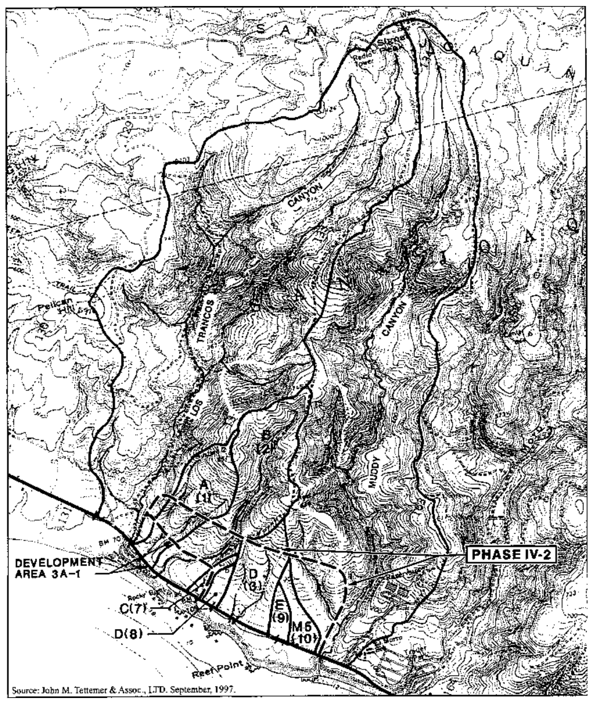
CITY OF NEWPORT BEACH CALIFORNIA

Plate 4-2

4.1.6 Detailed Hydrologic Studies: Drainage Impact at Pacific Coast Highway

Another source of flood information comes from detailed hydrologic studies that were performed as a requirement for Phase IV-2 of the Newport Coast Planned Community. The overall project was formerly called the Irvine Coast Planned Community before the land was annexed by the City of Newport Beach. This community encompasses much of the undeveloped land in the San Joaquin Hills, including the Muddy Canyon and Los Trancos Canyon watersheds (Figure 4-15).

Figure 4-15. Map showing Los Trancos Canyon and Muddy Canyon Watersheds and Location of Phase IV-2 of the Newport Coast Planned Community



(Figure from John M. Tettemer and Associates, 1998)

Los Trancos Canyon is one of two predominantly undeveloped watersheds in Newport Beach. The headwaters originate near Signal Peak (at an elevation of 1,150 feet above sea level) and drain an 1,180-acre watershed. Prior to development near the mouth of Los Trancos Canyon, The Keith Companies (1987; as reported in LSA, 1998) calculated a 100-year discharge of 1,952 cfs. After development, the modeled 100-year discharge increased to 2,377 cfs, most likely due to increased runoff associated with impervious surfaces (John M. Tettemer and Associates, 1998). However, the construction of detention basins should decrease the 100-year discharge to 1,683 cfs at Pacific Coast Highway. A single 9-foot by 10-foot arch culvert drains these flows beneath PCH. However, recent widening of PCH necessitated extending this culvert. The highway improvements result in decreased conveyance through the culvert and a higher ponded water surface upstream of PCH. This condition increases the potential for flooding at the PCH crossing.

Muddy Canyon is the other predominantly undeveloped watershed in Newport Beach. The Keith Companies (1987, as reported in LSA, 1998) calculated a pre-development 100-year discharge of 1,470 cfs for the 990-acre Muddy Canyon watershed. After development, the 100-year discharge increases to 1,908 cfs (Tettemer and Associates, 1998). However, like Los Trancos Canyon, detention projects will be constructed to reduce the post development 100-year discharge to only 1,008 cfs. A single 8-foot by 6-foot arch culvert drains floodwaters beneath PCH, but currently conveys less than the 100-year discharge. The post development 100-year water surface behind the culvert would be about 2 feet higher than the existing 100-year conditions. However, the culvert inlet will be modified so all of the 100-year discharge will be conveyed for the post development conditions.

4.1.7 Urban Street Flooding

Urban street flooding is rarely a problem in the City of Newport Beach (Auger, 2003 personal communication). However, when heavy rainfall coincides with high tides, the low-lying streets in Newport Beach can become inundated. For example, when tides reach ~6.5 feet and heavy rain is falling, the streets around the Marcus and Finley Tracts on Balboa Peninsula will flood. This condition also occurs along the lowest lying areas of Balboa Island.

The City of Newport Beach operates a total of 89 tide valves. These valves are usually closed to keep high tides from flooding the streets on Balboa Island and on the Peninsula. During rainstorms, urban runoff is in effect dammed by these tide valves. To mitigate this problem, the City pumps urban runoff ponded at the street ends into the ocean. This system has proven effective in minimizing the impacts of urban street flooding.

4.1.8 Bridge Scour

Scour at highway bridges involves sediment-transport and erosion processes that cause streambed material to be removed from the bridge vicinity (see Figure 4-14). Nationwide, several catastrophic collapses of highway and railroad bridges have occurred due to scouring and a subsequent loss of support of foundations. This has led to a nationwide inventory and evaluation of bridges (Richardson and others, 1993).

Scour processes are generally classified into separate components, including pier scour, abutment scour, and contraction scour. ***Pier scour*** occurs when flow impinges against the upstream side of the pier, forcing the flow in a downward direction and causing scour of the streambed adjacent to the pier. ***Abutment scour*** happens when flow impinges against the abutment, causing the flow to change direction and mix with adjacent main-channel flow, resulting in scouring forces near the abutment toe. ***Contraction scour*** occurs when flood-plain flow is forced back through a narrower opening at the bridge, where an increase in velocity can produce scour. ***Total scour*** for a particular site is the combined effects from all three components. Scour can occur within the main channel, on the flood plain, or both. While different materials scour at different rates, the ultimate scour attained for different materials is similar and depends mainly on the duration of peak streamflow acting on the material (Lagasse and others, 1991).

The State of California participates in the bridge scour inventory and evaluation program; however, to date, we have not found any records to indicate that the bridges in the

Newport Beach area have been evaluated. Therefore, we analyzed aerial photographs to identify and evaluate bridges that may be susceptible to scour during storm events. We used the following assumption for this evaluation: Bridges that cross channelized streams have a lower risk of scour because the concrete lining of the bed and banks resists undermining and erosion of bridge piers; although in intense floods, the concrete lining can still fail. The lower reaches of the Santa Ana River have been entirely channelized; therefore damage due to bridge scour is low, but not completely unlikely, as evidenced by the damage caused by the 1980 floods. In contrast, all other streams in Newport Beach have earthen or riprap-covered beds and banks, which allow for bed erosion and potential loss of bridge support.

The banks of San Diego Creek are comprised of earthen material with rock riprap sections near bridge crossings. The Jamboree, Highway 73, and MacArthur bridge crossings could be threatened by scour during flooding of San Diego Creek. Similarly, Bonita Canyon has an engineered channel comprised of earthen banks and riprap bridge protection. The bridges at MacArthur Boulevard and Bison Avenue could also be at risk during storm flow. There are no significant bridges crossing Big Canyon, Buck Gully, Los Trancos Canyon, or Muddy Canyon, therefore bridge scour is not a concern along these streams.

4.1.9 Existing Flood Protection Measures

During the past 70 years, private corporations, the Orange County Flood Control District (OCFCD), and the US Army Corps of Engineers have constructed several reservoirs in the San Joaquin Hills and Santa Ana Mountain foothills to minimize flood damage to downstream areas, such as Newport Beach. The US Army Corps of Engineers has also made channel alterations consisting primarily of concrete side-slopes and linings for the Santa Ana River. These flood control structures are presently owned and operated by the OCFCD, which has jurisdiction over the majority of watercourses in the Newport Beach area, as well as the regional flood control system in Orange County. All of these structures help regulate flow in the Santa Ana River, San Diego Creek, and smaller streams and hold back some of the flow during intense rainfall periods that could otherwise overwhelm the storm drain system in Newport Beach. As previously discussed, flood control measures on the Santa Ana River have effectively mitigated flood damage in recent years, although the area has not been subjected to storms comparable to those of either 1938 or 1969, so the system has not yet been truly tested.

4.1.10 Future Flood Protection

As developments, such as new phases of the Newport Coast Planned Community are considered, it is important that hydrologic studies be conducted to assess the impact that increased development may have on the existing development downgradient. These studies should quantify the effects of increased runoff and alterations to natural stream courses. Such constraints should be identified and analyzed in the earliest stages of planning. If any deficiencies are identified, the project proponent needs to prove that these can be mitigated to a satisfactory level prior to proceeding forward with the project, in accordance with the California Environmental Quality Act (CEQA) guidelines. Mitigation measures typically include flood control devices such as catch basins, storm drain pipelines, culverts, detention basins, desilting basins, velocity reducers, as well as debris basins for protection from mud and debris flows.

The methodology for analysis and design is set forth in several manuals published by the Orange County Public Facilities and Resources Department (OCPFRP). Future responsibilities for operation of regional flood control facilities will be with the OCPFRP, while the local storm drain network outside of the regional system will be with the City of Newport Beach. Therefore, both agencies must be involved in the planning and approval of mitigation measures, to assure compatibility.

Across the United States, substantial changes in the philosophy, methodology and mitigation of flood hazards are currently in the works. For example:

- Some researchers have questioned whether or not the current methodology for evaluating average flood recurrence intervals is still valid, since we are presently experiencing a different, warmer and wetter climate. Even small changes in climate can cause large changes in flood magnitude (Gosnold et al., 2000).
- Flood control in undeveloped areas should not occur at the expense of environmental degradation. Certain aspects of flooding are beneficial and are an important component of the natural processes that affect regions far from the particular area of interest. For instance, lining major channels with concrete reduces the area of recharge to the ground water, and depletes the supply of sand that ultimately would be carried to the sea to replenish our beaches. Thus there is a move to leave nature in charge of flood control. The advantages include lower cost, preservation of wildlife habitats and improved recreation potential.
- Floodway management design in land development projects can also include areas where stream courses are left natural or as developed open space, such as parks or golf courses. Where flood control structures are unavoidable, they are often designed with a softer appearance that blends in with the surrounding environment.
- Environmental legislation is increasingly coming in conflict with flood control programs. Under the authority of the Federal Clean Water Act and the Federal Endangered Species Act, development and maintenance of flood control facilities has been complicated by the regulatory activities of several Federal agencies including the U.S. Army Corps of Engineers, the Environmental Protection Agency, and the U.S. Fish and Wildlife Service. For instance, FEMA requires that Orange County and its incorporated cities maintain the carrying capacity of all flood control facilities and floodways. However, this requirement can conflict with mandates from the U.S. Fish and Wildlife Service regarding maintaining the habitat of endangered or threatened species. Furthermore, the permitting process required by the Federal agencies is lengthy, and can last several months to years. Yet, if the floodways are not permitted to be cleared of vegetation and other obstructing debris in a timely manner, future flooding of adjacent areas could develop. Zappe (1997) argues that reform of environmental laws is necessary to ease the burden on local governments, and ensure the health and safety of the public. In particular, Zappe calls for a categorical exemption from the Federal laws for routine maintenance and emergency repair of all existing flood control facilities.

4.1.11 Flood Protection Measures for Property Owners

Although the flood hazard in the City of Newport Beach has traditionally been limited to West Newport and narrow zones along stream corridors, areas in the San Joaquin Hills maybe increasingly susceptible to flooding as a result of both increased development, and possibly an increasingly wetter climate.

Property owners in these areas can make modifications to their houses to reduce the impact of flooding. FEMA has identified several flood protection measures that can be implemented by property owners to reduce flood damage. These include: installing waterproof veneers on the exterior walls of buildings; putting seals on all openings, including doors, to prevent the entry of water; raising electrical components above the anticipated water level improvements; and installing backflow valves that prevent sewage from backing up into the house through the drainpipes. Obviously, these changes vary in complexity and cost, and some need to be carried out only by a professional licensed contractor. For additional information and ideas, refer to the FEMA web page at www.fema.gov. Structural modifications require a permit from the City's Building Department. Refer to them for advice regarding whether or not flood protection measures would be appropriate for your property.

4.2 Seismically Induced Inundation

4.2.1 Dam Inundation

Seismically induced inundation refers to flooding that results when water retention structures, such as dams, fail due to an earthquake. Statutes governing dam safety are defined in Division 3 of the California State Water Code (California Department of Water Resources, 1986). These statutes empower the California Division of Dam Safety to monitor the structural safety of dams that are greater than 25 feet in dam height or have more than 50 acre-feet in storage capacity.

Dams under State jurisdiction are required to have inundation maps that show the potential flood limits in the remote, yet disastrous possibility a dam is catastrophically breached. Inundation maps are prepared by dam owners to help with contingency planning; these inundation maps in no way reflect the structural integrity or safety of the dam in question. Dam owners are also required to prepare and submit emergency response plans to the State Office of Emergency Services, the lead State agency for the State dam inundation-mapping program.

The City of Newport Beach is required by State law to have in place emergency procedures for the evacuation and control of populated areas within the limits of dam inundation. In addition, recent legislation requires real estate disclosure upon sale or transfer of properties in the inundation area (AB 1195 Chapter 65, June 9, 1998; Natural Hazard Disclosure Statement).

Three dams located in the Newport Beach area fall under State jurisdiction. From west to east they include Big Canyon Reservoir, Bonita Reservoir, and San Joaquin Reservoir (see Plate 4-3). These dams are owned by the City of Newport Beach, Irvine Ranch Water

District and the Irvine Water Company, respectively. They retain small reservoirs in the San Joaquin Hills.

Portions of Newport Beach are threatened by flooding from Prado Dam, Santiago Creek Reservoir, Villa Park Reservoir, San Joaquin Reservoir, Big Canyon Reservoir and Harbor View Reservoir. Bonita Reservoir also has the potential to cause localized flooding in the City, but inundation limits due to failure of this structure were not available. If Seven Oaks Dam fails, the flow reportedly will be contained by Prado Dam Reservoir, and is therefore not expected to impact the City of Newport Beach. Each of these reservoirs is described further below.

Prado Dam reservoir straddles the boundary between San Bernardino and Riverside counties and is located approximately 2 miles west of the City of Corona. This dam is an earth-filled, concrete capped structure that was completed in April 1941. The reservoir covers an area of 6,695 acres (www.spl.usace.army.mil/), and has a spillway capacity of 383,500 acre-feet (www.spl.usace.army.mil/resreg/htdocs/prdo.html). Summary information on this dam and its reservoir is provided in Table 4-3, and for a picture of the dam, see Figure 4-16. The flood inundation path, should the dam fail, is shown on Plate 4-3. If this dam failed catastrophically while full of water, the inundation area would impact much of Orange County including Newport Beach. Approximately 110,000 acres of residential, commercial, and agricultural land would be flooded. By the time floodwaters reached the ocean most areas from Long Beach to Newport Bay would be inundated. The flood would reach the city of Newport Beach 21.5 hours after dam failure (USACE, 1985) and cause flooding of West Newport along the Santa Ana Delhi Channel and San Diego Creek, and in Newport Bay as far south of Pacific Coast Highway (Plate 4-3).

Table 4-3: Characteristics of Prado Dam and Reservoir

Name:	Prado
Department of Water Resources No.	9000-022
National ID No.	CA10022
Owner:	U.S. Army Corps of Engineers
Year Completed:	1941
Latitude; Longitude:	33.89°; -117.643°
Crest Elevation:	566.0 feet
Stream:	Santa Ana River
Dam Type:	Earth-filled
Parapet Type:	N/A
Crest Length:	2,280 feet
Crest Width:	30 feet
Total Freeboard:	23 feet
Height above Streambed:	106 feet
Material Volume:	3,389,000 cubic yards
Storage Capacity:	383,500 acre-feet at top of pool
Drainage Area:	2,255 sq mi
Reservoir Area:	6,695 acres

Figure 4-16: View to the north of Prado Dam (to the right-center), and Prado Dam Reservoir in the background

(Photograph from www.spl.usace.army.mil/resreg/images/pradodam.jpg)

Seven Oaks Dam is an earth- and rock-filled dam located in San Bernardino County, approximately 8 miles northeast of the City of Redlands (see Figure 4-17). Construction of the dam was completed in November 1999. Seven Oaks Dam was designed to protect San Bernardino County from flooding and to work in conjunction with Prado dam, which is located approximately 41 miles downstream. The reservoir has a capacity of 145,600 acre-feet and covers an area of 780 acres when full. Summary information on this dam and its reservoir is provided in Table 4-4. The flood waters resulting from a Seven Oaks dam failure would be contained by Prado dam and therefore do not pose a threat to Newport Beach.

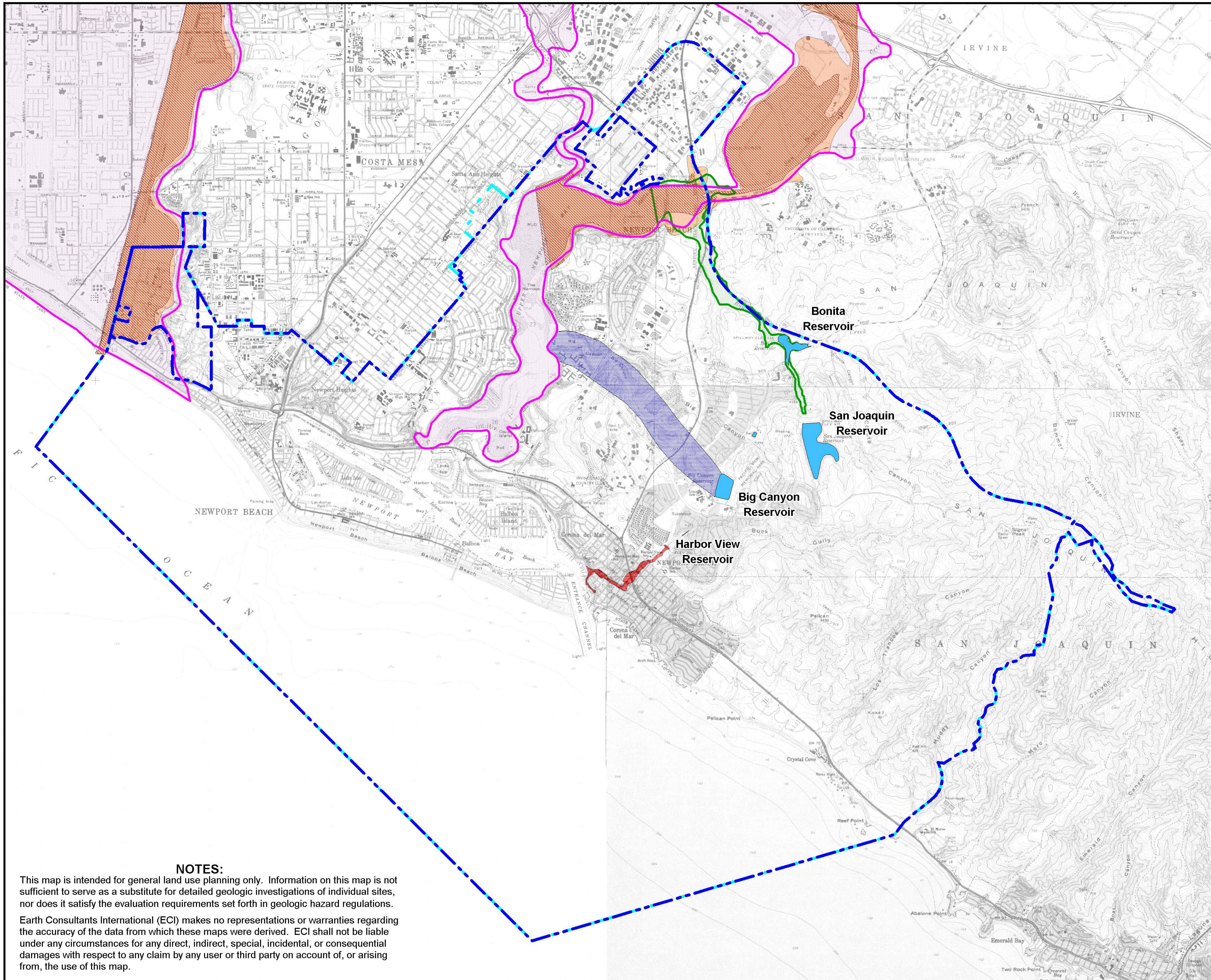
Figure 4-17: View Upstream of Seven Oaks Dam

(Photograph from www.co.san-bernardino.ca.us/flood/dampage.htm)

Table 4-4: Characteristics of Seven Oaks Dam and Reservoir

Name:	Seven Oaks
Department of Water Resources No.	9001-324
National ID No.	CA10324
Owner:	U.S. Army Corps of Engineers
Year Completed:	1999
Latitude; Longitude:	34.116°; -117.3°
Crest Elevation:	2610 feet
Stream:	Santa Ana River
Dam Type:	Rock
Parapet Type:	No Wall
Crest Length:	2,630 feet
Crest Width:	40 feet
Total Freeboard:	30 feet
Height:	550 feet
Material Volume:	4,000,000 cubic yards
Storage Capacity:	145,600 acre-feet
Drainage Area:	176 sq mi
Reservoir Area:	780 acres

Santiago Creek Reservoir dam is an earth-filled structure that has a storage capacity of 25,000 acre-feet. It is located 7 miles east of the City of Orange. Santiago Creek is the largest tributary to the lower Santa Ana River with a drainage basin area greater than 100 square miles. Summary information on this dam and its reservoir is provided in Table 4-5. The flood inundation path through Newport Beach, should the dam fail, is shown on Plate 4-3.



Dam Failure Inundation Map

Newport Beach, California

EXPLANATION

- Harbor View Reservoir Failure Inundation Pathway
- San Joaquin Reservoir Failure Inundation Pathway
- Villa Park Reservoir Failure Inundation Pathway
- Santiago Creek Reservoir Failure Inundation Pathway
- Prado Dam Failure Inundation Pathway
- Big Canyon Reservoir Failure Inundation Pathway
- Reservoir
- Newport Beach City Boundary
- Sphere of Influence

Scale: 1:60,000

0.5 0 0.5 1 1.5 Miles

1 0 1 2 3 Kilometers

Base Map: USGS Topographic Map from Sure!MAPS RASTER

Source: California Office of Emergency Services

Earth Consultants International

Project Number: 2112
Date: July, 2003

CITY OF NEWPORT BEACH CALIFORNIA

Plate 4-3

NOTES:

This map is intended for general land use planning only. Information on this map is not sufficient to serve as a substitute for detailed geologic investigations of individual sites, nor does it satisfy the evaluation requirements set forth in geologic hazard regulations.

Earth Consultants International (ECI) makes no representations or warranties regarding the accuracy of the data from which these maps were derived. ECI shall not be liable under any circumstances for any direct, indirect, special, incidental, or consequential damages with respect to any claim by any user or third party on account of, or arising from, the use of this map.

Table 4-5: Characteristics of the Santiago Creek Dam and Reservoir

Name:	Santiago Creek
Department of Water Resources No.	75-000
National ID No.	CA00298
Owner:	Serrano Irrigation District & Irvine Ranch Water District
Year Completed:	1933
Latitude; Longitude:	33.785°; -117.723°
Crest Elevation:	810 feet
Stream:	Santiago Creek
Dam Type:	Earth-filled
Parapet Type:	No wall
Crest Length:	1,425 feet
Crest Width:	24 feet
Total Freeboard:	16 feet
Height:	136 feet
Material Volume:	789,000 cubic yards
Storage Capacity:	25,000 acre-feet
Drainage Area:	63.1 sq mi
Reservoir Area:	650 acres

Villa Park Reservoir dam is located 3.5 miles downstream of Santiago Creek Reservoir and 4 miles east of the City of Orange. Villa Park dam is an earth-filled structure that has a storage capacity of 25,000 acre-feet. Summary information on this dam and its reservoir is provided in Table 4-6. The flood inundation path through Newport Beach, should the dam fail, is shown on Plate 4-3.

Table 4-6: Characteristics of the Villa Park Dam and Reservoir

Name:	Villa Park
Department of Water Resources No.	1012-000
National ID No.	CA00829
Owner:	County of Orange
Year Completed:	1963
Latitude; Longitude:	33.815°; -117.765°
Crest Elevation:	584 feet
Stream:	Santiago Creek
Dam Type:	Earth-filled
Parapet Type:	No wall
Crest Length:	119 feet
Crest Width:	20 feet
Total Freeboard:	18.3 feet
Height:	118 feet
Material Volume:	835,000 cubic yards
Storage Capacity:	15,600 acre-feet
Drainage Area:	83.4 sq mi
Reservoir Area:	480 acres

Harbor View Dam is a small earth-filled structure; its reservoir is usually empty and used primarily for flood control. It is located approximately 700 feet upstream of Harbor View School and has a storage capacity of 28 acre-feet. Summary information on this dam and its reservoir is provided in Table 4-7. The flood inundation path through Newport Beach, should the dam fail while full, is shown on Plate 4-3.

Table 4-7: Characteristics of the Harbor View Dam and Reservoir

Name:	Harbor View
Department of Water Resources No.	1012-002
National ID No.	CA00830
Owner:	County of Orange
Year Completed:	1964
Latitude; Longitude:	33.603°; -117.865°
Crest Elevation:	190 feet
Stream:	Jasmine Gulch
Dam Type:	Earth-filled
Parapet Type:	No wall
Crest Length:	330 feet
Crest Width:	60 feet
Total Freeboard:	20 feet
Height:	65 feet
Material Volume:	63,000 cubic yards
Storage Capacity:	28 acre-feet
Drainage Area:	0.39 sq mi
Reservoir Area:	3 acres

San Joaquin Dam is an earth-filled structure with a clay lining and asphalt surfacing. It is located in Newport Beach approximately half a mile west of Pacific View Memorial Park. Its reservoir has a storage capacity of 3,036 acre-feet and an area of 50 acres. Summary information on this dam and its reservoir is provided in Table 4-8. The flood inundation path through Newport Beach, should the dam fail, is shown on Plate 4-3.

Bonita Dam is an earth-filled structure located approximately one mile downstream (north) of San Joaquin Dam on Bonita Creek. Although it has the same reservoir area (50 acres) as San Joaquin Dam, it has a storage capacity of only 323 acre-feet. Summary information on this dam and its reservoir is provided in Table 4-9. The flood inundation path through Newport Beach, should the dam fail, is shown on Plate 4-3.

Table 4-8: Characteristics of the San Joaquin Dam and Reservoir

Name:	San Joaquin
Department of Water Resources No.	1029-000
National ID No.	CA00853
Owner:	Irvine Ranch Water District
Year Completed:	1966
Latitude; Longitude:	33.62°; -117.842°
Crest Elevation:	476 feet
Stream:	Tributary to Bonita Creek
Dam Type:	Earth-filled
Parapet Type:	No wall
Crest Length:	873 feet
Crest Width:	30 feet
Total Freeboard:	5.5 feet
Height:	224 feet
Material Volume:	1,911,000 cubic yards
Storage Capacity:	3,036 acre-feet
Drainage Area:	0.35 sq mi
Reservoir Area:	50 acres

Table 4-9: Characteristics of the Bonita Dam and Reservoir

Name:	Bonita Canyon
Department of Water Resources No.	793-004
National ID No.	CA00747
Owner:	The Irvine Company
Year Completed:	1938
Latitude; Longitude:	33.632°; -117.848°
Crest Elevation:	151 feet
Stream:	Bonita Creek
Dam Type:	Earth-filled
Parapet Type:	No wall
Crest Length:	331 feet
Crest Width:	20 feet
Total Freeboard:	8 feet
Height:	51 feet
Material Volume:	43,000 cubic yards
Storage Capacity:	323 acre-feet
Drainage Area:	4.2 sq mi
Reservoir Area:	50 acres

Big Canyon Dam is an earth-filled, asphalt-lined structure that provides fire protection and drinking water to residents in Newport Beach. It has a storage capacity of 600 acre-feet and is located in a residential area near Pacific View Memorial Park and Lincoln School. Failure of this structure would reportedly produce a flood wave between 300 and 1,000 feet wide on its course to Newport Bay. The limits of the inundation area, should this facility fail catastrophically, are shown on Plate 4-3. However, failure is unlikely because a seismic analysis of the Big Canyon Dam shows that it can withstand a maximum magnitude earthquake (M = 7) on the Newport-Inglewood fault. This earthquake is anticipated to produce very strong ground motions, with a peak horizontal ground acceleration of 0.91g, in the area of the reservoir (URS, 2001). Summary information on this dam and its reservoir is provided in Table 4-10.

Table 4-10: Characteristics of the Big Canyon Dam and Reservoir

Name:	Big Canyon
Department of Water Resources No.	1058-000
National ID No.	CA00891
Owner:	City of Newport Beach
Year Completed:	1959
Latitude; Longitude:	33.61°; -117.857°
Crest Elevation:	308 feet
Stream:	Tributary of Big Canyon Creek
Dam Type:	Earth-filled
Parapet Type:	No wall
Crest Length:	3824 feet
Crest Width:	20 feet
Total Freeboard:	5.5 feet
Height:	65 feet
Material Volume:	508,000 cubic yards
Storage Capacity:	600 acre-feet
Drainage Area:	0.04 sq mi
Reservoir Area:	22 acres

4.2.2 Inundation From Above-Ground Storage Tanks

Seismically induced inundation can also occur if strong ground shaking causes structural damage to aboveground water tanks. If a tank is not adequately braced and baffled, sloshing water can lift a water tank off its foundation, splitting the shell, damaging the roof, and bulging the bottom of the tank (elephant's foot) (EERI, 1992). Movement can also shear off the pipes leading to the tank, releasing water through the broken pipes. These types of damage occurred during southern California's 1992 Landers, 1992 Big Bear, and 1994 Northridge earthquakes. The Northridge earthquake alone rendered about 40 steel tanks non-functional (EERI, 1995), including a tank in the Santa Clarita area that failed and inundated several houses below. As a result of lessons learned from recent earthquakes, new standards for design of steel water tanks were adopted in 1994 (Lund, 1994). The new tank design includes flexible joints at the inlet/outlet connections to accommodate movement in any direction.

Based on a review of 1999 aerial photographs of the City, there appears to be no above-ground water tanks in the City. However, at least one 3.4 million gallon reservoir is proposed in the Irvine Coast Development along Pelican Hill Road (The Irvine Company, 1988). Any above-ground storage tanks proposed and built in the City need to be designed to the most current seismic design standards for liquid storage tanks.

4.3 Summary of Issues, Planning Opportunities and Mitigation Measures

Portions of the City of Newport Beach are susceptible to storm-induced flooding on the Santa Ana River and the other drainages that extend at last partly across the City. The 100- and 500-year flood zones have been identified by the Federal Emergency Management Agency, and are shown on Plate 4-2. These include the low-lying areas in West Newport at the base of the bluffs, the coastal areas around Newport Bay and all low-lying areas adjacent to Upper Newport Bay. 100- and 500-year flooding is also anticipated to occur along the lower reaches of Coyote Canyon, in the lower reaches of San Diego Creek and the Santa Ana Delhi Channel, and in a portion of Buck Gully. Most flooding along these second- and third-order streams is not expected to impact significant development. However, flooding in the coastal areas of the City will impact residential and commercial zones along West Newport, the Balboa Peninsula and Balboa Island and the seaward side of Pacific Coast Highway. Flooding as a result of coastal processes also poses a hazard to the City. This is discussed further in Chapter 1.

The National Flood Insurance Program makes federally subsidized flood insurance available in communities that agree to adopt and enforce floodplain management ordinances to reduce future flood damage. Owners of all structures within the FEMA-mapped Special Flood Hazard Areas (100-year flood) are required to purchase and maintain flood insurance as a condition of receiving a federally related mortgage or home equity loan on that structure. Estimates indicate that 75 percent of households located in the 100-year floodplain do not have insurance. In addition, between 20 and 25 percent of the National Flood Insurance Program claims come from structures located outside the designated 100-year flood zone, where insurance is not required. As a comparison, structures located in the 100-year flood plain have a 26 percent chance of being flooded over the course of a 30-year mortgage that experience a fire (4 percent chance in 30 years). National Flood Insurance is available in the City of Newport Beach; homeowners within the 500-year flood zones, and even outside these zones should be encouraged to buy flood insurance.

To ensure public participation in the National Flood Insurance Program and support of City-funded mitigation measures, property owners need to be informed about the potential for flooding in their area, including flooding of access routes to and from their neighborhoods. Community outreach and public information programs that not only identify the hazards but provide potential solutions need to be prepared and made available. The Federal Emergency Management Agency (FEMA) has excellent materials that describe specific mitigation measures that can be implemented to reduce flood damage to residential structures. A community's success in responding to a natural disaster is also dependent on how well its government officials, residents, businesses, and institutions (schools, churches, social organizations) cooperate and coordinate together to make effective decisions. To accomplish this, the City can prepare and manage a list of businesses, organizations and individuals that can be called in for help during emergencies.

For those portions of the 100- and 500-year flood zones that have already been developed, the City should implement flood warning systems and evacuation plans. This is especially important in the areas identified above, near the coast, especially the low-lying areas next to the tide valves, where water has the opportunity to pond until pumped into the ocean. Critical facilities such as schools should have evacuation plans in place that cover the possibility of flooding. Facilities using, storing, or otherwise involved with substantial quantities of onsite hazardous materials should not be permitted in the flood zones, unless all standards of elevation, anchoring, and flood proofing have been satisfied, and hazardous materials are stored in watertight containers that are not capable of floating.

The City should continue to require that future planning for new developments consider the impact on flooding potential, as well as the impact of flood control structures on the environment, both locally and regionally. Flood control should not be introduced in the undeveloped areas at the expense of environmental degradation. Land development planning should continue to consider leaving watercourses natural wherever possible, or developing them as parks, nature trails, golf courses or other types of recreation areas that could withstand inundation.

There are several flood retention and water storage structures that, should they fail catastrophically, have the potential to flood portions of the City. Several of these structures are located outside the City's boundaries, but their inundation zones extend through the City. Most potential inundation areas are coincident with the 100- and 500-year flood zones, in areas where residents are already required or encouraged to have flood insurance. However, failure of Prado Dam has the potential to impact the area by and south of the Newport Aquatic Center, an area not identified as within the 100-year flood zone. If Prado Dam failed, the City of Newport Beach is sufficiently far from the reservoir that it would take several hours for the floodwaters to reach the City, which would permit evacuation of the low-lying areas. The same is true for both Santiago Creek and Villa Park Reservoirs, although since both of these structures are closer to Newport Beach, it would take less time for the waters to reach the City. Failure of San Joaquin or Bonita Reservoirs is not anticipated to pose a significant impact, although portions of San Joaquin Hills Transportation Corridor would be flooded.

The structure that poses the highest risk to a small sector of the community is Harbor View Reservoir. Since this reservoir is located within Newport Beach, its failure would immediately impact those areas down gradient, within its inundation pathway. The reservoirs located in the San Joaquin Hills area of the City are not located astride any known active faults. However, all structures are underlain by the San Joaquin Hills thrust fault, which has the potential to generate very strong ground shaking in the hills (see Chapter 2). Since this thrust fault was only recently identified, these reservoirs were most likely not designed to withstand the near-source ground accelerations that this fault is believed capable of producing. As new data are generated on this fault, it would be advisable to revisit the design of these facilities, and implement a retrofit program if the analyses suggest that this is warranted. A seismic study recently conducted for Big Canyon Reservoir indicates that this reservoir can withstand the strong ground shaking expected in the area as a result of an earthquake on either the Newport-Inglewood or the San Joaquin Hills fault (URS, 2001).

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CHAPTER 5: FIRE HAZARDS

5.1 Vegetation Fires

Even though more wildfires occur in the West than in the rest of the country, wildfires are a significant hazard throughout the United States. The wildfire risk in the United States has increased in the last few decades with the increasing encroachment of residences and other structures into the wildland environment, the increasing number of people living and playing in wildland areas, and the enduring drought conditions that have affected some regions. Between 1990 and 1999 inclusive, there were on average 106,347 wildfires annually, for a combined average annual burn of nearly 3.65 million acres of brush (htpp://nifc.gov/fireinfo/1999/highlites.html). These fires are for the most part caused by people: between 1988 and 1997, human-induced fires burned nearly eight times more brush than fires caused by lightning. The number of wildland fires reported in Orange County also appears to be increasing; according to the Orange County Fire Authority, in 2002 the wildfire occurrence was 150 percent above the previous ten-year average.

A wildfire that consumes hundreds to thousands of acres of vegetated property can overwhelm local emergency response resources. Under the right wind conditions, multiple ignitions can develop as a result of the wind transport of burning cinders (called brands) over distances of a mile or more. Wildfires in those areas where the wildland approaches or interfaces with the urban environment (referred to as the urban-wildland interface area or UWI area) can be particularly dangerous and complex, posing a severe threat to public and firefighter safety, and causing devastating losses of life and property. This is because when a wildland fire encroaches onto the built environment, ignited structures can then sustain and transmit the fire from one building to the next. This is what happened at three of the most devastating fires in California: the Oakland Hills/Berkeley Tunnel fire of October 1991, the Laguna fire of 1970 in northern San Diego County, and the Laguna Beach fire of 1993. As a result of the Oakland Hills fire, 25 lives were lost and 2,900 structures were damaged, for a total of $1.7 billion in insured losses. The September 1970 fire, which was caused by downed power lines, burned 175,425 acres, destroyed 382 structures and killed 5 people. The Laguna Beach fire of 1993 destroyed 441 homes, but thankfully, no one died. What it is clear is that continuous planning, preparedness, and education are required to reduce the fire hazard potential, and to limit the destruction caused by fires. This is discussed in detail in this document.

Large areas of southern California are particularly susceptible to wildfire due to the region's weather, topography and native vegetation. The typically mild, wet winters characteristic of our Mediterranean climate result in an annual growth of grasses and plants that dry out during the hot summer months. This dry vegetation provides fuel for wildfires in the autumn, when the area is intermittently impacted by Santa Ana (or Santana) winds, the hot, dry winds that blow across southern California in the late fall. These winds often fan and help spread fires in the region. Furthermore, many of the native plants common in the area have a high oil content that makes them highly flammable.

5.1.1 Historical Wildland Fires in the Area

Regardless of the comments above, we should not forget that wildland fire is a natural process. Wildfires have been part of the natural ecosystem in the rolling hillsides of central and southern Orange County for millennia. In fact, some of the plants native to this area require periodic burning to germinate and recycle nutrients that enrich the soils. Wildfires become an issue, however, when they encroach into developed areas, with a resultant loss of property, and even life. The City of Newport Beach defines a wildland fire hazard area as any geographic area that contains the type and condition of vegetation, topography, weather, and structure density that potentially increases the possibility of wildland fires (Section 9.04.050 of the City of Newport Beach Municipal Code).

The most devastating wildland fire in this area in recent history was the Laguna Beach fire of 1993. The Laguna Beach fire, which was the result of arson, burned 14,437 acres and destroyed 441 homes. This fire is still ranked in the top ten worst wildland fires in California. The 1993 fire spread into the Newport Coast area that is now part of the City of Newport Beach. The area in Newport Beach burned by the 1993 fire is shown on Plate 5-1. Some of the damage caused by the Laguna Beach fire is shown on Figures 5-1 and 5-2.

Figure 5-1: View of Ridges and Hillsides Burned by the 1993 Laguna Beach Fire.

(Photo Courtesy of Mr. Robert Lemmer, Leighton & Associates)

According to records kept by the Orange County Fire Authority, the Niger fire of 1955 burned 1,606 acres, impacting the northeastern-most corner of the current boundaries of the City of Newport Beach. The 73 Fire of 2001 burned only 6.63 acres, but because it occurred along the 73 Freeway, where it had the potential to impact traffic, it is considered a significant wildland fire. The area in Newport Beach impacted by these two fires is also shown on Plate 5-1. There have been several other smaller, less significant wildland and vegetation fires in the Newport Beach area, but records of these are limited. Those that were recorded by the Orange County Authority between 1991 and 2001 are shown on Plate 5-1. In 2002 alone, the City of Newport Beach Fire Department responded to 30 brush/vegetation fires in their jurisdiction. The locations of these fires are not shown on Plate 5-1.

Insert Plate 5-1: Historical Wildland Fires in the Newport Beach Area

Figure 5-2: Another View of Hillsides Burned by the 1993 Laguna Beach Fire. The fire spread up the canyon but several of the houses on the ridge were thankfully spared.

(Photograph courtesy of Mr. Robert Lemmer, Leighton & Associates)

5.1.2 Wildfire Susceptibility in the Newport Beach Area

As the map of the area burned by the Laguna Beach fire (Plate 5-1) shows, the eastern portion of the City is susceptible to damage from wildland fire. In fact, portions of the Newport Beach region and surrounding areas to the north, east and southeast include grass- and brush-covered hillsides with significant topographic relief that facilitate the rapid spread of fire, especially if fanned by coastal breezes or Santa Ana winds.

The fire hazard of an area is typically based on the combined input of several parameters. These conditions include:

- fuel loading (that is, the density and type of vegetation),
- topography (slope),
- weather,
- dwelling density,
- wildfire history, and
- whether or not there are local mitigation measures in place that help reduce the zone's fire rating (such as an extensive network of fire hydrants, fire-rated construction, fuel modification zones, etc.).

That the eastern portion of Newport Beach and adjacent areas outside City limits are susceptible to wildfires is not a surprise; they are vegetated with high fire hazard plants such as tall grasses and coastal sage scrub, include steep slopes and canyons, and are subjected to both strong seasonal Santa Ana wind conditions and westerly winds that can help transport embers up the southwest-facing canyons. During Santa Ana conditions, when winds in excess of 40 miles per hour (mph) are typical, and gusts in excess of 100 mph may occur locally, fire-fighting resources are likely to be stressed, reducing their ability to suppress fires. Even with no unusual wind conditions, fire department response can be hindered by heavy traffic during peak hours, and by the long travel distances in the canyon and hillside areas of the southeastern part of the City. Furthermore, with the transportation corridors that now cut through these fire-prone areas, and the establishment of natural preserves in the canyons, there is an increased potential for fires, both accidental and purposely set, to impact the region. Therefore, enhanced onsite protection for structures and people in and near these wildfire-susceptible areas is necessary.

Plate 5-2 shows a wildfire susceptibility map for the City that is based on an analysis of the factors discussed above (vegetation, slope, and degree of development). The three wildland fire hazard zones proposed for the City are as follows: low/none, moderate, and high.

The low/none fire hazard zone includes the extensively developed western portion of the City where relief is minimal, and where hardscape (concrete, asphalt and structures) and landscaping vegetation predominate. In the eastern portion of the City, the **low** hazard zone includes the San Joaquin Reservoir, the low-lying, gently sloped, developed areas along the Pacific Coast highway adjacent to the coastline, and inland areas where an extensive network of fire sprinklers, fire-retardant construction and vegetation management plans help reduce the fire hazard. The **moderate** fire hazard zones are areas of moderate relief at the interface with the more developed areas of the City, undeveloped or partially undeveloped areas where grasses predominate, and areas at the interface between high and very high fire hazard zones and low/none hazard zones. The **high** fire hazard zones include primarily the undeveloped canyon and hillside areas where native vegetation, including coastal sage scrub and tree assemblages predominate. Small moderate to high fire hazard areas not mapped may be present locally and sporadically within the low/none zone in the eastern part of the City, if a vacant lot is not maintained and dried grasses or other vegetation are not controlled.

The Orange County Fire Authority had rated the Newport Coast area, now in the eastern one-third of the City, and the Moro Canyon area and surrounding hillsides to the east of the City, as Special Fire Protection Areas (SFPA). SFPAs are similar to the State's Very High Fire Hazard Severity Zones established in accordance with the Bates Bill (Assembly Bill 337, September 29, 1992 – an act that added Chapter 6.8, commencing with Section 51175, to Part 1 of Division 1 of Title 5 of the Government Code, and an amendment to Section 13108.5 of the Health and Safety Code). When the City of Newport Beach annexed the Newport Coast area, it adopted the Orange County Fire Authority's mapping for the area. The Fire Hazards Map adopted by the City is shown on Plate 5-3. However, due to the extensive development proposed in the far southeastern and northeastern corners of Newport Beach, the SFPA boundaries in Newport Beach are changing. Newer SFPA boundaries are shown on Plate 5-4, which also shows the approximate boundaries of the proposed new developments.

Insert Plate 5-2: Fire Hazard Zones in the City of Newport Beach

Plate 5-3: Orange County Fire Authority's Special Fire Severity Zones in Newport Beach

5.1.3 Wildland Fire Protection Strategies

5.1.3.1 Vegetation Management

Experience and research have shown that vegetation management is an effective means of reducing the wildland fire hazard. Therefore, in those areas identified as susceptible to wildland fire, land development is governed by special State and local codes, and property owners are required to follow maintenance guidelines aimed at reducing the amount and continuity of the fuel (vegetation) available. A recent, relatively local example of the effectiveness of these measures is the Antonio fire of May 2002 that burned 1,100 acres in the Las Flores area near Coto de Caza and Rancho Santa Margarita. Although the winds out of the west were blowing at only 10 to 15 miles per hour (mph), this was enough wind to fan the fire across a fairly large area in a short time. The fire even forced the closure of the 241 Toll Road for a few hours. Nevertheless, the fire did not damage any homes due in great measure to the strict vegetation management practices at the urban-wildland interface (UWI) that the local property owners are required to follow.

Requirements for vegetation management at the UWI in California were revisited following the 1993 Laguna Beach fire. In July 1994, the Orange County Wildland/Urban Interface Task Force Report was completed, and shortly thereafter approved by the Orange County Board of Supervisors. In a companion effort, the International Fire Code Institute formed a committee to develop an Urban-Wildland Interface Code under the direction of the California State Fire Marshal. The first draft of this code was published in October 1995.

In 1997, the City of Newport Beach adopted guidelines that mirror the Orange County Fire Authority guidelines for hazard reduction and fuel modification. Hazard reduction and fuel modification are the two methods that the City of Newport Beach employs for reducing the risk of fire at the UWI. Both methodologies use the principle of reducing the amount of combustible fuel available, which reduces the amount of heat, associated flame lengths, and the intensity of the fire that would threaten adjacent structures. The purpose of these methods, adopted as part of the City's Municipal Code, is to reduce the hazard of wildfire by establishing a defensible space around buildings or structures in the area. Defensible space is defined by the City as "an area, either natural or man-made, where plant materials and natural fuels have been treated, cleared, or modified to slow the rate and intensity of an advancing wildfire, and to create an area for firefighters to suppress the fire and save the structure." These standards require property owners in the UWI to conduct maintenance, modifying or removing non-fire-resistive vegetation around their structures to reduce the fire danger. This affects any person who owns, leases, controls, operates, or maintains a building or structure in, upon, or adjoining the UWI.

Fuel or vegetation treatments often used include mechanical, chemical, biological and other forms of biomass removal (Greenlee and Sapsis, 1996) within a given distance from habitable structures. The intent of this **hazard reduction** technique is to create a defensible space that slows the rate and intensity of the advancing fire, and provides an area at the urban-wildland interface where firefighters can set up to suppress the fire and save the threatened structures. Since the late 1980s, the Newport Beach Fire Department has been using **hazard reduction** in the canyons that extend across the older portions of the City, including the mouth of Big Canyon, Upper and Lower Buck Gully and Morning Canyon, and properties adjacent to Spyglass Canyon (see Plate 5-4). In total, 263 properties are maintained under the hazard reduction regulations.

Insert Plate 5-4: Hazard Reduction and Fuel Modification Zones in Newport Beach

The City standard for **hazard reduction** includes requirements for the maintenance of existing trees, shrubs, and ground cover within a 100-foot wide setback zone, to reduce the amount of fuel on those sides of any structure that face the UWI. These requirements are summarized below.

Trees: All trees located within 100 feet of any portion of a structure, which is facing an UWI area, shall comply with the following guidelines:

- ✓ Existing trees are not required to have a separation of tree canopies but must be maintained free of all dead or dying foliage.
- ✓ The selection of any new trees shall be made from the City-approved Fire Resistive Plant list, and the trees shall be planted such that mature canopies will have a minimum separation of 10 feet. [This list, developed by the City in cooperation with the Orange County Fire Authority, includes trees, bushes, shrubs and ground cover that will slow the progress and intensity of a wildfire and do not contribute to the fire load.] The City considers branch tip to branch tip to be synonymous with the term canopy. Non-fire resistive plants and trees should not be used. The City's Fire Department has a list of these non-fire resistive plants that should be avoided. For additional information regarding the acceptable and non-acceptable plants to be used in fire hazardous areas, contact the Newport Beach Fire Department.
- ✓ All dead trees shall be removed.
- ✓ Where shrubs are located within the dripline of a tree, the lowest tree branch shall be at least three times as high as the shrub. This process will remove the potential for fires to spread from lower shrubs and bushes to higher trees and structures.
- ✓ Trees extending to within 5 feet of any structure shall be pruned to maintain a minimum clearance of 5 feet.

Shrubs and Bushes: All shrubs and bushes located within 100 feet of any portion of a building shall comply with the following guidelines:

- ✓ All dead and dying growth shall be removed from shrubs and bushes.
- ✓ All shrubs and bushes **not** on the City's Fire Resistive Plant list shall be maintained no closer than 10 feet apart, measured from branch tip to branch tip.
- ✓ One to three shrubs and bushes together in a small group can be considered a single bush if properly maintained.
- ✓ All shrubs, if of the types listed on the Fire Resistive Plant list, need not be separated if properly maintained.
- ✓ For the purpose of firefighter entrance and egress, provide 3 feet of access along both sides of the structure.

Ground Cover:

- ✓ Ground cover that is properly planted, irrigated, and maintained is permitted within the defensible space.

- ✓ Non-planted areas may be covered with a minimum of 5 inches of chipped biomass or its equivalent.
- ✓ All ground cover that is either dead and/or dying shall be removed when located within 100 feet of the defensible space.

Firewood: Firewood and combustible material for consumption on the premises shall not be stored in unenclosed spaces beneath buildings or structures, or on decks or under eaves, canopies of other projections, or overhangs. Storage of firewood and combustible material stored in the defensible space must be located a minimum of 15 feet from structures and separated from the driplines of trees by a minimum of 15 feet.

Roofs: All roofs of structures in designated wildland fire hazard areas shall comply with the following guidelines:

- ✓ Remove leaves, needles, twigs, and other combustible matter from roofs and rain gutters.
- ✓ Portions of trees which extend within 10 feet of the outlet of a chimney shall be removed.
- ✓ All chimneys attached to any appliance or fireplace that burns solid fuel shall be equipped with an approved spark arrester. The spark arrester screen shall be made from a material that is both heat and corrosion resistant, and the openings shall not permit the passage of spheres having a diameter larger that 1/2- inch.

In some areas of Newport Beach, and specifically in Newport Coast, neighborhoods are required to comply with **fuel modification** requirements. These requirements are imposed when a new community or development is proposed adjacent to a wildland area. Any project in or adjoining a wildland fire hazard area is required to submit a Fire Protection Plan for review and approval before a grading or building permit for new construction is issued. These plans need to meet the criteria of the Newport Beach Fire Department's Fuel Modification Plan and Maintenance Guidelines (Section 9.04.030 of the City of Newport Beach Municipal Code). The areas with approved and preliminary fuel modification plans are shown on Plate 5-4. This map should be updated as the preliminary fuel modification zones are approved, or new plans are developed for those areas that currently have no plans in place. In Newport Coast, the Orange County Fire Authority has the responsibility for reviewing and approving fuel modification zones and the inspection of the installation of these zones. The City of Newport Beach has the responsibility of ensuring that these areas are maintained in accordance with the Fire Protection Plan approved by the Orange County Fire Authority.

Fire Protection Plans need to show the following:

- ✓ all existing and proposed private and public streets on the property proposed for development, and within 300 feet of the property line,
- ✓ the locations of all existing and proposed fire hydrants within 300 feet of the property line, and
- ✓ the location, occupancy classification and use of structures and buildings on the

properties abutting the proposed development.

A **fuel modification zone** is a ribbon of land surrounding a development within a fire hazardous area that is designed to diminish the intensity of a wildfire as it approaches the structures. Fuel modification includes both the thinning (reducing the amount) of native combustible vegetation, and the removal and replacement of native vegetation with fire-resistive plant species. **The minimum width of a fuel modification zone is 170 feet**. These areas may be owned by individual property owners or by a homeowners' association. In the case of Newport Coast, local homeowners' associations own the majority of the fuel modification areas. Emphasis is placed on the space near structures that provides natural landscape compatibility with wildlife, water conservation and ecosystem health. Immediate benefits of this approach include improved aesthetics, increased health of large remaining trees and other valued plants, and enhanced wildlife habitat.

The fuel modification zone is typically divided into four areas referred to as the A, B, C and D zones. The A Zone is the closest to the homes, and is the last 20-feet of the backyard of the private residences. The B, C and D zones lie outside the fence line and are within the common area typically owned by an association. Any dead or dying vegetation shall be removed from all zones, and certain fire-prone species of vegetation are required to be removed when found in any of the four fuel modification zones. Each of these zones is described further below and shown graphically on Figures 5-3 and 5-4.

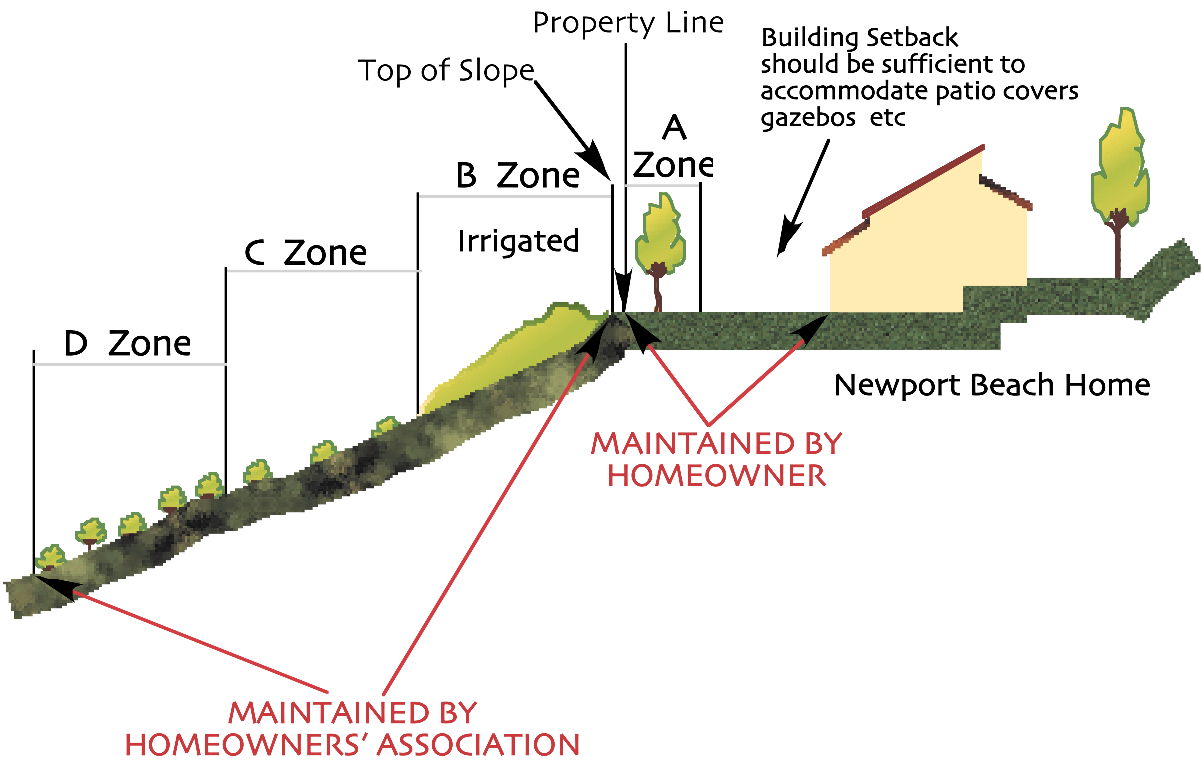
- The **A Zone** is the defensible space where firefighters will set up hose lines to extinguish the approaching fire. The A zone includes ornamental plants and single specimen trees. All plants in this area are required to be irrigated and must be from the City-approved plant list.

- The **B Zone** is the next 50 feet just outside the back fence line. This zone is an area where natural vegetation has been replaced with fire-resistive, drought-tolerant plants from the City-approved Fire Resistive Plant list. The B zone is fitted with automatic water sprinklers on a permanent basis. Non-approved vegetation must be removed from this zone.

- The **C and D zones** are the next 100 feet away from the homes. Each of these zones is a minimum of 50 feet in width. These zones are called the thinning zones. Natural vegetation is reduced by 50 percent in the C zone, and by 30 percent in the D zone. A way to imagine this thinning principle is as follows: in the 50 percent thinning zone (C zone) two people can walk side by side around clumps of vegetation. In a 30 percent thinning zone (D Zone), two people would have to walk single file between clumps of natural vegetation. These areas are not irrigated.

In addition to reduction of the vegetation hazards, areas regulated by the City's fuel modification requirements also have to "harden" the structures immediately adjacent to the wildland area by providing automatic fire sprinkler protection, installation of class "A" roof assemblies, installation of dual glazed windows, one-hour fire resistive construction on the sides of the structures facing the wildland area, and the elimination of combustible exterior structural elements (such as patio covers). These structural requirements are discussed further in Section 5.1.3.4, below.

Figure 5-3: Fuel Modification Zones Required in Fire Hazardous Areas in Newport Coast



The guidelines adopted by Newport Beach for vegetation management in defensible areas are designed to be a fire prevention partnership between property owners and the City in order to prevent disastrous fires. The ordinance is designed to minimize fire danger by controlling density and placement of flammable vegetation. It does not recommend indiscriminate clearing of native coastal sage scrub and other types of plants that perform important roles in erosion control. The mitigation measures provided herein are the minimum required standards. In some high fire hazard areas or during certain times of the year, when due to the hot, dry weather there is an increased risk of wildfires, the Fire Marshal may determine that conditions warrant greater fire protection measures than what the minimum standards provide for. In that event, the Fire Marshal has the authority to supercede the requirements described above.

Figure 5-4: Example of Vegetation Management at the Urban-Wildland Interface.
(Residential community in Newport Beach that uses fuel modification to reduce its fire hazard. Note selective thinning of vegetation in the slope below the structures (C and D Zones). Closer to the structures, there is a zone of fire-resistive plants that are irrigated (Zone B). The vegetation in the foreground is in its natural state.)

5.1.3.2 Exclusions to Special Fire Protection Areas

According to the City's Municipal Code (Section 9.04.410, Sections 7 through 12), a property originally located in a Special Fire Protection Area may be excluded (or removed) from the SFPA and placed in the Conditional Exclusions Zone if the property owner or homeowners' association can show to the satisfaction of the Orange County Fire Authority's Chief that they are in compliance with the following requirements:

- ✓ a Fuel Modification Zone adjoining the property has been created and is maintained;
- ✓ if the Fuel Modification Zone is maintained by a homeowners' association, the homeowners' association collects from the property owners specifically budgeted funds to conduct the maintenance obligations associated with the fuel modification requirements;
- ✓ the Fuel Modification Zone is inspected annually by a City representative to assure that the Fuel Modification Zone is being maintained appropriately;
- ✓ any occupied structure on any lot adjacent to a Special Fire Protection Area is constructed in compliance with all requirements of the Uniform Building Code and the Uniform Fire Code applicable to dwellings or occupied structures on lots within Special Fire Protection Areas;
- ✓ all construction within a tract excluded from a Special Fire Protection Area utilizes Class A roof assemblies.

The Conditional and Total Exclusion zones approved by the Orange County Fire Authority and adopted by Newport Beach are shown on Plate 5-3.

5.1.3.3 Notification and Abatement

City Code specifies that property owners are required to mitigate the fire hazard in their property by implementing the vegetation management practices discussed above. Therefore, if uncontrolled or high weeds, brush, plant material, or other items prohibited under the City's Municipal Code are present in a property, the Fire Marshal has the authority to give the property owner of record a notice to abate the hazard. The property owner has 30 days to comply. If the owner does not abate the hazard during the time period specified in the notice, the City may take further action to reduce the fire hazard. Further action may include the following:

- ✓ The City or its contractor may enter the parcel of land and remove or otherwise eliminate or abate the hazard;
- ✓ upon completion of the work, the City can bill the property owner for the cost of the work plus any administrative costs, or the cost can become a special assessment against that parcel; and
- ✓ upon City Council confirmation of the assessment and recordation of that order, a lien may be attached to the parcel, to be collected on the next regular property tax bill levied against the parcel.

The Fire Marshal has to notify the property owner of the intention to abate the fire hazard by certified mail. The notices have to be mailed at least 15 days prior to the date of the proposed abatement. The property owner may appeal the decision of the Fire Marshal requiring the maintenance of an effective firebreak by sending a written appeal to the Fire Chief within 10 days of the notice. For additional information regarding the Notification and Abatement procedures, refer to Section 16.6 of the City's Municipal Code.

5.1.3.4 Building to Reduce the Fire Hazard

Building construction standards for such items as roof coverings, fire doors, and fire resistant materials help protect structures from external fires *and* contain internal fires for longer periods. That portion of a structure most susceptible to ignition from a wildland fire is the **roof**, due to the deposition of burning cinders or brands. Burning brands are often deposited far in advance of the actual fire by winds. Roofs can also be ignited by direct contact with burning trees and large shrubs (Fisher, 1995). The danger of combustible wood roofs, such as wooden shingles and shakes, has been known to fire fighting professionals since 1923, when California's first major urban fire disaster occurred in Berkeley. It was not until 1988, however, that California was able to pass legislation calling for, at a minimum, Class C roofing in fire hazard areas. Then, in the early 1990s, there were several other major fires, including the Paint fire of 1990 in Santa Barbara, the 1991 Tunnel fire in Oakland/Berkeley, and the 1993 Laguna Beach fire, whose severe losses were attributed in great measure to the large percentage of combustible roofs in the affected areas. In 1995-1996, new roofing materials standards were approved by California for Very High Fire Hazard Severity Zones.

To help consumers determine the fire resistance of the roofing materials they may be considering, roofing materials are rated as to their fire resistance into three categories that are based on the results of test fire conditions that these materials are subjected to under rigorous laboratory conditions, in accordance with test method ASTM-E-108 developed by the American Society of Testing Materials. The rating classification provides information regarding the capacity of the roofing material to resist a fire that develops outside the building on which the roofing material is installed (The Institute for Local Self Government, 1992). The three ratings are as follows:

Class A: Roof coverings that are effective against **severe** fire exposures. Under such exposures, roof coverings of this class:

- Are not readily flammable;
- Afford a high degree of fire protection to the roof deck;
- Do not slip from position; and
- Do not produce flying brands.

Class B: Roof coverings that are effective against **moderate** fire exposures. Under such exposures, roof coverings of this class:

- Are not readily flammable;
- Afford a moderate degree of fire protection to the roof deck;
- Do not slip from position; and
- Do not produce flying brands.

Class C: Roof coverings that are effective against **light** fire exposures. Under such exposures, roof coverings of this class:

- Are not readily flammable;
- Afford a measurable degree of fire protection to the roof deck;
- Do not slip from position; and
- Do not produce flying brands.

Non-Rated Roof coverings have not been tested for protection against fire exposure. Under such exposures, non-rated roof coverings:

- May be readily flammable;
- May offer little or no protection to the roof deck, allowing fire to penetrate into attic space and the entire building; and
- May pose a serious fire brand hazard, producing brands that could ignite other structures a considerable distance away.

In 1992, the City of Newport Beach required roofing materials to be at a minimum Class C (The Institute for Local Self Government, 1992). This is still the case in most areas of the City, with the exceptions noted below. As of the writing of this document, however, a revision to the City's Building Code that may include stricter roofing material requirements was being proposed. In Special Fire Protection Areas, including those in the City of Newport Beach as shown on Plate 5-3, new construction and reconstruction are required to have, as a minimum, Class A roofing assemblies (Section 6.6 of Appendix II-A-2 of the California Fire Code). Any repairs and additions that amount to ten percent or more of the existing roof area are also required to be Class A roof assemblies.

Attic ventilation openings are also a concern regarding the fire survivability of a structure. Attics require significant amounts of cross-ventilation to prevent the degradation of wood rafters and ceiling joists. This ventilation is typically provided by openings to the outside of the structure, but these opening can provide pathways for burning brands and flames to be deposited within the attic. Therefore, it is important that all ventilation openings be properly screened to prevent this. In the Special Fire Protection Areas in the City of Newport Beach, attic or foundation ventilation openings in vertical walls and attic roof vents cannot be more than 144 square inches in size, and these need to be covered with metal louvers and 1/4-inch mesh corrosion-resistant metal screens. Furthermore, ventilation openings and access doors are not permitted on the exposed side of the structure. For more specific information refer to Section 6 – Building Construction Features of Section 9.04.410 of the City's Municipal Code, and Appendix II-A-2 of the California Fire Code). Additional prevention measures that can be taken to reduce the potential for ignition of attic spaces is to "use non-combustible exterior siding materials and to site trees and shrubs far enough away from the walls of the house to prevent flame travel into the attic even if a tree or shrub does torch" (Fisher, 1995).

The type of **exterior wall construction** used can also help a structure survive a fire. Ideally, exterior walls should be made of non-combustible materials such as stucco or masonry. During a wildfire, the dangerous active burning at a given location typically lasts about 5 to 10 minutes (Fisher, 1995), so if the exterior walls are made of non-combustible or fire-resistant materials, the structure has a better chance of surviving. For the same reason, the type of **windows** used in a structure can also help reduce the potential for fire to impact a structure. Single-pane, annealed glass windows are known for not performing well during fires; thermal radiation and direct contact with flames cause these windows to break because the glass under the window frame is protected and remains cooler than the glass in the center of the window. This differential thermal expansion of the glass causes the window to break. Larger windows are more susceptible to fracturing when exposed to high heat than smaller windows. Multiple-pane windows, and tempered glass windows perform much better than single-pane windows, although they do cost more. Fisher (1995) indicates that in Australia, researchers have noticed that the use of metal screens helps protect windows from thermal radiation.

The City of Newport Beach has construction requirements for **cornices, eaves, overhangs, soffits, and exterior balconies** in Special Fire Protection Areas. According to the City's Municipal Code, these need to be made of non-combustible construction materials, enclosed in one-hour fire-resistive material, or made of heavy timber construction. Space between rafters at the roof overhangs need to be protected by non-combustible materials or protected by double 2-inch nominal solid blocking under the exterior wall covering. Ventilation openings or other types of openings are not permitted in eave overhangs, soffits, between rafters at eaves, or in other overhanging areas on the exposed side of the structure (Section 6 – Building Construction Features of Section 9.04.410 of the City's Municipal Code).

5.1.3.5 Restricted Public Access

Although not apparent from the figures included in this report (such as Plates 5-2 and 5-3), in reality, the wildfire susceptibility of an area changes throughout the year, and from one year to the next in response to local variations in precipitation, temperature, vegetation growth, and other conditions. Therefore, since the early 1990's, the EROS Data Center (EDC) in Sioux Falls, South Dakota, has produced weekly and biweekly maps for the 48 contiguous states and Alaska. These maps, prepared under the Greenness Mapping Project, display plant growth and vigor, vegetation cover, and biomass production, using multi-spectral data from satellites of the National Oceanic and Atmospheric Administration (NOAA). The EDC also produces maps that relate vegetation conditions for the current two weeks to the average (normal) two-week conditions during the past seven years. EDC maps provide comprehensive growing season profiles for woodlands, rangelands, grasslands, and agricultural areas. With these maps, fire departments and land managers can assess the condition of all vegetation throughout the growing season, which improves planning for fire suppression, scheduling of prescribed burns, and study of long-term vegetation changes resulting from human or natural factors.

Another valuable fire management tool developed jointly by the US Geological Survey and the US Forest Service is the Fire Potential Index (FPI). The FPI characterizes relative fire potential for woodlands, rangelands, and grasslands, both at the regional and local scale. The index combines multi-spectral satellite data from NOAA with geographic information system (GIS) technology to generate 1-km resolution fire potential maps. Input data include the total amount of burnable plant material (fuel load) derived from vegetation maps, the water content of the dead vegetation, and the fraction of the total fuel load that is live vegetation. The proportion of living plants is derived from the greenness maps described above. Water content of dead vegetation is calculated from temperature, relative humidity, cloud cover, and precipitation. The FPI is updated daily to reflect changing weather conditions.

Local fire authorities can obtain data from either of the two sources above to better prepare for the fire season. When the fire danger in a High Fire Hazard Zone is deemed to be of special concern, local authorities can rely on increased media coverage and public announcements to educate the local population about being fire safe. For example, to reduce the potential for wildfires during fire season in the unincorporated areas of Orange County and in some cities, such as Orange, Anaheim, Brea and Laguna Beach, the Orange County Fire Authority (OCFA) closes hazardous fire areas to public access during at least part of the year. Typically, the fire season in Orange County begins in mid April and lasts until the first rains. With more site-specific data obtained from the FPI or Greenness Mapping Project, however, the fire hazard of an area could be assessed on a weekly or bi-weekly basis. These data can also be used to establish regional prevention priorities that can help reduce the risk of wildland fire ignition and spread, and help improve the allocation of suppression forces and resources, which can lead to faster control of fires in areas of high concern.

Restricted public access to preserves and parks in and around the eastern part of the City of Newport Beach during the fire season can help limit the opportunity for man-caused fires to develop. Continued use of signs during high and extreme fire conditions along the freeways and toll roads that cut through the wildland areas in the eastern portion of the City and adjacent areas can also help reduce the fire hazard by alerting and educating motorists about the potential fire hazard in the area.

5.1.3.6 Real-Estate Disclosure Requirements

California state law requires that fire hazard areas be disclosed in real estate transactions; that is, real-estate sellers are required to inform prospective buyers whether or not a property is located within a wildland area that could contain substantial fire risks and hazards [Assembly Bill 6; Civil Code Section 1103(c)(6)]. Current Real Estate disclosure requirements ask two "yes or no" questions concerning fire hazards. The questions are formatted as follows:

THIS REAL PROPERTY LIES WITHIN THE FOLLOWING HAZARDOUS AREA(S):

- A VERY HIGH FIRE HAZARD SEVERITY ZONE pursuant to Section 51178 or 51179 of the Government Code. (The owner of this property is subject to the maintenance *requirements of Section 51182 of the Government Code.) (Note that the Special Fire Protection Areas in the City of Newport Beach are equivalent to the State's Very High Fire Hazard Severity Zones.)*

- A WILDLAND AREA THAT MAY CONTAIN SUBSTANTIAL FOREST FIRE RISKS AND HAZARDS pursuant to Section 4125 of the Public Resources Code. *(The owner of this property is subject to the maintenance requirements of Section 4291 of the Public Resources Code. Additionally, it is not the State's responsibility to provide fire protection services to any building or structure located within the wildlands unless the Department of Forestry and Fire Protection has entered into a cooperative agreement with a local agency for those purposes pursuant to Public Resources Code Section 4142.)*

Real-estate disclosure requirements are important because in California the average period of ownership for residences is only five years (Coleman, 1994). This turnover creates an information gap between the several generations of homeowners in fire hazard areas. Uninformed homeowners may attempt landscaping or structural modifications that could be a detriment to the fire-resistant qualities of the structure, with negative consequences.

5.1.3.7 Fire Safety Education

Individuals can make an enormous contribution to fire hazard reduction and need to be educated about their important role. In addition to the specific requirements in the Code mentioned in the sections above regarding defensible space, appropriate landscaping and construction materials, there are other tasks that homeowners can take to reduce the risk of fire in their property. Some of these tasks are listed below. This list is not all-inclusive, but provides a starting point and framework to work from.

- Mow and irrigate your lawn regularly.
- Dispose of cuttings and debris promptly, according to local regulations.
- Store firewood away from the house.
- Be sure the irrigation system is well maintained.
- Use care when refueling garden equipment and maintain it regularly.
- Store and use flammable liquids properly.
- Dispose of smoking materials carefully.
- Do not light fireworks (Municipal Code prohibits fireworks).
- Become familiar with local regulations regarding vegetation clearings, disposal of debris, and fire safety requirements for equipment.
- Follow manufacturers' instructions when using fertilizers and pesticides.

- When building, selecting or maintaining a home, consider the slope of the terrain. Be sure to build on the most level portion of the lot, since fire spreads rapidly on slopes, even minor ones.
- Watch out for construction on ridges and cliffs. Keep a single-story structure at least 30 feet away from edges; increase distance if structure exceeds one story.
- Use construction materials that are fire-resistant or non-combustible whenever possible.
- For roof construction, recommended materials are Class-A asphalt shingles, slate or clay tile, metal, cement and concrete products, or terra-cotta tiles.
- Constructing a fire-resistant sub-roof can add protection.
- On exterior wall cladding, fire-resistive materials such as stucco or masonry are much better than vinyl, which can soften and melt.
- A driveway should provide easy access for fire engines. Roadway requirements for fire equipment are described later in this report. The driveway and access roads should be well maintained, clearly marked, and include ample turnaround space near the house.
- So that everyone has a way out, provide at least two ground level doors for safety exits and at least two means of escape (doors or windows) – in each room.
- Keep gutters, eaves, and roof clear of leaves and other debris.
- Occasionally inspect your home, looking for deterioration, such as breaks and spaces between roof tiles, warping wood, or cracks and crevices in the structure.
- If an all-wood fence is attached to your home, a masonry or metal protective barrier between the fence and house is recommended.
- Use non-flammable metal when constructing a trellis and cover it with high-moisture, non-flammable vegetation.
- Prevent combustible materials and debris from accumulating beneath patio decks or elevated porches. Screen, or box in, areas that lie below ground level with wire mesh.
- Make sure an elevated wooden deck is not located at the top of a hill where it will be in the direct line of a fire moving up slope.
- Install automatic seismic shut-off valves for the main gas line to your house. Information for approved devices, as well as installation procedures, is available from the Southern California Gas Company.

5.1.3.8 Other Fire Hazard Reduction Techniques

Before European settlers arrived, many areas of the United States experienced small but frequent wildfires that impacted primarily the grasses and low-lying bushes, without severely damaging the tree stands. Native Americans in California reportedly used fire to reduce fuel load and improve their ability to hunt and forage. It is thought that as much as 12 percent of the State was burned every year by various tribes (Coleman, 1994). However, in the early 20th Century, as development started to encroach onto the foothills, wildfires came to be unacceptable, and in the early 1920s, the Fire Service began campaigns to prevent wildfires from occurring. Unfortunately, over time, this has led to an increase in fuel loads. This is significant because wildfires that impact areas with fuel buildup are more intense and significantly more damaging to the ecosystem than periodic, low-intensity fires.

Over time, fire suppression and increasing populations have produced these results:

- Increased losses to life, property, and resources;
- Increased difficulty in suppressing fires, increased safety problems for firefighters, and reduced productivity by fire crews on perimeter lines;
- Longer periods between recurring fires;
- Increased volume of fuel per acre; and
- Increased taxpayer costs and property losses.

Recognition of these problems has led to vegetation management programs such as those described above, and in some areas, prescribed fires. A prescribed fire is deliberately set under carefully controlled and monitored conditions. The purpose is to remove brush and other undergrowth that can fuel uncontrolled fires. Prescribed fire is used to alter, maintain or restore vegetative communities, achieve desired resource conditions, and to protect life and property that would be degraded by wildland fire. Prescribed fire is only accomplished through managed ignition and should be supported by planning documents and appropriate environmental analyses.

Since 1981, prescribed fire has been the primary means of fuel management in Federal and State-owned lands. Approximately 500,000 acres — an average of 30,000 acres a year — have been treated with prescribed fire under the vegetation management program throughout the State. In the past, the typical vegetation management project targeted large wildland areas. Now, increasing development pressures (with increased populations) at the urban-wildland interface often preclude the use of large prescribed fires. Nevertheless, many still find the notion of "prescribed fire" difficult to accept given that it goes against nearly 100 years of common practice and beliefs. Prescribed fire does carry a risk, as recent experiences in New Mexico and Arizona have shown. The Cerro Grande fire began when a prescribed burn escaped, destroying several hundred homes in Los Alamos, New Mexico and burning more than 50,000 acres. It is likely that this fire will lead to revisions in the guidelines for performing prescribed burns. Furthermore, a recent program review by the California Department of Forestry and Fire Prevention (CDF) has identified needed changes, with focus on citizen and firefighter safety, and the creation of wildfire safety and protection zones.

Prescribed fire is not presently being used in the City of Newport Beach to mitigate the wildland fire hazard. Some communities like Laguna Beach have opted for other methods of vegetation management, namely, the use of goats to keep the vegetation in check. In Laguna Beach, this program appears to be working, and is also popular with residents, who generally enjoy the pastoral scenes provided by the goats grazing on the hillsides. Nevertheless, the environmental impacts of goat herding need to be evaluated over time to determine whether or not this is an environmentally sensitive solution. Some issues to consider, for example, is that if indeed, some plant species endemic to the area will not reproduce unless aided by fire, then the use of prescribed fire as a management tool may be reconsidered.

5.1.4 Post-Fire Effects

Fires usually last only a few hours or days, but their effects can last much longer, especially in the case of intense fires that develop in areas where large amounts of dry, combustible vegetation have been allowed to accumulate. If wildland fires are followed by a period of intense rainfall, debris flows off the recently burned hillsides can develop. Flood control facilities may be severely taxed by the increased flow from the denuded hillsides and the resulting debris that washes down. If the flood control structures are overwhelmed, widespread damage can ensue in areas down gradient from these failed structures.

However, this does not need to happen if remedial measures following a wildfire are taken in anticipation of the next winter. Studies (Cannon, 2001) suggest that in addition to rainfall and slope steepness, other factors that contribute to the formation of post-fire debris flows include the underlying rock type, the shape of the drainage basin, and the presence or absence of water-repellant soils (during a fire, the organic material in the soil may be burned away or decompose into water-repellent substances that prevents water from percolating into the soil.)

Figure 5-5: Photograph Showing Denudation of Slopes Following the 1993 Laguna Beach Fire. Sandbags, plastic covers and other measures were implemented as soon as possible to reduce the potential for slope instability during the winter following the fire.

(Photograph courtesy of Mr. Robert Lemmer, Leighton and Associates)

Other effects of wildfires are economical and social. Homeowners who lose their house to a wildfire may not be able to recover financially and emotionally for years to come. Recreational areas that have been affected may be forced to close or operate at a reduced scale. In addition, the buildings that are destroyed by fire are usually eligible for re-assessment, which reduces income to local governments from property taxes.

The impact of wildland fire on plant communities is generally beneficial, although it often takes time for plant communities to re-establish themselves. If a grassland area has been burned, it will re-sprout the following spring. Coastal sage scrub and chaparral plant communities will take three to five years. Oak woodland, if it has had most of the seedlings and saplings destroyed by fire, will require at least five to ten years for a new crop to start.

5.2 Structural Fires

In order to quantify the structural fire risk in a community, it is necessary for the local fire departments to evaluate all occupancies based upon their type, size, construction type, built-in protection (such as internal fire sprinkler systems) and risk (high-occupancy versus low-occupancy) to assess whether or not they are capable of controlling a fire in the occupancy types identified. Simply developing an inventory of the number of structures present within a fire station's response area is not sufficient, as those numbers do not convey all the information necessary to address the community's fire survivability. In newer residential areas where construction includes fire-resistant materials and internal fire sprinklers, most structural fires can be confined to the building or property of origin. In older residential areas where the building materials may not be fire-rated, and the structures are not fitted with fire sprinklers, there is a higher probability of a structural fire impacting adjacent structures, unless there is ample distance between structures, there are no strong winds, and the Fire Department is able to respond in a timely manner. As discussed in detail below, in some areas of Newport Beach older structures abut each other, increasing the probability of a structural fire not being confined only to its building of origin.

The previous section described in detail the wildfire risk in the City. Review of the maps provided would suggest that the western, extensively developed portion of Newport Beach does not have a fire hazard, but this is not so – it is just not a wildfire hazard. The small-town character that makes several of the older portions of the City, including Balboa Peninsula, Balboa Island and Corona del Mar, so appealing to residents and tourists alike, also puts these areas at risk from structural fires. Many of the structures in these areas are of older vintage, some dating back to the 1930s, built to older building standards and fire codes, made from non-fire resistive construction materials, and with no internal sprinklers and other fire safety systems in place.

The density of construction in these areas is also an issue. Residences are close to each other, generally with only 3-foot setbacks (4-foot setbacks in Corona del Mar) between the houses and the property lines, and projections (such as window and roof awnings) into this 3-foot area are allowed. These projections into the 3-foot setback hinder emergency access to the back of residences (see Figure 5-6), and should therefore be discouraged or prohibited. The narrow streets in these areas of the City also make it difficult to maneuver and position response vehicles so as to be most effective in fighting a fire, and have the potential to severely constrain efforts to evacuate the area if necessary during a fire or other disaster. The City's permanent residential population is currently about 75,660, but this number does not include the thousands that come into Newport Beach daily to work, dine or shop. On weekends, and during the summer, because of the City's tourist draw, the population in the City may swell to well over 200,000. A large percentage of these visitors park their vehicles and visit in the older sections of town, adding to the congestion and difficulty of ingress and egress of emergency response vehicles.

Geography is also at odds with fire safety in the City. Upper and Lower Newport Bay essentially divide the City into two regions, with approximately one-third of the Fire Department assets located west of the bay, and the remaining assets east of the bay (see

Plate 5-2). Connection between these two sides is provided by only a handful of roadways (Pacific Coast Highway in the south, Bristol Street and the 73 Freeway on the north), making it difficult for fire stations on both sides of the bay to support each other during multiple alarm emergencies. Often, it best to request support from adjacent cities via mutual aid agreements than to have Newport Beach fire stations from the other side of the bay send in reinforcements. Catastrophic failure of the bridge connectors on any of these roadways as a result of an earthquake, for example, would hinder emergency response from fire stations in east Newport Beach and Newport Coast into the densely populated areas of the City west and south of the bay.

Figure 5-6: Newport Beach Fire Department personnel illustrating the difficulty of maneuvering emergency equipment and victims through the 3-foot allowable building setback, especially if non-structural additions project into this area. Dumpsters and other things stored in this area can also make access to the back of a residence difficult, if not impossible. Residents should maintain this area free of obstructions.

5.2.1 Structural Target Fire Hazards and Standards of Coverage

Fire departments quantify and classify structural fire risks to determine where a fire resulting in large losses of life or property is more likely to occur. The structures at risk are catalogued utilizing the following criteria:

- The size, height, location and type of occupancy;
- The risk presented by the occupancy (probability of a fire and the consequence if one occurs);
- The unique hazards presented by the occupancy (such as the occupant load, the types of combustibles therein and any hazardous materials);

- Potential for loss of life;
- The presence of fire sprinklers and proper construction;
- Proximity to exposures;
- The estimated dollar value of the occupancy;
- The needed fire flow versus available fire flow; and
- The ability of the on-duty forces to control a fire therein.

These occupancies are called "Target Hazards." Target Hazards encompass all significant community structural fire risk inventories. Typically, fire departments identify the major target hazards and then perform intensive pre-fire planning, inspections and training to address the specific fire problems in that particular type of occupancy (for example, training to respond to fires in facilities that handle hazardous materials is significantly different than training to respond to a fire in a high-occupancy facility such as a mall, auditorium or night club). Typically, the most common target hazard due to the life-loss potential, 24-hour occupancy, risk and frequency of events, is the residential occupancy, however, the consequences of residential fires can be high or low, depending on the age, location, size, and occupancy load, among other factors. Four classifications of risk are considered, as follows:

- High Probability/High consequences (Example: multi-family dwellings and residential high-rise buildings, single-family residential homes in the older sections of the City such as Balboa Island, Balboa Peninsula and Corona del Mar, hazardous materials occupancies (see Chapter 6), and large shopping centers such as Fashion Island).
- Low Probability/High consequences (Example: Hoag Memorial hospital and other medical facilities, mid-size shopping malls, industrial occupancies, large office complexes and new upscale homes in the high hazard vegetation areas).
- High Probability/Low consequences (Example: older detached single-family dwellings in the non-vegetated areas of town).
- Low Probability/Low Consequences (Example: newer detached single-family dwellings in non-vegetated areas and small office buildings).

In order to address the Fire Department's capability to respond effectively to the structural fire risk in Newport Beach, "Standards of Coverage" need to be determined based upon the various risks. Those risks are: Single-family detached residential, multi-family attached residential, commercial and industrial. Some of these risks exist in various areas throughout the City, rather than in well-defined separate areas. For example, residential areas adjoining, and intermixed with, commercial areas occur especially in the older portions of the City on Balboa Peninsula, Balboa Island, and Corona del Mar. Given these combined risks within the same geographic area, it is appropriate for the Newport Beach Fire Department to have several fire stations within the older, intensely developed portion of the City. For the location and distribution of fire stations in the City of Newport Beach, refer to Plates 5-2, 5-3 and 5-5.

Some of the high probability/high consequence risks that fire departments worry the most are high-rise buildings due to the specialized fire-fighting equipment needed, the limited routes of access into and out of a building, and the potential for great loss of life. Newport Beach has over 30 high-rise buildings that were constructed since the 1960s. [A high-rise in the City is defined as any building with floors used for human occupancy that are located more than 55 feet (16.76 m) above the lowest level of fire department access.] High-rise buildings are now required to have several redundant fire and life safety systems in place, including automatic fire sprinklers and fire alarm detectors (Municipal Code Section 9.04.130). However, there are three older residential high-rise buildings in the City that are not sprinklered. These buildings are located at:

- 3121 West Coast Highway
- 601 Lido Park Drive, and
- 611 Lido Park Drive

The property owners of these buildings should be encouraged to retrofit their structures to include internal fire sprinklers.

5.2.2 Model Ordinances and Fire Codes

Effective fire protection cannot be accomplished solely through the acquisition of equipment, personnel and training. The area's infrastructure also must be considered, including adequacy of nearby water supplies, transport routes and access for fire equipment, addresses, and street signs, as well as maintenance. The City of Newport Beach has adopted the 2001 California Fire Code with City amendments and some exceptions (City Ordinance 2002-19 § 1 (part), 2002). The City's Fire Chief is authorized and directed to enforce the provisions of the Municipal Code throughout the City.

These provisions include constructions standards in new structures and remodels, road widths and configurations designed to accommodate the passage of fire trucks and engines, and requirements for minimum fire flow rates for water mains. The construction requirements are a function of building size, type, material, purpose, location, proximity to other structures, and the type of fire suppression systems installed. For building construction standards in the City of Newport Beach refer to the City's Municipal Code. The City of Newport Beach road standards for fire equipment access are summarized in Table 5-1. For more specific information, refer to Section 9.04.060 of the City's Municipal Code.

Some of the more significant Municipal Code items that help reduce the hazard of structural fire in the City include requirements regarding fire sprinklers (Municipal Code Section 9.04.090). The City has been requiring fire sprinklers in all structures more than 5,000 square feet in area since 1987, and therefore all post-1987 structures more than 5,000 square feet in area have this fire safety feature. Fire sprinklers can help contain a fire that starts inside a structure from spreading to other nearby structures, and also help prevent total destruction of a building. If additions to a structure cause it to exceed the 5,000 square foot area, one of the three following conditions apply:

1. When such additions are 25 percent or less than the original building square footage, the existing structure, and the addition need not be equipped with an automatic sprinkler system.

2. When such additions exceed 25 percent but are less than 50 percent of the original building square footage, the addition shall be equipped with an automatic sprinkler system.

3. When such additions are 50 percent or more of the original building square footage, the entire structure shall be equipped with an automatic sprinkler system throughout.

Table 5-1: Road Standards for Fire Equipment Access

Width of Fire Lanes	20 feet wide, no less than 26 feet within 30 feet of a fire hydrant; 28 feet in Special Fire Protection Areas.
Grades	Not to exceed 10 percent.
Turning Radius	No less than 20 feet inside radius and 40 feet outside radius, without parking. Cul-de-sacs with center obstructions require larger radii as approved by the Fire Chief.
Gates	Minimum width of any gate or opening required as a point of access shall be no less than 20 feet. Based on the length of the approach, this width may have to be larger. If there are separate gates for each direction of travel, then each gate shall be no less than 14 feet wide. Any point of access deemed necessary for emergency response shall remain unobstructed at all times. All primary access points, if gated, must be electronically operated and controlled by an approved key switch and strobe light receiver. Any secondary access points shall have a lock approved by the Newport Beach Fire Department. Electrically operated gates require an approved key switch and strobe light receiver.
Signage	All premises need to be identified with approved numbers or addresses in a position plainly visible and legible from the street or road fronting the property. Refer to Section 9.04.060 of the City's Municipal Code for specifics on the minimum size of the letters and numbers.
Other Requirements for Fire Access Roadways	A minimum of 2 fire apparatus access roads shall be provided in residential units containing 25 or more dwellings. Speed bumps, speed humps or any obstructions in required fire access roadways are prohibited.

For structures more than 5,000 square feet in area that pre-date the 1987 Code requirements and are therefore not equipped with fire sprinklers, the following conditions apply if and when the building is added on to:

1. When additions are 1,250 square feet or less, the existing structure and the addition need not be equipped with an automatic sprinkler system.

2. When additions exceed 1,250 square feet but are less than 2,500 square feet, the addition shall be equipped with an automatic sprinkler system.

3. When additions are 2,500 square feet or more, the entire structure shall be equipped with an automatic sprinkler system throughout.

The City's Municipal Code also states that in partially sprinklered buildings, sprinklered areas shall be separated from non-sprinklered areas, and such separation shall not be less than that required for a one-hour occupancy separation.

Other Municipal Code requirements that help reduce the fire hazard in structures include fire sprinkler monitoring systems that transmit a signal to a remote, continuously attended station (Municipal Code Section 9.04.100); hose outlets and exterior access doors in all new buildings with horizontal dimensions (width or length) greater than 300 feet so that all parts of the building can be reached with 150 feet of hose from an access door or hose outlet (Section 9.04.110); and smoke detectors and smoke detection systems (Section 9.04.80).

The City also prohibits the use, sale, possession or handling of fireworks anywhere in the City, unless the fireworks are part of a permitted public display conducted by a licensed pyrotechnic operator (Sections 9.04.220 and 9.04.230).

Fire Flow is the flow rate of water supply (measured in gallons per minute – gpm) available for fire fighting measured at 20 pounds per square inch (psi) residual pressure. Available fire flow is the total water flow available at the fire hydrants, also measured in gallons per minute. As of the writing of this report, Newport Beach had adopted the section of the 2001 California Fire Code that lists the minimum required fire-flow and flow duration for buildings of different floor areas and construction types (Appendix III-A). For additional information regarding the required fire-flow for your building, contact the City's Fire Department. Do note that, consistent with the California Fire Code, the Newport Beach Municipal Code indicates that in buildings fitted with approved internal automatic sprinkler systems, the minimum require fire flow for that structure may be reduced by up to 50 percent, as approved by the Fire Chief, but the resulting fire flow cannot be less than 1,500 gallons per minute (Section 9.04.450 of the Municipal Code). Local water districts are required to test their fire protection capability for the various land uses per the flow requirements of the California Fire Code.

Emergency water storage is critical, especially when battling large wildland fires. During the 1993 Laguna Beach fire, "water streams sprayed on burning houses sometimes fell to a trickle" (Orange County Fire Department, 1994), primarily because most water reservoirs in Laguna were located at lower elevations, and the water district could not supply water to the higher elevations as fast as the fire engines were using it. Leaks and breaks in the water distribution system, including leaking irrigation lines and open valves in destroyed homes also reduced the amount of water available to the fire fighters. A seven-day emergency storage supply is recommended, especially in areas likely to be impacted by fires after earthquakes, due to the anticipated damage to the main water distribution system as a result of ground failure due to fault rupture, liquefaction, or landsliding.

5.3 Fire Suppression Responsibilities

The Newport Beach Fire Department is responsible for fire suppression within the City of Newport Beach. The Newport Beach Fire Department constantly monitors the fire hazard in the City, and has ongoing programs for investigation and alleviation of hazardous situations. Fire fighting resources in Newport Beach area include Fire Station Nos. 1 through 8, as shown on Table 5-2 below. The general telephone number for the Newport Beach fire department is **949-644-3104. For emergencies, dial 911.**

Table 5-2: Fire Stations in the City of Newport Beach

Fire Station No.	Street Address	Location Area	Units Available		
			Ladder Trucks	*Engine Companies*	*Paramedic Ambulances*
1	110 Balboa Blvd. East	Balboa	0	1	0
2	475 32nd St.	Lido	1	1	1
3	868 Santa Barbara Dr.	Newport Center	1	1	1
4	124 Marine Avenue	Balboa Island	0	1	0
5	410 Marigold Avenue	Corona del Mar	0	1	1
6	1348 Irvine Avenue	Mariners	0	1	0
7	2301 Zenith Avenue	Santa Ana Heights	0	1	0
8	6502 Ridge Park Road	Newport Coast	0	1	0

Each engine or truck company has a staff of three persons per 24-hour shift. Each paramedic ambulance has a staff of two firefighter-paramedics per 24-hour shift.

Statistics from the Newport Beach Fire Department regarding incidents that they responded to during 2002 are summarized in Table 5-3, below.

Table 5-3: 2002 Statistics, City of Newport Beach Fire Department

Type of Incident	Sub-Type	Responses in 2002
Fires	Structural	139
	Vehicles	81
	Brush / vegetation	30
	Miscellaneous / Other	188
Total Fires		438
Medical Emergencies		5,717
Fire Alarms		1,164
Other Emergencies	(such as Hazardous Materials)	130
Public Assistance		868
Total Number of Incidents		8,317

The table above shows that the eight fire stations in the City of Newport Beach responded to 8,317 incidents in 2002, which resolves to an average of about 1,040 incidents per station. Note that 69 percent of the responses were medical emergency calls. This is typical of most communities. In Newport Beach, these medical emergencies are handled by the closest available engine company and the closest paramedic ambulance from one of the three fire stations with paramedic ambulances (Fire Stations 2, 3 and 5). In 2002, each paramedic ambulance responded to 1,903 medical emergencies on average. These numbers are well within the number of calls recommended by the Insurance Services Office (ISO) when rating a community for fire insurance rates. Specifically, the ISO recommends that a second company be put in service in a fire station if that station receives more than 2,500 calls per year. The reason for this recommendation is to assure reliability of response to a structure fire. If an engine company provides support to the paramedic ambulance by responding to medical aid calls, and this impacts the station's response to structure fire calls, it may be prudent to add another paramedic ambulance or support squad vehicle and increase staffing at that fire station with the most medical aid traffic. A high volume of calls also creates a high potential for multiple calls occurring at once (multiple queuing), which can result in a company being unavailable to respond to a structure fire. Thus, if this forces a response from other stations farther away, it can result in a larger fire before assistance arrives.

Fires in Newport Beach represent only about 5 percent of all calls, with structure fires representing less than 2 percent of all calls. This is due to the use of modern fire and building codes, effective fire prevention inspection work by the Fire Department, and effective public education. Fires, when they do occur in newer occupancies, are kept small by fire sprinkler systems and the efforts of the Fire Department. Therefore, in recent years, there has been a concern that in some areas, when a major structure fire does occur, the Fire Department personnel will have to apply "seldom used skills." This can result in firefighter injuries, and perhaps larger fires than would have occurred in past years when Fire Departments were accustomed to responding to more structure fires due to the absence of sprinkler systems, poor construction, and lack of ongoing Code enforcement. The Newport Beach Fire Department, however, participates in extensive fire-fighting training.

For emergency response, it is recommended that a 3 to 4-person engine company should arrive within 5 minutes response time to 90 percent of all structure fire calls in the City. Response time shall be defined as 1 minute to receive and dispatch the call, 1 minute to prepare to respond in the fire station or field, and 3 minutes driving time at 35 miles per hour (mph) average (for an approximate distance not exceeding 1.75 miles between the responding fire station and the incident location).

The 5-minute response time is based on the demands created by a structural fire: It is critical to attempt to arrive and intervene at a fire prior to the fire flashing over the entire room or building of origin, which results in total destruction. Flashover can occur within 3 to 5 minutes after ignition. Response time includes the following components:

1 minute: (Call Processing time): Dispatcher receives, processes and dispatches the call. This is an average time, which can vary based upon call volume, from a minimum of 30 seconds.

1 minute: (Turnout time): Fire company acknowledges call and apparatus begins to move.

3 minutes: (Driving Time): Apparatus drives to scene at an average speed of 35 mph. If the average response time for the Fire Department is more than this, and the distance between the closest, responding station and most incidents exceeds 1.5 miles, more fire stations may be needed. If necessary, traffic signal actuation devices (Opticom) can also be installed on critical traffic lights and installed in all fire apparatus to improve the driving time response.

Actual response statistics for the Newport Beach Fire Department for 2002 and the first five months of 2003 are provided in Table 5-4 below. These response times are measured from the time the dispatch is made to arrival at the scene by the responding engine company. The averages show that the majority of the fire units in the City reach their destination within the preferred 5-minute response time, and all units respond within 6 minutes of the call being received by dispatch. The longer response times are for Fire Station 8 located in Newport Coast, a large area presently serviced by only one fire station. With increasing development in this area, the City should consider the construction of another fire station, possibly in the easternmost portion of Newport Coast, in anticipation of the increasing demand for emergency assistance due to a larger population base.

Table 5-4: Average Response Time, from Dispatch to Arrival, for Each Unit in the Newport Beach Fire Department for 2002 and Part of 2003

Units	Average Response Time (Minutes)	
	Year 2002	**Jan – May 2003**
NE61 (Engine – Station 1)	4.09	3.47
NE62 (Engine - Station 2)	4.18	4.18
NM62 (Medical – Station 2)	4.59	5.02
NT62 (Truck – Station 2)	4.44	4.51
NE63 (Engine – Station 3)	4.41	4.36
NM63 (Medical – Station 3)	5.11	5.14
NT63 (Truck – Station 3)	5.00	5.09
NE64 (Engine – Station 4)	4.44	4.40
NE65 (Engine – Station 5)	4.22	4.29
NM65 (Medical – Station 5)	5.17	5.38
NE66 (Engine – Station 6)	4.09	4.29
NE67 (Engine – Station 7)	4.50	5.15
NE68 (Engine – Station 8)	5.58	5.47
Average Totals	**4.60**	**4.67**

In addition to these components, there is another component called "set up" time. This is the time it takes firefighters to get to the source of a fire and get ready to fight the fire. This may range from 2 minutes at a small house fire to 15 minutes or more at a large or multi-story occupancy, such as a fire at Fashion Island, Hoag Memorial Hospital, or a large condominium.

The 90 percent figure is stated as a goal to be achieved. Regular management audits by the Fire Chief should be conducted to reveal if the goal is being met. In many communities it is difficult to exceed the 90 percent figure in a cost-effective manner due to the following limiting factors:

- Access obstructions
- Traffic calming devices and median strips on major highways
- Traffic congestion
- Weather
- Multiple alarms
- Delayed response
- Winding access roads in developments

- Road grades
- Gated communities
- Multiple story buildings or large buildings where it takes time to reach the source of the fire, after arrival at the occupancy.

A 3 to 4-person ladder truck company, with an aerial device, a second engine company with 3 to 4 persons, a paramedic ambulance and a fire battalion chief should arrive within a 10-minute response time interval to 80 percent of all structure fire calls within the City. ISO recommends a truck company within 2.5 miles if there are five or more buildings that are three or more stories or 35 feet or more in height, or five buildings with fire flow needs greater than 3,500 gallons per minute. Fire Station 2 provides this level of service for the high rises on the west side of Newport Beach. Fire Station 3 provides this level of service for the high rises in the Fashion Island and John Wayne Airport areas. An additional truck company from Costa Mesa or Santa Ana can respond via automatic aid if within 5 miles of the City limits.

Structural fire response requires numerous critical tasks to be performed simultaneously. The number of firefighters required to perform the tasks varies based upon the risk. Obviously, the number of firefighters needed at a maximum high-risk occupancy, such as a shopping mall or large industrial occupancy would be significantly higher than for a fire in a lower-risk occupancy. Given the large number of firefighters that are required to respond to a high-risk, high-consequence fire, Fire Departments increasingly rely on automatic and mutual aid agreements to address the fires suppression needs of their community. If additional resources are needed due to the intensity or size of the fire, a second alarm may be requested. The second alarm results in the response of at least another two engine companies, and a ladder truck. Beyond this response, additional fire units are requested via the automatic or mutual aid agreements.

5.3.1 Automatic and Mutual Aid Agreements

Although the City of Newport Beach Fire Department is tasked with the responsibility of fire prevention and fire suppression in the City, in reality, fire-fighting agencies generally team up and work together during emergencies. These teaming arrangements are handled through automatic and mutual aid agreements.

The California Disaster and Civil Defense Master Mutual Aid Agreement (California Government Code Section 8555-8561) states: "Each party that is signatory to the agreement shall prepare operational plans to use within their jurisdiction, and outside their area." These plans included fire and non-fire emergencies related to natural, technological, and war contingencies. The State of California, all State agencies, all political subdivisions, and all fire districts signed this agreement in 1950.

Section 8568 of the California Emergency Services Act, (California Government Code, Chapter 7 of Division 1 of Part 2) states that "the State Emergency Plan shall be in effect in each political subdivision of the State, and the governing body of each political subdivision shall take such action as may be necessary to carry out the provisions thereof." The Act provides the basic authorities for conducting emergency operations following the proclamations of emergencies by the Governor or appropriate local authority, such as a City Manager. The provisions of the act are further reflected and expanded on by appropriate local emergency ordinances. The act further describes the function and operations of government at all levels during extraordinary emergencies, including war (www.scesa.org/cal_govcode.htm). Therefore, local emergency plans are considered extensions of the California Emergency Plan.

Newport Beach has automatic aid agreements with the cities of Costa Mesa, Santa Ana, Huntington Beach, and Fountain Valley, and with the Orange County Fire Authority. These agreements obligate these fire departments to help each other under pre-defined circumstances. **Automatic aid** agreements obligate the nearest fire company to respond to a fire regardless of the jurisdiction. **Mutual aid** agreements obligate fire department resources to respond outside of their district upon request for assistance.

Numerous other agencies are available to assist the City if needed. These include local law enforcement agencies that can provide support during evacuations and to discourage people from traveling to the fire zone to watch the fire, as this can hinder fire suppression efforts. Several State and Federal agencies have roles in fire hazard mitigation, response, and recovery, including: the Office of Emergency Services, the Fish and Wildlife Service, National Park Service, US Forest Service, Office of Aviation Services, National Weather Service, and National Association of State Foresters, the Department of Agriculture, the Department of the Interior, and, in extreme cases, the Department of Defense. Private companies and individuals may also assist.

5.3.2 Standardized Emergency Management System (SEMS)

The SEMS law refers to the Standardized Emergency Management System described by the Petris Bill (Senate Bill 1841; California Government Code Section 8607, made effective January 1, 1993) that was introduced by Senator Petris following the 1991 Oakland fires. The intent of the SEMS law is to improve the coordination of State and local emergency response in California. It requires all jurisdictions within the State of California to participate in the establishment of a standardized statewide emergency management system.

When a major incident occurs, the first few moments are absolutely critical in terms of reducing loss of life and property. First responders must be sufficiently trained to understand the nature and the gravity of the event to minimize the confusion that inevitably follows catastrophic situations. The first responder must then put into motion relevant mitigation plans to further reduce the potential for loss of lives and property damage, and to communicate with the public. According to the State's Standardized Emergency Management System, local agencies have primary authority regarding rescue and treatment of casualties, and making decisions regarding protective actions for the community. This on-scene authority rests with the local emergency services organization and the incident commander.

Depending on the type of incident, several different agencies and disciplines may be called in to assist with emergency response. Agencies and disciplines that can be expected to be part of an emergency response team include medical, health, fire and rescue, police, public works, and coroner. The challenge is to accomplish the work at hand in the most effective manner, maintaining open lines of communication between the different responding agencies to share and disseminate information, and to coordinate efforts.

Emergency response in every jurisdiction in the State of California is handled in accordance with SEMS, with individual City agencies and personnel taking on their responsibilities as defined by the City's Emergency Plan. This document describes the different levels of emergencies, the local emergency management organization, and the specific responsibilities of each participating agency, government office, and City staff.

The framework of the SEMS system is the following:

- Incident Command System – a standard response system for all hazards that is based on a concept originally developed in the 1970s for response to wildland fires
- Multi-Agency Coordination System – coordinated effort between various agencies and disciplines, allowing for effective decision-making, sharing of resources, and prioritizing of incidents
- Master Mutual Aid Agreement and related systems – agreement between cities, counties and the State to provide services, personnel and facilities when local resources are inadequate to handle and emergency
- Operational Area Concept – coordination of resources and information at the county level, including political subdivisions within the county; and
- Operational Area Satellite Information System - a satellite-based communications system with a high-frequency radio backup that permits the transfer of information between agencies using the system.

The SEMS law requires the following:

- Jurisdictions must attend training sessions for the emergency management system.
- All agencies must use the system to be eligible for funding for response costs under disaster assistance programs.
- All agencies must complete after-action reports within 120 days of each declared disaster.

5.3.3 *ISO Rating for the City of Newport Beach*

The Insurance Services Office provides rating and statistical information for the insurance industry in the United States. To do so, ISO evaluates a community's fire protection needs and services, and assigns each community evaluated a Public Protection Classification (PPC) rating. The rating is developed as a cumulative point system, based on the community's fire-suppression delivery system, including fire dispatch (operators, alarm dispatch circuits, telephone lines available), fire department (equipment available, personnel, training, distribution of companies, etc.), and water supply (adequacy, condition, number and installation of fire hydrants). Insurance rates are based upon this rating. The worst rating is a Class 10. The best is a Class 1. Newport Beach currently has a Class 2 ISO rating.

5.4 Earthquake-Induced Fires

Although wildland fires can be devastating, earthquake-induced fires have the potential to be the worst-case fire-suppression scenarios for a community because an earthquake typically causes multiple ignitions distributed over a broad geographic area. In addition, if fire fighters are involved with search and rescue operations, they are less available to fight fires, and the water distribution system could be impaired, limiting even further the fire suppression efforts. If earthquake-induced fires occur during Santa Ana wind conditions, the results can be far worse.

The major urban conflagrations of yesteryear in major cities were often the result of closely built, congested areas of attached buildings with no fire sprinklers, no adequate fire separations, no Fire Code enforcement, and narrow streets. In the past, fire apparatus and water supplies were also inadequate in many large cities, and many fire departments were comprised of volunteers. Many of these conditions no longer apply to the cities of today.

Nevertheless, major earthquakes can result in fires and the loss of water supply, as it occurred in San Francisco in 1906, and more recently in Kobe, Japan in 1995. A large portion of the structural damage caused by the great San Francisco earthquake of 1906 was the result of fires rather than ground shaking. The moderately sized, M 6.7 Northridge earthquake of 1994 caused 15,021 natural gas leaks that resulted in three street fires, 51 structural fires (23 of these caused total ruin) and the destruction by fire of 172 mobile homes. In one incident, the earthquake severed a 22-inch gas transmission line and a motorist ignited the gas while attempting to restart his stalled vehicle. Response to this fire was impeded by the earthquake's rupture of a water main; five nearby homes were destroyed. Elsewhere, one mobile home fire started when a ruptured transmission line was ignited by a downed power line. In many of the destroyed mobile homes, fires erupted when inadequate bracing allowed the houses to slip off their foundations, severing gas lines and igniting fires. There was a much greater incidence of mobile home fires (49.1 per thousand) than other structure fires (1.1 per thousand). Although the threat that existed in San Francisco in 1906 was far greater than that in Newport Beach today, there are some older sections in Newport Beach where due to ground failure, breaks in the gas mains and the water distribution system could lead to a significant fire-after-earthquake situation.

As discussed in the Seismic Hazards section of this report (Chapter 2), there are several major earthquake-generating faults that could affect the Newport Beach area. The three most significant faults to the Newport Beach area include the Newport-Inglewood, San Joaquin Hills, and Whittier faults. A moderate to strong earthquake on any of these faults could trigger multiple fires, disrupt lifelines services (such as the water supply), and trigger other geologic hazards, such as landslides or rock-falls, which could block roads and hinder disaster response. The California Division of Mines and Geology (Toppozada and others, 1988) published in 1988 a study that identified projected damages in the Los Angeles area as a result of an earthquake on the Newport-Inglewood fault. The earthquake scenario estimated that thousands of gas leaks would result from damage to pipelines, valves and service connections. This study prompted the Southern California Gas Company to start replacing their distribution pipelines with flexible plastic polyethylene pipe, and to develop ways to isolate and shut off sections of supply lines when breaks are severe. Nevertheless, as a result of the 1994 Northridge earthquake, the Southern California Gas Company reported 35 breaks in its natural gas transmission lines and 717 breaks in distribution lines. About 74 percent of its 752 leaks were corrosion related. Furthermore, in the aftermath of the earthquake, 122,886 gas meters were closed by customers or emergency personnel. The majority of the leaks were small and could be repaired at the time of service restoration.

History indicates that fires following an earthquake have the potential to severely tax the local fire suppression agencies, and develop into a worst-case scenario. Earthquake-induced fires can place extraordinary demands on fire suppression resources because of multiple ignitions. The principal causes of earthquake-related fires are open flames, electrical malfunctions, gas leaks, and chemical spills. Downed power lines may ignite fires if the lines do not automatically de-energize. Unanchored gas heaters and water heaters are common problems, as these readily tip over during strong ground shaking (State law now requires new and replaced gas-fired water heaters to be attached to a wall or other support).

Many factors affect the severity of fires following an earthquake, including ignition sources, types and density of fuel, weather conditions, functionality of the water systems, and the ability of firefighters to suppress the fires. Casualties, debris and poor access can all limit fire-fighting effectiveness. Water availability in Orange County following a major earthquake will most likely be curtailed due to damage to the water distribution system — broken water mains, damage to the aqueduct system, damage to above-ground reservoirs, etc. (see Chapter 2 – Seismic Hazards, and Chapter 4 – Flooding Hazards).

5.4.1 Earthquake-Induced Fire Scenarios for the Newport Beach Area using HAZUS

HAZUS™ is a standardized methodology for earthquake loss estimation based on a geographic information system (GIS). The user can run the program to estimate the damage and losses that an earthquake on a specific fault would generate in a specific geographic area, such as a city. Detailed information on this methodology is covered in Chapter 2. One of the HAZUS components is earthquake-induced fire loss estimation.

Loss estimation is a new methodology, and our understanding of fires following earthquakes is limited. An accurate, fire-following-earthquake evaluation possibly requires extensive knowledge of the level of readiness of local fire departments, as well as the types and availability (functionality) of water systems, among other data. Although these parameters are not yet considered in the fire-after-earthquake module, preliminary results obtained from this HAZUS component are encouraging.

Current data suggest that about 70% of all earthquake-induced fire ignitions occur immediately after an earthquake since many fires are discovered within a few minutes after an earthquake. The remaining ignitions occur about an hour to a day after the earthquake. A typical cause of the delayed ignitions is the restoration of electric power. When power is restored, short circuits caused by the earthquake become energized and can start fires. Also, items that have overturned or fallen onto stove tops, etc., can ignite. If no one is present at the time electric power is restored, ignitions can develop into fires requiring fire department response.

HAZUS loss estimations were made for earthquake scenarios on the Newport-Inglewood, San Joaquin Hills, Whittier and San Andreas faults (refer to Chapter 2 for additional information on each of these earthquake scenarios). Two wind speeds were used for each earthquake scenario. A value of 10 mph was used to model normal wind conditions. A speed of 30 miles per hour (mph) was assigned to evaluate fire spread as a result of Santa Ana winds. HAZUS uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area that each earthquake scenario is likely to generate.

Note that the HAZUS loss estimation does not consider effects of reduced water pressure due to breaks in the water distribution system. These are expected to be widespread where ground failure occurs, especially in the area near the coastline where liquefaction damage is anticipated. This would further reduce functionality in some areas, such as the Balboa Peninsula and Balboa Island areas.

Table 5-5 shows that earthquakes on the Newport-Inglewood and San Joaquin Hills faults have the potential to cause significant fire-after-earthquake losses in the City of Newport Beach. The HAZUS results show that wind speeds definitely have an impact on the damage extent. The San Joaquin Hills fault fire-after-earthquake scenario is modeled as the worst case for the City of Newport Beach if Santa Ana wind conditions are present at the time of the earthquake, with the Newport-Inglewood earthquake scenario a close second. Rupture of the Newport-Inglewood fault, if it breaks along the traces of the fault thought to extend into the City of Newport Beach and surrounding communities, is anticipated to cause many breaks in the gas and water distribution systems. Therefore, retrofitting those pipe sections across and near the mapped trace of these faults with flexible plastic polyethylene pipe and flexible joints should be a priority. Breakage of the San Andreas fault is regionally significant, as it could impact the distribution of water to many cities in the southern California area that purchase water from the Metropolitan Water District.

Table 5-5: Earthquake-Induced Fire Losses in Newport Beach Based on HAZUS Scenario Earthquakes

Earthquake Scenario	**No. of Ignitions**		**Population Displaced At a Wind Speed of**		**Building Value Burnt At a Wind Speed of (US$ millions)**	
(refer to Chapter 2 for additional information)	10 mph	30 mph	10 mph	30 mph	10 mph	30 mph
Newport-Inglewood	9	9	353	1,553	24.42	109.08
San Joaquin Hills	12	12	569	1,906	38.36	133.65
Whittier	3	3	70	422	5.66	38.40
San Andreas	1	1	48	291	3.31	19.94

The Newport Beach Fire Department has procedures in place to follow immediately after an earthquake. In accordance with their Earthquake Response Plan, immediately after an earth tremor, fire apparatus and other response vehicles are taken out of the stations and parked outside. Then, personnel from each station drive around their district to assess the damage, if any, and provide assistance as needed.

5.5 Recommended Programs

The City of Newport Beach:

- Should continue to require property owners to conduct maintenance on their properties to reduce the fire danger in accordance with the property owner's checklist presented above. The single most important mitigation measure for a single-family residence is to maintain a fire-safe landscape, thereby creating a defensible space around the structure(s).
- Should support the new State-level shift in its vegetation management program. Emphases are on smaller projects closer to new developments, and alternatives to fire treatment, such as weed abatement using mechanical treatments.
- Should continue to develop education and mitigation strategies that focus on the enhanced or higher hazard present in the months of August, September and October, when dry vegetation and Santa Ana winds coexist.
- Should regularly reevaluate specific fire hazard areas and adopt reasonable safety standards, covering such elements as adequacy of nearby water supplies, routes or throughways for fire equipment, clarity of addresses and street signs, and maintenance.
- Encourage owners of non-sprinklered properties, especially high- and mid-rise structures, to retrofit their buildings and include internal fire sprinklers. The City may consider some form of financial assistance (such as low-interest or no-interest loans) to encourage property owners to do this as soon as possible.
- Staff, as well as elected officials, should conduct earthquake-induced fire-scenario exercises based on this study's HAZUS loss estimates.
- Staff should continue to conduct annual training sessions using the adopted emergency management system (SEMS).
- Should review the adequacy of its water storage capacity and distribution network in the event of an earthquake. Redundant systems should be considered and implemented in those areas of the City where liquefaction and other modes of ground failure could result in breaks to both the water and gas mains, with the potential for significant conflagrations. This includes considering alternate sources of water, such as the ocean, bay, open reservoirs, and swimming pools, and providing fire engines with engine-driven pumps that can be used to obtain water from these alternate sources.
- Should encourage the local gas and water purveyors to review and retrofit their main distribution pipes, with priority given first to those lines that cross or are located near the mapped trace or projections of the Newport-Inglewood fault (see Chapter 2).

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California Fire Plan: http://www.fire.ca.gov/FireEmergencyResponse/FirePlan/FirePlan.asp

National Fire Plan: http://www.fireplan.gov

Orange County Fire Authority's Web Site: http://www.ocfa.org/

National Fire Protection Association Web Site: http://nfpa.org/

Site dedicated to providing information to homeowners about becoming firewise in the urban/wildland interface: http://firewise.org/

Federal Emergency Management Agency Web Site; includes general information on how to prepare for wildfire season, current fire events, etc.: http://www.fema.gov/

U.S. Fire Administration Web Site: http://www.usfa.fema.gov/

Insurance Services Office Web Site: http://www.iso.com

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CHAPTER 6: HAZARDOUS MATERIALS MANAGEMENT

6.1 Introduction

A high standard of living has driven society's increased dependence on chemicals. Hydrocarbon fuels that power our vehicles, chlorine used to treat our drinking water and pools, and pesticides used in the agricultural sector are a few examples of chemicals used on a daily basis and in large quantities. This demand requires the manufacturing, transportation and storage of chemicals. As we will discuss throughout this chapter, these activities provide opportunities for the release of chemicals into the environment, sometimes with negative consequences because exposure to many of these chemicals is often hazardous to human health and to the environment. Recognizing these potential health hazards, Federal, State, and local regulations have been implemented since the late 1960's to dictate the safe use, storage, transportation, and handling of hazardous materials and wastes. These regulations help to minimize the public's risk of exposure to hazardous materials.

The United States Environmental Protection Agency (EPA) defines a hazardous waste as a substance that 1) may cause or significantly contribute to an increase in mortality or an increase in serious, irreversible, or incapacitating reversible illness; and 2) that poses a substantial present or potential future hazard to human health or the environment when it is improperly treated, stored, transported, disposed of or otherwise managed. Hazardous waste is also ignitable, corrosive, explosive, or reactive (Federal Code of Regulations – FCR - Title 40: Protection of the Environment, Part 261). A material may also be classified as a hazardous material if it contains defined amounts of toxic chemicals. The EPA has developed a list of specific hazardous wastes that are in the forms of solids, semi-solids, liquids, and gases. Producers of such wastes include private businesses, and Federal, State, and local government agencies. The EPA regulates the production and distribution of commercial and industrial chemicals to protect human health and the environment. The EPA also prepares and distributes information to further the public's knowledge about these chemicals and their effects, and provides guidance to manufacturers in pollution prevention measures, such as more efficient manufacturing processes and recycling used materials.

The State of California defines hazardous materials as substances that are toxic, ignitable or flammable, reactive, and/or corrosive. The State also defines an extremely hazardous material as a substance that shows high acute or chronic toxicity, is carcinogenic (causes cancer), has bioaccumulative properties (accumulates in the body's tissues), is persistent in the environment, or is water reactive (California Code of Regulations, Title 22; California Health and Safety Code, Division 20, Chapter 6.5).

This report will deal with hazards associated with the existence of hazardous wastes and materials in the City of Newport Beach and its Sphere of Influence (herein referred to as the Newport Beach area), with emphasis on the impact these substances can have on the air we breathe or the drinking water supply. There are hundreds of Federal, State and local programs that regulate the use, storage, and transportation of hazardous materials in the City. Some of these programs are discussed in this report. However, the environmental regulatory scene is in a constant state of flux as new findings are published, and new or modified methods for studying and cleaning contaminants are developed. Therefore, for recent updates, the reader is encouraged to contact the City of Newport Beach Fire Department, the Orange County Health Care Agency's Environmental Division, and/or the U.S. Environmental Protection

Agency. All of these agencies have dedicated web pages where extensive information about hazardous wastes is provided. This report also addresses the potential for hazardous materials to be released during a natural disaster, such as an earthquake, since these events have the potential to cause multiple releases of hazardous materials at the same time, taxing the local emergency response agencies.

6.2 Air Quality

Each one of us breathes about 3,400 gallons of air every day. Unfortunately, our air is contaminated on a daily basis by human activities such as driving cars, burning fossil fuels, and manufacturing chemicals. Natural events, such as wildfires, windstorms, and volcanic eruptions also degrade air quality. Nevertheless, during the last three decades, the United States has made impressive strides in improving and protecting air quality despite substantial economic expansion and population growth. However, as any resident of the greater Los Angeles metropolitan area can attest, additional improvements in air quality can and should be made.

6.2.1 National Ambient Air Quality Standards

The Clean Air Act requires the EPA to set National Ambient Air Quality Standards for pollutants considered harmful to public health and the environment. The EPA uses two types of national air quality standards: Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly, and secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

National Ambient Air Quality Standards have been set for six principal pollutants called "criteria" pollutants. These pollutants include:

- Carbon monoxide (CO)
- Particulate matter (PM10)
- Lead (Pb)
- Nitrogen dioxide (NO_2)
- Ground-level ozone (O_3)
- Sulfur dioxide (SO_2)

For each of these pollutants, the EPA tracks two kinds of air pollution trends: air concentrations based on actual measurements of pollutant concentrations in the ambient (outside) air at selected monitoring sites throughout the country, and emissions based on engineering estimates of the total tons of pollutants released into the air each year. The standards or allowable concentrations for these six pollutants are known as National Ambient Air Quality Standards (NAAQS). These are listed in Table 6-1. California has established State standards for some of these pollutants that are more restrictive than the National standards. These are also shown on Table 6-1. The health effects of two of these pollutants, ozone and particulate matter, are discussed further below.

Table 6-1: National Ambient Air Quality Standards
(where California standards are different than National standards,
California standards are also provided)

Pollutant	Allowable Concentration		Type
	In parts per million*	In mg/m³ or µg/m³	
Carbon Monoxide			
8-hour average (U.S.) 8-hour average (CA)	≥9.5 >9.0		Primary
1-hour average (U.S.) 1-hour average (CA)	>35 >20		Primary
Nitrogen Dioxide			
AAM (U.S.) 1-hour average (CA)	>0.0534 >0.25		Primary and Secondary
Ozone			
1-hour average (U.S.) 1-hour average (CA)	>0.12 >0.09		Primary and Secondary
8-hour average	*>0.08*		*Primary and Secondary*
Lead			
Quarterly average (U.S.) Monthly average (CA)		>1.5 µg/m³ ≥1.5 µg/m³	Primary and Secondary
Particulate (PM 10)			
AAM (U.S.) AGM (CA)		>50 µg/m³ >30 µg/m³	Primary and Secondary
24-hour average (U.S.) 24-hour average (CA)		>150 µg/m³ >50 µg/m³	Primary and Secondary
Particulate (PM 2.5)			
AAM (U.S.)		>15 µg/m³	Primary and Secondary
24-hour average (U.S.)		*>65 µg/m³*	*Primary and Secondary*
Sulfur Dioxide			
AAM (U.S.)	>0.03		Primary
24-hour average (U.S.) 24-hour average (CA)	>0.14 >0.045		Primary
3-hour average (U.S.) 1-hour average (CA)	>0.50 >0.25		Secondary

* Parts per million, ppm, of air, by volume
AAM = Annual Arithmetic Mean; AGM = Annual Geometric Mean
PM 10 refers to particles with diameters of 10 micrometers or less.
PM 2.5 refers to particles with diameters of 2.5 micrometers or less.
The ozone 8-hour standard and the PM 2.5 standards are included for information only, since a 1999 Federal court ruling blocked implementation of these standards, and the issue has not yet been resolved.
mg/m^3 = milligrams per cubic meter; $\mu g/m^3$ = micrograms per cubic meter
U.S. = Federal (or National) Standard; CA = California Standard

Ozone is an odorless, colorless gas that occurs naturally in the Earth's upper atmosphere – 10 to 30 miles above the Earth's surface – where it forms a protective layer that shields us from the sun's harmful ultraviolet rays. The releases of man-made chemicals, such as chlorofluorocarbons (CFCs), and natural emissions from volcanic eruptions destroy this beneficial ozone, resulting in seasonal thinning of the ozone layer over Antarctica. In the Earth's lower atmosphere, near ground level, ozone is formed when pollutants emitted by cars, power plants, industrial boilers, refineries, chemical plants, and other sources react chemically in the presence of sunlight. Ozone at ground level is a harmful pollutant. Ozone pollution is a concern during the summer months, when the weather conditions needed to form it – lots of sun and hot temperatures – normally occur.

Roughly one out of every three people in the United States is at a higher risk of experiencing ozone-related health effects. Sensitive people include children and adults who are active outdoors, people with respiratory disease, such as asthma, and people with unusual sensitivity to ozone. People of all ages who are active outdoors are at increased risk because, during physical activity, ozone penetrates deeper into the parts of the lungs that are more vulnerable to injury. Ozone can irritate the respiratory system, causing coughing, throat irritation, and/or an uncomfortable sensation in the chest, and aggravating asthma. Ozone can also reduce lung function, making it more difficult to breathe deeply and vigorously, and can increase susceptibility to respiratory infections.

The term "particulate matter" (PM) includes both solid particles and liquid droplets found in air. Many man-made and natural sources emit PM directly or emit other pollutants that react in the atmosphere to form PM. These solid and liquid particles come in a wide range of sizes. Particles less than 10 micrometers in diameter tend to pose the greatest health concern because they can be inhaled into and accumulate in the respiratory system. Particles less than 2.5 micrometers in diameter are referred to as "fine" particles. Sources of fine particles include all types of combustion (motor vehicles, power plants, wood burning, etc.) and some industrial processes. Particles with diameters between 2.5 and 10 micrometers are referred to as "coarse." Sources of coarse particles include crushing or grinding operations, and dust from paved and unpaved roads, and agricultural or vacant fields (think Santa Ana wind conditions). Both fine and coarse particles can accumulate in the respiratory system and are associated with numerous health effects. Coarse particles can aggravate respiratory conditions such as asthma. Exposure to fine particles is associated with several serious health effects, including premature death. Adverse health effects have been associated with exposures to PM over both short periods (such as a day) and longer periods (a year or more).

Peak air quality statistics for the six principal pollutants measured in the year 2001 in the North Coastal Orange County area, which includes Newport Beach, are listed in Table 6-2. The data show that none of the peak values in the North Coastal Orange County area exceeded the National or State ambient air quality standards, with one exception: The maximum allowable concentration of ozone defined by the State for a 1-hour period (of more than 0.09 parts per million) was exceeded only one day in

2001 (also see Table 6-4). As of the writing of this report, the 2002 air quality data were not yet available. The reader is encouraged to go to http://www.aqmd.gov to look for more recent air quality information, which is posted by the South Coast Air Quality Management District as it becomes available.

Table 6-2: Year 2001 Peak Air Quality Statistics for Criteria Pollutants in the North Coastal Orange County Area
(compared, unless otherwise noted, to the California Standards, which are more restrictive than the National standards)

Pollutant	Sate Air Quality Standard	Maximum Concentration in North Coastal Orange County Area
Carbon Monoxide		
8-hour average	>9 ppm	4.57 ppm
Nitrogen Dioxide		
1-hour average	>0.25 ppm	0.08 ppm
Ozone		
1-hour average	>0.09 ppm	0.098 ppm
8-hour average (U.S.)	>0.08 ppm	0.073 ppm
Lead		
Monthly maximum	≥1.5 $\mu g/m^3$	NM
Particulate (PM 10)		
Annual Geometric Mean	>30 $\mu g/m^3$	NM
24-hour average (U.S.)	150 $\mu g/m^3$	NM
Sulfur Dioxide		
1-hour average	>0.25 ppm	0.01 ppm
24-hour average	>0.045 ppm	0.007 ppm

ppm = parts per million; $\mu g/m^3$ = micrograms per cubic meter; NM = Pollutant Not Monitored
Source: http://www.epa.gov/airtrends

6.2.2 Air Quality Index

There are two indicators that are typically used to assess the air quality of a given area. These indicators are the Air Quality Index and the quantity of pollutant emissions. In 1976, EPA developed the Pollutant Standards Index (PSI), which was a consistent and easy to understand way of stating air pollutant concentrations and associated health implications. In June 2000, the EPA updated the index and renamed it Air Quality Index (AQI). EPA's AQI provides accurate, timely, and easily understandable information about daily levels of air pollution. The Index provides a uniform system for measuring pollution levels for five major air pollutants regulated under the Clean Air Act.

The AQI is reported as a numerical value between 0 and 500, which corresponds to a health descriptor like "good," or "unhealthy" (see Table 5-3). AQI values are reported daily in the local news media (TV, radio, internet (http://www.epa.gov/airnow), and newspapers) serving metropolitan areas with populations exceeding 350,000. The AQI converts daily measured pollutant concentration in a community's air to a numerical value and color code. The most important number on the scale is 100. *An AQI level in excess of 100 means that a pollutant is in the "unhealthy for sensitive groups" range for that day. An AQI level at or below 100 means that a pollutant reading is in the satisfactory range with respect to the National Ambient Air Quality Standard (NAAQS).*

Table 6-3: Air Quality Index
(a measure of community-wide air quality)

Index Values	Levels of Health Concern	Cautionary Statements
0-50	Good	None
51-100*	Moderate	Unusually sensitive people should consider limiting prolonged outdoor exertion.
101-150	Unhealthy for Sensitive Groups	Active children and adults, and people with respiratory disease, such as asthma, should limit prolonged outdoor exertion.
151-200	Unhealthy	Active children and adults, and people with respiratory disease, such as asthma, should avoid prolonged outdoor exertion; everyone else, especially children, should limit prolonged outdoor exertion.
201 - 300	Very Unhealthy	Active children and adults, and people with respiratory disease, such as asthma, should avoid all outdoor exertion; everyone else, especially children, should limit outdoor exertion.
301 - 500	Hazardous	Everyone should avoid all outdoor exertion

Source: www.epa.gov/airnow/aqibroch/aqi.html#8

The EPA determines, on a daily basis, the index value for each of the measured pollutants, and reports the highest figure as the AQI value for the day. The pollutant with the highest daily value is identified as the Main Pollutant. The pollutants indexed by the AQI are the criteria pollutants discussed earlier. The Clean Air Act directs the EPA to regulate criteria pollutants because of their impact on human health and the environment. The standards or allowable concentrations for these six pollutants are known as National Ambient Air Quality Standards (NAAQS).

The South Coast Air Quality Management District (SCAQMD) monitors and provides NAAQS air quality data for the Los Angeles, Orange, Riverside, and San Bernardino counties. The most recent year for which these data are available is 2001. The last column in Table 6-4 provides the number of days that Criteria Air Pollutant concentrations for the area around Newport Beach were in excess of Federal or State standards for the year 2001.

Table 6-4: Air Quality in the Newport Beach Area in 2001

Pollutant	Measurement Location	# Days in excess
Ozone	North Coastal Orange County	1*
Carbon Monoxide	North Coastal Orange County	0**
Nitrogen Dioxide	North Coastal Orange County	0***
PM10	North Coastal Orange County	NM
PM2.5	North Coastal Orange County	NM

* 1-hour average California standard (1-hour and 8-hour average Federal standards were not exceeded)
** 8-hour average California standard
*** 1-hour average California standard
NM = Pollutant not measured
Source: www.aqmd.gov

Significant improvements in the air quality of the larger Los Angeles basin region are attributed to emission reduction and reduced reactivity of emitted organic compounds in the region (SCAQMD, 2001). As everybody who owns a vehicle in California knows, vehicular emissions are monitored through the State's Smog Check Program. Emissions from stationary sources are also monitored. The South Coast Air Quality Management District (SCAQMD) is the local agency responsible for monitoring and enforcing air quality control with emphasis on emissions from stationary sources, such as restaurants, hotels, dry cleaners, tire shops, welding shops, car repair shops, hospitals, and industrial and manufacturing facilities. Those facilities that release emissions into the air are required to obtain a permit to do so from the EPA. The more recent data available (Hazus99 SR-2) indicate that there are approximately 95 facilities permitted to release emissions into the air in the Newport Beach Area. The regional distribution of these permitted facilities is shown on Plate 6-1.

To reduce air emissions, SCAQMD staff conducts periodic inspections of permitted facilities to ensure continued compliance with Federal and State requirements, and provide training to help business owners understand these requirements and keep up with new rules. If necessary, SCAQMD takes enforcement action to bring businesses into compliance. The SCAQMD does not provide a listing of all permitted facilities but it does provide information on facilities that were found to be non-compliant or for which there are violation reports. None of the facilities in the Newport Beach area have been cited in the last 90 days (as of December 1, 2002). For updated information, refer to http://ea1.aqmd.gov/nov/novintro.htm.

6.3 Drinking Water Quality

Most people in the United States take for granted that the water that comes out of their kitchen taps is safe to drink. In most areas, this is true, thanks to the efforts of hundreds of behind-the-scene individuals that continually monitor the water supplies for contaminants, in accordance with the drinking water standards set by the EPA. Primary authority for EPA water programs

Plate 6-1: Hazardous Materials Site Map of Newport Beach was established by the 1986 amendments to the Safe Drinking Water Act (SDWA) and the 1987 amendments to the Clean Water Act (CWA).

The National Primary Drinking Water Standard protects drinking water quality by limiting the levels of specific contaminants that are known to occur or have the potential to occur in water, and that can adversely affect public health. All public water systems that provide service to 25 or more individuals are required to satisfy these legally enforceable standards. Water purveyors must monitor for these contaminants on fixed schedules and report to the EPA when a Maximum Contaminant Level (MCL) has been exceeded. MCL is the maximum permissible level of a contaminant in water that is delivered to any user of a public water system. Drinking water supplies are tested for a variety of contaminants, including organic and inorganic chemicals (minerals), substances that are known to cause cancer (carcinogens), radionuclides (such as uranium and radon), and microbial contaminants. The contaminants for which the EPA has established MCLs are listed at http://www.epa.gov/safewater/mcl.html. Changes to the MCL list are typically made every three years, as the EPA adds new contaminants or, because, based on new research or new case studies, there are reason to issue revised MCLs for some contaminants.

One of the contaminants checked for on a regular basis is the coliform count. Coliform is a group of bacteria primarily found in human and animal intestines and wastes. These bacteria are widely used as indicator organisms to show the presence of such wastes in water and the possible presence of pathogenic (disease-producing) bacteria. Pathogens in these wastes can cause diarrhea, cramps, nausea, headaches, or other symptoms. These pathogens may pose a special health risk for infants, young children, and people with severely compromised immune systems. One of the fecal coliform bacteria that water samples are routinely tested for is Escherichia coli (E. coli). To fail the monthly Total Coliform Report (TCR), the following must occur:

- For systems testing more than 40 samples, more than five percent of the samples test positive for Total Coliform, or
- For those systems testing less than 40 samples, more than one sample tests positive for Total Coliform.

Two water agencies provide drinking water to the city of Newport Beach. The two agencies are:

- Orange County Water District (OCWD), and
- Metropolitan Water District of Orange County (MWDOC)

The OCWD is the agency that manages the Orange County Groundwater Basin ("Basin") that serves much of central and north Orange County, including the Newport Beach area. Ground water from four wells beneath the City of Fountain Valley is blended with MWDOC water at Newport Beach's Utilities Yard and distributed to Newport Beach residents. Neither the OCWD, nor the MWDOC, is listed in the EPA Safe Drinking Water Violation Report for Orange County, found at www.epa.gov/enviro/html/sdwis/sdwis_ov.html. This means that the water provided by these agencies meets standards for coliform levels and does not exceed the maximum levels for the contaminants routinely tested.

The Basin receives treated reclaimed water from the Orange County Sanitation District (OCSD). The reclaimed water goes through reverse osmosis and enters or will enter the groundwater basin in one of two ways: (1) direct injection into the seawater intrusion barrier by Water Factory #21; and (2) passive settling into settling ponds at the base of the Santa Ana River near Anaheim and Anaheim Hills (the latter is the so-called Groundwater Replenishment System or GWRS).

The Basin's use of reclaimed water to recharge the Basin can and has caused limited contamination of the Basin by at least two "chemicals of concern" for which "action levels" ("ALs") have been set by the California Health Services Department's Division of Drinking Water & Environmental Management. ALs are different from MCLs in that ALs simply require public agencies to notify appropriate agencies that an AL has been reached – water providers are NOT required to remove water from service that has attained an Action Level.

The chemicals found in the Basin are NDMA and 1,4-dioxane. In recent years, OCWD has detected both 1,4-dioxane and NDMA at levels at or near ALs at Newport Beach's four well sites. OCWD continues to monitor these and other chemicals of concern on an ongoing basis.

According to the EPA, (www.epa.gov/enviro/html/pcs/pcs_querry_java.html), no facilities in the Newport Beach area have EPA permits to discharge to local water sources.

One of the products most often used as a disinfectant by swimming pool, drinking water and wastewater facilities is chlorine, making chlorine one of the most prevalent extremely hazardous substances. Chlorine is typically found in the form of a colorless to amber-colored liquid, or as a greenish-yellow gas with a characteristic odor. The liquid solutions are generally very unstable, reacting with acids to release chlorine gas (such as bleach mixed with vinegar or toilet bowl cleaner containing hydrochloric acid). Mixing bleach with other products is the largest single source of inhalation exposure reported to poison control centers (http://www.emedicine.com/EMERG/topic851.htm). Chlorine gas is heavier than air and therefore stays close to the ground, where it can impact individuals. Exposure to chlorine gas generally impacts the respiratory system, with cough, shortness of breath, chest pain, and burning sensation in the throat reported as the most common symptoms. Respiratory distress can occur at even low concentrations of less than 20 parts per million (ppm). At high concentrations (> 800 parts per million – ppm) chlorine gas is lethal.

Chlorine gas is stored at the Big Canyon Reservoir ("BCR"). The City intends to phase out the use of chlorine gas at BCR by 2004 as a result of the covering of BCR. The City will use liquid chlorine to disinfect the water after the cover is installed. Similarly, when the currently empty San Joaquin Reservoir is used as a reclaimed water storage facility (anticipated to be late 2004), the Irvine Ranch Water District will use liquid chlorine as a disinfectant.

Chlorine pellets and chlorine solutions can be found at supermarkets, hardware stores and other locations that sell pool supplies. Bleach solutions can be found in almost every household and in commercial and industrial facilities, including hotels, hospitals, medical and veterinary facilities, etc. Proper storage and usage practices are required at all of these locations to reduce or eliminate the potential for a toxic release of chlorine. At larger facilities, such as the reservoirs mentioned above, proper operations and maintenance are critical to prevent equipment and process failures that could lead to the unauthorized release of chlorine at concentrations that could impact the surrounding areas. These facilities need to maintain a comprehensive program of personnel training, security enforcement and equipment monitoring to reduce the risk of an accidental or intentional (terrorist) release.

6.4 Regulations Governing Hazardous Materials and Environmental Profile of the City of Newport Beach

Various Federal and State programs regulate the use, storage, and transportation of hazardous materials. These will be discussed in this report as they pertain to the City of Newport Beach and its management of hazardous materials. The goal of the discussions presented herein is to provide information that can be used to reduce or mitigate the danger that hazardous substances may pose to Newport Beach residents and visitors.

Although several of these programs are summarized below, this is not meant to be an all-inclusive list. Hazardous materials management is legislated extensively, and the laws governing hazardous waste are complex and diverse. Several of the agencies involved in this process are identified below. Additional information can be obtained from their web pages.

6.4.1 National Pollutant Discharge Elimination System (NPDES)

Stormwater and Dry-Weather Runoff. "Out of sight, out of mind" has traditionally been a common approach to dealing with trash, sediment, fertilizer-laden irrigation water, used motor oil, unused paint and thinner, and other hazardous substances that people dump into the sewer or storm drains. What we often forget is that these substances eventually make their way into the rivers and oceans, where they can sicken surfers and swimmers, and endanger wildlife. The Clean Water Act of 1972 originally established the National Pollutant Discharge Elimination System (NPDES) to control wastewater discharges from various industries and wastewater treatment plants, known as "point sources." Point sources are defined by the EPA as discrete conveyances such as pipes or direct discharges from businesses or public agencies. Then, in 1987, the Water Quality Act amended the NPDES permit system to include "nonpoint source" pollution (NPS pollution). NPS pollution refers to the introduction of bacteria, sediment, oil and grease, heavy metals, pesticides, fertilizers and other chemicals into our rivers, bays and oceans from less defined sources. These pollutants are washed away from roadways, parking lots, yards, farms, and other areas by rain and dry-weather urban runoff, entering the storm drains, and ultimately the area's streams, bays and ocean. NPS pollution is now thought to account for most water quality problems in the United States. Therefore, strict enforcement of this program at the local level, with everybody doing his or her part to reduce NPS pollution, can make a significant difference.

The National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point and nonpoint sources that discharge pollutants into waters of the United States. Though individual households do not need NPDES permits, cities like Newport Beach hold NPDES permits to operate their municipal separate storm sewer systems (MS4s). Newport Beach's MS4 Permit (adopted January 2002) directs it to keep pollutants out of its MS4 to the maximum extent practicable and to ensure that dry-weather flows entering recreational waters from the MS4 do not cause or contribute to exceedances of water quality standards. The Permit requires the City to do the following:

- Control contaminants into storm drain systems;
- Educate the public about stormwater impacts;
- Detect and eliminate illicit discharges;
- Control runoff from construction sites;
- Implement "best management practices" or "BMPs" and site-specific runoff controls for new development and redevelopment; and
- Prevent pollution from municipal operations, including fixed facilities (like City Hall and fire stations) and field activities (like trash collection).

Specific programs that local governments typically implement in support of the NPDES program include:

- Regular maintenance of public rights of way, including street sweeping, litter collection, and storm drain facility maintenance;
- Implementation of spill response procedures;
- Periodic screening of water samples collected from the storm sewer system and local streams, to test for specific contaminants;
- Adoption and enforcement of an ordinance prohibiting the discharge of pollutants into the storm drain system;
- Plan review procedures to ensure that unauthorized connections to the storm sewer system are not made; and
- Public education efforts to inform residents about stormwater quality. These efforts typically include utility bill inserts describing the NPDES program, storm drain stenciling, booths at fairs and other public events, and school programs. The City of Newport Beach has developed the website at http://www.CleanWaterNewport.com/ to describe the local NPDES program and measures that can be taken by businesses and residents alike to reduce the potential for contamination of the local waters.

The City of Newport Beach is a member of the County of Orange's Stormwater Program (www.ocwatersheds.com). This program coordinates all cities and the county government in Orange County to regulate and control storm water and urban runoff into all Orange County waterways, and ultimately, into the Pacific Ocean. The Orange County Stormwater Program administers the current NPDES MS4 Permit and the 2003 Drainage Area Management Plan (DAMP) for the County of Orange and the thirty-four incorporated cities within the region. The Orange County NPDES permit serves a population of approximately 2.8 million, occupying an area of approximately 786 square miles. In the Newport Beach Area, NPDES permits are issued by the California Regional Water Quality Control Board, Santa Ana Region.

In support of the City's obligation to comply with its MS4 Permit and to keep waterways clean by reducing or eliminating contaminants from stormwater and dry-weather runoff, the City has an aggressive Water Quality Ordinance (Newport Beach Ordinance 97-26). The City has a stormwater education program, an aggressive inspection team that issues citations for water quality violations, and requires the use of "best management practices" in many residential, commercial, and development-related activities to reduce runoff.

Wastewater. Newport Beach also operates under a Waste Discharge Requirement (WDR) that directs it to effectively manage its wastewater collection system so that it eliminates sanitary sewer overflows (SSOs). SSOs threaten public health and resources by discharging pollutants – including untreated sewage, cleaning chemicals, endocrine disruptors and related medicines, food particles, and laundry and bath waters.

6.4.2 Comprehensive Environmental Response, Compensation and Liability Act

The Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), is a regulatory or statute law developed to protect the water, air, and land resources from the risks created by past chemical disposal practices. This act is also referred to as the Superfund Act, and the sites listed under it are referred to as Superfund sites.

According to the most recent EPA data available, there are two CERCLIS sites in the Newport Beach area (see Table 6-5), and both of these are not on the National Priorities List (NPL). The preliminary assessment of the Cagney Trust site was begun in March of 1999, and the study was completed on August 30, 1999. As a result of this study, the Cagney Trust site is considered a No Further Remedial Action Planned (NFRAP) site, and will most likely not be included in next year's Superfund list. The Ford Aerospace/Loral site is, according to the U.S. EPA database, being investigated (Preliminary Assessment Ongoing status). According to City of Newport Beach officials, however, the Regional Water Quality Control Board and the Orange County Health Care Agency both reportedly reviewed and approved the remediation activities conducted at this site prior to its development as part of the One Ford Road residential project.

Table 6-5: CERCLIS Sites in the Newport Beach Area

Facility Name	Facility Address	EPA ID	Status
Cagney Trust	SW corner of 32nd St. & Newport Blvd	CA0000187997	Not on NPL NFRAP
Ford Aerospace Facility (Loral Aerospace)	3501 Jamboree Blvd. # 500	CAD983623257	Not on NPL, PA Ongoing

Sources: www.epa.gov/superfund/sites/arcsites/index/htm;
http://www.epa.gov/superfund/sites/cursites/index.htm
http://oaspub.epa.gov/enviro/multisys_web.report

6.4.3 Emergency Planning and Community Right-To-Know (EPCRA)

The primary purpose of the Federal Emergency Planning and Community Right-To-Know Act (EPCRA) is to inform communities and citizens of chemical hazards in their areas. Sections 311 and 312 of EPCRA require businesses to report to State and local agencies the locations and quantities of chemicals stored on-site. These reports help communities prepare to respond to chemical spills and similar emergencies. This reduces the risk to the community as a whole.

EPCRA mandates that Toxic Release Inventory (TRI) reports be made public. The Toxics Release Inventory (TRI) is an EPA database that contains information on toxic chemical releases and other waste management activities reported annually by certain industry groups as well as federal facilities. This inventory was established in 1986 under the EPCRA and expanded by the Pollution Prevention Act of 1990. Sites on the TRI database are known to release toxic chemicals into the air. The EPA closely monitors the emissions from these facilities to ensure that their annual limits are not exceeded. TRI reports provide accurate information about potentially hazardous chemicals and their uses to the public in an attempt to give the community more power to hold companies accountable and to make informed decisions about how such chemicals should be managed.

Section 313 of EPCRA requires manufacturers to report the release to the environment of any of more than 600 designated toxic chemicals. These reports are submitted to the EPA and State agencies. The EPA compiles these data into an on-line, publicly available national digital TRI. These data are readily available on the EPA website at www.epa.gov. Facilities are required to report releases of toxic chemicals to the air, soil, and water. They are also required to report off-site transfers of waste for treatment or disposal at separate facilities. Pollution prevention measures and activities, and chemical recycling must also be reported. All reports must be submitted on or before July 1 of every year and must cover all activities that occurred at the facility during the previous year.

The following types of facilities are required to report their activities to the EPA and the regulatory State agencies:

Facilities with ten or more full-time employees that

- manufacture or process over 25,000 pounds of any of approximately 600 designated chemicals or twenty-eight chemical categories specified in regulations, or
- use more than 10,000 pounds of any designated chemical or category, or
- are engaged in certain manufacturing operations in the industry groups specified in the U.S. Government Standard Industrial Classification Codes (SIC) 20 through 39, or
- are a Federal facility.

The three facilities in the City of Newport Beach listed in the Toxic Release Inventory for year 2000 (the most recent TRI data available) are summarized in Table 6-6.

Table 6-6: Toxic Release Inventory of Facilities in the Newport Beach Area

Facility Name, Address	EPA ID	Chemicals
Conexant Systems Int. (Rockwell Semiconductor Systems) 4311 Jamboree Road	CAD008371437	Ammonia, catechol, hydrogen fluoride, nitric acid, nitrate compounds A formal enforcement action was filed by the EPA for this site on 1/29/2003.
Hixson Metal Finishing 829 Production Place	CAD008357295	tetrachloroethylene
Raytheon Systems Company (Hughes Aircraft Co.) 500 Superior Avenue	CAD057468944	Chemical names not listed. TRI Report dated 2000. According to the City, this facility has since closed its Newport Beach location.

Sources: U.S. Environmental Protection Agency, 2000, TRI On-site and Off-site Reported Releases in Orange County, California; List of EPA-regulated Facilities in Envirofacts (http://oaspub.gov/enviro/).

6.4.4 Resources Conservation and Recovery Act

The Resources Conservation and Recovery Act (RCRA) is the principal Federal law that regulates the generation, management, and transportation of hazardous materials and other wastes. Hazardous waste management includes the treatment, storage, or disposal of hazardous waste. Treatment is defined as any process that changes the physical, chemical, or biological character of the waste to make it less of an environmental threat. Treatment can include neutralizing the waste, recovering energy or material resources from the waste, rendering the waste less hazardous, or making the waste safer to transport, dispose of, or store. Storage is defined as the holding of waste for a temporary period of time. The waste is treated, disposed of, or stored at a different facility at the end of each storage period. Disposal is the permanent placement of the waste into or on the land. Disposal facilities are usually designed to contain the waste permanently and to prevent the release of harmful pollutants to the environment.

The EPA lists the following four transporters of hazardous waste in the Newport Beach area:

- Innovative Waste Control, Inc. – 1300 Bristol Street N., Suite 100
- R.E. Mockett – 1601 Antigua
- Roadway Construction Company Inc. – 4101 Westerly Place, Suite 101
- W B R Transportation, LLC – 2240 Newport Boulevard

Transportation of hazardous materials on the portions of the freeways and major roads that extend through the City is most likely also conducted by other companies that are not based out of Newport Beach.

Many types of businesses can be producers of hazardous waste. Small businesses like dry cleaners, auto repair shops, medical facilities or hospitals, photo processing centers, and metal-plating shops are usually generators of small quantities of hazardous waste. Small-quantity generators are facilities that produce between 100 and 1,000 kilograms (Kg) of hazardous waste per month (approximately equivalent to between 220 and 2,200 pounds, or between 27 and 275 gallons). Since many of these facilities are small, start-up businesses that come and go, the list of small-quantity generators in a particular area changes significantly over time. Often, a facility remains, but the name of the business changes with new ownership. For these reasons, small-quantity generators in the Newport Beach area are not listed in this report. As of December 2002, there were approximately 115 small-quantity generators of hazardous materials in the Newport Beach area (http://oaspub.epa.gov/enviro - search for small quantity generators under the RCRA Info database).

Larger businesses are sometimes generators of large quantities of hazardous waste. These include chemical manufacturers, large electroplating facilities, and petroleum refineries. The EPA defines a large-quantity generator as a facility that produces over 1,000 Kg (2,200 pounds or about 275 gallons) of hazardous waste per month. Large-quantity generators are fully regulated under RCRA. The large-quantity generators in the City of Newport Beach registered in 1999 and more recently are listed in Table 6-7.

Table 6-7: EPA-Registered Large-Quantity Generator (LQG) Facilities in Newport Beach

Facility Name, Address	EPA ID	RCRA Tons Generated
Conexant Systems, Inc. (Rockwell Semiconductor Systems) 4311 Jamboree Road	CAD008371437	2051.28 reported as a LQG in 1999 and 2000
Raytheon Systems Company* 500 Superior Avenue	CAD057468944	16.91
Newport Fab LLC 4311 Jamboree Road, Bldg. 503	CAR000113233	Not Available RCRA Notified in 2002

Sources:

 List of Large Quantity Generators in the United States: The National Biennial RCRA Hazardous Waste Report (Based on 1999 Data); and
 List of EPA-Regulated Facilities in Envirofacts (http://www.epa.gov/enviro/)
* The Raytheon Systems Company has since closed its Newport Beach facility, and the site has been redeveloped into a business park (Alford, personal communication, 2003).

In addition to the facilities listed in Table 6-7 above, the following businesses and facilities in Newport Beach have been reported as large quantity generators in years prior to 1999:

- Ford Motor Company – 1000 Ford Road – reported as a large quantity generator in 1996 and 1997;
- Hixson Metal Finishing – 829 Production Place – reported as a large quantity generator inspected by EPA in 1996;
- Hoag Memorial Hospital – 301 Newport Boulevard – reported as a large quantity generator in 1997;

- Jetronic Industries In., - Transchem Division – 3767 Birch – reported as a large quantity generator inspected by EPA in 1996;
- The Koll Company KCN 4 – 4910 Birch Street – reported as a large quantity generator in 1996;
- Loral Aeronutronic – 1000 Ford Road Buildings 1, 2, 9, & 11 – reported as a large quantity generator in 1996;
- Newport Enterprises DBA Land Rover – 1540 Jamboree Road – reported as a large quantity generator in 1996; and
- Sterling Motors Ltd., DBA Sterling BMW – 3000 West Coast Hwy. – reported as a large quantity generator in 1996.

As reported elsewhere in this document, some of these businesses, like Loral Aeronutronics, have since ceased their operations in Newport Beach.

6.4.5 Hazardous Materials Disclosure Program

Both the Federal Government and the State of California require all businesses that handle more than a specified amount of hazardous materials or extremely hazardous materials, termed a reporting quantity, to submit a business plan to its local Certified Unified Program Agency (CUPA). The CUPA with responsibility for the City of Newport Beach is the Orange County Environmental Health Division. The Newport Beach Fire Department is listed as the local participating agency for the CUPA program.

Business plans are designed to be used by responding agencies, such as the Newport Beach Fire Department, during a release to allow for a quick and accurate evaluation of each situation for an appropriate response. Business plans are also used during a fire to quickly assess the types of chemical hazards that fire-fighting personnel may have to deal with, and to make such decisions as evacuating the surrounding areas. The Newport Beach Fire Department reviews annually submitted business plans.

Business plans need to be submitted by any business that uses, generates, processes, produces, treats, stores, emits, or discharges a hazardous material in the following reportable quantities:

- 55 gallons of more of a liquid,
- 500 pounds or more of a solid, and/or
- 200 cubic feet or more of (compressed) gas.

Any new business that meets the criteria above must submit a full hazardous materials disclosure report that includes an inventory of the hazardous materials generated, used, stored, handled, or emitted; and emergency response plans and procedures to be used in the event of a significant or threatened significant release of a hazardous material. The plan needs to identify the procedures to follow for immediate notification to all appropriate agencies and personnel in the event of a release, identification of local emergency medical assistance appropriate for potential accident scenarios, contact information for all company emergency coordinators of the business, a listing and location of emergency equipment at the business, an evacuation plan, and a training program for business personnel. On subsequent years, once the full contingency plan is on file at the Fire Department, and if nothing has changed, businesses are allowed to submit a letter stating that there are no changes to their business plan. The Fire Department conducts yearly inspections of all these businesses to confirm that their business plan is in order and up-to-date.

6.4.6 Hazardous Materials Incident Response

There are thousands of different chemicals available today, each with its own unique physical characteristics; what might be an acceptable mitigation practice for one chemical could be totally inadequate for another. Therefore it is essential that agencies responding to a hazardous material release have as much available information as possible regarding the type of chemical released, the amount released, and its physical properties to effectively and quickly evaluate and contain the release. The EPA-required business plans are an excellent resource for this type of information. Other sources of information are knowledgeable facility employees present onsite.

In 1986, Congress passed the Superfund Amendments and Reauthorization Act (SARA). Title III of this legislation requires that each community establish a Local Emergency Planning Committee (LEPC). This committee is responsible for developing an emergency plan that outlines steps to prepare for and respond to chemical emergencies in that community. This emergency plan must include the following:

- an identification of local facilities and transportation routes where hazardous materials are present;
- the procedures for immediate response in case of an accident (this must include a community-wide evacuation plan);
- a plan for notifying the community that an incident has occurred;
- the names of response coordinators at local facilities; and
- a plan for conducting exercises to test the plan.

The plan is reviewed by the State Emergency Response Commission (SERC) and publicized throughout the community. The LEPC is required to review, test, and update the plan each year. The Newport Beach Fire Department and the City Manger's Office are the City entities charged with the coordination of the City's disaster operations.

6.4.7 Hazardous Material Spill/Release Notification Guidance

All significant releases or threatened releases of hazardous materials, including oil, require emergency notification to several government agencies. The State of California, Governor's Office of Emergency Services (OES) has developed a Hazardous Material Spill/Release Notification Guidance to guide the public, industry, and other government entities in the reporting process for hazardous materials accidents. This Guidance can be found at the OES website (http://www.oes.ca.gov/) under the Hazardous Materials Unit link.

To report all significant releases or threatened releases of hazardous materials, first call 911, and then call the Governor's Office of Emergency Services (OES) Warning Center at 1-800-852-7550. The City of Newport Beach has developed a Hazardous Materials Response Plan (Policy 5.F.100) that establishes the responsibility of different responding agencies to any hazardous materials release incident. The Local Authority for scene management in the event of a hazardous materials spill is the Newport Beach

Fire Department. The Fire Department personnel that first respond to the incident make the decision to call in other agencies, depending on the situation. The Newport Beach Police Department also responds to the first call to assess whether there were any law violations or negligent acts that caused the incident, documenting the resources spent by the City for civil recovery, and documenting any exposures or injuries.

Requirements for immediate notification of all significant spills or threatened releases cover: Owners, Operators, Persons in Charge, and Employers. Notification is required regarding significant releases from: facilities, vehicles, vessels, pipelines and railroads. Under Health and Safety Code §25507, State law requires Handlers, any Employees, Authorized Representatives, Agents or Designees of Handlers to, upon discovery, immediately report any release or threatened release of hazardous materials. Federal law requires, under the Emergency Planning and Community-Right-to-Know Act (SARA Title III) (EPCRA) and the Comprehensive Environmental Response, Compensation, and Liability Act (Superfund) (CERCLA), that all Owners, Operators, and Persons in Charge report all releases that equal or exceed federal reporting quantities.

State law requires, at a minimum, the following information during the notification of a spill or threatened release:

- Identity of caller;
- Location, date and time of spill, release, or threatened release;
- Substance and quantity involved;
- Chemical name (if known, it should be reported; also if the chemical is extremely hazardous); and
- Description of what happened.

Federal law requires the following additional information during the notification of spills (CERCLA chemicals) that exceed federal reporting requirements:

- Medium or media impacted by the release
- Time and duration of the release
- Proper precautions to take
- Known or anticipated health risks
- Name and phone number for more information

In the event of a release/spill, at a minimum, the following government agencies must be notified:

- Local Emergency Response agency (9-1-1 or Local Fire Department)
- The Certified Unified Program Agency (CUPA) (Orange County Environmental Health Division (714/667-3771) and Participating CUPA Agency (Newport Beach Fire Department, (949/644-3106)
- Governor's Office of Emergency Services Warning Center (1-800-852-7550 or (916/845-8911)
- California Highway Patrol (CHP) (9-1-1), only if the spill/release occurred on a highway.

In addition to the afore mentioned notification agencies, one or more of the following agencies may need to be notified, depending on the specifics of the incident:

- National Response Center (1-800/424-8802) if the spill equals or exceeds CERCLA Federal reportable quantities;
- United States Coast Guard (Marine Safety Office LA/Long Beach (310/732-7380) if the spill occurred in a waterway;
- California Occupational Safety and Health Administration (Cal/OSHA) (Anaheim Enforcement District Office (714/939-0145) if serious injuries or harmful exposures to workers occurred during the spill;
- Department of Toxic Substances Control (DTSC) Cypress Regional Office (714/484-5300) if the release is from a hazardous waste tank system or from a secondary containment system;
- Department of Conservation, Division of Oil Gas and Geothermal Resources (DOGGR) District 1, Cypress Office (714/816-6847) in the case of an oil or gas release at a drilling site; and
- Public Utilities in the case of a natural gas pipeline release.

For further information on the requirements for emergency notification of a hazardous chemical release, refer to the following statutes:

- Health and Safety Code §25270.7, 25270.8, 25507
- Vehicle Code §23112.5
- Public Utilities Code §7673, (PUC General Orders #22-B, 161)
- Government Code §51018, 8670.25.5 (a)
- Water Code §13271, 13272
- California Labor Code §6409.1 (b)10, and
- Title 42, U.S. Code §9603, 11004.

The California Accidental Release Prevention Program (CalARP) became effective on January 1, 1997, in response to Senate Bill 1889. The CalARP replaced the California Risk Management and Prevention Program (RMPP). Under the CalARP, the Governor's Office of Emergency Services (OES) must adopt implementing regulations and seek delegation of the program from the EPA. The CalARP program aims to be proactive: it requires businesses to prepare Risk Management Plans (RMPs), which are detailed engineering analyses of:

- the potential accident factors present at a business; and
- the mitigation measures that can be implemented to reduce this accident potential.

In most cases, local governments have the lead role for working directly with businesses in this program. The Newport Beach Fire Department is designated as the local administering agency for this program.

6.5 Leaking Underground Storage Tanks (LUST)

Leaking underground storage tanks (LUSTs) are one of the greatest environmental concerns of the past several decades. In California, regulations aimed at protecting against UST leaks have been in place since 1983, one year before the Federal Resource Conservation and Recovery Act (RCRA) was amended to add Subtitle I requiring UST systems to be installed in accordance with standards that address the prevention of future leaks. The Federal regulations are found in the Code of Federal Regulations (CFR), parts 280-281. The State law and regulations are found in the California Health and Safety Code, Chapter 6.7, and the California Code of Regulations (CCR) Title 23, commonly referred to as the "California Underground Storage Tank Regulations." Federal and state programs include leak reporting and investigation regulations, and standards for clean up and remediation. UST cleanup programs exist to fund the remediation of contaminated soil and groundwater caused by leaking tanks. California's program is more stringent than the Federal program, requiring that all tanks be double walled, and prohibiting gasoline delivery to non-compliant tanks. The State Water Resources Control Board (SWRCB) has been designated the lead regulatory agency in the development of UST regulations and policy.

The State of California now requires replacement of older tanks with new double-walled, tanks with flexible connections and monitoring systems. Many older tanks were single-walled steel tanks that have leaked as a result of corrosion and detached fittings. Extensive Federal and State legislation addresses LUSTs, including replacement and cleanup. UST owners were given a ten-year period to comply with the new requirements, and the deadline came due on December 22, 1998. However, many UST owners did not act by the deadline, so the State granted an extension for the Replacement of Underground Storage Tanks (RUST) program to January 1, 2002. The California Regional Water Quality Control Board (CRWQCB), in cooperation with the Office of Emergency Services, maintains an inventory of LUSTs in a statewide database.

According to the most recent State Water Resources Control Board's (SWRCB) Leaking Underground Storage Tank (LUST) database (dated September 25, 2002; www.swrcb.ca.gov/cwphome/lustis/dbinfo.html*)*, 76 LUST cases were reported in the Newport Beach Area between 1982 and 2000. Of these, according to the LUST database, 47 sites have been remediated and closed, leaving 29 cases still open. These are listed in Table 6-8, below. This list however, is reportedly not updated as often as necessary, so several of the cases in Table 6-8 may be further along in the assessment and remediation process than the list indicates, and some of the cases may already be closed. This is the case with at least two leak cases, at the Newport Beach Corporate Yard and the Newport Beach Police Facility which, according to the City's General Services Director (Niederhaus, personal communication, 2003), have been released from further testing by the Orange County Health Care Agency's Environmental Division.

It is also important to note that none of the leaks that have been reported in the City have impacted a drinking source of ground water. Of the cases listed in Table 6-8, fifteen impacted ground water that is not used for drinking purposes, and the rest impacted the surrounding soil only.

Table 6-8: Leaking Underground Storage Tanks Reported in the Newport Beach Area

SITE NAME	ADDRESS	CASE No.	CASE TYPE	STATUS, CONTAMINANT	REPORT DATE
Arco	200 Coast Hwy.	083002615T	S	3A, G	28-Apr-94
Beach Imports	848 Dove St.	083001608T	S	3B, G	31-Jul-90
Beacon Bay Car Wash	4200 Birch St.	083001459T	O	5R, G	12-Apr-90
Big Canyon Country Club	1850 Jamboree Rd.	083000064T	O	8, G	30-May-86
Chevron #20-1093	1240 Bison Ave.	083003036T	S	1, G	21-Jul-97
Chevron #20-2016	2121 Bristol St.	083003460T	S	1, G	23-Apr-99
Chevron #9-3042	1550 Jamboree Rd.	083000097T	O	5C, G	10-Apr-85
Chevron #9-7100	3531 Newport Blvd.	083000104T	O	8, G	08-Oct-85
Dollar Rental Car	2152 Bristol Ave.	083003725T	S	1, G	15-Feb-99
Edgewater Place	309 Palm St.	083000134T	S	5C, G	02-Feb-87
Ford Aerospace Corporation	3000 Ford Rd.	083001066T	S	5C, D	25-Oct-88
Four Seasons Hotel	690 Newport Center Dr.	083003073T	S	3B, D	23-Sep-97
Hughes Aircraft Co-Solid Prod.	500 Superior Ave.	083000821T	O	7, D	02-Feb-88
Koll Center Newport (KCN A)	4910 Birch St.	083002383T	S	3B, G	04-Nov-93
Lido Park Condominiums	601 Lido Park Dr.	083003306T	S	1, D	10-Nov-98
Mobil #18-HG7	1500 Balboa Blvd.	083000618T	O	5C, G	02-Jun-87
Mobil #18-HGK	301 Coast Hwy.	083000246T	O	5C, G	01-Aug-86
Newport Auto Center	445 Coast Hwy.	083001744T	O	5R, WO	21-Dec-93
Newport Beach Corp. Yard	592 Superior Ave.	083003489T	S	1, G	07-May-99
Newport Beach Golf Club	3100 Irvine Ave.	083000295T	O	5R, G	01-Oct-86
Newport Beach Police Dept.	870 Santa Barbara Dr.	083002849T	S	1, MO	25-Jun-96
Newport Nissan	888 Dove St.	083000302T	S	5R, UG	12-Jul-90
Permalite Plastics Corporation	1537 Monrovia Ave.	083003609T	S	1, MEK	08-Oct-99
Shell #990	990 Coast Hwy.	083002129T	O	5R, G	06-Jul-92
Shell #1000	1000 Irvine Ave.	083000358T	O	7, G	01-Oct-86
Shell #2801	2801 Coast Hwy.	083000359T	O	8, G	10-Apr-85
Triangle Associates (Luby)	4625 Coast Hwy.	083000411T	O	7, G	19-Sep-85
Unocal #6521	2690 San Miguel Dr.	083000574T	O	5R, G	07-Jul-87
World Oil Service Station #42	3401 Newport Blvd.	083001456T	O	7, H	26-Mar-90

Source: www.swrcb.ca.gov/cwphome/lustis/index.html

Abbreviations Used for Case Type: **S** = Soil contaminated; **O** = ground water not used for drinking contaminated; **U** = undetermined; **A** = drinking water aquifer contaminated.
Abbreviations Used for Contaminant: G = Gasoline, UG = Unleaded Gasoline; D = Diesel, MO = Motor Oil; WO = Waste Oil; MEK = Methyl ethyl ketone.
Abbreviations Used for Status: **0** = No action taken; **1** = Leak being confirmed; **3A** = Preliminary site assessment workplan submitted; **3B** = Preliminary site assessment underway; **5C** = Pollution characterization underway; **5R** = Remediation plan submitted; **7**= Remedial action under way; **8** = Post-remedial monitoring; **9** = Case closed / Remediation completed.

6.6 Household Hazardous Waste and Recycling

According to FEMA (1999), most victims of chemical accidents are injured at home. These accidents usually result from ignorance or carelessness in using flammable or combustible materials. In an average city of 100,000 residents, 23.5 tons of toilet bowl cleaner, 13.5 tons of liquid household cleaners, and 3.5 tons of motor oil are discharged into city drains each month (FEMA, 1999).

The County of Orange operates four household hazardous waste collection centers in accordance with the California Integrated Solid Waste Management Act of 1989 (Assembly Bill 939). These centers are located in the cities of Anaheim, Huntington Beach, Irvine, and San Juan Capistrano. The two locations closest to the City are the Huntington Beach center at 17121 Nichols Street and the Irvine location at 6411 Oak Canyon. Both locations are open Tuesday through Saturday from 9AM to 1PM. For more information on these locations, please visit http://www.oclandfills.com/hhwcc.htm.

A variety of household toxics are accepted. Acceptable wastes include batteries, cleaning products, cosmetics, latex paints, oil paint, paint in aerosol cans, fluorescent tubes with ballasts, personal care products, antifreeze, degreasers, gasoline, motor oil, unused road flares, waxes and polishes, aerosols, BBQ propane tanks, hobby chemicals, medications, varnishes, wood preservatives, and mercury. Items not accepted at these locations include ammunition, asbestos, biological waste, compressed gas cylinders, explosives, radioactive materials, and cathode ray tubes (TV and computer monitors).

6.7 Oil Fields and Methane Gas Mitigation Districts

Oil and gas seeps are common occurrences in many parts of California, including in and around Newport Beach. Many of California's oil fields were discovered upon drilling next to oil or gas seeps that had been flowing for centuries, if not millennia. In fact, at least 52 of California's oil fields were discovered by drilling next to seeps (California Division of Oil and Gas, 1980), and many of the area's cities started their days as oil field boom towns. Although Newport Beach does not owe its fame to oil and gas, several oil seeps and oil-stained rock in outcrops led to prospectors drilling for oil in this part of Orange County as early as 1904 (Corwin, 1946). It would take several years, until 1922, before a commercial oil field was developed in the area, but today there are two oil fields in the area: the Newport field within City limits, and the West Newport oil field within the City's Sphere of Influence. These oil fields are discussed below, and their locations are shown on Plate 6-2.

Seeps still occur locally; in 1975, when the Division of Oil and Gas (now known as the Division of Oil, Gas and Geothermal Resources), surveyed the oil and gas seeps in California, six separate gas or oil and gas seeps were reported in or near Newport Beach (California Division of Oil and Gas, 1980). At least two of the oil and gas seeps were associated with a strong hydrogen sulfide odor, and in the vicinity of 43rd Street, pipes driven 2 to 3 feet into the ground had a continuous gas flow. Residents used these pipes as "tiki" torches. The City of Newport Beach recognizes several gas mitigation districts where gas can be encountered at the surface, or in the shallow subsurface. Special studies and mitigation measures are required in these areas. This will be discussed further below, in Section 6.7.2.

Newport Oil Field – This oil field is located in the western portion of Newport Beach (see Plate 6-2). The field was divided into two areas known as the Cagney and Beach areas. The discovery well in this field was drilled in 1922 by Gilbert H. Beesemyer in the Beach Area. The well was completed at a depth of 1,750 feet, and peak production from this well was 28,946 barrels (bbl) of oil in 1925. The first well in the Cagney Area was developed by the California Exploration Co. in June 1947. This well, drilled to a total depth of 1,906 feet, had a peak production of 4,270 bbl in 1948. The deepest well in this area was developed by Jergins Oil Co. to a depth of 3,878 feet. According to the California Division of Oil and Gas (1997), the Beach Area of this field has been abandoned. As of December 2001, there were still 3 gas-producing wells in the Cagney area, and this field was estimated to have oil reserves of 35 million bbl (Division of Oil, Gas and Geothermal Resources, 2001 Annual Report). In the most recent map of the Division of Oil, Gas and Geothermal Resources (2003) only two active wells are shown in this field (see Plate 6-2). When Newport Beach adopted its charter in 1954, oil drilling was banned in the City, so no new wells will be drilled in this field.

West Newport Oil Field – The West Newport Oil Field, located to the west of the older Newport Field, was discovered in April 1943, when the discovery well "Banning" 1 was completed by D.W. Elliott to a depth of 2,404 feet. Initial production of this well was 40 bbl a day. Another well was drilled about 1,000 feet to the northeast in November 1943. This well, "Banning" 2, was completed at a depth of 2,497 feet, and produced 12 bbl of oil a day. No new wells were drilled after that until 1945. Since then, hundreds of wells have been drilled in the area, the deepest completed at a depth of 7,889 feet. At the end of 2001, there were 66 producing wells in this field, including several offshore, and 30 shut-in wells (idle but not abandoned). At least one new well was being drilled in this field in 2002. Fifteen of the producing wells are owned by the City of Newport Beach. In 2001, the 66 wells produced 131,831 bbl of oil and condensate; and the field was estimated to have 847 millions bbl of oil in reserves (Division of Oil, Gas and Geothermal Resources, 2001 Annual Report).

6.7.1 Environmental Hazards Associated with Oil Fields

Petroleum contains several components that are considered hazardous by the State of California, such as benzene, a known carcinogen. Oil field activities often include the use of hazardous materials like fuels and solvents. Day-to-day practices in some of the earlier oil fields were not environmentally sensitive, and oil-stained soils and other contaminants can often be found in and around oil fields. This typically becomes an issue when the oil field is no longer economically productive, and the property becomes a valuable real estate asset if developed, usually for residential purposes. Assessing the feasibility of developing an oil field property requires comprehensive site investigations in order to accurately identify and characterize any soil and groundwater contamination that may have resulted from the oil field operations. These site investigations are required by local and/or regional environmental laws and regulations, and vary in scope according to applicable government regulations, generally accepted standards of practice, and site-specific conditions (Fakhoury and Patton, 1992).

Insert Plate 6-2: Oil Fields, Oil Wells and Methane Gas Mitigation Districts

The major areas of potential environmental concern associated with oil and gas production include:

Oil spilled adjacent to oil wells: Oil-stained soil (often discolored) that occurs around oil wells and the pumping units. As can be seen by a review of the CERCLIS sites for the Newport Beach, at least one oil well site has been previously listed as a Superfund site (South Basin Oil Co. Well #1). It is possible that other well sites may need such a level of remediation prior to a change in land use.

Heavy metals and oil contained in sumps, pits and spill containment areas: In many oil fields, sumps were often used in the construction and maintenance of wells. Sumps are usually earthen berms constructed to contain the waste products from drilling and well completion operations. Alternatively, drilling waste materials are piped to or disposed of in metal or concrete containers. Typical waste materials consist of petroliferous cuttings, drilling fluid, additives, formation water, sludge, and crude oil. Drilling fluid typically consists of a water-based clay suspension with various chemical additives. Additives may have included any variety of heavy metals, such as arsenic, which was used as a corrosion inhibitor, or chromium and barite, which were used as weighting compounds.

Wells and Cellars: Wells and cellars are often built around wells to collect oil spilled during well maintenance or equipment malfunction, but occasionally oil may spill outside the well cellar.

Oil releases from above ground and underground storage tanks: Oil-stained soils are often encountered adjacent to storage tanks. Releases may occur if a pipeline connected to the tank ruptures, if the tank itself is punctured or damaged, or during the transfer of crude between the storage tanks and transport vehicles. Released oil could impact the surrounding soils.

Oil releases from broken pipelines: Buried and aboveground pipelines often exist in oil fields. These pipelines carry crude oil, water, and natural gas from the oil wells to storage tanks. A pipeline rupture would result in the release of crude oil that could impact the surrounding soils.

Spilled refined fuels used in the operation and maintenance of oil-field vehicles and generators, and boneyards (disposal sites): Oil fields often have an equipment maintenance area where equipment and supplies are stored and where generators and other pumping equipment are serviced. Refined fuel (gasoline, diesel) storage tanks are often present in these areas to supply fuel for the vehicles used in servicing and maintaining the oil field. Spills of refined product can impact the soil and ground water. Refined fuels pose a greater hazard to the environment than crude oil because the lighter hydrocarbon fractions present in refined fuels are more soluble and volatile, thereby posing a greater environmental and health hazard than crude oil. Some of the constituents in gasoline and diesel fuel, including benzene, toluene, ethylbenzene and isomers of xylene, are known to be harmful to human health.

Tank bottom material used to oil roads: Road oiling was historically a common practice in some oil fields to control dust. The oiling material was typically a residue consisting of water, oil, sediment and sludge from storage tanks. This material was sprayed on road surfaces.

Formation water spilled onto the ground surface: Formation water, often containing high concentrations of total dissolved solids (approximating saline water), is often produced as part of the development of an oil field (oil wells typically produce oil, gas and water in varying quantities). If large quantities of this saline water are disposed of onto the ground surface and the water infiltrates the soil, the water quality of any near-surface aquifers could be impacted.

Natural Hydrocarbon Seeps: In some oil fields, the occurrence of near-surface or at-the-surface deposits of natural tar and tar-saturated sediments, or concentrations of methane at explosive or near-explosive limits also pose a constraint to development. Both oil and gas seeps have been reported in the Newport Beach area. The potential hazards of gas (methane) are discussed further below.

If these oil fields are ultimately developed into other uses, such as residential areas, those portions of the field with potential environmental concerns should be identified, and characterized by type and extent of contamination. Once established, a complete presentation of the findings, conclusions and recommendations should be done to determine risk assessments, feasibility studies and remedial action plans. The types of concern may include: crude oil, volatile organic compounds (VOCs), semi-VOCs, metals, and polychlorinated biphenyls (PCBs). The extent of contamination is investigated by conducting site inspections, and addressing the impacts of chemical discharge to both the soil and ground water.

6.7.2 Methane Gas Mitigation Districts

As briefly mentioned above, gas occurs in the shallow subsurface in some areas of the City. This gas is predominantly methane, although small amounts of many other natural gases may be part of the mix. Methane is a naturally occurring gas that typically forms as a by-product of bacterial digestion of organic matter, and therefore, occurs ubiquitously, although generally at very low concentrations, in the air we breathe. If free of impurities, methane is colorless and odorless, and under normal atmospheric conditions, does not pose a health hazard, as it is not poisonous. However, at high concentrations, this gas is flammable, and at concentration of between 55,000 and 140,000 parts per million (ppm), it is explosively combustible. At very high concentrations it can cause asphyxiation due to oxygen displacement. Methane is not toxic below levels that would lead to asphyxiation. The fact that it is colorless and odorless makes it especially hazardous, as it cannot be readily detected without special sensors.

In the subsurface, methane forms in areas where organic-rich sediments, such as in a swamp, are undergoing bacterial decomposition. Because of its origin, this type of methane is referred to as "biogenic". A man-made example of such an area would be a landfill or dairy pasture. Methane and other natural gases can also form at great depth, where they are most often associated with petroleum deposits. Since this type of methane forms as a result of thermal (heat) alteration of petroleum and/or organic matter in the rocks, it is termed "thermogenic" or "petrogenic". Methane produced near the surface is generally at low to very low pressures, whereas that derived from oil-producing zones is generally at high pressures (Cobarrubias, 1992). There are numerous chemical characteristics of the gas that may reveal clues about its origin. However, the processes by which the gas forms and moves through the rocks or sediments are often very complex, altering and adding to the chemical characteristics of the gas. Consequently, it frequently becomes very difficult to determine the source. Some gases may be a combination of both thermogenic and biogenic processes.

Regardless of the environment in which it forms, methane is lighter than air, and therefore tends to migrate upwards through permeable sediments, rock fractures, and even man-made structures (such as well casings). If the geologic unit is permeable enough, the gases eventually reach the surface and mix with the atmosphere. Under certain conditions, the gas can become trapped under an impermeable layer. In nature, these impermeable layers are typically comprised of claystone or similar fine-grained materials. As the gas accumulates under the impermeable layer, it can build up to high concentrations and pressures. Man-made structures, such as pavement or building foundations can also prevent gas from venting to the atmosphere. Methane can accumulate in the upper reaches of poorly ventilated building components, such as basements, crawl-spaces, and attics, sometimes with catastrophic results. For example, in 1986, there was a methane gas explosion and fire in the Fairfax area of Los Angeles (in the former Salt Lake oil field) that resulted from gas trapped beneath the pavement.

MITIGATION OF METHANE GAS

Given the potential for combustible gases to accumulate in or under buildings or structures, the City of Newport Beach has established guidelines to reduce the hazard posed by these gases. These guidelines are based on findings that show that high concentrations of methane gas can be managed and mitigated effectively with the proper investigation and analysis so that the development is protected from the adverse impacts of methane. Five methane gas mitigation districts have been identified in the City. These areas are shown on Plate 6-2. For proposed projects within these areas (project is defined as any application for tentative tract map, parcel map or zoning amendment, any construction on a previously vacant building site, or any construction that would increase the impervious surface on any parcel or parcels by 300 square feet or more), the City requires the following prior to approval of the project (City Code Chapter 15.55):

- Submittal of a plan prepared by a licensed consulting geologist or other qualified consultant to test for the presence of methane gas, or committal to test in conformance with the standard plans and specifications adopted by the Fire Chief and/or Building Director;

- Testing for the presence of methane gas in accordance with the approved plan (above) or the standard plans and specifications;

- If testing reveals the presence of methane gas in excess of 1.25 percent by volume at ambient pressure and temperature (the lower explosive limit), submittal of a mitigation plan for approval by the Fire Chief and/or Building Director. The mitigation plan needs to be prepared by a licensed geologist or other qualified consultant. Mitigation measures that can be used include flared vent systems, underground collection systems, or other proven systems, devices or techniques. The mitigation measures proposed need to be designed to reduce the level of methane gas in any building or structure to less than 25 percent of the lower explosive limit. If the mitigation measures undertaken do not reduce the level of methane gas to below 25 percent of the lower explosive limit, the mitigation plan needs to be modified to include additional measures, and those measures need to be implemented within 30 days after approval of the amended mitigation plan.

- Installation of an isolation barrier consisting of a continuous, flexible, permanent and non-gas permeable barrier beneath all newly constructed foundations and floors at ground level. Barrier penetrations need to be secured with a gas-tight seal.

- Obtaining a certificate of compliance from the Fire Chief and/or Building Director in conformance with City Ordinance 89-42 §1 (part) passed in 1990.

The objective of these guidelines is to prevent gases from accumulating to potentially hazardous concentrations. In the last 10 years or so, several new developments in the Newport Beach area have installed methane gas barriers to mitigate this hazard. The most complex remediation system in the area is that one in place at Hoag Hospital, in an area where the methane gas mixture includes hydrogen sulfide. The remediation system at Hoag incorporates a network of wells and trench collectors that pump the soil gases to a central unit where air scrubbers remove the hydrogen sulfide. Hoag then uses the cleaned methane to heat the building. Other features of this remediation system include a pipe-and-barrier system underneath the building slab that serves as extra guard against gas leaking through the building's foundation, and air pumps inside the building that can pull in fresh air at a rate faster than gas can come through the foundation. Therefore, should the gas sensors in the building detect seeping methane, the air pumps can bring in fresh air that would reduce the methane concentrations well below hazardous levels (http://www.laweekly.com/ink/01/24/belmont-perera3.php).

Although the West Newport oil field is not located within or next to a methane gas mitigation district, if and when this field is developed for residential or other purposes, methane gas associated with the oil wells and any oil-stained soils may be encountered. The mitigation measures to be selected and implemented in this area should address oil wells in addition to natural gas seepages. The Orange County Fire Authority (OCFA, 2000) has guidelines regarding mitigation of gas leakage from abandoned wells, and mitigation procedures for buildings located near abandoned wells. The California Division of Oil, Gas and Geothermal Resources (CDOGGR), as well as the OCFA, does not approve of placing buildings directly on top of an abandoned well. Specific tasks that can be undertaken to reduce the hazard of methane gas in an abandoned oil field include:

- Baseline Study – Prior to grading, a baseline study can be performed to gain a better understanding of the current distribution and concentrations of methane in the area proposed for development. This study can include soil gas sampling and analysis performed by a methane consultant. Since the distribution of methane can change with depth, the consultant's report should include a work plan for further investigation during grading, including sampling intervals, procedures, and potential mitigation measures that might be implemented during grading.

- Excavation Sampling – During grading, soil gas sampling and analysis should be performed on the bottom of all excavations in the development area. This would include cuts to design grade, overexcavation of building pads, the bottoms of areas where unsuitable foundation soils have been removed, buttress cuts, etc. "Bottoms" sampling should also be conducted at each well location. The sampling and analysis should include a determination of gas pressure, hydrocarbon concentration, and chemical composition. If anomalous, and potentially hazardous gas seeps are identified, the methane consultant shall recommend specific remedial measures.

- Evaluation of Subsurface Structures – During grading, any subsurface structures that may act as a conduit for methane gas (such as sewer lines, storm drains, subdrains, etc.) should be evaluated by the methane consultant with respect to the local conditions. The methane consultant should provide specific remedial recommendations, such as venting, as needed.

- Documentation of Oil-Impacted Fill Placement – Full time monitoring of the grading activities should be provided by the environmental consultant in order to document the depth, lateral extent, and concentrations of any crude oil-impacted fills. This information should be provided to the methane consultant for evaluation and consideration in the final methane remedial recommendations.

- Abandoned Oil Wells – All non-operational oil wells should be properly abandoned or reabandoned to conform with the current CDOGGR standards and subjected to CDOGGR inspections. During grading venting systems for abandoned oil wells should be constructed in accordance with recommendations and guidelines from the CDOGGR and the OCFA. Building placement should not be allowed directly over an abandoned well.

- Final Grade Soil Gas Survey – At the completion of grading, and prior to the issuance of building permits, sampling and analysis should be performed by the methane consultant at future building locations. Based on the data collected prior to, during, and at the completion of grading, the methane consultant should make final recommendations for methane mitigation during construction. The analysis and recommendations should consider the guidelines recommended by the City of Newport Beach or the Orange County Fire Authority (OCFA Guideline C-03, dated January 31, 2000) as minimum requirements. Any deviations from the guidelines should be supported by scientific evidence, and approved by the City's Fire Chief or Building Director.

- Maintenance/Monitoring Manual – Prior to the issuance of occupancy permits, the methane consultant should prepare a manual describing the responsible parties, upkeep, monitoring program, record-keeping required, and reporting required with respect to the methane mitigation installed within the project. The report should include a map showing the locations of all monitoring wells, vents, or other pertinent structures.

- All methane investigations and analyses should be performed by a California registered engineer and/or geologist with demonstrated proficiency in the subject of soil gas investigation and mitigation. All methane reports, work plans, mitigation plans, and monitoring plans are subject to the review and approval of the City of Newport Beach. An independent third party review could be required at the discretion of the City.

In addition to methane gas associated with oil fields, the City of Newport Beach has methane gas associated with old abandoned landfills. The Newport Terrace Landfill (also known as Newport City Dump No. 1) was owned and operated by the City of Newport Beach between 1953 and 1967 (see Plate 6-1). The landfill was developed by infilling a small canyon with construction and demolition debris, and domestic waste, including paper, cardboard, metal, glass and yard trimmings. When the landfill was abandoned, a gas ventilation system was installed along the property boundary. Then, in the early 1970s, a condominium was built along the southeast and northwest sides of the landfill. A gas extraction system to control subsurface gas migration was installed in the 1980s, but recent evaluation of this system has shown that the system is not functioning due to potential leaks or blocks in the lines (California Integrated Waste Management Board, 2001). As a result, a gas investigation workplan has been prepared for the site, which includes extensive gas sampling and analysis to determine those areas of the condominium where gas occurs at levels above the regulatory thresholds. Based on the results of these analyses, additional mitigation measures for the site may be proposed. This case is an example of the methane gas issues associated with developments on or near old landfills. Mitigation measures for these facilities are similar to those employed in natural gas seepage areas, except that geotechnical issues associated with differential settlement of the refuse also need to be considered. In landfills where hazardous materials were accepted, far more stringent requirements apply to ensure that leachate from the landfill that may contain hazardous waste does not impact the ground water.

6.8 Hazard Analysis

The primary concern associated with a hazardous materials release is the short and/or long term effect to the public from exposure to the hazardous material, especially when a toxic gas is involved. The best way to reduce the liability for a hazardous material release is through stringent regulations governing the storage, use, manufacturing, and handling of hazardous materials.

The Newport Beach Fire Department and the Orange County Fire Authority observe the 2000 version of the Uniform Fire Code (UFC), which identifies proper usage, storage, handling and transportation requirements for hazardous materials. Risk minimization criteria include secondary containment, segregation of chemicals to reduce reactivity during a release, sprinkler and alarm systems, monitoring, venting and auto shutoff equipment, and treatment requirements for toxic gas releases.

A list of the "Significant Hazardous Materials Sites" in the City of Newport Beach was compiled from the data reported in the sections above. With the exceptions noted below, the list includes facilities that are identified in the following State and/or Federal databases:

- Superfund-Active or Archived Sites (CERCLIS)
- RCRA/RCRIS-EPA Registered Large Quantity Generators
- Toxic Release Inventories (TRIs)

Given that the two sites in Newport Beach still on the Superfund list have been archived and deemed to no longer pose a threat to the environment, they have not been included in the list of Significant Hazardous Sites. Furthermore, and more importantly, the lists included in this report are snapshots in time, and are often based on EPA data that date back to the late 1990s. Facilities that use, store, generate or transport hazardous materials are expected to come and go; so these lists, or comparable lists, should be updated at least once a year as the data become available. In fact, several facilities that in the 20th Century used to generate, use or store hazardous materials in the City have now closed their plants, and those facilities have now been redeveloped into other, cleaner uses. The "Most Significant Hazardous Waste Sites in Newport Beach are listed in Table 6-9, and their locations are shown on Plate 6-1.

Table 6-9: Significant Hazardous Materials Sites in Newport Beach

Facility Name	Facility ID	Source
Hixson Metal Finishing 829 Production Place	CAD008357295	TRI (2000)
Conexant Systems Inc. 4311 Jamboree Road	CAD008371437	LQG (1999-2000), TRI (2001) Formal EPA Enforcement Action 1/29/2003
Newport Fab LLC 4311 Jamboree Road, Bldg. 503	CAR000113233	LQG (2002)

Abbreviations: TRI = Toxic Release Inventory; LQG = Large Quantity Generator

5.8.1 Hazardous Materials Releases as a Result of the Northridge Earthquake

Isolated unauthorized releases of hazardous materials can occur at any time, but earthquakes have the potential to cause several incidents at the same time, generating worst-case scenarios for emergency response personnel. Strong seismic shaking can lead to the release of hazardous materials by damaging storage facilities and transport infrastructure. During an earthquake, chemical storage tanks could buckle, or if improperly secured and fastened, could easily be punctured and/or tipped over. Improperly segregated chemicals could react forming a toxic gas could. Pipelines are especially vulnerable to damage as they can be pulled apart or ruptured by strong ground shaking. Natural gas lines pose a significant hazard due to the high number of pipes in urban environments and because gas leaks from ruptured lines can lead to secondary fires.

As a result of the Northridge earthquake, 134 locations reported hazardous materials problems and 60 emergency hazardous materials responses were required. The majority of these events occurred where structural damage was minimal or absent (Perry and Lindell, 1995). The earthquake caused 1,377 breaks in the natural gas piping system and half a dozen leaks in a 10-inch crude oil pipeline (Hall, 1994).

The 1987 Whittier Narrows earthquake, a significantly smaller event than the Northridge earthquake, caused 22 hazardous materials situations, including the collapse of a chlorine tank that forced the evacuation of an area in Santa Fe Springs. The Whittier Narrows earthquake also caused over 1,400 natural gas leaks, three of which caused subsequent fires.

A key point to remember regarding the management of hazardous materials spills in the aftermath of an earthquake is that it is substantially more difficult to do so than under non-earthquake conditions. Hazardous materials response teams responding to a release as a result of an earthquake have to deal with potential structural and non-structural problems of the buildings housing the hazardous materials, potential leaks of natural gas from ruptured pipes, and/or downed electrical lines or equipment that could create sparks and cause a fire. When two hazards with potentially high negative consequences intersect, the challenges of managing each are greatly increased. During an earthquake response, hazardous materials emergencies become an additional threat that must be integrated into the response management system.

6.8.2 Hazards Overlays

Plate 6-1 was used as an overlay to the other plates prepared for this Hazard Evaluation Study for the City of Newport Beach to assess the natural hazards vulnerability of the significant hazardous materials sites. The intent was to identify whether some of these sites are located in areas at risk of being impacted by the natural hazards discussed in other chapters. This analysis indicates that none of the Significant Hazardous Materials sites are located within or near the Fault Hazard Management Zone proposed for the Newport-Inglewood fault. Nevertheless, the entire City is susceptible to strong to very strong ground motions due to its location relative to the Newport-Inglewood and San Joaquin Hills faults. Due to the large quantities of hazardous materials used at the Significant Hazardous Materials facilities, strong ground shaking poses a special concern that needs to be addressed. Proactive management of these hazardous substances, to levels far beyond the required standards should be considered.

None of the Significant Hazardous Materials sites are located within a liquefaction susceptible area, or in the 100-flood zone.

The City of Newport Beach has approximately nineteen schools. Two schools are located within one mile of one of the Significant Hazardous Materials Sites in the northwest portion of the City. Hoag Memorial Hospital is also located within one mile of this site. The Toxic Release Inventory sites are of most concern in this regard, since emissions into the air have the potential to impact a large geographical area. If any of the chemicals used at this facility are toxic when released into the atmosphere, evacuation of the surrounding area may be required. The Toxic Release Inventory for the Hixson Metal Finishing facility reports the use of tetrachloroethylene. This is a manufactured chemical that is widely used in the dry-cleaning industry, for metal degreasing, and in the manufacturing of other chemicals and consumer products. In a poorly ventilated area, release of this chemical onto the air can pose a health hazard, but when released into a ventilated area, such as the surrounding neighborhood, the chemical is broken down by sunlight, or brought back to the soil and water by rain (http://www.atsdr.cdc.gov/tfacts18.html), greatly reducing its health hazard.

A greater concern is posed by the chlorine gas used at Big Canyon Reservoir, especially given that there are three schools located very close to the reservoir. As discussed in Section 6.3, chlorine gas is highly toxic, and since it is heavier than air, it tends to stay close to the ground, where it has a greater likelihood of impacting the surrounding population. Chlorine gas detectors, secondary containment systems and the continual operation of scrubbers or other treatment systems to neutralize the chlorine before the gas is vented can all be used to reduce the adverse impacts of an accidental release of chlorine. The potential impact to the surrounding community is expected to be greatly reduced in 2004, when the reservoir will be covered, and liquid chlorine, instead of chlorine gas, will be used as the water disinfectant. Liquid chlorine will also be used at San Joaquin Reservoir once the Irvine Ranch Water District starts using it as a reclaimed water storage facility. There are two schools located near this facility. Although liquid chlorine is less likely to pose a hazard to the surrounding areas, it is still an unstable substance, especially if allowed to come in contact with acids. Proper maintenance, storage and usage procedures should be utilized at all times.

Since schools and hospitals have special evacuation needs, Significant Hazardous Material facilities should be required to prepare Risk Management Plans (RMPs) that identify the procedures by which the surrounding critical facilities will be evacuated, should it become necessary during an accidental release of hazardous materials. Similar mitigation measures should be considered for other facilities where the populations have special evacuation needs, such as nursing homes and child care centers.

The two other significant hazardous materials sites are located at or near the City's boundaries. Several of the chemicals reportedly used at Conexant Systems are toxic gases that could impact the surrounding population if released onto the environment. Critical facilities not identified herein because they are outside the City, in surrounding communities may be located within a short distance of these hazardous materials sites. The Risk Management Plans prepared by these facilities should address all critical facilities within a given radius, such as 1/2-mile or 1-mile from the hazardous materials site, so as to identify potential impact areas not within City limits.

6.9 Summary of Findings and Natural Hazards Overlays

The primary concern associated with a hazardous materials release is the short and/or long term effect to the public from exposure to the hazardous material. The best way to reduce the liability for a hazardous material release is through stringent regulation governing the storage, use, manufacturing and handling of hazardous materials. These regulations are typically issued by the EPA, but various local agencies are tasked with the responsibility of monitoring those facilities that use, storage, transport, and dispose hazardous materials for compliance with the

Federal guidelines, or if applicable, with more stringent State guidelines. Some of these programs and regulations, and the local enforcement agency, are summarized below, as they pertain to the City of Newport Beach.

6.9.1 Summary of Findings

Air Quality: Data from the South Coast Air Quality District for the year 2001 show that the ozone levels were above the Federal standards for only one day that year in the North Coastal Orange County area, which includes the City of Newport Beach. All other pollutants were below both Federal and State air quality standards. Air quality criteria are expected to become more stringent, however, as the results of recent studies indicate that air quality in many parts of the southern California area is still poor.

Drinking Water Quality: Two water agencies provide drinking water to the Newport Beach area. The two agencies are: Orange County Water District and the Metropolitan Water District of Orange County. Neither of these agencies is listed on the EPA Safe Drinking Water Violation Report.

National Pollutant Discharge Elimination System (NPDES): The City of Newport Beach is a member of the Orange County's Stormwater Program, the local administering agency for the National Pollutant Discharge Elimination System. NPDES permits in the Newport Beach area are issued by the California Regional Water Quality Control Board, Santa Ana Region. The City of Newport Beach holds a NPDES permit, adopted January 2002, to operate its municipal separate storm sewer system (MS4). The permit requires the City to keep pollutants out of its MS$ to the maximum extent practicable, and to ensure that dry-weather flows entering recreational waters from the MS4 do not cause or contribute to exceedances of water quality standards. The City also has a stringent Water Quality Ordinance and requires the use of "best management practices" in many residential, commercial, and development-related activities to reduce runoff.

Superfund Sites: According to the EPA, there are two Superfund sites in the City of Newport Beach, but neither of them is listed in the National Priority List (NPL). Furthermore, one of the sites is considered by the EPA as a "No Further Remedial Action Planned (NFRAP) site, while the other site has reportedly been cleaned up, although the EPA data is not yet reflecting this information. Given that both sites appear to no longer pose an environmental hazard to the area, they have not been included in the list of most significant hazardous sites in the City of Newport Beach.

Toxic Release Inventory: According to the EPA records, there are three facilities in the Newport Beach area that are listed in the most recently available Toxics Release Inventory (TRI). One of these facilities has since closed its plant in Newport Beach. TRI sites are known to release toxic chemicals into the air. The EPA closely monitors the emissions from these facilities to ensure that their annual limits are not exceeded. The South Coast Air Quality Management District also issues permits to facilities that emit chemicals, both toxic and non-toxic, into the atmosphere. These facilities include restaurants, hotels, dry-cleaners, and other small businesses.

Hazardous Waste Sites: According to the most recent EPA and City data available, there are two large quantity generators and approximately 115 small quantity generators in the Newport Beach area. In addition there are four transporters of hazardous waste with offices in the City. The number of small quantity generators is expected to increase with increasing development in the City, since this list includes businesses like gasoline stations, dry cleaners, and photo-processing shops.

Leaking Underground Storage Tanks: According to data from the State Water Resources Control Board, 76 underground storage tank leaks have been reported in the Newport Beach area. Of these, according to the State list, 47 sites have been either cleaned up or deemed to be of no environmental consequence, leaving 29 cases that are still open and in various stages of the remediation process. Information provided by the City, however, suggests that some of the cases still on the State list have already been closed. None of the leaks that have been reported in the City have impacted a drinking source of ground water. The Orange County Environmental Health Department provides oversight and conducts inspections of all underground tank removals and installation of new tanks.

Hazardous Materials Disclosure Program: Both the Federal government and the State of California require all businesses that handle more than a specified amount of hazardous materials or extremely hazardous materials to submit a business plan to a regulating agency. Business plans are currently reviewed by the Newport Beach Fire Department, who also conducts annual on-site reviews of permitted businesses to confirm that the information in their business plans is current and correct.

Household Hazardous Waste: The County of Orange operates four household hazardous waste collection centers in accordance with the California Integrated Solid Waste Management Act of 1989 (AB 939). These centers are located in the cities of Anaheim, Huntington Beach, Irvine, and San Juan Capistrano. The two locations closest to the City are the Huntington Beach center at 17121 Nichols Street and the Irvine location at 6411 Oak Canyon.

Oil Fields: There is one oil field in the City of Newport Beach and one in its Sphere of Influence. Hazardous materials are often associated with these facilities, usually as a result of poor practices in the early days of exploration, when oil cuttings, brine water, and other by-products were dumped onto the ground. The development of oil fields for residential or commercial purposes typically involves a detailed study to identify any areas impacted by oil or other hazardous materials, and the remediation of the property prior to development.

Methane Gas Mitigation Districts: Natural seepages of gas occur in the western and southwestern portions of the City. Methane gas associated with an abandoned landfill has also been reported near the City's northwestern corner. The City has implemented a series of mitigation measures to reduce the hazard associated with methane gas. Continuous implementation of these guidelines is recommended.

6.9.2 Hazards Overlays

The City of Newport Beach is a vital economic and residential region, where, especially in the older sections of the City, businesses and residential areas are often within short distances of each other, or they co-exist. This gives the City a strong sense of community, a quality unique to only a few areas of southern California. Most "planned" communities that have sprung elsewhere in the last decades do not provide for this desirable mix of uses within short, walking distances of each other. Unfortunately, there are also some disadvantages to this zoning plan - facilities that generate, use, or store hazardous materials are often located near residential areas or near critical facilities, with the potential to impact these areas if hazardous materials are released into the environment at concentrations of concern.

There are two large-quantity and more than one hundred small-quantity generators of hazardous materials in the City. Given these numbers, it is impressive that the actual number of unauthorized releases of hazardous materials into the environment is fairly small, as documented in the Federal and State databases reviewed. There are two active sites that are known to release toxic chemicals into the air – the EPA monitors these facilities closely to reduce the potential of future emissions at concentrations above the acceptable limits.

Strong ground shaking caused by an earthquake on one of the many faults in the region could cause the release of hazardous materials at any of the hazardous materials facilities in the City. Therefore, all sites should provide for, at a minimum, secondary containment of hazardous substances, including segregation of reactive chemicals, in accordance with the most recent Uniform Fire Code. None of the significant hazardous materials sites are located within or next to the proposed Fault Hazard Management Zone for the Newport-Inglewood fault, or within a liquefaction-susceptible or flooding hazard area.

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CHAPTER 7: AVIATION DISASTERS

HAZARDS & POTENTIAL IMPACTS CAUSED BY AIR TRAFFIC ON THE CITY OF NEWPORT BEACH, CALIFORNIA

Prepared by Gunnar J. Kuepper @ for Earth Consultants International
Emergency & Disaster Management
5959 West Century Boulevard, Suite 501
Los Angeles, CA 90045
Ph: (310) 649 – 0700 Fax: (310) 649 – 1126
www.edmus.info

CHAPTER 7: AVIATION DISASTERS

7.1 Introduction and Scope of the Evaluation

The City of Newport Beach seeks to assess and identify the potential for an aviation disaster within its jurisdiction, and the impact of such an event on:

- the health and safety of persons
  - in the affected area and
  - responding to the incident;
- property, facilities, and infrastructure
- the environment
- local businesses and the economy, and
- the reputation and value of the City as a whole.

John Wayne Airport (JWA) generates nearly all aviation traffic above the City of Newport Beach. This report illustrates the actual conditions and legal obligations of the airport and the aviation community, including the Federal Aviation Administration (FAA) and local emergency response services. After an initial overview, this report analyzes the impact of potential events that might take place within the Newport Beach City limits and might substantially affect the area. The analysis provides a clear idea of the likelihood of a major aviation accident, what areas or functions can be expected to be most seriously impacted, and what actions will most effectively protect life and safety, property, the environment, and the interests of the City.

This report does not address the risk of general aviation accidents. General Aviation (GA) is defined by the International Civil Aviation Organization (ICAO) in Annex 6 as "all civil aviation operations other than scheduled air services and non-scheduled air transport operations for remuneration or hire." The vast majority of GA planes are light, single, or twin-engine models, used mainly for recreational purposes, limited in size and seating capacity (usually 2 to 8), with a small amount of fuel carried (less than 200 gallons on average), with a typical gross weight not in excess of 12,500 pounds. A crash involving this type of aircraft, even a collision in mid-air, may account for a major incident, but does not pose the threat of a catastrophic impact. The forces and consequences of a small aircraft could be compared with a high-speed automobile accident involving numerous occupants, and should, therefore, be manageable for local emergency services. Even jets or a Boeing 747 used for private purposes can count as "general aviation" (as does Air Force One), but these larger general aviation aircraft represent only a fraction of all air traffic at John Wayne Airport.

7.2 Setting

The City of Newport Beach has a population of more than 75,000 living in nearly 38,400 housing units within a land area of 25 square miles. (According to the City's website, the inland bodies of water and 23 square miles of ocean combine for a total of 50.5 square miles.) Of the housing units in the City, 19,400 (56 percent) are occupied by the owners. The median value of each of these houses is more than $700,000; the per capita income is $63,000. Newport Beach has several gated communities.

Geographically, the City can be divided into the four areas described below (see Plate 7-1):

1) west of the bay (residential with mainly free-standing single-family residences, schools, and light commercial property);
2) east of the bay (free-standing residences, gated communities, and commercial areas, including Fashion Island, and high-rise office and hotel buildings);
3) north of the bay (free-standing residences in the Santa Ana Heights area, and high-rises in the Airport Area); and
4) water front property (including Newport Peninsula and Balboa Island), with a total water frontage of 31 miles (6 miles of ocean front, 25 miles of harbor front).

7.3 Orange County John Wayne Airport (JWA)

7.3.1 Overview

JWA is operated as a department of the County of Orange, but is a self-supporting enterprise fund in the general financial statements of the county. It operates under the direction of the Airport Director, currently Mr. Alan L. Murphy, and an Assistant Director. It is comprised of five functional divisions (Business Development, Facilities, Finance and Administration, Public Affairs, Operations), each managed by a Deputy Airport Director. Two hundred County employees are assigned to JWA, including 54 members of the Sheriff's Department. In addition, 21 fire personnel of the Orange County Fire Authority (OCFA) are assigned to the Airport Fire Station (No. 33) that is staffed 24 hours a day, 7 days a week.

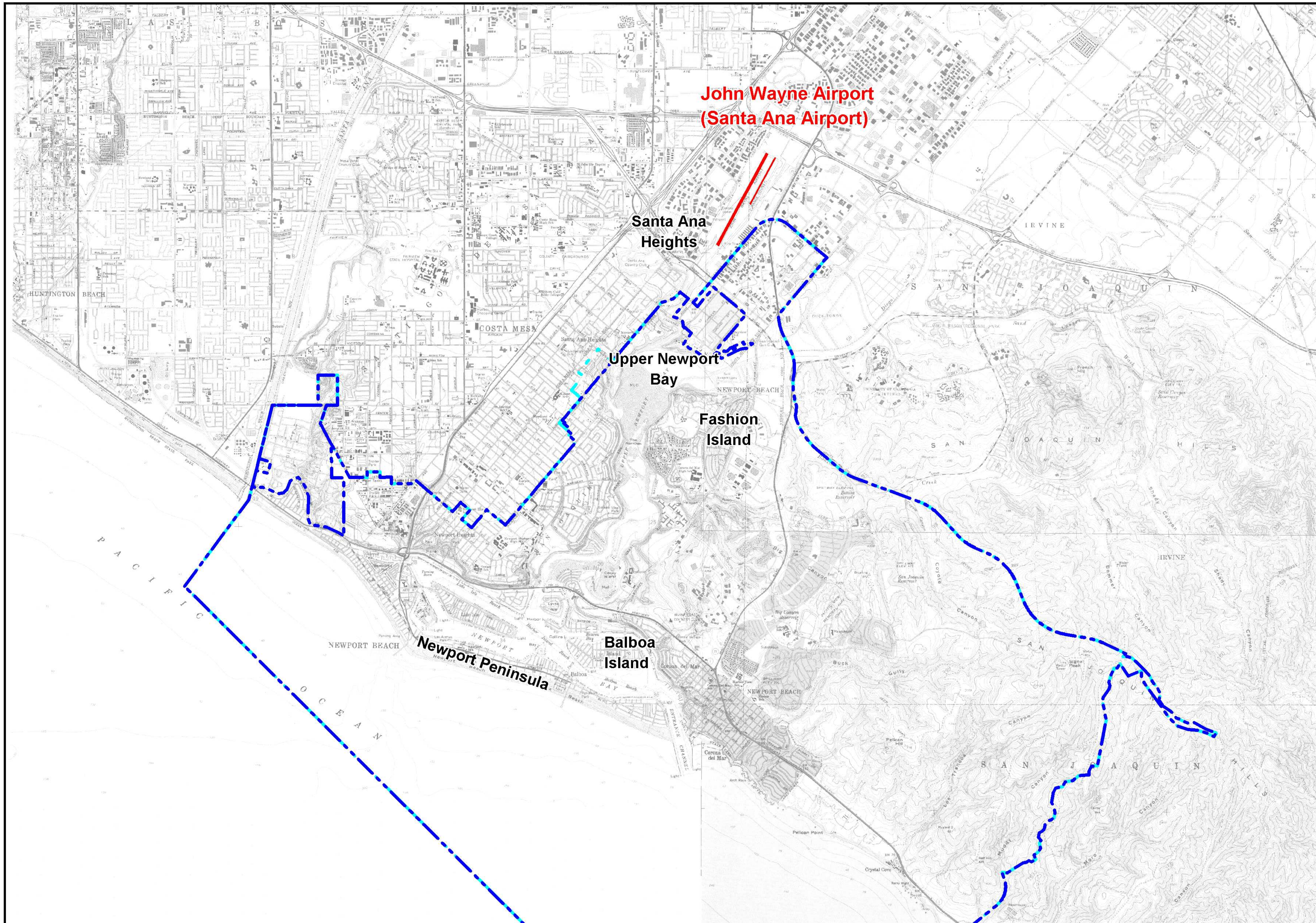
The airport is located on 500 acres, and has two runways. The commercial runway (1L/19R) has a length of 5,700 feet, and the parallel general aviation runway (19L) is 2,900 feet long (see Plate 7-2).

7.3.2 2001 Air Operations

With nearly 380,000 air operations in 2001, JWA was the 29th busiest airport in the United States. It is important to note, however, that 80 percent of these activities were attributed to general aviation. Commercial and commuter planes accounted for 95,000 starts (take-offs) and landings.

Ten commercial passenger airlines (Alaska, Aloha, American, America West, Continental, Delta, Northwest, Southwest, United, US Airways) and three commuter carriers (SkyWest, America West Express, American Eagle) moved 7.32 million passengers (3.67 million enplaned; 3.65 million deplaned). Also in 2001, 16,100 tons of air cargo were processed, primarily via FedEx and UPS planes.

According to reports published by Orange County, JWA generates more than $3.5 billion each year for the local economy, including 57,000 direct or indirect jobs. Personnel directly employed at JWA facilities or by airport service providers number 2,500. It is important to note that the income and revenue stream for the City of Newport Beach seems not to rely significantly on airport and aviation business.



NOTES:
This map is intended for general land use planning only. Information on this map is not sufficient to serve as a substitute for detailed geologic investigations of individual sites, nor does it satisfy the evaluation requirements set forth in geologic hazard regulations.

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Geographic Areas of Newport Beach Near John Wayne Airport Mentioned in Text

EXPLANATION

Newport Beach City Boundary

Sphere of Influence

Scale: 1:72,000

1 0 1 2 3 Kilometers

0.5 0 0.5 1 1.5 Miles

Base Map: USGS Topographic Map from Sure!MAPS RASTER

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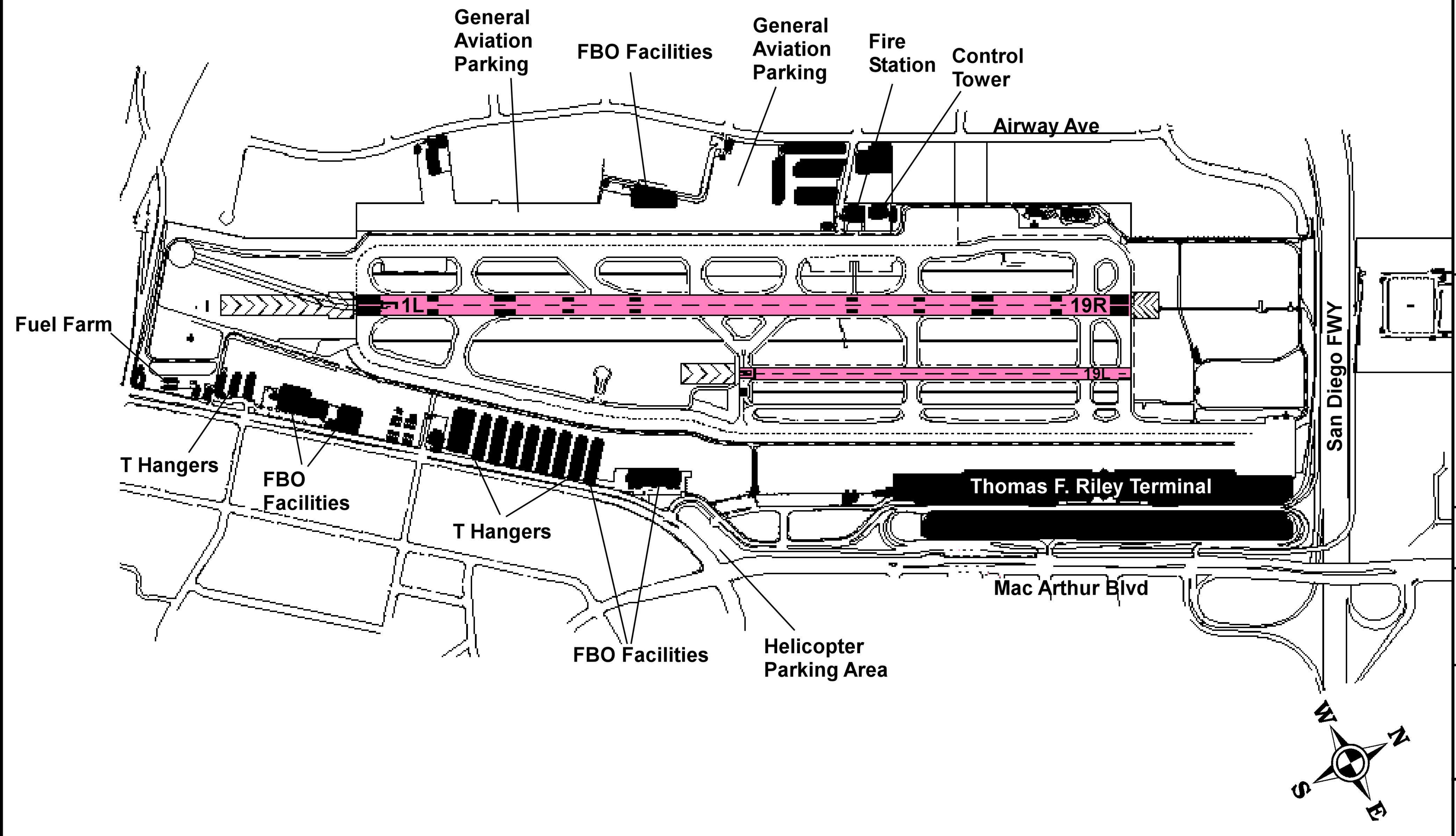
Project Number: 2112
Date: July, 2003

CITY OF NEWPORT BEACH CALIFORNIA

Plate 7-1

Diagram of John Wayne Airport Showing Runways and Facilities



EXPLANATION

SYMBOLS

Runway

Buildings / Structures

Not to Scale

Modified from John Wayne Airport Website
www.ocari.com/images/Airfield_layout_map.gif

Earth Consultants International

Project Number: 2112
Date: March, 2003

Plate 7-2

7.3.3 Future Air Operations

An existing noise abatement program and a federal court settlement signed in 1985 by the County of Orange, the City of Newport Beach, the Airport Working Group, and Stop Polluting Our Newport limits the number of passengers and departures until December 31, 2005. The City has reached an agreement with the County to extend the settlement agreement through 2015. Under the amended settlement agreement, after January 1, 2003, the annual passenger limit can increase to 9.8 million; the daily number of noise-regulated passenger flights can increase to 85; and the daily number of cargo flights can increase to 4.

Due to JWA's relatively short runway length of 5,700 feet (in comparison to Los Angeles International Airport [LAX] and other airports accommodating large airplanes on runways 12,000 feet long), it is highly probable that the size of future airplanes at John Wayne Airport will be limited to short- and medium-range airliners.

The airport is open 24 hours a day, 7 days a week. Air carrier operations are limited to between 7 A.M. and 10 P.M. (11 P.M. for arrivals) Monday through Saturday, and 8 A.M. to 10 P.M. (11 P.M. for arrivals) on Sundays. The air traffic control tower is operational from 6:15 A.M. to 11 P.M. daily.

7.3.4 Departure Route

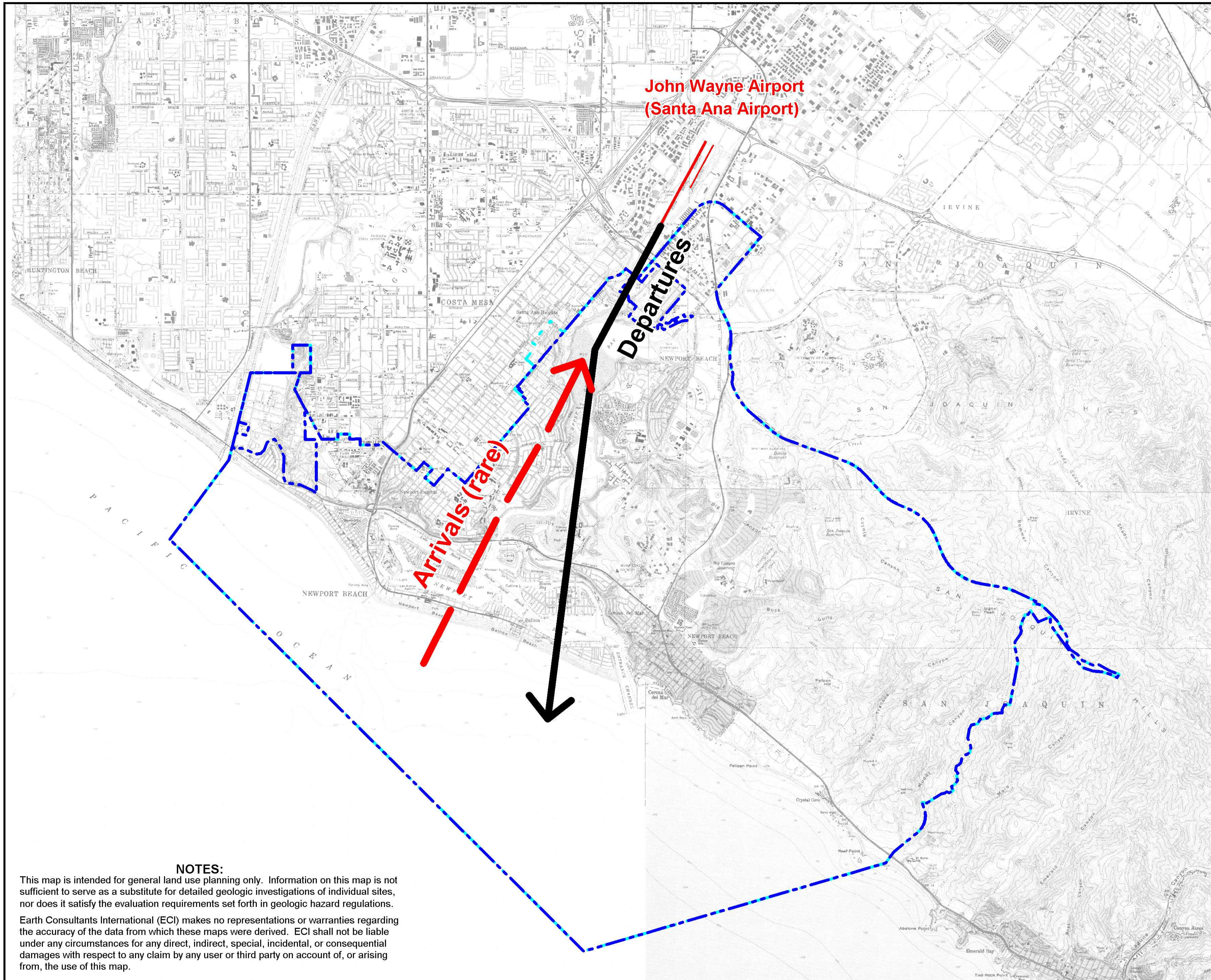
Due to the noise abatement program in place, all commercial airplanes departing JWA using runway 1L are required to:

- follow the course of the Newport Bay,
- make an initial steep climb using full power until the plane has reached an altitude of 800 to 1,000 feet, and
- continue to climb with reduced power (half-throttle) until the coast line is reached, which is usually at an altitude of 2,200 to 2,500 feet (see Plate 7-3).

This procedure may not be considered a difficult or risky maneuver. It is easily handled by modern airplanes. Should pilots encounter any kind of difficulties or problems, however, they can abandon the designated take-off route at any time and proceed as the situation mandates.

7.3.5 Airport Fire Rescue Services (ARFF or CFR)

The airport is protected by an on-site airport fire service as required by FAA regulations. This service is provided by Orange County Fire Station No. 33, which is staffed 24 hours a day, seven days a week, with a minimum of seven firefighters at any given time.



NOTES:

This map is intended for general land use planning only. Information on this map is not sufficient to serve as a substitute for detailed geologic investigations of individual sites, nor does it satisfy the evaluation requirements set forth in geologic hazard regulations.

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Air Traffic Routes Above Newport Beach, California

EXPLANATION

- Arrival Path (rare)-- most airplanes arrive from the north
- Departure Path
- Newport Beach City Boundary
- Sphere of Influence

Scale: 1:72,000

1 0 1 2 3 Kilometers

0.5 0 0.5 1 1.5 Miles

Base Map: USGS Topographic Map from Sure!MAPS RASTER

Earth Consultants International

Project Number: 2112
Date: July, 2003

City of Newport Beach California

Plate 7-3

The Orange County Fire Station No. 33 maintains the following equipment:

- Oshkosh 3000 (Crash 1)
- Oshkosh 1500 (Crash 2)
- Oshkosh 1500 (Crash 3)
- Walter 1500 (Crash 4) – relief vehicle.

Unfortunately, these Aircraft Rescue Fire Fighting (ARFF) units are not yet outfitted entirely with state-of-the-art equipment, such as elevated water booms with penetrating nozzles. These devices fitted atop an ARFF vehicle are used to penetrate the outer skin of an airplane and spray cooling water or foam directly into the cabin. This procedure reduces the temperature and provides the occupants with a more survivable atmosphere and increased time to evacuate. The author was assured that specifications for a new vehicle (Oshkosh 3000) have been submitted, and the new equipment is expected within the next two years.

The primary objective of the airport fire service is to provide fire protection for the airfield. ARFF units will respond to:

1) airplane crashes on airport property
2) airplane crashes within one mile of the airport (only if in doing so the airport does not fall below Index C required ARFF protection OR if approved by the Airport Director[*]). The described 1-mile radius will cover only the northern part of Newport Beach.

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[*] According to Part 139.315 of Title 14 of the Federal Aviation Regulations (FAR), an Index for Airport Fire Rescue Services exists for each certificate holder (airport). The Index is determined by a combination of:
(1) The length of air carrier aircraft expressed in groups; and
(2) Average daily departures of air carrier aircraft.
For the purpose of Index determination, air carrier aircraft lengths are grouped as follows:
(1) Index A includes aircraft less than 90 feet in length (i.e., Bae 146, Saab 340 B and 2000);
(2) Index B includes aircraft at least 90 feet but less than 126 feet in length (i.e., Boeing 737-300, Airbus A320-200);
(3) Index C includes aircraft at least 126 feet but less than 159 feet in length (i.e., Boeing 757-200, MD-87);
(4) Index D includes aircraft at least 159 feet but less than 200 feet in length (i.e., Airbus A340-200, Lockheed L-1011-500 Tristar);
(5) Index E includes aircraft at least 200 feet in length (i.e., Boeing 747, Boeing 777-200, Airbus A330-300, MD-11).
The Index required is determined as follows:
(1) For five or more average daily departures of air carrier aircraft in a single Index group serving an airport, the longest Index group with an average of five or more daily departures is the Index required for the airport.
(2) If there are fewer than an average of five daily departures of air carrier aircraft in a single Index group serving an airport, the next lower Index from the longest group is the Index required for the airport. The minimum designated Index shall be Index A.
According to Part 139.317, an Index C airport must provide either:
(1) THREE ARFF vehicles (One carrying at least 500 pounds of sodium-based dry chemical or halon 1211, or 450 pounds of potassium-based dry chemical and water with a commensurate quantity of AFFF (Aqueous Film Forming Foam) to total 100 gallons, for simultaneous dry chemical and AFFF application, plus Two vehicles carrying an amount of water and the commensurate quantity of AFFF, so that the TOTAL quantity of WATER for foam production CARRIED BY ALL THREE VEHICLES is at least 3,000 gallons); OR
(2) TWO ARFF vehicles (One carrying at least 500 pounds of sodium-based dry chemical or halon 1211, AND 1,500 gallons of water, and the commensurate quantity of AFFF for foam production, plus One vehicle carrying water and the commensurate quantity of AFFF so that the TOTAL quantity of WATER for foam production carried by BOTH VEHICLES is at least 3,000 gallons).
The minimum requirement of ARFF personnel is one (driver) for each vehicle.

Figure 7-1: Image Shows the Steep Ascent of a Passenger Jet Taking Off from JWA

Figure 7-2: Crash 1 & 2 During the September 1998 Exercises at JWA

Airliners departing from JWA carry a significant load of fuel. When a jet or turboprop plane crashes on take-off, the force of the impact will rupture components of the fuel system. Numerous ignition sources (i.e., sparks caused by friction, electrical short circuits, hot engine components) will initiate a major fuel fire.

Local fire services use water to extinguish fires in day-to-day operations, but water is generally not suitable for large liquid fuel (Class B) fires. Instead, foam or dry chemicals must be used to contain and extinguish the flames, and to allow for the evacuation and rescue of survivors. The large quantities of foam needed in such an event are carried on the ARFF vehicles stationed at JWA. These units may be the only way to successfully save lives threatened by smoke, heat, and fire.

In the event of a fiery crash into Balboa Island or other areas with dense buildings, the immediate response of ARFF units will be critical. However, the Newport Beach harbor and island areas are located four to five miles south of JWA, outside the pre-designated operational area (limited to airport property or the one-mile radius surrounding the airfield).

7.4 Airplanes Operating at John Wayne Airport (JWA)

JWA is designated by the Federal Aviation Administration (FAA) as an Index C airport (see footnote in Pages 7-7 and 7-8).

As mentioned before, the airport is open 24 hours a day, 7 days a week, but commercial departures are restricted to between 7 A.M. and 10 P.M. Monday through Saturday, and between 8 A.M. and 10 P.M. on Sunday. Arrivals are allowed until 11 P.M.

On an average business day, 150 commercial and 20 regional flights arrive at and depart from JWA. Among the airplanes most often used by passenger and cargo carriers (airlines) at JWA are the following:

- Airbus A 319/320:
  up to 179 passengers
- Boeing 737 (Version 200, 300, 400, 500, 700 and 800):
  up to 239 passengers (fuel capacity 6,800 gallons)
- Boeing 757 (Version 200):
  up to 239 passengers (fuel capacity 11,500 gallons)
- Boeing 757 F (Freighter Version)
- MD 80:
  up to 130 passengers
- MD 90:
  up to 187 passengers

All of the planes listed above are short- to medium-range airliners and belong to the current generation of aircraft. (See examples for aircraft dimensions and ARFF references in the appendix). The only airplane larger than those above is an

- Airbus A 310 Freighter:
  operated once a day by FedEx. This airplane can carry up to 55 tons of cargo (see risk of cargo planes).

7.5 Airplane Crashes

7.5.1 Probability and Location

Accidents with one or more fatalities involving commercial aircraft are rare events. On average, 40 planes crash in any given year throughout the world, causing approximately 1,000 fatalities. Given the size of the United States' surface (9.63 million square miles), the number of commercial plane crashes within the country in any given year (less than 10), and the size of Newport Beach (50.5 square miles), the statistical risk comes to 1 in 20,000 per year.

The risk of any given community being hit by an airplane disaster is extremely low, and probably a one-in-one-hundred-years or more event. The current accident rate, particularly for United States and Canadian operators, is less than 0.5 per million departures.

However, 75 percent of all air carrier accidents occur on or in the vicinity of an airport, usually within a 3- to 5-mile radius of the runway threshold. According to a survey by the Air Line Pilots Association (ALPA), the vast majority of these accidents occur within 2,000 feet of the runway threshold and within 500 feet of the runway centerlines.

The City of Newport Beach borders the southeastern portion of JWA. More than 95 percent of all airplanes take off and climb over the City (see Plate 7-2). Although this increases significantly the risk of an accident within the City limits, statistically the risk is still very low. Of the air carrier accidents that occur in the vicinity of an airport (which are 75 percent of an average of 40 per year, worldwide), one-third may happen on landing approach, one-third on airport property, and one-third on take-off or in a runway-overrun situation.

In 1970, the County of Orange established an Airport Land Use Commission (ALUC). Its key duties are to prepare and adopt an airport land use plan and to review plans, regulations, and other actions of local agencies and airport operators. The commission, however, has no jurisdiction over any airport operations.

The ALUC issued final draft of the Airport Environs Land Use Plan (AELUP) for John Wayne Airport on December 10, 2002. The scope and purpose of the document is:

- to safeguard the general welfare of the inhabitants within the vicinity of the airport, which includes that people and facilities are not concentrated in areas susceptible to aircraft accidents, and
- to ensure continued airport operations, which includes that no structures or activities adversely affect navigable airspace.

Section 2.1.2 of the plan describes the ALUC's task to designate Accident Potential Zones (APZs) around civil airports. The Commission stated that data had been evaluated from all airport accidents in California and at each civilian airport in Orange County, and concluded that there was insufficient evidence to identify crash hazard zones applicable to all airports.

The Airport Environs Land Use Plan (AELUP) contains in Appendix D a map entitled John Wayne Airport Impact Zones, which displays Runway Protection Zones (RPZ). Again, the Commission has not adopted these Accident Potential Zones for JWA, as none could be justified with the available data. The author disagrees with this particular conclusion. As discussed in Section 7.5.2 below, potential accident areas, probability, and impacts can be assessed based on multiple factors described in this Hazard Assessment Study.

The map of JWA Impact Zones in Appendix D of the AELUP is largely consistent with the findings in this study. The RPZ (Runway Protection Zone) is the imaginary extension of runway 19R/1L in both directions. As described in Section 3.2.5 of the AELUP, it allows only for airport-related and open space uses (agriculture, transportation, etc.), and prohibits buildings intended for human habitation. Such a requirement, even if not adopted by the Commission, is satisfied in the southern vicinity of the JWA (Newport Beach). It covers the unpopulated open space of the Newport Beach Golf Course.

The next area is described as Accident Potential Zone I (Section 3.2.6 of the AELUP). It allows for open space, commercial, industrial, and airport-related uses as long as lot coverage does not exceed 50 percent, and no more than 100 persons occupy any single building for an extended period of time. Residential use and places of indoor or outdoor assembly (i.e., churches, schools, restaurants, conference facilities) should not be allowed in this area. This APZ covers the Newport Beach Golf Course leading into the uninhabited Upper Newport Bay. The area described as Accident Potential Zone II in Section 3.2.7 of the AELUP covers the unpopulated Upper Newport Bay area.

Airplane accidents are primarily caused by three factors: human error, technological failure, and adverse weather (or a combination thereof). JWA and the City of Newport Beach are located in southern California and, therefore, rarely experience heavy or adverse weather conditions. Most states and countries throughout the world see frequent snowstorms and rainstorms, high winds, reduced visibility, etc., but these conditions are rather unusual at JWA.

In addition, airplanes that experience technical malfunctions (i.e., landing gear that does not extend) are usually diverted to nearby Los Angeles International Airport (LAX). LAX provides four runways with a length of 12,000 feet each and maintains the sophisticated fire and rescue equipment appropriate for an Index E airport.

The exact location and time of an airplane accident cannot be predetermined. Taking all the above facts into consideration, it may be safe to say that the crash of a commercial airplane within the City of Newport Beach will be a 25- to 40-year event. (Statistically, at this time, it is a 41-year event.)

The probability of an airplane accident also depends on the age and model of the aircraft. According to a Boeing study, the first models of every new generation of airplanes are at higher risk (due in part to undetected flaws and the lack of pilot familiarity). Obviously, aging airplanes (at least those older than 22 years) face an increased, if not exponentially increased, risk of accident.

As part of a mitigation effort to prevent or reduce the risk of aviation disaster, the City of Newport Beach might choose to steer JWA towards limiting landing and departure rights to commercial airplanes not exceeding a specific age.

7.5.2 Impact and Vulnerability

Any major plane crash has the potential for a catastrophic outcome. In addition to the loss of life aboard the plane (up to 200), such an event can cause casualties and devastation on the ground (i.e., Cerritos, California on August 31, 1986; San Diego, California on September 25, 1978).

A little known fact is that most airplane crashes at or in the vicinity of an airport are survivable. Many plane occupants survive the force of the ground impact only to die minutes later in the subsequent smoke and fire conditions. These consequences can be significantly reduced by a prepared and comprehensive response of local emergency services.

During the evaluation, the author found two possible areas of increased vulnerability within the City of Newport Beach. These are discussed in detail below.

- **Balboa Island**: In a worst-case scenario, a fully loaded commercial plane might crash into Marine Avenue on a sunny Saturday afternoon. The area is usually crowded with cars, pedestrians, and day visitors, and the island's access and egress is limited to a small bridge. Many of the two-story buildings, including shops, small restaurants, and residences, are wood-frame structures, and very close to one another.

  A fire fed by thousands of gallons of jet fuel could quickly spread through the neighborhood and consume most of the buildings. Countless casualties on the ground would be caused by falling aircraft wreckage and the resulting fire(s).

  The only fire station located on Balboa Island, No. 4, might be impacted by the incident, or its response hampered by traffic congestion, people fleeing the area, debris, and narrow streets. The same problem of limited access may hinder reinforcements by other fire and rescue services.

  Although this scenario might be a very unlikely one, its impact would be catastrophic in terms of loss of life, destruction of property and community. It would certainly deal a tremendous blow to the local economy and tourism industry.

  In this scenario, the immediate response of ARFF vehicles carrying large quantities of foam can be considered essential for saving lives and property.

Figure 7-3:
Image of Balboa Island (in the Foreground) Looking North Towards John Wayne Airport; Marine Avenue, Newport Bay and Runway 19R in a Straight Line

- **Upper Newport Bay:** A more likely scenario than an accident on Balboa Island is a major airliner ending up in the Upper Newport Bay area. The soft underground and the abundant water might limit the impact force and the spread of fire and, therefore, ensure a high degree of survivability for the aircraft occupants. The fast and well-coordinated response of City and County emergency services into the difficult terrain is crucial.

  The Upper Newport Bay scenario, however, creates a significant ecological and economic hazard to the environment. The recreational value of the City of Newport Beach with its more than 9,000 registered boats would be dramatically affected. Local businesses are heavily dependant upon a clean and enjoyable bay, harbor, and oceanfront.

  Planes taking off from JWA (mainly short- to medium-range airliners with up to 200 passengers) can carry up to 12,000 gallons of Jet A fuel. Spilled into the marshland, the kerosene would flow through the bay and significantly pollute the waterways. According to recent newspaper articles, beaches have been closed, and swimming and diving prohibited for days due to spills of less than 400 gallons of sewage. The environmental and economic impact of an accident-related spill of thousands of gallons of Jet A fuel would therefore be devastating.

Figure 7-4: Image from Upper Newport Bay Looking Towards the Ocean

- **Other Scenarios:**
  A) A crash into a residential area west or east of the Newport Bay has an extremely low probability because, without a doubt, the pilot crew of an airplane in distress will make every effort to avoid these areas and attempt to stay above the uninhabited bay. Moreover, the area's population density is relatively low (mostly single freestanding houses), with the exception of some retail areas and schools. It would be a localized and manageable incident. (Such an accident would be comparable to the crash of American Airlines Flight 587 immediately after take-off from New York's JFK Airport on November 12, 2001. All 260 people aboard perished, 12 residences were destroyed by the impact and fire, and five persons on the ground perished.)

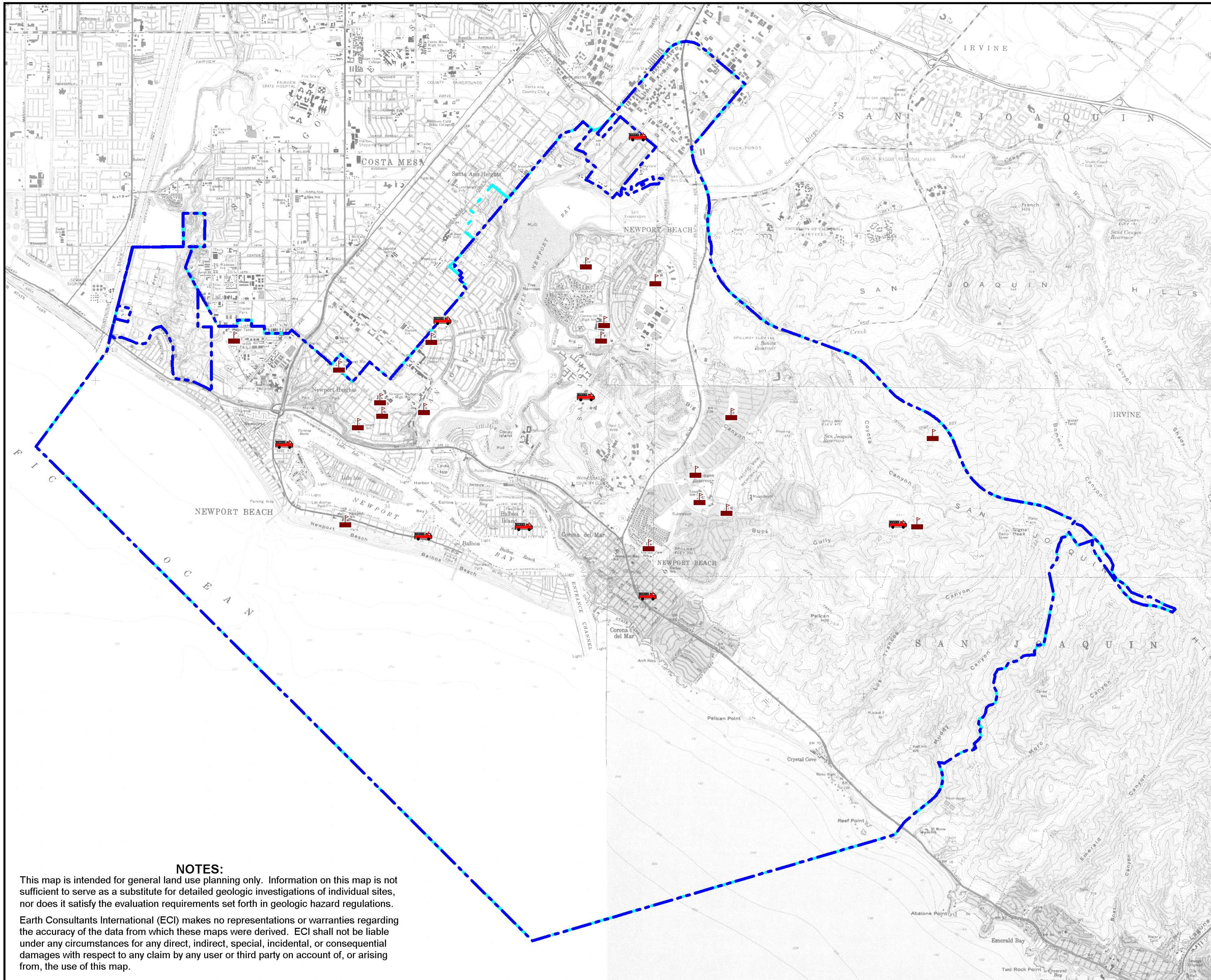
  B) A crash into a high-rise building in Fashion Island also has an extremely low probability because pilots would avoid these areas at all costs. In addition, the buildings themselves (concrete with sprinkler systems) might offer some protection for occupants. The area contains large open spaces that allow for fast egress and access for emergency vehicles.

Figure 7-5: Image of Fashion Island (to the right)
With Ample Space Between Buildings and in the Area

C) A crash into the Pacific Coast Highway bridge over the Lower Newport Bay is highly unlikely, but this is the primary connection between the northern and southern parts of Newport Beach. For an airplane to hit the overpass it would have to make a sharp turn towards the bridge. The resulting disruption would have a significant impact on tourism and business in the area. A detour via Highway 55, Freeway 73, and Jamboree Road would cause a major inconvenience with consequences for commuters, local restaurants, retail stores, and other businesses.

D) A crash into a school during classes could become a nightmare for the community of Newport Beach. As shown on Plate 7-4, numerous elementary, intermediate, and high schools are located within the City of Newport Beach. An airplane crashing into one of these facilities is extremely unlikely, but this scenario cannot be excluded. Many of these schools house hundreds of students (i.e., Newport Harbor High School at 600 Irvine Avenue, nearly 2,000; Ensign Intermediate School at 2000 Cliff Drive, more than 1,100; four elementary schools with more than 500 pupils each are located at 300 East 15th Street, at 14th Street and Balboa Boulevard, at 2100 Mariners Drive, and 1900 Port Seabourne Way).

Even if the statistical risk of such an event is extremely low, the emotional consequences of several children injured or worse will be colossal. Such an occurrence cannot be ruled out. On May 4th, 2002, a BAC one-eleven aircraft crashed shortly after take off from Kano International Airport in Nigeria. The plane veered off into houses, two mosques and a school in a densely populated neighborhood approximately 1.2 miles from the runway threshold. Seventy-five people on the ground and 74 of the 77 people aboard the short-range passenger jet perished.



Schools and Fire Stations in Newport Beach, California

EXPLANATION

School

Fire Station

Newport Beach City Boundary

Sphere of Influence

Scale: 1:60,000

0.5 0 0.5 1 1.5 Miles

1 0 1 2 3 Kilometers

Base Map: USGS Topographic Map from Sure!MAPS RASTER

Source: City of Newport Beach

NOTES:

This map is intended for general land use planning only. Information on this map is not sufficient to serve as a substitute for detailed geologic investigations of individual sites, nor does it satisfy the evaluation requirements set forth in geologic hazard regulations.

Earth Consultants International (ECI) makes no representations or warranties regarding the accuracy of the data from which these maps were derived. ECI shall not be liable under any circumstances for any direct, indirect, special, incidental, or consequential damages with respect to any claim by any user or third party on account of, or arising from, the use of this map.

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CITY OF NEWPORT BEACH CALIFORNIA

Plate 7-4

Mitigation procedures that might save lives in an airplane crash scenario are similar to those addressing other hazards. It includes clear and designated evacuation routes and procedures, well maintained fire suppression systems, regular drills and testing, and a proactive mindset of teachers, parents, and children. An up-to-date and exercised school emergency plan will reduce the number of potential casualties.

E) Mid-air collisions (i.e., Cerritos, California on August 31, 1986; San Diego, California on September 25, 1978), mid-air bombings (i.e., PanAm Flight 103 above Lockerbie, Scotland on December 21, 1988), and mid-air break-ups (i.e., Alaska Airlines MD 80 off the Coast of Ventura County on January 31, 2000; American Airlines on November 12, 2001 in New York City) are, despite their seemingly increased frequency in southern California, extremely rare events. Crashes with significant loss of life on the ground are the exception and rarely produce more than ten fatalities in a community (see statistics of ground fatalities in the appendix of this report).

The FAA has classified the airspace surrounding JWA, which includes the City of Newport Beach, as CHARLIE. Every aircraft, including helicopters and general aviation planes must announce its flight intention and receive permission from JWA Air Traffic Control to enter this space up to a height of 5,000 feet.

- **Cargo Planes:** On October 4, 1992, an El Al Cargo Boeing 747 crashed shortly after take-off from Amsterdam's Schiphol airport into a 12-story high-rise apartment building in a suburb of Amsterdam. The flight crew of four died, as did 43 people on the ground, where many others sustained injuries. Despite the magnitude of the accident, it is not considered a catastrophe, as it was a manageable incident, handled by local resources and authorities.

  The plane carried a load of more than 120 tons. In the aftermath, more than 850 people, including residents, emergency and recovery workers, and police officers experienced long-term health effects, ranging from respiratory problems to neurological ailments. A report published in 1998, six years after the fiery accident, revealed the contents of the freight. It included six tons of military cargo and 10 tons of chemicals, including DMMP (dimethylmethyphosphonate), a substance used for the production of the nerve gas Sarin.

  It is absolutely crucial that every plane crash is handled with the same consideration as a major hazmat release. This includes proper protection, equipment, and training for emergency responders, and procedures for the evacuation of residents from the nearby and downwind areas. Establishing these precautions is also important in the event that a plane crashes on the airport or in neighboring areas (i.e., the city of Costa Mesa) and exposes residents of Newport Beach to harm.

  JWA is allowed to operate up to 85 passenger flights and four cargo flights daily. The probability that one of these planes should crash into Newport Beach is close to random. More or less equally distributed throughout passenger and cargo carriers are accident-causing factors such as aging aircraft, faulty maintenance, and human error. Only a few air carriers have spotless safety records (i.e., Southwest airlines never had a fatal accident). Most major cargo carriers have had plane crashes (i.e., Emery Worldwide February 1991 DC-9 crash in Cleveland, Ohio and February 2000 CD-8 crash in Sacramento, California; Federal Express MD-11 crash of July 1997 in Newark, New Jersey, the Freeport, Philippines crash of another MD-11 in October 1999, and a Boeing 727 crash on July 26, 2002 in Tallahassee, Florida). The likelihood of one plane crashing on any given day is equally disseminated throughout all flights. The probability may be compared with the game of roulette. It does not matter whether one or twenty odd numbers are played in a row, the next number to come has an equal chance of being odd, even, or zero. Coincidence also applies to the small number of plane crashes.

Considering the environment at JWA, the models of airplanes flown there, and the statistically low probability of plane crashes in Newport Beach (1 in 41 years), the risk of a cargo plane accident is on par with a passenger plane crash. Even three cargo plane crashes in a row in Newport Beach would be within the principle of acceptable coincidence.

7.6 Response Agencies and Procedures

7.6.1 Newport Beach Fire Department (NBFD)

Newport Beach maintains its own fire service with approximately 120 uniformed members operating out of eight stations.

During the year 2001, the department responded to more than 7,600 calls, including 360 fires, 5,250 medical situations, 1,200 other emergencies, and 850 service type demands. Fire Station No. 7 is located at 2301 Zenith in the northern part of the City, close to JWA (see Plate 7-4). The three-person engine company is frequently called for mutual aid to the airport, particularly for medical emergencies.

Newport Beach Fire Department has incorporated the Life Guard Services, which covers the coastal beaches. Lifeguards are available from 7 A.M. to 6 P.M. (during the summer, as late as 9.30 p.m.), and operate three boats. Also, the Lifeguard Services has a dive team with 16 trained members. During the night, two lifeguards are on call and required to be at their station within 30 minutes.

- **Mass Casualty Incident Experience:** On Monday, September 2, 2002, a multi-casualty event occurred at 500 South Bay Front in Newport Beach. The motor vehicle/pedestrian accident involved more than ten patients. Fortunately, most of them sustained only minor injuries. A thorough look into the response activities revealed some opportunities for improvement:

  a) The accident occurred at a very difficult location. As described in the Balboa Island scenario above, traffic congestion can become a major factor. Newport Beach Emergency Services arrived in a very reasonable time. However, the magnitude of the accident activated different agencies, and multiple fire, EMS, police, and rescue vehicles responded to the location on the narrow street. The vehicles had limited space to maneuver and sometimes blocked each other.

b) EMS resources from outside the City were requested due to the number of victims. Those ambulances from neighboring communities are not always familiar with the City and its layout and, in this case, had difficulties locating and arriving at the site in time.

Because this is a common challenge in non-rectangular environments, rendezvous points and escort procedures should be established to ensure smooth operations in critical times.

Smaller fire departments, particularly in affluent jurisdictions, are fortunate in not having to experience great numbers of mass-casualty events. But with the rarity of these events comes the lack of experience in practicing proper procedures and operations. Training must focus on these rare events, rather than on incidents that are handled on a daily or weekly basis.

7.6.2 Orange County Fire Authority (OCFA)

OCFA serves 1.3 million people living in 460,000 housing units in 19 cities and the unincorporated parts of Orange County. The agency responded in 2001 to more than 73,000 calls within its jurisdiction covering of an area of 550 square miles served by 60 fire stations.

OCFA Station No. 33 provides airport and aircraft fire protection for JWA.

7.6.3 Newport Beach Police Department (NBPD) Helicopter Division

One of the most impressive assets for a city the size of Newport Beach is the existence of a helicopter division staffed 7 A.M. to 3 A.M., 7 days a week.

Helicopters have proven their worth in countless plane crashes because of their ability to aid in the:

- location of the incident site,
- search for and location of survivors,
- rescue and evacuation of survivors from areas not easily accessible to ground crews (i.e., Air Florida Boeing 737 crash into the Potomac River in Washington, DC, on January 13, 1982),
- assessment of the overall damage and situation, and
- direct response operations of ground crews.

7.6.4 Orange County Sheriff Harbor Patrol – Waterways

Within the jurisdiction of Orange County and protected by the Harbor Patrol Division of the Orange County Sheriff Department (OCSD) are Upper and Lower Newport Bay and the harbor areas. An OCSD captain oversees the daily operations of the agency, which provides law enforcement, marine fire-fighting, open-water rescue, and vessel assistance for the three Orange County harbors of Sunset/Huntington Harbor, Newport Harbor, and Dana Point, as well as an additional 42 miles of Orange County coastline.

Deputies assigned to the Harbor Patrol Division are also trained in environmental law and are qualified and equipped as "first-responders" to hazardous material spills. They are fully trained peace officers and receive nearly 800 hours of additional training in navigation, marine fire-fighting, heavy weather rescue boat operations, boat handling, and advanced first aid, including the administering of oxygen and the use of automated external defibrillators.

7-6: Image of a Eurocopter used by the Newport Beach Police Department

The Newport Beach Harbor Patrol office at 1901 Bayside Drive serves as the headquarters for the entire division. The building contains a 800 MHz dispatch area and an emergency operations center.

Included in the Harbor Patrol Division is the Sheriff's Dive Team. It consists of 11 divers who are trained in underwater search, rescue, and recovery operations along with swift water rescues.

The Harbor Patrol rescue fleet consists of six twin-engine fireboats and eight single-engine patrol boats. The fleet provides its services 24 hours a day, 7 days a week, providing services to Newport Harbor, Dana Point Harbor and Huntington Harbor. This agency is a tremendous resource for Newport Beach emergency services in the case of an airplane crash into the bay, the harbor areas, or the ocean (which is the most likely scenario).

7.6.5 Safety of Newport Beach Emergency Crews Responding to JWA

Due to their close proximity, emergency crews from Newport Beach may be called to JWA to assist Orange County Emergency Services in major events, ranging from plane crashes, to terminal or hanger fires, to acts of terrorism.

The aviation industry has been subjected to acts of terrorism and violence since its early beginnings. These attacks have not stopped in the aftermath of September 11, 2001. Terminals have been bombed and shooting attacks (i.e., New Orleans Airport on May 23, 2002, LAX on July 4, 2002) are still common occurrences. JWA may be even more exposed now, because LAX is improving security and is becoming a "hard" target. Potential attackers might look at nearby JWA and consider its facilities a "softer" target for an attack.

To reduce the risk of life and health for fire, EMS, and police personnel, the City of Newport Beach should consider providing the following:

- terrorism awareness training (including the threat of secondary devices, nuclear, biological, and chemical agents; operating procedures for situations involving active shooters; etc.); and
- airplane/airport related hazard familiarization

for those emergency crews that might respond to an incident on airport premises. The loss of any emergency service individual in the line of duty has a tremendous emotional impact on the community at large and can cause major grievances. Tragedies can be avoided through preparedness and protective measures.

7.6.6 Communication

One of the most critical factors for the effectiveness of life saving operations and the prevention of further escalation and damage in an airplane crash is communication.

Direct communication between Traffic Control at JWA and Fire/Rescue Dispatch for the City of Newport Beach, which is located in the City of Anaheim, does not exist.

Direct radio communication exists between John Wayne ATC (Air Traffic Control) and the NBPD helicopter crew.

Direct radio communication exists between the NBPD helicopter and NBPD and NBFD ground crews.

Direct radio communication is exercised between NBFD units and OCFA units.

Direct radio communication exists between the different emergency services working on the water (US Coast Guard, NBFD Lifeguards, Sheriff's Harbor Patrol).

Although an area for communications improvement exists between water-based and land-based agencies, the commanding officers involved understand each other's jurisdictions and responsibilities and try not to interfere in the operations of other agencies.

Another flaw in communications and coordination seems to exist between the local agencies and the US Coast Guard (USCG). USCG has jurisdiction and the appropriate equipment to perform ocean search and rescue operations. However, their response capabilities, times, and procedures for an airplane crash off the shores of Newport Beach are largely unknown.

7.6.7 Training and Coordination

A formalized training program between the different entities (NBFD, NBPD, OCFA, OC Sheriff) does not exist. However, NBFD units participated in the tri-annual full-scale exercises at JWA in September of 1998 and May of 2002, and NBFD Fire Station No. 7 regularly responds to the airport. A mutual aid agreement between NBFD and OCFA exists and is exercised on a regular basis.

Figure 7-6: JWA Full-Scale Disaster Exercise with Participation of NBFD Units

7.7 Aftermath of an Airplane Crash

It is important to realize that an airplane crash into a city the size of Newport Beach or off its shores will stretch all public services to the limit. (See experiences of Ventura County in the aftermath of the deadly crash of an Alaska Airlines MD-83 on January 31, 2000. While en route from Puerto Vallarta to San Francisco, the aircraft crashed into the Pacific Ocean south of Point Mugu in 650 feet of water, approximately 10 miles off the shore. Radio transmissions from the plane indicated the pilots were struggling with a jammed stabilizer for the last 11 minutes of the flight before diving into the sea. They tried to make an emergency landing at Los Angeles International Airport, but control was lost and the MD-83 was seen in a nose-down attitude, spinning and tumbling in a continuous roll, inverted before it impacted the sea. All 88 people on board perished.)

The services needed in the aftermath of an airliner crash range from space and accommodations for hundreds of media representatives, airline employees, care providers, and family members (consider at least three family members for every airplane occupant), to site security, evidence preservation, transportation arrangements for those involved, body recovery, and even memorial services.

All services will be required in a time of great pressure and emotional tensions. Therefore, it is crucial that the different roles and responsibilities of the County, the Airport, and the City of Newport Beach (who takes care for what, who reports to whom) are determined in advance, and that clear documentation (i.e., Memorandum of Understanding) exists.

The way in which an incident is handled can make or break a crisis. The lack of proper crisis management or even the perception of failure can have a tremendous negative impact on the prestige of the city impacted by the tragedy (referred to as the CNN factor).

A plane crash always attracts the national and often the international media. Timely and coordinated public information management is essential. In addition to the air carrier involved in an accident, in Newport Beach the other agencies involved will be JWA, Orange County, FAA, NTSB, etc. It is recommended that the responsibilities and actions to be taken are determined in advance and understood by all Authorities Having Jurisdiction (AHJ). The objective is to avoid conflicting statements and speculation, and to establish a single point of contact for the media (Joint Media Center).

It must be stressed that failure to address the media and the perception of the public in a high profile accident such as a plane crash, may damage the reputation of the City's leadership or of the City as a whole.

7.7.1 Financial Impacts

The aftermath of a major airplane accident will require numerous resources, facilities, personnel, equipment, logistics, etc., and will become a costly endeavor. Most of these activities (particularly response, salvage operations, and scene security) will be covered by the airline and/or its insurance carrier. However, based on experience, the NTSB and other federal agencies (i.e., FAA, FBI) may demand space, manpower, equipment, accommodations, etc., to support their investigative efforts, which can last for months.

It is strongly recommended, therefore, to address reimbursement and payment issues before committing City resources to an expensive operation. It is helpful to have procedures in place to track and document all activities, expenses, manpower, overtime, supplies, claims (i.e., injured personnel), and other costs for reimbursement.

7.8 Summary and Recommendations

The City of Newport Beach is located in the take-off path of aircraft departing John Wayne Airport (JWA), which statistically increases the risk of a plane crash into the City. A commercial plane accident might be a 1-in-25- to 1-in-40-year occurrence. However, pilots are instructed to follow the Newport Bay away from residential or developed areas.

The author did not detect a hazard risk that might be likely to result in a catastrophe for Newport Beach. Given the amount of resources available in the City and throughout the County of Orange, any impact will be significantly reduced by fast, coordinated, and skilled response operations of all available emergency services.

Nevertheless, it is highly recommended that arrangements be made to ensure that ARFF units can and will respond immediately to a major airplane accident within the City limits of Newport Beach. Any JWA ARFF vehicle responding to an off-airport aircraft accident is equipped to and required to use the designated 800 MHz frequency for communicating with the Fire Incident Commander of the Authority Having Jurisdiction (AHJ).

It is critically important and required by FAA regulations that the airport is not allowed to operate if the minimum fire protection coverage is not guaranteed. Therefore, airport fire vehicles are allowed to respond off-site only if the airport has been shut down to commercial air traffic.

According to JWA documents, the primary fire, rescue, and law enforcement responsibility for off-airport accidents is with the jurisdiction(s) involved. It is recommended that a formalized Memorandum of Understanding regarding the response of ARFF vehicles in case of commercial airliner crash within the City of Newport Beach be established between John Wayne Airport, the Orange County Fire Authority, and the City of Newport Beach.

Specific recommendations that can be made to further reduce the impact of aviation hazards in the City of Newport Beach include the following:

- Designate staging areas and rendezvous points for mutual aid agencies and procedures to escort outside ambulances, fire companies, etc., to the incident site, and casualty collection points.
- Provide a formalized Aircraft Rescue Fire Fighting (ARFF) training program (including airport and aircraft familiarization, fuel fire extinguishment, hazards associated with airplanes and aircraft cargo, safety procedures, aviation communications, evacuation, and rescue operations) for all firefighters and Chief Fire Officers in Newport Beach.
- Provide ARFF awareness training for all Newport Beach emergency personnel on a regular basis.
- Provide every emergency response unit (vehicles and individuals) with a laminated Airplane Crash Checklist (ACC), as described in the appendix
- Develop, implement, and exercise a City-wide aviation emergency response plan.
- Conduct comprehensive tabletop and full-scale exercises on mass-casualty events in areas potentially at risk (Upper and Lower Newport Bay, Balboa Island, Main Channel, Pacific Ocean), with the participation of all available agencies, jurisdictions, and resources.
- Develop clear mutual-aid agreements and Memoranda of Understanding with the airport fire service, county emergency and law enforcement agencies, USCG, private ferry providers, and other potential resources.

- As part of a mitigation effort to prevent or reduce the risk of aviation disaster, the City of Newport Beach might choose to steer JWA towards limiting landing and departure rights to commercial airplanes not exceeding a specific age.
- Consider providing terrorism awareness training to emergency crews that might respond to an incident on JWA premises.
- Address reimbursement and payment issues before committing City resources to an expensive operation.

7.9 Sources

The findings in this report are based on the following:

- On-site ground visits to the City of Newport Beach and John Wayne Airport
- Aerial tour of the Newport Beach and John Wayne Airport area
- Publications, Media, and Internet Resources
- In-person interviews with:
    - Donna Boston, Emergency Services Coordinator, City of Newport Beach
    - Joe Davis, Captain, Airport Police Services Division, Orange County Sheriff Department
    - Michael R. Hart, Deputy Director Operations, John Wayne Airport
    - Paul Henisey, Captain, Police Department, City of Newport Beach
    - Marty Kasules, Captain, Harbor Patrol, Orange County Sheriff Department.
    - Timothy Riley, Fire Chief, City of Newport Beach
    - Chuck Ullmann, Air Traffic Manager, FAA Tower, John Wayne Airport
    - David R. Wilson, Chief Battalion 5, Orange County Fire Authority

The author (Gunnar K. Kuepper) wishes to express his gratitude to each agency and individual who committed time and energy to assist in this effort. He is particularly grateful to Captain Paul Henisey of the Newport Beach PD for his generous support.

APPENDIX

1) AIRPLANE CRASH CHECKLIST (ACC)

At least 7 in 10 plane crashes occur on or near an airport; these accidents are often survivable.

To ensure proper response operations:

- All emergency units (Police, Fire, EMS, etc.), in a 15-mile radius of a commercial airport should have an airplane crash checklist (ACC)

- Checklists should be laminated and put into every glove compartment

- Checklists must follow the **KISS principle** (Keep It Simple, Stupid) and should include:

    - Grid-map of the airport
    - Staging areas and access gates
    - Specifically assigned radio frequencies
    - Priorities and DOs & DON'Ts on airports / at aircraft crash sites:
        - Always approach from upwind
        - Always use PPE (personnel protective equipment)
        - No freelancing: report and work exclusively within ICS (Incident Command System
        - Stay alert for the following hazards:
            - Fuel can always ignite
            - Sharp metal debris
            - Force of a working engine
            - Unknown freight hazmats
            - Bio-hazmat
            - Damaged aircraft structures can collapse and/or roll over

2) LAWS and REGULATIONS

- Code of Federal Regulations (CFR), Federal Aviation Regulations (FAR) Title 14, Part 139 – Certification and Operations: Land Airports Serving Certain Air Carriers
  Subpart D – Operations
  139.315 Aircraft rescue and firefighting: Index determination
  139.317 Aircraft rescue and firefighting: Equipment and agents
  139.319 Aircraft rescue and firefighting: Operational requirements
  139.325 Airport emergency plan

- NTSB Part 830 – Notification and reporting of aircraft accidents or incidents and overdue aircraft, and preservation of aircraft wreckage, mail cargo, and records

- CFR, Title 49, Chapter XII, Port 1500, Transportation Security Administration

- Aviation Disaster Family Assistance Act of 1996

3) GUIDELINES

- **FAA Advisory Circulars, AC 150/5210-17 and NFPA Guidelines and Standards, NFPA 415**

AC 150/5200 – 12 B	-	Fire Department Responsibility in Protecting Evidence at the Scene of an Aircraft Accident
AC 150/5200 – 31A	-	Airport Emergency Plans
AC 150/5210 – 6C	-	Aircraft and Fire Rescue Facilities and Extinguishing Agents
AC 150/5210 – 7C	-	Aircraft Rescue and Firefighting Communications
AC 150/5210 – 13A	-	Water Rescue Plans, Facilities and Equipment
AC 150/5210 – 14A	-	Airport Fire and Rescue Personnel Protective Clothing
AC 150/5210 – 15	-	Airport Rescue and Firefighting Station Building Design
AC 150/5210 – 17	-	Programs for Training of Aircraft Rescue and Firefighting Personnel
AC 150/5210 – 18	-	Systems for Interactive Training of Airport Personnel
AC 150/5210 – 19	-	Drivers Enhanced Vision System
AC 150/5220 – 4B	-	Water Supply Systems for ARFF Protection
AC 150/5220 – 10B	-	Guide Specification for Water/Foam ARFF Vehicles
AC 150/5220 – 17A	-	Design Standards for an ARFF Training Facility
AC 150/5220 – 19	-	Guide Specification for Small Dual Agent ARFF Vehicles

- **NFPA (National Fire Protection Association) Guidelines and Standards**

NFPA 402	Aircraft Rescue and Fire Fighting Operations
NFPA 403	Aircraft Rescue and Fire-Fighting Services at Airports
NFPA 407	Aircraft Fuel Servicing
NFPA 409	Aircraft Hangars
NFPA 414	Aircraft Rescue and Fire-Fighting Vehicles
NFPA 415	Airport Terminal Buildings, Fueling Ramp Drainage And Loading Walkways
NFPA 418	Heliports
NFPA 422	Aircraft Accident Response
NFPA 1003	Airport Fire Fighter Professional Qualifications
NFPA 1600	Emergency/Disaster Management and Business

Continuity Programs

4) WEBSITES

- Boeing Company <www.boeing.com>
- Emergency & Disaster Management, Inc. <www.edmus.info>
- Federal Aviation Administration <www.faa.gov>
- International Civil Aviation Organization <www.icao.org>
- John Wayne Airport <www.ocair.com>
- National Transportation Safety Board <www.ntsb.gov>
- City of Newport Beach <www.city.newport-beach.ca.us>
- Newport Beach Firefighters Association <www.nbfa.org>
- Newport Beach Police Department <www.nbpd.org>
- County of Orange <www.oc.ca.gov>
- Orange County Fire Authority <www.ocfa.org>
- Orange County Sheriff Department <www.ocsd.org>
- Transportation Security Administration <www.tsa.gov>
- Air Disasters <www.airdisaster.com>

5) STATISTICS

Ground Fatalities

- Worldwide Aircraft Accidents with Ground Fatalities in 2002, 2001, 2000, 1999 and 1998 caused by:
    - <u>Military aircraft accidents</u>
        - **5** on October 1, 2002, when two Indian navy aircraft flying in formation in a military flyby collided in mid-air and crashed. One plane crashed into a house under construction, while the other crashed onto a field next to a highway in Vasco, India.
        - **85** on July 27, 2002, when a Russian combat fighter Su-76 performing aerobatics crashed into crowd of spectators at an air show at Skniliv Airport in the Ukraine.
        - **3** on March 7, 1999, when an Indian Air Force Antonov An-32 crashed into a building site while attempting to land at New Delhi Airport, India.
        - **1** on March 28, 1998, when a Peruvian Air Force Antonov An-32 carrying villagers stranded by flooding crashed near a shantytown 1.5 miles from the runway while attempting to land at Piura Airport, Peru.
        - **20** on February, 1998, when a US Marine Corps Grumman EA-6B fighter jet struck and severed the cable to a gondola causing it to fall 300 feet to the ground, resulting in the deaths of 20 people on board near Cavalese in Trento, Italy.

- Commercial plane accidents
  - **75** on May 4, 2002, when an EAS Airline BAC one-eleven crashed shortly after take off into houses, two mosques, and a school in the densely populated neighborhood of Gwammaja, approximately 1.2 miles from Kano International Airport, Nigeria.
  - **5** on November 12, 2001, when an American Airlines Airbus A 300 crashed into a residential neighborhood three minutes after taking off from JFK Airport in New York City.
  - **4** on October 8, 2001, when a SAS MD-87 collided at Linate Airport with a German Cessna Citation II business jet. The MD-87 then swerved off the runway and crashed into a baggage handling building.
  - **1** on March 24, 2001, when an Air Caraibes de Havilland Canada DHC-6 Twin Otter crashed into a house on a landing attempt at St. Barthélémy in the French West Indies.
  - **4** on October 6, 2000, when an Aeroméxico DC-9 overshot the runway near Reynosa, Mexico, while landing and crashed into vehicles and houses, finally coming to rest in a canal.
  - **4** on July 2000, when an Air France Concorde crashed into a small hotel complex after taking off from Charles de Gaulle Airport near Paris, France.
  - **5** on July 17, 2000, when a Indian Airlines Boeing 737 attempted to land at Patna Airport and crashed into houses in the Gardanibagh district in India.
  - **7** on June 22, 2000, when a Wuhan Airlines Xian Yunshuji Y-7-100C plane crashed into the Hanjiang River while attempting to land at Wuhan's Wanjiatun Airport in thunderstorms and heavy rain. Seven people aboard a boat on the southern bank of the river were killed when they were swept away by the impact of the crash.
  - **4** on March 24, 2000, when a Sky Cabs Cargo Antonov An-12 ran out of fuel while landing and crashed short of the runway into houses in Kadirana, Sri Lanka.
  - **1** on January 5, 2000, when a Skypower Express Airways Embraer 110 crashed into a field adjacent to the runway while attempting to land in Abuja, Nigeria.
  - **9** on December 1, 1999, when a Cubana de Aviación DC-10 overshot the runway and crashed into houses in the La Libertad section while attempting to land at La Aurora International Airport, Guatemala City, Guatemala.
  - **10** on August 31, 1999, when a LAPA Airlines Boeing 737 attempting to take off from Jorge Newberry Airport in Buenos Aires, Argentina, overran the runway, skidded across a service road, and crashed into several cars and onto a golf course.
  - **19** on February 2, 1999, when a Savannair Antonov An-12 crashed into the Cazenga district destroying five houses while attempting to land at Luanda Airport, Angola.
  - **4** on October 21, 1998, when an Ararat Avia Airlines Yakovlev YAK-40 airplane struck a military bus as it crossed the runway while attempting to take off from Yerevan Airport, Armenia.
  - **10** on August 29, 1998, when a Cubana de Aviación Tupolev Tu-154 aircraft crashed into an auto body shop and came to rest in a soccer field during takeoff from Quito, Ecuador.

- **2** on July 30, 1998, when an Indian Airlines crashed shortly after taking from Kochi Airport, India.
- **3** on March 22, 1998, when a Philippine Airlines Airbus A-320 overran the runway, went through a concrete perimeter fence, crossed a small river and hit a karaoke house before stopping near a market during a landing attempt at Bacolod Airport in the Philippines.
- **7** on February 16, 1998, when a China Airlines Airbus A-300 crashed into a residential neighborhood while attempting to land at the international Airport of Taipei, Taiwan.

Appendix A
GLOSSARY

Acceleration – The rate of change for a body's magnitude, direction, or both over a given period of time.

Active fault - For implementation of Alquist-Priolo Earthquake Fault Zoning Act (APEFZA) requirements, an active fault is one that shows evidence of, or is suspected of having experienced surface displacement within the last 11,000 years. APEFZA classification is designed for land use management of surface rupture hazards. A more general definition (National Academy of Science, 1988), states "a fault that on the basis of historical, seismological, or geological evidence has the finite probability of producing an earthquake" (see potentially active fault).

Adjacent grade – Elevation of the natural or graded ground surface, or structural fill, abutting the walls of a building. See *highest adjacent grade* and *lowest adjacent grade*.

Aftershocks - Minor earthquakes following a greater one and originating at or near the same place.

Aggradation – The building up of earth's surface by deposition of sediment.

Alluvium - Surficial sediments of poorly consolidated gravels, sand, silts, and clays deposited by flowing water.

Anchor – To secure a structure to its footings or foundation wall in such a way that a continuous load transfer path is created and so that it will not be displaced by flood, wind, or seismic forces.

Aplite – A light-colored igneous rock with a fine-grained texture and free from dark minerals. Aplite forms at great depths beneath the earth's crust.

Appurtenant structure – Under the *National Flood Insurance Program*, a structure which is on the same parcel of property as the principal *structure* to be insured and the use of which is incidental

Argillic – Alteration in which certain minerals of a rock or sediments are converted to clay.

Armor – To protect slopes from *erosion* and *scour* by *flood* waters. Techniques of armoring include the use of riprap, gabions, or concrete.

Artesian – An adjective referring to ground water confined under hydrostatic pressure. The water level in wells drilled into an **artesian** aquifer (also called a confined aquifer) will stand at some height above the top of the aquifer. If the water reaches the ground surface the well is a "flowing" **artesian** well.

Attenuation – The reduction in amplitude of a wave with time or distance traveled.

A zone – Under the *National Flood Insurance Program*, area subject to inundation by the *100-year flood* where wave action does not occur or where waves are less than 3 feet high, designated Zone A, AE, A1-A30, A0, AH, or AR on a *Flood Insurance Rate Map* (FIRM).

Base flood – *Flood* that has as 1-percent probability of being equaled or exceeded in any given year. Also known as the *100-year flood*.

Base Flood Elevation (BFE) – Elevation of the *base flood* in relation to a specified datum, such as the *National Geodetic Vertical Datum* or the *North American Vertical Datum*. The Base Flood Elevation is the basis of the insurance and *floodplain management* requirements of the *National Flood Insurance Program*.

Basement – Under the *National Flood Insurance Program*, any area of a building having its floor subgrade on all sides. (Note: What is typically referred to as a “walkout basement,” which has a floor that is at or above grade on at least one side, is not considered a basement under the *National Flood Insurance Program*.)

Beach nourishment – Replacement of beach sand removed by ocean waters.

Bedding - The arrangement of a sedimentary rock in beds or layers of varying thickness and character.

Bedrock - Designates hard rock that is in its natural intact position and underlies soil or other unconsolidated surficial material.

Bench - A grading term that refers to a relatively level step excavated into earth material on which fill is to be placed.

Berm – Horizontal portion of the backshore beach formed by sediments deposited by waves.

Biotite – A general term to designate all ferromagnesian micas.

Blind thrust fault - A thrust fault is a low-angle reverse fault (top block pushed over bottom block). A "blind" thrust fault refers to one that does not reach the surface.

Breakaway wall – Under the *National Flood Insurance Program*, a wall that is not part of the structural support of the building and is intended through its design and construction to collapse under specific lateral loading forces, without causing damage to the elevated portion of the building or supporting foundation system. Breakaway walls are required by the *National Flood Insurance Program* regulations for any enclosures constructed below the *Base Flood Elevation* beneath elevated buildings in *Coastal High Hazard Areas* (also referred to as *V zones*). In addition, breakaway walls are recommended in areas where *flood* waters flow at high velocities or contain ice or other debris.

Building code – Regulations adopted by local governments that establish standards for construction, modification, and repair of buildings and other structures.

Built-up roof covering – Two or more layers of felt cemented together and surfaced with a cap sheet, mineral aggregate, smooth coating, or similar surfacing material.

Bulkhead –Wall or other structure, often of wood, steel, stone, or concrete, designed to retain or prevent sliding or *erosion* of the land. Occasionally, bulkheads are use to protect against wave action.

Cast-in-place concrete – Concrete that is poured and formed at the construction site.

Cladding – Exterior surface of the building envelope that is directly loaded by the wind.

Clay - A rock or mineral fragment having a diameter less than 1/256 mm (4 microns, or 0.00016 in.). A clay commonly applied to any soft, adhesive, fine-grained deposit.

Claystone - An indurated clay having the texture and composition of shale, but lacking its fine lamination. A massive mudstone in which clay predominates over silt.

Coastal A zone – The portion of the *Special Flood Hazard Area* landward of a *V zone* or landward of an open coast without mapped *V zones* (e.g., shorelines of the Great Lakes), in which the principal sources of flooding are astronomical tides, *storm surge*, seiches, or *tsunamis*, not riverine sources. The *flood* forces in coastal A zones are highly correlated with coastal winds or coastal seismic activity. Coastal A zones may therefore be subject to wave effects, velocity flows, *erosion*, *scour*, or combinations of these forces. See *A zone* and *Non-coastal A zone*. (Note: the *National Flood Insurance Program* regulations do not differentiate between coastal A zones and *non-coastal A zones*.)

Coastal barrier – Depositional geologic feature such as a bay barrier, tombolo, barrier spit, or barrier island that consists of unconsolidated sedimentary materials; is subject to wave, tidal, and wind energies; and protects landward aquatic habitats from direct wave attack.

Coastal Barrier Resources Act of 1982 (CBRA) – Act (Pub. L. 97-348) that established the Coastal Barrier Resources System (CBRS). The act prohibits the provision of new flood insurance coverage on or after October 1, 1983, for any *new construction* or *substantial improvements* of structures located on any designated undeveloped coastal barrier within the CBRS. The CBRS was expanded by the Coastal Barrier Improvement Act of 1991. The date on which an area is added to the CBRS is the date of CBRS designation for that area.

Coastal flood hazard area – Area, usually along an open coast, bay, or inlet, that is subject to inundation by storm surge and, in some instances, wave action caused by storms or seismic forces.

Coastal High Hazard Area – Under the *National Flood Insurance Program*, an area of special flood hazard extending from offshore to the inland limit of a *primary frontal dune* along an open coast and any other area subject to high-velocity wave action from storms or seismic sources. On a *Flood Insurance Rate Map*, the Coastal High Hazard Area is designated Zone V, VE, or V1-V30. These zones designate areas subject to inundation by the *base flood* where *wave heights* or *wave runup depths* are greater than or equal to 3.0 feet.

Code official – Officer or other designated authority charged with the administration and enforcement of the code, or a duly authorized representative, such as a building, zoning, planning, or *floodplain management* official.

Column foundation – Foundation consisting of vertical support members with a height-to-least-lateral-dimension ratio greater than three. Columns are set in holes and backfilled with compacted material. They are usually made of concrete or masonry and often must be braced. Columns are sometimes known as posts, particularly if the column is made of wood.

Concrete Masonry Unit (CMU) – Building unit or block larger than 12 inches by 4 inches by 4 inches made of cement and suitable aggregates.

Conglomerate - A coarse-grained sedimentary rock composed of rounded to subangular fragments larger than 2 mm in diameter set in a fine-grained matrix of sand or silt, and commonly cemented by calcium carbonate, iron oxide, silica or hardened clay. The consolidated equivalent of gravel.

Connector – Mechanical device for securing two or more pieces, parts, or members together, including anchors, wall ties, and fasteners.

Consolidation - Any process whereby loosely aggregated, soft earth materials become firm and cohesive rock. Also the gradual reduction in volume and increase in density of a soil mass in response to increased load or effective compressive stress, such as the squeezing of fluids from pore spaces.

Contraction joint – Groove that is formed, sawed, or tooled in a concrete structure to create a weakened plane and regulate the location of cracking resulting from the dimensional change of different parts of the structure. See *Isolation joint*.

Corrosion-resistant metal – Any nonferrous metal or any metal having an unbroken surfacing of nonferrous metal, or steel with not less than 10 percent chromium or with not less than 0.20 percent copper.

Coseismic rupture - Ground rupture occurring during an earthquake but not necessarily on the causative fault.

Cretaceous – The final period of the Mesozoic era (before the Tertiary period of the Cenozoic era), thought to have occurred between 136 and 65 million years ago.

Dead load – Weight of all materials of construction incorporated into the building, including but not limited to walls, floors, roofs, ceilings, stairways, built-in partitions, finishes, *cladding*, and other similarly incorporated architectural and structural items and fixed service equipment. See *Loads*.

Debris – (Seismic) The scattered remains of something broken or destroyed; ruins; rubble; fragments. (Flooding, Coastal) Solid objects or masses carried by or floating on the surface of moving water.

Debris impact loads –Loads imposed on a structure by the impact of floodborne debris. These loads are often sudden and large. Though difficult to predict, debris impact loads must be considered when structures are designed and constructed. See *Loads*.

Debris flow - A saturated, rapidly moving saturated earth flow with 50 percent rock fragments coarser than 2 mm in size which can occur on natural and graded slopes.

Debris line – Line left on a structure or on the ground by the deposition of debris. A debris line often indicates the height or inland extent reached by *flood* waters.

Deck – Exterior floor supported on at least two opposing sides by an adjacent structure and/or posts, piers, or other independent supports.

Deflected canyons - A relatively spontaneous diversion in the trend of a stream or canyon caused by any number of processes, including folding and faulting.

Deformation - A general term for the process of folding, faulting, shearing, compression, or extension of rocks.

Design flood – The greater of either (1) the *base flood* or (2) the *flood* associated with the *flood hazard area* depicted on a community's flood hazard map, or otherwise legally designated.

Design Flood Elevation (DFE) – Elevation of the *design flood*, or the flood protection elevation required by a community, including wave effects, relative to the *National Geodetic Vertical Datum*, *North American Vertical Datum*, or other datum.

Design flood protection depth – Vertical distance between the eroded ground elevation and the *Design Flood Elevation*.

Design stillwater flood depth – Vertical distance between the eroded ground elevation and the *design stillwater flood elevation*.

Design stillwater flood elevation – Stillwater elevation associated with the *design flood*, excluding wave effects, relative to the *National Geodetic Vertical Datum*, *North American Vertical Datum*, or other datum.

Development – Under the *National Flood Insurance Program*, any manmade change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation, or drilling operations or storage of equipment or materials.

Differential settlement – Non-uniform settlement; the uneven lowering of different parts of an engineered structure, often resulting in damage to the structure. Sometimes included with liquefaction as ground failure phenomenon.

Dike – A tabular shaped, igneous intrusion that cuts across bedding of the surrounding rock.

Diorite – A group of igneous rocks that form at great depth beneath the earth's crust. These rocks are intermediate in composition between acidic and basic rocks.

Dune – See *Frontal dune* and *Primary frontal dune*.

Dune toe – Junction of the gentle slope seaward of the dune and the dune face, which is marked by a slope of 1 on 10 or steeper.

Dynamic analysis - A complex earthquake-resistant engineering design technique (UBC - used for critical facilities) capable of modeling the entire frequency spectra, or composition, of ground motion. The method is used to evaluate the stability of a site or structure by considering the motion from any source or mass, such as that dynamic motion produced by machinery or a seismic event.

Earth flow - Imperceptibly slow-moving surficial material in which 80 percent or more of the fragments are smaller than 2 mm, including a range of rock and mineral fragments.

Earthquake - Vibratory motion propagating within the Earth or along its surface caused by the abrupt release of strain from elastically deformed rock by displacement along a fault.

Earth's crust - The outermost layer or shell of the Earth.

Effective Flood Insurance Rate Map (FIRM) – See *Flood Insurance Rate Map*.

Enclosure – That portion of an elevated building below the *Design Flood Elevation (DFE)* that is partially or fully surrounded by solid (including breakaway) walls.

Encroachment – Any physical object placed in a floodplain that hinders the passage of water or otherwise affects the flood flows.

Engineering geologist - A geologist who is certified by the State as qualified to apply geologic data, principles, and interpretation to naturally occurring earth materials so that geologic factors affecting planning, design, construction, and maintenance of civil engineering works are properly recognized and used. An engineering geologist is particularly needed to conduct investigations, often with geotechnical engineers, of sites with potential ground failure hazards.

Epicenter - The point at the Earth's surface directly above where an earthquake originated.

Episodic erosion – Erosion induced by a single storm event. Episodic erosion considers the vertical component of two factors: general beach profile lowering and localized conical scour around foundation supports. Episodic erosion is relevant to foundation embedment depth and potential undermining. See *Erosion*.

Erodible soil – Soil subject to wearing away and movement due to the effects of wind, water, or other geological processes during a flood or storm or over a period of years.

Erosion – Under the *National Flood Insurance Program*, the process of the gradual wearing away of landmasses. In general, erosion involves the detachment and movement of soil and rock fragments, during a flood or storm or over a period of years, through the action of wind, water, or other geologic processes.

Erosion analysis – Analysis of the short- and long-term *erosion* potential of soil or strata, including the effects of wind action, *flooding* or *storm surge*, moving water, wave action, and the interaction of water and structural components.

Expansive soil - A soil that contains clay minerals that take in water and expand. If a soil contains sufficient amount of these clay minerals, the volume of the soil can change significantly with changes in moisture, with resultant structural damage to structures founded on these materials.

Fault - A fracture (rupture) or a zone of fractures along which there has been displacement of adjacent earth material.

Fault segment - A continuous portion of a fault zone that is likely to rupture along its entire length during an earthquake.

Fault slip rate - The average long-term movement of a fault (measured in cm/year or mm/year) as determined from geologic evidence.

Federal Emergency Management Agency (FEMA) – Independent agency created in 1979 to provide a single point of accountability for all Federal activities related to disaster mitigation and emergency preparedness, response and recovery. FEMA administers the *National Flood Insurance Program*.

Federal Insurance Administration (FIA) – The component of the *Federal Emergency Management Agency* directly responsible for administering the flood insurance aspects of the *National Flood Insurance Program*.

Feldspar – The most widespread of any mineral group; constitutes ~60% of the earth's crust. Feldspars occur as components of all kinds of rocks and, on decomposition, yield a large part of the clay of a soil.

Fetch – Distance over which wind acts on the water surface to generate waves.

Fill – Material such as soil, gravel, or crushed stone placed in an area to increase ground elevations or change soil properties. See *structural fill*.

Five (500)-year flood – *Flood* that has as 0.2-percent probability of being equaled or exceeded in any given year.

Flood - A rising body of water, as in a stream or lake, which overtops its natural and artificial confines and covers land not normally under water. Under the *National Flood Insurance Program*, either (a) a general and temporary condition or partial or complete inundation of normally dry land areas from:

(1) the overflow of inland or tidal waters,

(2) the unusual and rapid accumulation or runoff of surface waters from any source, or

(3) mudslides (i.e., mudflows) which are proximately caused by flooding as defined in (2) and are akin to a river of liquid and flowing mud on the surfaces of normally dry land areas, as when the earth is carried by a current of water and deposited along the path of the current,

or (b) the collapse or subsidence of land along the shore of a lake or other body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels or suddenly caused by an unusually high water level in a natural body of water, accompanied by a severe storm, or by an unanticipated force of nature, such as flash flood or abnormal tidal surge, or by some similarly unusual and unforeseeable event which results in flooding as defined in (1), above.

Flood-damage-resistant material – Any construction material capable of withstanding direct and prolonged contact (i.e., at least 72 hours) with floodwaters without suffering significant damage (i.e., damage that requires more than cleanup or low-cost cosmetic repair, such as painting).

Flood elevation – Height of the water surface above an established elevation datum such as the *National Geodetic Vertical Datum*, *North American Vertical Datum*, or *mean sea level*.

Flood hazard area – The greater of the following: (1) the area of special flood hazard, as defined under the *National Flood Insurance Program*, or (2) the area designated as a flood hazard area on a community's legally adopted flood hazard map, or otherwise legally designated.

Flood insurance – Insurance coverage provided under the National Flood Insurance Program.

Flood Insurance Rate Map (FIRM) – Under the *National Flood Insurance Program*, an official map of a community, on which the *Federal Emergency Management Agency* has delineated both the special hazard areas and the risk premium zones applicable to the community. (Note: The latest FIRM issued for a community is referred to as the *effective FIRM* for that community.)

Flood Insurance Study (FIS) – Under the *National Flood Insurance Program*, an examination, evaluation, and determination of *flood* hazards and, if appropriate, corresponding *water surface elevations*, or an examination, evaluation, and determination of mudslide (i.e., mudflow) and/or flood-related erosion hazards in a community or communities. (Note: The *National Flood Insurance Program* regulations refer to Flood Insurance Studies as "flood elevation studies.")

Flood-related erosion area or flood-related erosion prone area – A land area adjoining the shore of a lake or other body of water, which due to the composition of the shoreline or bank and high water levels or wind-driven currents, is likely to suffer *flood*-related *erosion* damage.

Flooding – See *Flood*.

Floodplain – Under the *National Flood Insurance Program*, any land area susceptible to being inundated by water from any source. See *Flood*.

Floodplain management – Operation of an overall program of corrective and preventive measures for reducing *flood* damage, including but not limited to emergency preparedness plans, flood control works, and *floodplain management regulations*.

Floodplain management regulations – Under the *National Flood Insurance Program*, zoning ordinances, subdivision regulations, building codes, health regulations, special purpose ordinances (such as floodplain ordinance, grading ordinance, and erosion control ordinance), and other applications of police power. The term describes such state or local regulations, in any combination thereof, which provide standards for the purpose of *flood* damage prevention and reduction.

Footing – Enlarged base of a foundation wall, pier, post, or column designed to spread the load of the structure so that it does not exceed the soil bearing capacity.

Footprint – Land area occupied by a structure.

Freeboard – Under the *National Flood Insurance Program*, a factor of safety, usually expressed in feet above a *flood* level, for the purposes of *floodplain management*. Freeboard tends to compensate for the many unknown factors that could contribute to flood heights greater than the heights calculated for a selected size flood and floodway conditions, such as the hydrological effect of urbanization of the watershed.

Frontal dune – Ridge or mound of unconsolidated sandy soil, extending continuously alongshore landward of the sand beach and defined by relatively steep slopes abutting markedly flatter and lower regions on each side.

Gabion – Rock-filled cage made of wire or metal that is placed on slopes or embankments to protect them from *erosion* caused by flowing or fast-moving water.

Geomorphology - The science that treats the general configuration of the Earth's surface. The study of the classification, description, nature, origin and development of landforms, and the history of geologic changes as recorded by these surface features.

Geotechnical engineer - A licensed civil engineer who is also certified by the State as qualified for the investigation and engineering evaluation of earth materials and their interaction with earth retention systems, structural foundations, and other civil engineering works.

Grade beam – Section of a concrete slab that is thicker than the slab and acts as a footing to provide stability, often under load-bearing or critical structural walls. Grade beams are occasionally installed to provide lateral support for vertical foundation members where they enter the ground.

Grading - Any excavating or filling or combination thereof. Generally refers to the modification of the natural landscape into pads suitable as foundations for structures.

Granite – Broadly applied, any completely crystalline, quartz-bearing, plutonic rock.

Ground failure - Permanent ground displacement produced by fault rupture, differential settlement, liquefaction, or slope failure.

Ground rupture - Displacement of the earth's surface as a result of fault movement associated with an earthquake.

High-velocity wave action – Condition in which *wave heights* or *wave runup depths* are greater than or equal to 3.0 feet.

Highest adjacent grade – Elevation of the highest natural or regarded ground surface, or structural fill, that abuts the walls of a building.

Holocene – An epoch of the Quaternary period spanning from the end of the Pleistocene to the present time (10,000 years).

Hornblende – The most common mineral of the amphibole group. It is a primary constituent in many intermediate igneous rocks.

Hurricane – Tropical cyclone, formed in the atmosphere over warm ocean areas, in which wind speeds reach 74 miles per hour or more and blow in a large spiral around a relatively calm center or "eye." Hurricane circulation is counter-clockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere.

Hurricane clip or strap – Structural connector, usually metal, used to tie roof, wall, floor, and foundation members together so that they can resist wind forces.

Hydrocompaction - Settlement of loose, granular soils that occurs when the loose, dry structure of the sand grains held together by a clay binder or other cementing agent collapses upon the introduction of water.

Hydrodynamic loads – Loads imposed on an object, such as a building, by water flowing against and around it. Among these loads are positive frontal pressure against the structure, drag effect along the sides, and negative pressure on the downstream side.

Hydrostatic loads – Loads imposed on a surface, such as a wall or floor slab, by a standing mass of water. The water pressure increases with the square of the water depth.

Igneous – Type of rock or mineral that formed from molten or partially molten magma.

Intensity - A measure of the effects of an earthquake at a particular place. Intensity depends on the earthquake magnitude, distance from the epicenter, and on the local geology.

Isolation joint – Separation between adjoining parts of a concrete structure, usually a vertical plane, at a designated location such as to interfere least with the performance of the structure, yet such as to allow relative movement in three directions and avoid formation of cracks elsewhere in the concrete and through which all or part of the bonded reinforcement is interrupted. See *Contraction joint*.

Jetting (of piles) – Use of a high-pressure stream of water to embed a pile in sandy soil. See *pile foundation*.

Jetty – Wall built out into the water to restrain currents or protect a structure.

Joist – Any of the parallel structural members of a floor system that support, and are usually immediately beneath, the floor.

ka – thousands of years before present.

Lacustrine flood hazard area – Area subject to inundation by *flooding* from lakes.

Landslide - A general term covering a wide variety of mass-movement landforms and processes involving the downslope transport, under gravitational influence, of soil and rock material en masse.

Lateral force - The force of the horizontal, side-to-side motion on the Earth's surface as measured on a particular mass; either a building or structure.

Lateral spreading - Lateral movements in a fractured mass of rock or soil which result from liquefaction or plastic flow or subjacent materials.

Left-lateral fault – A strike-slip fault across which a viewer would see the block on the opposite side of the fault move to the left.

Lifeline system - Linear conduits or corridors for the delivery of services or movement of people and information (e.g., pipelines, telephones, freeways, railroads)

Lifeline system - Linear conduits or corridors for the delivery of services or movement of people and information (e.g., pipelines, telephones, freeways, railroads).

Lineament – Straight or gently curved, lengthy features of earth's surface, frequently expressed topographically as depressions or lines of depressions, scarps, benches, or change in vegetation.

Liquefaction - Changing of soils (unconsolidated alluvium) from a solid state to weaker state unable to support structures; where the material behaves similar to a liquid as a consequence of earthquake shaking. The transformation of cohesionless soils from a solid or liquid state as a result of increased pore pressure and reduced effective stress.

Littoral – Of or pertaining to the shore, especially of the sea; coastal.

Littoral drift – Movement of sand by littoral (longshore) currents in a direction parallel to the beach along the shore.

Live loads – *Loads* produced by the use and occupancy of the building or other structure. Live loads do not include construction or environmental loads such as wind load, snow load, rain load, earthquake load, flood load, or dead load. See *Loads*.

Load-bearing wall – Wall that supports any vertical load in addition to its own weight. See *Non-load-bearing wall*.

Loads – Forces or other actions that result from the weight of all building materials, occupants and their possessions, environmental effects, differential movement, and restrained dimensional changes. Permanent loads are those in which variations over time are rare or of small magnitude. All other loads are variable loads.

Lowest adjacent grade (LAG) – Elevation of the lowest natural or re-graded ground surface, or structural fill, that abuts the walls of a building. See *Highest adjacent grade*.

Lowest floor – Under the *National Flood Insurance Program*, the lowest floor of the lowest enclosed area (including basement) of a structure. An unfinished or *flood*-resistant enclosure, usable solely for parking of vehicles, building access, or storage in an area other than a basement is not considered a building's lowest floor, provided that the enclosure is not built so as to render the structure in violation of *National Flood Insurance Program* regulatory requirements.

Lowest horizontal structural member – In an elevated building, the lowest beam, *joist*, or other horizontal member that supports the building. *Grade beams* installed to support vertical foundation members where they enter the ground are not considered lowest horizontal structural members.

Ma – millions of years before present.

Magnitude - A measure of the size of an earthquake, as determined by measurements from seismograph records.

Major earthquake - Capable of widespread, heavy damage up to 50+ miles from epicenter; generally near Magnitude range 6.5 to 7.0 or greater, but can be less, depending on rupture mechanism, depth of earthquake, location relative to urban centers, etc.

Mangrove stand – Under the *National Flood Insurance Program*, an assemblage of mangrove trees, which are mostly low trees noted for a copious development of interlacing adventitious roots above the ground and which contain one or more of the following species: black mangrove (Avicennia Nitida), red mangrove (Rhizophora Mangle), white mangrove (Languncularia Racemosea), and buttonwood (Conocarpus Erecta).

Manufactured home – Under the *National Flood Insurance Program*, a *structure*, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when attached to the required utilities. The term "manufactured home" does not include a "recreational vehicle."

Marsh – Wetland dominated by herbaceous or non-woody plants often developing in shallow ponds or depressions, river margins, tidal areas, and estuaries.

Masonry – Built-up construction of combination of building units or materials of clay, shale, concrete, glass, gypsum, stone, or other approved units bonded together with or without mortar or grout or other accepted methods of joining.

Maximum Magnitude Earthquake (Mmax) - The highest magnitude earthquake a fault is capable of producing based on physical limitations, such as the length of the fault or fault segment.

Maximum Probable Earthquake (MPE) - The design size of the earthquake expected to occur within a time frame of interest, for example within 30 years or 100 years, depending on the purpose, lifetime or importance of the facility. Magnitude/frequency relationships are based on historic seismicity, fault slip rates, or mathematical models. The more critical the facility, the longer the time period considered.

Metamorphic rock – A rock whose original mineralogy, texture, or composition has been changed due to the effects of pressure, temperature, or the gain or loss of chemical components.

Mean sea level (MSL) – Average height of the sea for all stages of the tide, usually determined from hourly height observations over a 19-year period on an open coast or in adjacent waters having free access to the sea. See *National Geodetic Vertical Datum*.

Metal roof panel – Interlocking metal sheet having a minimum installed weather exposure of 3 square feet per sheet.

Metal roof shingle – Interlocking metal sheet having an installed weather exposure less than 3 square feet per sheet.

Mitigation – Any action taken to reduce or permanently eliminate the long-term risk to life and property from natural hazards.

Mitigation Directorate – Component of *Federal Emergency Management Agency* directly responsible for administering the flood hazard identification and *floodplain management* aspects of the *National Flood Insurance Program*.

Moderate earthquake - Capable of causing considerable to severe damage, generally in the range of Magnitude 5.0 to 6.0 (Modified Mercalli Intensity <VI), but highly dependent on rupture mechanism, depth of earthquake, and location relative to urban center, etc.

National Flood Insurance Program (NFIP) – Federal program created by Congress in 1968 that makes *flood* insurance available in communities that enact and enforce satisfactory *floodplain management regulations*.

National Geodetic Vertical Datum (NGVD) – Datum established in 1929 and used as a basis for measuring flood, ground, and structural elevations, previously referred to as Sea Level Datum or *Mean Sea Level*. The *Base Flood Elevations* shown on most of the *Flood Insurance Rate Maps* issued by the *Federal Emergency Management Agency* are referenced to NGVD or, more recently, to the *North American Vertical Datum*.

Naturally decay-resistant wood – Wood whose composition provides it with some measure of resistance to decay and attack by insects, without preservative treatment (e.g., heartwood of cedar, black locust, black walnut, and redwood).

Near-field earthquake - Used to describe a local earthquake within approximately a few fault zone widths of the causative fault which is characterized by high frequency waveforms that are destructive to above-ground utilities and short period structures (less than about two or three stories).

New construction – For the purpose of determining flood insurance rates under the *National Flood*

Insurance Program, *structures* for which the start of construction commenced on or after the effective date of the initial *Flood Insurance Rate Map* or after December 31, 1974, whichever is later, including any subsequent improvements to such structures. (See *Post-FIRM structure*.) For *floodplain management* purposes, new construction means *structures* for which the *start of construction* commenced on or after the effective date of a *floodplain management regulation* adopted by a community and includes any subsequent improvements to such structures.

Non-coastal A zone – For the purposes of this manual, the portion of the *Special Flood Hazard Area* in which the principal source of *flooding* is runoff from rainfall, snowmelt, or a combination of both. In non-coastal A zones, *flood* waters may move slowly or rapidly, but waves are usually not a significant threat to buildings. See *A zone* and *coastal A zone*. (Note: the *National Flood Insurance Program* regulations do not differentiate between non-coastal A zones and *coastal A zones*.)

Non-load-bearing wall – Wall that does not support vertical loads other than its own weight. See *Load-bearing wall*.

North American Vertical Datum (NAVD) – Datum used as a basis for measuring flood, ground, and structural elevations. NAVD is used in many recent *Flood Insurance Studies* rather than the *National Geodetic Vertical Datum*.

Oblique – reverse fault – A fault that combines some strike-slip motion with some dip-slip motion in which the upper block, above the fault plane, moves up over the lower block.

Offset ridge - A ridge that is discontinuous on account of faulting.

Offset stream - A stream displaced laterally or vertically by faulting.

(One) 100-year flood – See *Base flood*.

Oriented strand board (OSB) – Mat-formed wood structural panel product composed of thin rectangular wood strands or wafers arranged in oriented layers and bonded with waterproof adhesive.

Orthoclase – One of the most common rock-forming minerals; colorless, white, cream-yellow, flesh-reddish, or grayish in color.

Paleoseismic – Pertaining to an earthquake or earth vibration that happened decades, centuries, or millennia ago.

Peak Ground Acceleration (PGA) - The greatest amplitude of acceleration measured for a single frequency on an earthquake accelerogram. The maximum horizontal ground motion generated by an earthquake. The measure of this motion is the acceleration of gravity (equal to 32 feet per second squared, or 980 centimeter per second squared), and generally expressed as a percentage of gravity.

Pedogenic – Pertaining to soil formation.

Pegmatite – An igneous rock with extremely large grains, more than a centimeter in diameter.

Perched ground water - Unconfined ground water separated from an underlying main body of ground water by an unsaturated zone.

Peak flood - The highest discharge or stage value of a flood.

Plagioclase – One of the most common rock forming minerals.

Plutonic – Pertaining to igneous rocks formed at great depth.

Plywood – Wood structural panel composed of plies of wood veneer arranged in cross-aligned layers. The plies are bonded with an adhesive that cures on application of heat and pressure.

Pore pressure - The stress transmitted by the fluid that fills the voids between particles of a soil or rock mass.

Post foundation – Foundation consisting of vertical support members set in holes and backfilled with compacted material. Posts are usually made of wood and usually must be braced. Posts are also known as columns, but columns are usually made of concrete or masonry.

Post-FIRM structure – For purposes of determining insurance rates under the *National Flood Insurance Program*, structures for which the *start of construction* commenced on or after the effective date of an initial *Flood Insurance Rate Map* or after December 31, 1974, whichever is later, including any subsequent improvements to such structures. This term should not be confused with the term *new construction* as it is used in *floodplain management*.

Potentially active fault - A fault showing evidence of movement within the last 1.6 million years (750,000 years according to the U.S. Geological Survey) but before about 11,000 years ago, and that is capable of generating damaging earthquakes.

Precast concrete – Structural concrete element cast elsewhere than its final position in the structure. See *Cast-in-place concrete*.

Pressure-treated wood – Wood impregnated under pressure with compounds that reduce the susceptibility of the wood to flame spread or to deterioration caused by fungi, insects, or marine borers.

Primary frontal dune – Under the *National Flood Insurance Program*, a continuous or nearly continuous mound or ridge of sand with relatively steep seaward and landward slopes immediately landward and adjacent to the beach and subject to erosion and overtopping from high tides and waves during major coastal storms. The inland limit of the primary frontal dune occurs at the point where there is a distinct change from a relatively steep slope to a relatively mild slope.

Project - A development application involving zone changes, variances, conditional use permits, tentative parcel maps, tentative tract maps, and plan amendments.

Quartzite – A metamorphic rock consisting mostly of quartz.

Quartz monzonite – A plutonic rock containing major plagioclase, orthoclase and quartz; with increased orthoclase it becomes a granite.

Quaternary – The second period of the Cenozoic era, consisting of the Pleistocene and Holocene epochs; covers the last two to three million years.

Resonance - Amplification of ground motion frequencies within bands matching the natural frequency of a structure and often causing partial or complete structural collapse; effects may demonstrate minor damage to single-story residential structures while adjacent 3- or 4-story buildings may collapse because of corresponding frequencies, or vice versa.

Recurrence interval – The time between earthquakes of a given magnitude, or within a given magnitude range, on a specific fault or within a specific area.

Reinforced concrete – *Structural concrete* reinforced with steel bars.

Response spectra - The range of potentially damaging frequencies of a given earthquake applied to a specific site and for a particular building or structure.

Retrofit –Any change made to an existing structure to reduce or eliminate damage to that structure from flooding, *erosion*, high winds, earthquakes, or other hazards.

Revetment – Facing of stone, cement, sandbags, or other materials placed on an earthen wall or embankment to protect it from *erosion* or *scour* caused by *flood* waters or wave action

Right-lateral fault - A strike-slip fault across which a viewer would see the block on the opposite side of the fault move to the right.

Riprap – Broken stone, cut stone blocks, or rubble that is placed on slopes to protect them from *erosion* or *scour* caused by *flood* waters or wave action.

Roof deck – Flat or sloped roof surface not including its supporting members or vertical supports.

Sand boil - An accumulation of sand resembling a miniature volcano or low volcanic mound produced by the expulsion of liquefied sand to the sediment surface. Also called sand blows, and sand volcanoes.

Sand dunes – Under the *National Flood Insurance Program*, natural or artificial ridges or mounds of sand landward of the beach.

Sandstone - A medium-grained, clastic sedimentary rock composed of abundant rounded or angular fragments of sand size set in a fine-grained matrix and more or less firmly united by a cementing material.

Saturated - Said of the condition in which the interstices of a material are filled with a liquid, usually water.

Scarp – A line of cliffs produced by faulting or by erosion. The term is an abbreviated form of escarpment.

Schist – A metamorphic rock characterized by a preferred orientation in grains resulting in the rock's ability to be split into thin flakes or slabs.

Scour – Removal of soil or fill material by the flow of *flood* waters. The term is frequently used to describe storm-induced, localized conical erosion around pilings and other foundation supports where the obstruction of flow increases turbulence. See *Erosion*.

Seawall – Solid barricade built at the water's edge to protect the shore and to prevent inland *flooding*.

Sediment - Solid fragmental material that originates from weathering of rocks and is transported or deposited by air, water, ice, or that accumulates by other natural agents, such as chemical precipitation from solution. and that forms in layers on the Earth's surface in a loose, unconsolidated form.

Seiche - A free or standing-wave oscillation of the surface of water in an enclosed or semi-enclosed basin (such as a lake, bay, or harbor), that is initiated chiefly by local changes in atmospheric pressure, aided by winds, tidal currents, and earthquakes, and that continues, pendulum-fashion, for a time after cessation of the originating force.

Seismogenic - Capable of producing earthquake activity.

Seismograph - An instrument that detects, magnifies, and records vibrations of the Earth, especially earthquakes. The resulting record is a seismogram.

Shearwall – *Load-bearing wall* or *non-load-bearing wall* that transfers in-plane lateral forces from lateral *loads* acting on a structure to its foundation.

Shoreline retreat – Progressive movement of the shoreline in a landward direction caused by the composite effect of all storms considered over decades and centuries (expressed as an annual average *erosion* rate). Shoreline retreat considers the horizontal component of *erosion* and is relevant to long-term land use decisions and the siting of buildings.

Shutter ridge – That portion of an offset ridge that blocks or "shutters" the adjacent canyon.

Silt - A rock fragment or detrital particle smaller than a very fine sand grain and larger than coarse clay, having a diameter in the range of 1/256 to 1/16 mm (4-62 microns, or 0.00016-0.0025 in.). An indurated silt having the texture and composition of shale but lacking its fine lamination is called a siltstone.

Single-ply membrane – Roofing membrane that is field-applied with one layer of membrane material (either homogeneous or composite) rather than multiple layers.

Sixty (60)-year setback – A state or local requirement that prohibits new construction and certain improvements and repairs to existing coastal buildings located in an area expected to be lost to *shoreline retreat* over a 60-year period. The inland extent of the area is equal to 60 times the average annual long-term recession rate at a site, measured from a reference feature.

Slope ratio - Refers to the angle or gradient of a slope as the ratio of horizontal units to vertical units. For example, in a 2:1 slope, for every two horizontal units, there is a vertical rise of one unit (equal to a slope angle, from the horizontal, of 26.6 degrees).

Slump - A landslide characterized by a shearing and rotary movement of a generally independent mass of rock or earth along a curved slip surface.

Soil horizon – A layer of soil that is distinguishable from adjacent layers by characteristic physical properties such as structure, color, or texture.

Special Flood Hazard Area (SFHA) – Under the *National Flood Insurance Program*, an area having special *flood*, mudslide (i.e., mudflow) and/or flood-related erosion hazards, and shown on a Flood Hazard Boundary Map or *Flood Insurance Rate Map* as Zone A, AO, A1-A30, AE, A99, AH, V, V1-V30, VE, M or E.

Start of construction (for other than new construction or substantial improvements under the Coastal Barrier Resources Act) – Under the *National Flood Insurance Program*, date the building permit was issued, provided the actual start of construction, repair, reconstruction, rehabilitation, addition placement, or other improvement was within 180 days of the permit date. The actual start means either the first placement of permanent construction of a structure on a site, such as the pouring of slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation; or the placement of a manufactured home on a foundation. Permanent construction does not include land preparation, such as clearing, grading, and filling; nor does it include the installation of streets and/or walkways; nor does it include excavation for a basement, footings, piers, or foundations or the erection of temporary forms; nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure. For a *substantial improvement*, the actual start of construction means the first alteration of any wall, ceiling, floor, or other structural part of a building, whether or not that alteration affects the external dimensions of the building.

State Coordinating Agency – Under the *National Flood Insurance Program*, the agency of the state government, or other office designated by the Governor of the state or by state statute to assist in the implementation of the *National Flood Insurance Program* in that state.

Stillwater elevation – Projected elevation that flood waters would assume, referenced to the *National Geodetic Vertical Datum*, *North American Vertical Datum*, or other datum, in the absence of waves resulting from wind or seismic effects.

Storage capacity - Dam storage measured in acre-feet or decameters, including dead storage.

Storm surge – Rise in the water surface above normal water level on the open coast due to the action of wind stress and atmospheric pressure on the water surface.

Storm tide – Combined effect of *storm surge*, existing astronomical tide conditions, and breaking *wave setup*.

Strike-slip fault - A fault with a vertical to sub-vertical fault surface that displays evidence of horizontal and opposite displacement.

Structural concrete – All concrete used for structural purposes, including *plain concrete* and *reinforced concrete*.

Structural engineer - A licensed civil engineer certified by the State as qualified to design and supervise the construction of engineered structures.

Structural fill – Fill compacted to a specified density to provide structural support or protection to a *structure*. See *Fill*.

Structure – Something constructed, such as a building, or part of one. For *floodplain management* purposes under the *National flood Insurance Program*, a walled and roofed building, including a gas or liquid storage tank, that is principally above ground, as well as a manufactured home. For insurance coverage purposes under the NFIP, structure means a walled and roofed building, other than a gas or liquid storage tank, that is principally above ground and affixed to a permanent site, as well as a *manufactured home* on a permanent foundation. For the latter purpose, the term includes a building while in the course of construction, alteration, or repair, but does not include building materials or supplies intended for use in such construction, alteration, or repair, unless such materials or supplies are within an enclosed building on the premises.

Subsidence - The sudden sinking or gradual downward settling of the Earth's surface with little or no horizontal motion.

Substantial damage – Under the *National Flood Insurance Program*, damage of any origin sustained by a *structure* whereby the cost of restoring the structure to its before-damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.

Substantial improvement – Under the *National Flood Insurance Program*, any reconstruction, rehabilitation, addition, or other improvement of a *structure*, the cost of which equals or exceeds 50 percent of the market value of the structure before the *start of construction* of the improvement. This term includes structures, which have incurred *substantial damage*, regardless of the actual repair work performed. The term does not, however, include either (1) any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions, or (2) any alteration of a "historic structure," provided that the alteration will not preclude the structure's continued designation as a "historic structure."

Surge – See *Storm surge*.

Swale – In hillside terrace, a shallow drainage channel, typically with a rounded depression or "hollow" at the head.

Thirty (30)-year erosion setback – A state or local requirement that prohibits new construction and certain improvements and repairs to existing coastal buildings located in an area expected to be lost to *shoreline retreat* over a 30-year period. The inland extent of the area is equal to 30 times the average annual long-term recession rate at a site, measured from a reference feature.

Thrust fault – A fault, with a relatively shallow dip, in which the upper block, above the fault plane, moves up over the lower block.

Transform system – A system in which faults of plate-boundary dimensions transform into another plate-boundary structure when it ends.

Transpression – In crustal deformation, an intermediate stage between compression and strike-slip motion; it occurs in zones with oblique compression.

Tropical depression – Tropical cyclone with some rotary circulation at the water surface. With maximum sustained wind speeds of up to 39 miles per hour, it is the second phase in the development of a *hurricane*.

Tropical disturbance – Tropical cyclone that maintains its identity for at least 24 hours and is marked by moving thunderstorms and with slight or no rotary circulation at the water surface. Winds are not strong. It is a common phenomenon in the tropics and is the first discernable stage in the development of a *hurricane*.

Tsunami – Great sea wave produced by submarine earth movement or volcanic eruption.

Typhoon – Name given to a *hurricane* in the area of the western Pacific Ocean west of 180 degrees longitude.

Unconfined aquifer – Aquifer in which the upper surface of the saturated zone is free to rise and fall.

Unconsolidated sediments - A deposit that is loosely arranged or unstratified, or whose particles are not cemented together, occurring either at the surface or at depth.

Underlayment – One or more layers of felt, sheathing paper, non-bituminous saturated felt, or other approved material over which a steep-sloped roof covering is applied.

Undermining – Process whereby the vertical component of erosion or scour exceeds the depth of the base of a building foundation or the level below which the bearing strength of at the foundation is compromised.

Uplift – Hydrostatic pressure caused by water under a building. It can be strong enough lift a building off its foundation, especially when the building is not properly anchored to its foundation.

Upper bound earthquake – Defined as a 10% chance of exceedance in 100 years, with a statistical return period of 949 years.

V zone – See *Coastal High Hazard Area*.

Variance – Under the *National Flood Insurance Program*, grant of relief by a community from the terms of a *floodplain management regulation*.

Violation – Under the *National Flood Insurance Program*, the failure of a structure or other development to be fully compliant with the community's *floodplain management regulations*. A *structure* or other *development* without the elevation certificate, other certifications, or other evidence of compliance required in Sections 60.3(b)(5), (c)(4), (c)(10), (d)(3), (e)(2), (e)(4), or (e)(5) of the NFIP regulations is presumed to be in violation
until such time as that documentation is provided.

Watershed - A topographically defined region draining into a particular water course.

Water surface elevation – Under the *National Flood Insurance Program*, the height, in relation to the *National Geodetic Vertical Datum* of 1929 (or other datum, where specified), of *floods* of various magnitudes and frequencies in the *floodplains* of coastal or riverine areas.

Water table - The upper surface of groundwater saturation of pores and fractures in rock or surficial earth materials.

Wave – Ridge, deformation, or undulation of the water surface.

Wave crest elevation – Elevation of the crest of a wave.

Wave height – Vertical distance between the wave crest and wave trough.

Wave runup – Rush of wave water up a slope or structure.

Wave runup depth – Vertical distance between the maximum wave runup elevation and the eroded ground elevation.

Wave runup elevation – Elevation, referenced to the *National Geodetic Vertical Datum* or other datum, reached by *wave runup*.

Wave setup – Increase in the stillwater surface near the shoreline, due to the presence of breaking waves.

X zone – Under the *National Flood Insurance Program*, areas where the *flood* hazard is less than that in the *Special Flood Hazard Area*. Shaded X zones shown on recent *Flood Insurance Rate Maps* (B zones on older maps) designate areas subject to inundation by the *500-year flood*. Un-shaded X zones (C zones on older *Flood Insurance Rate Maps*) designate areas where the annual probability of flooding is less than 0.2 percent.

Section 6.8 Noise

6.8 NOISE

This section describes the environmental noise conditions within the City of Newport Beach Planning Area. Data used in the preparation of this section is based upon various State and Federal sources, field measurements, and modeling of existing noise levels from traffic data in the Planning Area.

FUNDAMENTALS OF SOUND AND ENVIRONMENTAL NOISE

Sound is technically described in terms of amplitude (loudness) and frequency (pitch). The standard unit of sound amplitude measurement is the decibel (dB). The decibel scale is a logarithmic scale that describes the physical intensity of the pressure vibrations that make up any sound. The pitch of the sound is related to the frequency of the pressure vibration. Since the human ear is not equally sensitive to a given sound level at all frequencies, a special frequency-dependent rating scale has been devised to relate noise to human sensitivity. The A weighted decibel scale (dBA) provides this compensation by discriminating against frequencies in a manner approximating the sensitivity of the human ear.

Noise, on the other hand, is typically defined as unwanted sound. A typical noise environment consists of a base of steady ambient noise that is the sum of many distant and indistinguishable noise sources. Superimposed on this background noise is the sound from individual local sources. These can vary from an occasional aircraft or train passing by to virtually continuous noise from, for example, traffic on a major highway. Table 6.8-1 illustrates representative noise levels for the environment.

Several rating scales have been developed to analyze the adverse effect of community noise on people. Since environmental noise fluctuates over time, these scales consider that the effect of noise upon people is largely dependent upon the total acoustical energy content of the noise, as well as the time of day when the noise occurs. Those that are applicable to this analysis are as follows:

L_{eq}, the equivalent energy noise level, is the average acoustic energy content of noise for a stated period of time. Thus, the L_{eq} of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure. For evaluating community impacts, this rating scale does not vary, regardless of whether the noise occurs during the day or the night.

CNEL, the Community Noise Equivalent Level, is a 24 hour average L_{eq} with a 10 dBA “weighting” added to noise during the hours of 10:00 P.M. to 7:00 A.M., and an additional 5 dBA weighting during the hours of 7:00 P.M. to 10:00 P.M. to account for noise sensitivity in the evening and nighttime. The logarithmic effect of these additions is that a 60 dBA 24-hour L_{eq} would result in a measurement of 66.7 dBA CNEL:

- L_{min}, the minimum instantaneous noise level experienced during a given period of time
- L_{max}, the maximum instantaneous noise level experienced during a given period of time

Table 6.8-1 Representative Environmental Noise Levels

Common Outdoor Activities	*Noise Level (dBA)*	*Common Indoor Activities*
	—110—	Rock Band
Jet Fly-over at 100 feet		
	—100—	
Gas Lawnmower at 3 feet		
	—90—	
		Food Blender at 3 feet
Diesel Truck going 50 mph at 50 feet	—80—	Garbage Disposal at 3 feet
Noisy Urban Area during Daytime		
Gas Lawnmower at 100 feet	—70—	Vacuum Cleaner at 10 feet
Commercial Area		Normal Speech at 3 feet
Heavy Traffic at 300 feet	—60—	
		Large Business Office
Quiet Urban Area during Daytime	—50—	Dishwasher in Next Room
Quiet Urban Area during Nighttime	—40—	Theater, Large Conference Room (background)
Quiet Suburban Area during Nighttime		
	—30—	Library
Quiet Rural Area during Nighttime		Bedroom at Night, Concert Hall (background)
	—20—	
		Broadcast/Recording Studio
	—10—	
Lowest Threshold of Human Hearing	—0—	Lowest Threshold of Human Hearing

SOURCE: California Department of Transportation 1998

Noise environments and consequences of human activities are usually well represented by median noise levels during the day, night, or over a 24-hour period. Environmental noise levels are generally considered low when the CNEL is below 55 dBA, moderate in the 55 to 70 dBA range, and high above 70 dBA. Examples of low daytime levels are isolated natural settings that can provide noise levels as low as 20 dBA, and quiet suburban residential streets that can provide noise levels around 40 dBA. Noise levels above 45 dBA at night can disrupt sleep. Examples of moderate level noise environments are urban residential or semi-commercial areas (typically 55 to 60 dBA) and commercial locations (typically 60 dBA). People may consider louder environments adverse, but most will accept the higher levels associated with more noisy urban residential or residential-commercial areas (60 to 75 dBA) or dense urban or industrial areas (65 to 80 dBA).

When evaluating changes in 24-hour community noise levels, a 3 dBA increase is barely perceptible to most people. While a 5 dBA increase is readily noticeable, a 10 dBA increase would be perceived as a doubling of loudness.[1]

Noise levels from a particular source decline as distance to the receptor increases. Other factors such as the weather and reflecting or shielding also help intensify or reduce the noise level at any given location. A commonly used rule of thumb for roadway noise is that for every doubling of distance

[1] U.S. DOT, Federal Highway Administration, 1980

from the source, the noise level is reduced by about 3 dBA at acoustically "hard" locations (i.e., the area between the noise source and the receptor is nearly complete asphalt, concrete, hard-packed soil, or other solid materials) and 4.5 dBA at acoustically "soft" locations (i.e., the area between the source and receptor is normal earth or has vegetation including grass). Noise from stationary or point sources is reduced by about 6 dBA to 7.5 dBA for every doubling of distance at acoustically hard and soft locations, respectively. Noise levels may also be reduced by intervening structures—generally, a single row of buildings between the receptor and the noise source reduces the noise level by about 5 dBA, while a solid wall or berm reduces noise levels by 5 to 10 dBA. The manner in which older homes in California were constructed generally provides a reduction of exterior-to-interior noise levels of about 20 dBA with closed windows. The exterior-to-interior reduction of newer homes is generally 30 dBA or more.

EXISTING NOISE ENVIRONMENT

Sources of Noise

Land uses within the Planning Area include a range of residential, commercial, institutional, industrial, recreational, and open space areas. Although other noise sources occur, vehicular traffic is the primary source of noise throughout the Planning Area. Noise also occurs from aircraft overflights from John Wayne Airport and a variety of stationary sources throughout the Planning Area.

Coast Highway and Arterial Roadways

The dominant noise sources throughout the Planning Area are transportation related. Motor vehicle noise commonly causes sustained noise levels and often in close proximity of sensitive land uses.

The major sources of traffic noise in the Planning Area are Coast Highway, Jamboree Road, and MacArthur Boulevard. Many of the residential uses built near the arterial roadways include some level of noise attenuation, provided by either a sound barrier or grade separation. Other—primarily older—residential uses built near arterial roadways do not have any attenuation from noise other than the distance between the roadway and the residential structure. The noise attenuation features for new residences are reviewed on a project-by-project basis. This means that as residential projects are proposed near the major roadways within the Planning Area, future noise levels are evaluated and noise mitigation strategies are developed as necessary to meet City standards.

Aircraft Overflights

John Wayne Airport serves both general aviation, and scheduled commercial passenger airline and cargo operations. In the year 2000, John Wayne Airport experienced 387,866 aircraft operations, of which approximately 85,560 were jet air carriers and 15,455 were general aviation jets.[2] The number of average daily departures was just over 130, which included 14 daily departures by commuter aircraft.[3]

Although aircraft noise can be heard throughout the Planning Area, the highest noise levels are experienced just south of the airport and are generated by aircraft departures. Portions of the north-central part of the Planning Area are located within the 65 and 60 dBA CNEL noise contours for John Wayne Airport, as shown in Figures 6.8-1(1) to 6.8-1(3).

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[2] Orange County, John Wayne Airport Settlement Agreement Amendment Draft Environmental Impact Report, 2001.
[3] Ibid.

Stationary Sources

Stationary sources of noise within the Planning Area include common building or home mechanical equipment, such as air conditioners, ventilation systems, or pool pumps; bells and loudspeakers at schools and businesses; and mechanical tools at commercial and industrial facilities. Another stationary source of noise is nightclub operations within the Harbor area.

Existing Noise Levels

Monitored Daytime Noise Levels

Existing ambient daytime noise levels were measured at twenty selected locations on December 18, 2003, and December 19, 2003, in order to identify representative noise levels in various areas of the Planning Area. These locations were identified as unique noise generators within the Planning Area, and shown in Figure 6.8-2.

The noise levels were monitored using a Larson-Davis Model 814 precision sound level meter, which satisfies the American National Standards Institute (ANSI) for general environmental noise measurement instrumentation. The average noise levels and sources of noise measured at each location are identified in Table 6.8-2. The average noise level measurements represent Suburban to Noisy Urban noise levels and are consistent with residential noise levels. In contrast, the maximum noise levels recorded for locations 2 and 3 represent noise levels consistent with City Noise, which reflects a more urban environment.

Roadway Noise Levels

Existing 24-hour noise levels have been calculated for Coast Highway and various roadways throughout the Planning Area. This task was accomplished using the Federal Highway Administration Highway Noise Prediction Model (FHWA-RD-77-108). The model calculates the average noise level at specific locations based on traffic volumes, average speeds, roadway geometry, and site environmental conditions. The average vehicle noise rates (energy rates) utilized in the FHWA Model have been modified to reflect average vehicle noise rates identified for California by Caltrans.[4] The Caltrans data show that California automobile noise is 0.8 to 1.0 dBA higher than national levels and that medium and heavy truck noise is 0.3 to 3.0 dBA lower than national levels.[5]

Noise levels were modeled for Coast Highway and the roadways with the highest traffic volumes within the Planning Area. The calculated noise levels are presented in Table 6.8-3 along with the distances to various noise level contours. Based on this formation, Coast Highway, Jamboree Road, and MacArthur Boulevard are the greatest sources of noise within the Planning Area. Existing residential uses in close proximity to these highway and roadway segments could be exposed to high noise levels on a regular basis. Existing roadway noise contours are shown in Figures 6.8-1(1) to 6.8-1(3).

[4] Hendriks 1987

[5] Ibid.

Figure 6.8-1(1) Existing Roadway (2003) Noise Contours

Fig p.2 (11x17)

Figure 6.8-1(2) Existing Roadway (2003) Noise Contours

Fig p.2 (11x17)

Figure 6.8-1(3) Existing Roadway (2003) Noise Contours

Fig p.2 (11x17)

Figure 6.8-2 Noise Measurement Locations

Fig p.2 (11x17)

Table 6.8-2 Existing Daytime Noise Levels at Selected Locations				
		Noise Level Statistics		
Noise Measurement Location	*Primary Noise Sources*	L_{eq}	L_{min}	L_{max}
1. Hoag Hospital	Traffic on Newport Beach Boulevard	55.6	49.5	63.3
2. 127 41st Street—Corner of Balboa Boulevard	Traffic on Balboa Boulevard	67.4	48.0	77.9
3. 204 Via Antibes—Corner of Via Lido Nord	Traffic on Via Lido Nord	59.4	44.1	77.2
4. 601 Via Lido Nord—Corner of Via Orvieto	Traffic on Via Orvieto	58.9	41.0	75.8
5. Park at Look Out Point	Traffic on Coast Highway	61.6	53.8	82.5
6. Adjacent to 331 Mayflower—Deanza Trailer Park	Traffic on Coast Highway	58.4	45.9	70.5
7. Southwest corner of Patolita Road and Bonnie Doone Terrace	Traffic on Coast Highway	58.2	45.1	67.5
8. Corner of Park Road and Onyx Road	Traffic on Park Road	61.7	45.2	78.8
9. 214 Coronado Road	Traffic on Balboa Boulevard	63.1	48.0	77.4
10. End of Adams Road	Boating facilities	60.5	50.3	78.7
11. Vacant Lot on Bayside Drive	Traffic on Bayside Drive	59.4	42.4	69.9
12. Front Yard of 415½ Marguerite Avenue	Traffic on Marguerite Avenue	60.5	50.0	75.6
13.Crystal Cove Commercial Center—next to housing at south end of parking lot	Commercial use activities	56.0	43.0	72.4
14. Adjacent to Newport Beach Fire Department	Traffic on Newport Coast Drive	61.8	47.0	81.1
15. Corner of Pt. Conception and El Capitan	Traffic on San Joaquin Road	40.2	33.4	53.8
16. North of Sausalito Street on Marguerite Avenue	Traffic on Marguerite Avenue	66.0	41.8	82.3
17. Intersection of San Miguel Drive and Yacht Coquette	Traffic on San Miguel Drive	66.1	47.2	85.2
18. 500 yards east of MacArthur Boulevard on Bonita Canyon Drive	Traffic on Bonita Canyon Drive	64.9	53.2	75.1
19. Eastbluff Drive N.E. of Vista Del Oro	Traffic on Eastbluff Drive	62.8	47.0	73.0
20. Bison and Belcourt Drive North	Traffic on Bison	63.3	50.4	78.9

SOURCE: EIP Associates 2003. Noise monitoring records are provided in Appendix A.
Noise levels were monitored for 15 minutes at each location on December 18 and 19, 2003.

Table 6.8-3 Existing Roadway Noise Levels					
			Distance to Noise Contour[b]		
Roadway	*Roadway Segment*	*Reference L_{dn} at 100 Feet*[a]	70 L_{dn}	65 L_{dn}	60 L_{dn}
16th Street	Irvine Avenue to Dover Drive	56.7	—	—	52
32nd Street	West of Newport Boulevard	57.7	—	—	71
32nd Street	East of Newport Boulevard	53.5	—	—	—
Avocado Avenue	North of San Miguel Drive	54.6	—	—	44
Avocado Avenue	South of San Miguel Drive	62.2	—	65	140
Avocado Avenue	North of Coast Highway	61.8	—	61	132
Balboa Boulevard	South of Coast Highway	60.3	—	48	104
Bayside Drive	South of Coast Highway	57.8	—	—	71
Birch Street	Jamboree Road to Von Karman Avenue	61.0	—	54	116
Birch Street	Von Karman Avenue to MacArthur Boulevard	61.9	—	63	135
Birch Street	West of MacArthur Boulevard	62.2	—	65	141
Birch Street	North of Bristol Street North	63.8	—	83	179
Birch Street	Bristol Street North to Bristol Street South	63.0	—	73	158
Birch Street	South of Bristol Street South	61.9	—	63	135

Table 6.8-3 Existing Roadway Noise Levels

Roadway	Roadway Segment	Reference L_{dn} at 100 Feet[a]	Distance to Noise Contour[b]		
			70 L_{dn}	65 L_{dn}	60 L_{dn}
Bison Avenue	Jamboree Road to MacArthur Boulevard	61.6	—	—	128
Bison Avenue	MacArthur Boulevard to SR-73 Freeway	58.9	—	—	84
Bonita Canyon Drive	East of MacArthur Boulevard	66.7	60	130	279
Bonita Canyon Drive	West of SR-73 Freeway	64.8	—	98	210
Bristol Street North	West of Campus Drive	64.6	—	94	202
Bristol Street North	Campus Drive to Birch Street	63.7	—	82	177
Bristol Street North	East of Birch Street	63.5	—	80	172
Bristol Street North	West of Jamboree Road	62.1	—	64	138
Bristol Street South	West of Campus Drive/Irvine Avenue	64.6	—	94	202
Bristol Street South	Campus Drive to Birch Street	62.4	—	67	145
Bristol Street South	East of Birch Street	62.1	—	64	139
Bristol Street South	West of Jamboree Road	65.0	47	100	216
Campus Drive	Jamboree Road to Von Karman Avenue	63.5	—	79	170
Campus Drive	Von Karman Avenue to MacArthur Boulevard	64.4	—	92	197
Campus Drive	West of MacArthur Boulevard	65.6	51	109	235
Campus Drive	North of Bristol Street North	65.9	53	115	247
Campus Drive	Bristol Street North to Bristol Street South	66.2	56	120	258
Coast Highway	West of 15th Street	70.2	103	222	479
Coast Highway	15th Street to Bluff Road	70.5	107	231	498
Coast Highway	Bluff Road to Superior Avenue/Balboa Avenue	70.5	107	231	498
Coast Highway	Superior Avenue to Newport Boulevard	65.8	79	171	368
Coast Highway	Newport Avenue to Riverside Avenue	71.1	118	254	548
Coast Highway	Riverside Avenue to Tustin Avenue	70.2	103	223	480
Coast Highway	Tustin Avenue to Dover Drive	69.9	99	213	459
Coast Highway	Dover Drive to Bayside Drive	71.6	127	274	591
Coast Highway	Bayside Drive to Jamboree Road	71.1	118	255	549
Coast Highway	Jamboree Road to Newport Center Drive	70.5	107	232	499
Coast Highway	Newport Center Drive to Avocado Avenue	69.3	89	193	415
Coast Highway	Avocado Avenue to MacArthur Boulevard	69.4	91	196	423
Coast Highway	MacArthur Boulevard to Goldenrod Avenue	69.6	94	203	436
Coast Highway	Goldenrod Avenue to Marguerite Avenue	69.3	90	194	417
Coast Highway	Marguerite Avenue to Poppy Avenue	69.0	86	185	399
Coast Highway	Poppy Avenue to Newport Coast Drive	68.3	77	166	358
Coast Highway	East of Newport Coast Drive	69.3	89	193	415
Dover Drive	Irvine Avenue to Westcliff Drive	57.1	—	—	65
Dover Drive	Westcliff Drive to 16th Street	63.4	36	79	169
Dover Drive	16th Street to Cliff Drive	64.0	40	86	184
Dover Drive	Cliff Drive to Coast Highway	64.6	44	94	204
Eastbluff Drive	West of Jamboree Road at University Drive	61.4	—	58	124
Eastbluff Drive	West of Jamboree Road at Ford Road	63.3	—	77	166
Ford Road	Jamboree Road to MacArthur Boulevard	61.0	—	54	1116
Goldenrod Avenue	North of Coast Highway	54.2	—	—	41

Table 6.8-3 Existing Roadway Noise Levels

Roadway	Roadway Segment	Reference L_{dn} at 100 Feet[a]	Distance to Noise Contour[b]		
			70 L_{dn}	65 L_{dn}	60 L_{dn}
Highland Drive	East of Irvine Avenue	54.2	—	—	41
Hospital Road	Placentia Avenue to Newport Boulevard	60.0	—	—	100
Hospital Road	East of Newport Boulevard	57.3	—	—	66
Irvine Avenue	Bristol Street South to Mesa Drive	63.2	—	75	162
Irvine Avenue	Mesa Drive to University Drive	63.8	—	83	178
Irvine Avenue	University Drive to Santa Isabel Avenue	64.0	—	86	186
Irvine Avenue	Santa Isabel Avenue to Santiago Drive	63.5	—	79	170
Irvine Avenue	Santiago Drive to Highland Drive	63.2	—	75	162
Irvine Avenue	Highland Drive to Dover Drive	63.2	—	75	162
Irvine Avenue	Dover Drive to Westcliff Drive	62.3	—	66	142
Irvine Avenue	Westcliff Drive to 16th Street	59.6	—	—	95
Jamboree Road	Campus Drive to Birch Street	69.4	91	196	423
Jamboree Road	Birch Street to MacArthur Boulevard	70.1	101	218	469
Jamboree Road	MacArthur Boulevard to Bristol Street North	69.4	91	196	423
Jamboree Road	Bristol Street North to Bristol Street South	70.6	109	235	506
Jamboree Road	Bristol Street South to Bayview Way	70.6	109	235	506
Jamboree Road	Bayview Way to University Drive	70.6	109	235	506
Jamboree Road	University Drive to Bison Avenue	69.5	93	200	431
Jamboree Road	Bison Avenue to Ford Road	69.7	96	207	446
Jamboree Road	Ford Road to San Joaquin Hills Road	70.5	107	231	498
Jamboree Road	San Joaquin Hills Road to Santa Barbara Road	69.2	88	189	407
Jamboree Road	Santa Barbara Road to Coast Highway	68.9	84	182	391
Jamboree Road	Coast Highway to Bayside Drive	64.4	—	91	196
MacArthur Boulevard	Campus Drive to Birch Street	68.1	75	162	349
MacArthur Boulevard	Birch Street to Von Karman Avenue	67.3	66	141	305
MacArthur Boulevard	Von Karman Avenue to Jamboree Road	68.0	73	158	341
MacArthur Boulevard	South of Jamboree Road	68.1	75	162	349
MacArthur Boulevard	North of Bison Avenue	71.7	130	279	602
MacArthur Boulevard	Bison Avenue to Ford Road	72.2	141	303	654
MacArthur Boulevard	Ford Road to San Joaquin Hills Road	71.6	127	274	590
MacArthur Boulevard	San Joaquin Road to San Miguel Road	69.7	95	205	442
MacArthur Boulevard	San Miguel Road to Coast Highway	68.7	83	178	383
Marguerite Avenue	South of San Joaquin Hills Road	59.9	—	—	98
Marguerite Avenue	North of Coast Highway	59.0	—	40	86
Mesa Drive	East of Irvine Drive	61.0	—	54	116
Newport Boulevard	North of Hospital Road	63.6	—	81	174
Newport Boulevard	Hospital Road to Coast Highway	64.4	—	91	196
Newport Boulevard	Coast Highway to Via Lido	64.9	—	98	211
Newport Boulevard	Via Lido to 32nd Street	63.6	—	71	174
Newport Boulevard	South of 32nd Street	62.7	—	70	151
Newport Center Drive	North of Coast Highway	63.1	—	75	162
Newport Coast Drive	SR-73 Freeway to San Joaquin Hills Road	62.5	—	68	147

Table 6.8-3 Existing Roadway Noise Levels					
			Distance to Noise Contour[b]		
Roadway	*Roadway Segment*	*Reference L_{dn} at 100 Feet*[a]	*70 L_{dn}*	*65 L_{dn}*	*60 L_{dn}*
Newport Coast Drive	South of San Joaquin Hills Road	62.2	—	65	105
Newport Coast Drive	North of Coast Highway	61.2	—	—	121
Placentia Avenue	North of Superior Avenue	61.0	—	54	116
Placentia Avenue	Superior Avenue to Hospital Road	58.6	—	—	81
Poppy Avenue	North of Coast Highway	53.0	—	—	34
Riverside Avenue	North of Coast Highway	57.1	—	—	65
San Joaquin Hills Road	Jamboree Road to Santa Cruz Road	63.7	—	82	177
San Joaquin Hills Road	Santa Cruz Road to Santa Rosa Road	62.1	—	64	138
San Joaquin Hills Road	Santa Rosa Road to MacArthur Boulevard	64.9	—	98	212
San Joaquin Hills Road	MacArthur Boulevard to San Miguel Road	64.3	—	90	194
San Joaquin Hills Road	San Miguel Road to Marguerite Avenue	64.2	—	89	191
San Joaquin Hills Road	Marguerite Avenue to Spyglass Hill Road	62.5	—	68	146
San Joaquin Hills Road	Spyglass Hill Road to Newport Coast Drive	62.2	—	65	140
San Miguel Drive	North of Spyglass Hill Road	58.6	—	—	81
San Miguel Drive	South of Spyglass Hill Road	58.6	—	—	81
San Miguel Drive	North of San Joaquin Hills Road	61.0	—	54	116
San Miguel Drive	San Joaquin Hills Road to MacArthur Boulevard	62.2	—	65	140
San Miguel Drive	MacArthur Boulevard to Avocado Avenue	64.2	—	88	191
San Miguel Drive	West of Avocado Avenue	61.4	—	58	124
Santa Barbara Drive	East of Jamboree Road	60.2	—	—	103
Santa Cruz Drive	South of San Joaquin Hills Road	59.2	—	—	89
Santa Rosa Drive	South of San Joaquin Hills Road	60.6	—	51	110
Santiago Drive	Tustin Avenue to Irvine Avenue	58.3	—	—	77
Santiago Drive	East of Irvine Drive	56.0	—	—	54
Spyglass Hill Road	San Miguel Drive to San Joaquin Hills Road	56.1	—	—	55
Superior Avenue	North of Placentia Avenue	62.5	—	68	147
Superior Avenue	Placentia Avenue to Hospital Road	63.6	—	81	174
Superior Avenue	Hospital Road to Coast Highway	64.0	—	86	184
Tustin Avenue	North of Coast Highway	53.0	—	—	34
University Drive	East of Irvine Avenue	58.3	—	—	78
University Drive	East of Jamboree Road	64.0	—	86	185
Via Lido	East of Newport Boulevard	57.9	—	—	72
Von Karman Avenue	Campus Drive to Birch Street	61.6	—	60	129
Von Karman Avenue	Birch Street to MacArthur Boulevard	61.0	—	54	116
Westcliff Drive	Irvine Avenue to Dover Drive	60.9	—	53	115

SOURCE: EIP Associates 2003. Calculation data and results are provided in Appendix A.

[a] Distances are in feet from roadway centerline. The identified noise level at 100 feet from the roadway centerline is for reference purposes only as a point from which to calculate the noise contour distances. It does not reflect an actual building location or potential impact location.

[b] "—" Noise contour is located within the roadway lanes.

Special Noise Sources

Construction activities are a regular and on-going source of noise throughout the Planning Area. The noise levels generated by construction activities are generally isolated to the immediate vicinity of the construction site and occur during daytime hours in accordance with City regulations (discussed below). Construction activities also occur for relatively short-term periods of a few weeks to a few months, and then, the noise sources are removed from the construction area.

The Harbor area is a mix of residential and commercial land uses; often located in close proximity to each other. Noise is generated on a regular basis by nighttime restaurant activities within commercial uses. Sometimes these nighttime activities generate noise levels that disturb nearby residents when they are trying to sleep and result in complaints filed with the City Police Department. Residences throughout the Planning Area are also known to occasionally generate noise from parties that result in complaints filed with the local authorities.

Sensitive Receptors

Various standards have been developed to address the compatibility of land uses and noise levels. The applicable standards are presented in the following discussion. Special emphasis is placed on land uses that are considered to be sensitive to high noise levels.

From a noise perspective, typical sensitive receptors include residences, schools, child care centers, hospitals, long-term health care facilities, convalescent centers, and retirement homes. Each of these land use types currently occur within the Planning Area.

REGULATORY SETTING

Federal Regulations

There are no Federal noise requirements or regulations that bear directly on local actions of the County and City. However, there are Federal regulations that influence the audible landscape, especially for projects where Federal funding is involved. The Federal Highway Administration (FHWA) requires abatement of highway traffic noise for highway projects through rules in the Code of Federal Regulations (23 CFR Part 772), and the Federal Transit Administration (FTA) and Federal Railroad Administration (FRA) each recommend thorough noise and vibration assessments through comprehensive guidelines for any mass transit or high-speed railroad projects that would pass by residential areas. For housing constructed with assistance from the U.S. Department of Housing and Urban Development, minimum noise insulation standards must be achieved (24 CFR Part 51, Subpart B). The FAA has prepared guidelines for acceptable noise exposure in its FAR Part 150 Noise Compatibility Planning program for airports. According to the Part 150 guidelines, exterior aircraft exposures of 65 dBA CNEL or less and an interior exposure 45 dBA CNEL or less are considered acceptable for residential uses.[6] These standards apply to the operation of John Wayne Airport.

[6] Although the noise standards identified by the FAA are based on L_{dn} levels, CNEL is used in this EIR. Noise levels based on CNEL are generally less than 1.0 dBA less than L_{dn}.

State Regulations

The State of California, Governor's Office of Planning and Research has published recommended guidelines for mobile source noise and land use compatibility.[7] Each jurisdiction is required to consider these guidelines when developing its General Plan noise element and determining the acceptable noise levels within its community. The land use compatibility standards for community noise levels recommended in the guidelines are identified in Title 24 of the California Code of Regulations establishes California Noise Insulation Standards, which identify an interior noise standard of 45 dBA CNEL for new multi-family residential units. This standard would apply to all new townhomes, condominiums, apartments, hotels, and motels developed within the Planning Area.

Local Regulations

City of Newport Beach Municipal Code

The City of Newport Beach has also adopted noise regulations (Chapter 10.26 of the Newport Beach Municipal Code), which identify specific noise restrictions, exemptions, and variances for sources of noise within the city.

Section 10.28.010 of the City Municipal Code regulates what is considered loud and unreasonable noise as follows:

> It is unlawful for any person or property owner to willfully make, allow, continue or cause to be made, allowed, or continued, any loud and unreasonable, unnecessary, or disturbing noise, including, but not limited to, yelling, shouting, hooting, whistling, singing, playing music, or playing a musical instrument, which disturbs the peace, comfort, quiet or repose of any area or which causes discomfort or annoyance to any reasonable person of normal sensitivities in the area, after a peace or code enforcement officer has first requested that the person or property owner cease and desist from making or continuing, or causing to make or continue, such loud, unreasonable, unnecessary, excessive or disturbing noise

In addition, the City has adopted an ordinance to regulate noise levels during construction (City of Newport Beach, Municipal Code Section 10.28.040). The hours of limitation for construction activities are specified in Section 10.28.040 of the Municipal Code as follows:

A. Weekdays and Saturdays. No person shall, while engaged in construction, remodeling, digging, grading, demolition, painting, plastering or any other related building activity, operate any tool, equipment or machine in a manner which produces loud noise that disturbs, or could disturb, a person of normal sensitivity who works or resides in the vicinity, on any weekday except between the hours of seven a.m. and six-thirty p.m., nor on any Saturday except between the hours of eight a.m. and six p.m.

B. Sundays and Holidays. No person shall, while engaged in construction, remodeling, digging, grading, demolition, painting, plastering or any other related building activity, operate any tool, equipment or machine in a manner which produces loud noise that disturbs, or could disturb, a person of normal sensitivity who works or resides in the vicinity, on any Sunday or any Federal holiday.

[7] California, Governor's Office of Planning and Research, 1998

REFERENCES

Barry, T.M. and J.A. Reagan. 1978. FHWA Highway Traffic Noise Prediction Model (FHWA-RD-77-108).

California. Governor's Office of Planning and Research. 12002998. General Plan Guidelines, Appendix A: Guidelines for the Preparation and Content of the Noise Element of the General Plan.

Hendriks, Rudolf W. 1987. California Vehicle Noise Emission Levels (FHWA/CA/TL-87/03).

Newport Beach, City of. 1994. Noise Element, City of Newport Beach General Plan. Chapter 11.44. Ord. 89-29, 23 January 1990.

Orange, County of. 2001. John Wayne Airport Settlement Agreement Amendment Draft Environmental Impact Report.

U.S. Department of Transportation. Federal Highway Administration. 1980. Highway Noise Fundamentals.

Appendix A
NOISE DATA

```
Sound Level Meter Summary
Translated: 08-Mar-2004 14:13:44
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File Translated:  C:\Documents and Settings\MBrown.LAV-1\My Documents\Projects\10579-01
Newport Beach GP\Noise Monitoring Data\Location 1.slmdl
Model Number:     814
Serial Number:    A0174
Firmware Rev:     1.026
Software Version: 1.070
Name:             EIP Associates
Descr1:           12301 Wilshire Blvd. Suite 430
Descr2:           Los Angeles, CA 90025
Setup:            15Minute.slm
Setup Descr:      15 Minute
Octave Filters:   None

Location:         Newport Beach Location 1
Note 1:
Note 2:

Overall Measurement                    Current Measurement
-------------------------------------- ---------------------------------------
Start Time:       18-Dec-2003 11:37:47  Start Time        18-Dec-2003 11:38:41
Elapsed Time:               00:15:01.2  Elapsed Time                00:15:00.0
Leq:                              55.6  Leq:                              55.6
SEL:                              85.2  SEL:                              85.2
Dose:                             0.00  Dose:                             0.00
Proj. Dose:                       0.00  Proj. Dose:                       0.00
Threshold:                        0 dB  Threshold:                        0 dB
Criterion:                        0 dB  Criterion:                        0 dB
Exchange Rate:                    3 dB  Exchange Rate:                    3 dB
Min:     49.5     18-Dec-2003 11:46:03  Min:     49.5     18-Dec-2003 11:46:03
Max:     63.3     18-Dec-2003 11:44:12  Max:     63.3     18-Dec-2003 11:44:12
Peak-1:  90.8     18-Dec-2003 11:44:16  Peak-1:  90.8     18-Dec-2003 11:44:16
Peak-2:  81.0     18-Dec-2003 11:40:58  Peak-2:  81.0     18-Dec-2003 11:40:58

L    (1.67)  61.3
L    (8.33)  58.7
L   (33.33)  55.5
L   (50.00)  54.4
L   (66.67)  53.4
L   (90.00)  51.8

Detector:   Slow
Weighting:  A
Oba Filter: 1000 Hz
SPL Exceedance Level 1:  115.00          Exceeded: 0 times
SPL Exceedance Level 2:     120          Exceeded: 0 times
Peak-1 Exceedance Level:    140          Exceeded: 0 times
Peak-2 Exceedance Level:    140          Exceeded: 0 times
Hysteresis:               2
Overloaded:               0
Pause Count:              0              Pause Time: 00:00:00.0

Calibrated:       12-Dec-2003 15:24:31   Offset:   8.8 dB
Checked:          12-Dec-2003 15:24:31   Level:   91.9 dB
Calibrator:       LD 0504
Level:            114.0
Cal Record Count:   6

Interval Records:   Enabled              Number Interval Records:           2
Time History:       Enabled              Number History Records:           21

814 Memory:           524288
Free Memory:          290553             Percent Free:  55.42%
Battery Level:           75%             Source: INT
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Sound Level Meter Summary
Translated: 08-Mar-2004 14:14:04
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File Translated:  C:\Documents and Settings\MBrown.LAV-1\My Documents\Projects\10579-01
Newport Beach GP\Noise Monitoring Data\Location 2.slmdl
Model Number:     814
Serial Number:    A0174
Firmware Rev:     1.026
Software Version: 1.070
Name:             EIP Associates
Descr1:           12301 Wilshire Blvd. Suite 430
Descr2:           Los Angeles, CA 90025
Setup:            15Minute.slm
Setup Descr:      15 Minute
Octave Filters:   None

Location:         Newport Beach Location 2
Note 1:
Note 2:

Overall Measurement                     Current Measurement
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Start Time:       18-Dec-2003 12:09:26  Start Time        18-Dec-2003 12:09:26
Elapsed Time:               00:15:00.0  Elapsed Time                00:15:00.0
Leq:                              67.4  Leq:                              67.4
SEL:                              97.0  SEL:                              97.0
Dose:                             0.00  Dose:                             0.00
Proj. Dose:                       0.00  Proj. Dose:                       0.00
Threshold:                        0 dB  Threshold:                        0 dB
Criterion:                        0 dB  Criterion:                        0 dB
Exchange Rate:                    3 dB  Exchange Rate:                    3 dB
Min:     48.0     18-Dec-2003 12:23:59  Min:     48.0     18-Dec-2003 12:23:59
Max:     77.9     18-Dec-2003 12:10:33  Max:     77.9     18-Dec-2003 12:10:33
Peak-1:  99.6     18-Dec-2003 12:16:46  Peak-1:  99.6     18-Dec-2003 12:16:46
Peak-2:  91.9     18-Dec-2003 12:10:32  Peak-2:  91.9     18-Dec-2003 12:10:32

L    (1.67)  73.9
L    (8.33)  72.0
L   (33.33)  67.1
L   (50.00)  64.8
L   (66.67)  61.8
L   (90.00)  56.4

Detector:   Slow
Weighting:  A
Oba Filter: 1000 Hz
SPL Exceedance Level 1:  115.00          Exceeded: 0 times
SPL Exceedance Level 2:     120          Exceeded: 0 times
Peak-1 Exceedance Level:    140          Exceeded: 0 times
Peak-2 Exceedance Level:    140          Exceeded: 0 times
Hysteresis:                2
Overloaded:                0
Pause Count:               0             Pause Time: 00:00:00.0

Calibrated:       12-Dec-2003 15:24:31   Offset:   8.8 dB
Checked:          12-Dec-2003 15:24:31   Level:   91.9 dB
Calibrator:       LD 0504
Level:            114.0
Cal Record Count:   0

Interval Records:   Enabled              Number Interval Records:           1
Time History:       Enabled              Number History Records:           18

814 Memory:           524288
Free Memory:          290553             Percent Free:  55.42%
Battery Level:           73%             Source: INT
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Sound Level Meter Summary
Translated: 08-Mar-2004 14:14:22
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File Translated:  C:\Documents and Settings\MBrown.LAV-1\My Documents\Projects\10579-01
Newport Beach GP\Noise Monitoring Data\Location 3.slmdl
Model Number:     814
Serial Number:    A0174
Firmware Rev:     1.026
Software Version: 1.070
Name:             EIP Associates
Descr1:           12301 Wilshire Blvd. Suite 430
Descr2:           Los Angeles, CA 90025
Setup:            15Minute.slm
Setup Descr:      15 Minute
Octave Filters:   None

Location:         Newport Beach Location 3
Note 1:
Note 2:

Overall Measurement                     Current Measurement
--------------------------------------- --------------------------------------
Start Time:       18-Dec-2003 12:37:28  Start Time        18-Dec-2003 12:37:28
Elapsed Time:               00:15:00.0  Elapsed Time                00:15:00.0
Leq:                              59.4  Leq:                              59.4
SEL:                              89.0  SEL:                              89.0
Dose:                             0.00  Dose:                             0.00
Proj. Dose:                       0.00  Proj. Dose:                       0.00
Threshold:                        0 dB  Threshold:                        0 dB
Criterion:                        0 dB  Criterion:                        0 dB
Exchange Rate:                    3 dB  Exchange Rate:                    3 dB
Min:     44.1     18-Dec-2003 12:49:16  Min:     44.1     18-Dec-2003 12:49:16
Max:     77.2     18-Dec-2003 12:44:36  Max:     77.2     18-Dec-2003 12:44:36
Peak-1: 100.4     18-Dec-2003 12:44:35  Peak-1: 100.4     18-Dec-2003 12:44:35
Peak-2:  90.3     18-Dec-2003 12:44:34  Peak-2:  90.3     18-Dec-2003 12:44:34

L    (1.67)  68.6
L    (8.33)  62.7
L   (33.33)  56.9
L   (50.00)  53.5
L   (66.67)  49.9
L   (90.00)  47.3

Detector:   Slow
Weighting:  A
Oba Filter: 1000 Hz
SPL Exceedance Level 1:  115.00          Exceeded: 0 times
SPL Exceedance Level 2:     120          Exceeded: 0 times
Peak-1 Exceedance Level:    140          Exceeded: 0 times
Peak-2 Exceedance Level:    140          Exceeded: 0 times
Hysteresis:                2
Overloaded:                0
Pause Count:               0             Pause Time: 00:00:00.0

Calibrated:       12-Dec-2003 15:24:31   Offset:   8.8 dB
Checked:          12-Dec-2003 15:24:31   Level:   91.9 dB
Calibrator:       LD 0504
Level:            114.0
Cal Record Count:   0

Interval Records:   Enabled              Number Interval Records:           1
Time History:       Enabled              Number History Records:           18

814 Memory:           524288
Free Memory:          290553             Percent Free:  55.42%
Battery Level:           72%             Source: INT
```

```
Sound Level Meter Summary
Translated: 08-Mar-2004 14:14:35
--------------------------------------------------------------------------------
File Translated:  C:\Documents and Settings\MBrown.LAV-1\My Documents\Projects\10579-01
Newport Beach GP\Noise Monitoring Data\Location 4.slmdl
Model Number:     814
Serial Number:    A0174
Firmware Rev:     1.026
Software Version: 1.070
Name:             EIP Associates
Descr1:           12301 Wilshire Blvd. Suite 430
Descr2:           Los Angeles, CA 90025
Setup:            15Minute.slm
Setup Descr:      15 Minute
Octave Filters:   None

Location:         Newport Beach Location 4
Note 1:
Note 2:

Overall Measurement                    Current Measurement
-------------------------------------- ---------------------------------------
Start Time:       18-Dec-2003 12:57:01  Start Time        18-Dec-2003 12:57:01
Elapsed Time:               00:15:00.0  Elapsed Time                00:15:00.0
Leq:                              58.9  Leq:                              58.9
SEL:                              88.5  SEL:                              88.5
Dose:                             0.00  Dose:                             0.00
Proj. Dose:                       0.00  Proj. Dose:                       0.00
Threshold:                        0 dB  Threshold:                        0 dB
Criterion:                        0 dB  Criterion:                        0 dB
Exchange Rate:                    3 dB  Exchange Rate:                    3 dB
Min:     41.0     18-Dec-2003 13:02:28  Min:     41.0     18-Dec-2003 13:02:28
Max:     75.8     18-Dec-2003 12:59:07  Max:     75.8     18-Dec-2003 12:59:07
Peak-1: 100.8     18-Dec-2003 12:59:07  Peak-1: 100.8     18-Dec-2003 12:59:07
Peak-2:  88.6     18-Dec-2003 12:59:07  Peak-2:  88.6     18-Dec-2003 12:59:07

L    (1.67)  67.4
L    (8.33)  62.4
L   (33.33)  57.3
L   (50.00)  55.5
L   (66.67)  53.1
L   (90.00)  48.0

Detector:   Slow
Weighting:  A
Oba Filter: 1000 Hz
SPL Exceedance Level 1:  115.00          Exceeded: 0 times
SPL Exceedance Level 2:     120          Exceeded: 0 times
Peak-1 Exceedance Level:    140          Exceeded: 0 times
Peak-2 Exceedance Level:    140          Exceeded: 0 times
Hysteresis:                2
Overloaded:                0
Pause Count:               0             Pause Time: 00:00:00.0

Calibrated:       12-Dec-2003 15:24:31   Offset:   8.8 dB
Checked:          12-Dec-2003 15:24:31   Level:   91.9 dB
Calibrator:       LD 0504
Level:            114.0
Cal Record Count:   0

Interval Records:   Enabled              Number Interval Records:           1
Time History:       Enabled              Number History Records:           18

814 Memory:           524288
Free Memory:          290553             Percent Free:  55.42%
Battery Level:           71%             Source: INT
```

```
Sound Level Meter Summary
Translated: 08-Mar-2004 14:14:49
--------------------------------------------------------------------------------
File Translated:  C:\Documents and Settings\MBrown.LAV-1\My Documents\Projects\10579-01
Newport Beach GP\Noise Monitoring Data\Location 5.slmdl
Model Number:     814
Serial Number:    A0174
Firmware Rev:     1.026
Software Version: 1.070
Name:             EIP Associates
Descr1:           12301 Wilshire Blvd. Suite 430
Descr2:           Los Angeles, CA 90025
Setup:            15Minute.slm
Setup Descr:      15 Minute
Octave Filters:   None

Location:         Newport Beach Location 5
Note 1:
Note 2:

Overall Measurement                    Current Measurement
-------------------------------------- --------------------------------------
Start Time:       18-Dec-2003 13:25:22  Start Time        18-Dec-2003 13:25:22
Elapsed Time:               00:15:00.0  Elapsed Time                00:15:00.0
Leq:                              61.6  Leq:                              61.6
SEL:                              91.2  SEL:                              91.2
Dose:                             0.00  Dose:                             0.00
Proj. Dose:                       0.00  Proj. Dose:                       0.00
Threshold:                        0 dB  Threshold:                        0 dB
Criterion:                        0 dB  Criterion:                        0 dB
Exchange Rate:                    3 dB  Exchange Rate:                    3 dB
Min:     53.8     18-Dec-2003 13:29:09  Min:     53.8     18-Dec-2003 13:29:09
Max:     82.5     18-Dec-2003 13:31:54  Max:     82.5     18-Dec-2003 13:31:54
Peak-1: 107.8     18-Dec-2003 13:31:53  Peak-1: 107.8     18-Dec-2003 13:31:53
Peak-2:  97.2     18-Dec-2003 13:31:00  Peak-2:  97.2     18-Dec-2003 13:31:00

L    (1.67)  66.0
L    (8.33)  61.8
L   (33.33)  60.0
L   (50.00)  59.2
L   (66.67)  58.5
L   (90.00)  57.1

Detector:   Slow
Weighting:  A
Oba Filter: 1000 Hz
SPL Exceedance Level 1:  115.00          Exceeded: 0 times
SPL Exceedance Level 2:     120          Exceeded: 0 times
Peak-1 Exceedance Level:    140          Exceeded: 0 times
Peak-2 Exceedance Level:    140          Exceeded: 0 times
Hysteresis:                2
Overloaded:                0
Pause Count:               0             Pause Time: 00:00:00.0

Calibrated:       12-Dec-2003 15:24:31   Offset:   8.8 dB
Checked:          12-Dec-2003 15:24:31   Level:   91.9 dB
Calibrator:       LD 0504
Level:            114.0
Cal Record Count:   0

Interval Records:   Enabled              Number Interval Records:           1
Time History:       Enabled              Number History Records:           18

814 Memory:           524288
Free Memory:          290553             Percent Free:  55.42%
Battery Level:           71%             Source: INT
```

Sound Level Meter Summary
Translated: 08-Mar-2004 14:15:02

File Translated: C:\Documents and Settings\MBrown.LAV-1\My Documents\Projects\10579-01 Newport Beach GP\Noise Monitoring Data\Location 6.slmdl
Model Number: 814
Serial Number: A0174
Firmware Rev: 1.026
Software Version: 1.070
Name: EIP Associates
Descr1: 12301 Wilshire Blvd. Suite 430
Descr2: Los Angeles, CA 90025
Setup: 15Minute.slm
Setup Descr: 15 Minute
Octave Filters: None

Location: Newport Beach Location 6
Note 1:
Note 2:

Overall Measurement			Current Measurement		
Start Time:		18-Dec-2003 13:54:52	Start Time		18-Dec-2003 13:54:52
Elapsed Time:		00:15:00.0	Elapsed Time		00:15:00.0
Leq:		58.4	Leq:		58.4
SEL:		87.9	SEL:		87.9
Dose:		0.00	Dose:		0.00
Proj. Dose:		0.00	Proj. Dose:		0.00
Threshold:		0 dB	Threshold:		0 dB
Criterion:		0 dB	Criterion:		0 dB
Exchange Rate:		3 dB	Exchange Rate:		3 dB
Min:	45.9	18-Dec-2003 14:09:52	Min:	45.9	18-Dec-2003 14:09:52
Max:	70.5	18-Dec-2003 13:56:33	Max:	70.5	18-Dec-2003 13:56:33
Peak-1:	96.1	18-Dec-2003 13:56:40	Peak-1:	96.1	18-Dec-2003 13:56:40
Peak-2:	83.3	18-Dec-2003 14:06:42	Peak-2:	83.3	18-Dec-2003 14:06:42

L (1.67) 67.7
L (8.33) 61.7
L (33.33) 56.8
L (50.00) 55.4
L (66.67) 54.1
L (90.00) 52.1

Detector: Slow
Weighting: A
Oba Filter: 1000 Hz

SPL Exceedance Level 1:	115.00	Exceeded: 0 times
SPL Exceedance Level 2:	120	Exceeded: 0 times
Peak-1 Exceedance Level:	140	Exceeded: 0 times
Peak-2 Exceedance Level:	140	Exceeded: 0 times
Hysteresis:	2	
Overloaded:	0	
Pause Count:	0	Pause Time: 00:00:00.0

Calibrated:	12-Dec-2003 15:24:31	Offset: 8.8 dB
Checked:	12-Dec-2003 15:24:31	Level: 91.9 dB
Calibrator:	LD 0504	
Level:	114.0	
Cal Record Count:	0	

Interval Records:	Enabled	Number Interval Records:	1
Time History:	Enabled	Number History Records:	18

814 Memory:	524288	
Free Memory:	290553	Percent Free: 55.42%
Battery Level:	71%	Source: INT

```
Sound Level Meter Summary
Translated: 08-Mar-2004 14:15:15
-------------------------------------------------------------------------------
File Translated:  C:\Documents and Settings\MBrown.LAV-1\My Documents\Projects\10579-01
Newport Beach GP\Noise Monitoring Data\Location 7.slmdl
Model Number:     814
Serial Number:    A0174
Firmware Rev:     1.026
Software Version: 1.070
Name:             EIP Associates
Descr1:           12301 Wilshire Blvd. Suite 430
Descr2:           Los Angeles, CA 90025
Setup:            15Minute.slm
Setup Descr:      15 Minute
Octave Filters:   None

Location:         Newport Beach Location 7
Note 1:
Note 2:

Overall Measurement                    Current Measurement
-------------------------------------- -------------------------------------
Start Time:       18-Dec-2003 14:17:14  Start Time        18-Dec-2003 14:17:14
Elapsed Time:               00:15:00.0  Elapsed Time                00:15:00.0
Leq:                              58.2  Leq:                              58.2
SEL:                              87.8  SEL:                              87.8
Dose:                             0.00  Dose:                             0.00
Proj. Dose:                       0.00  Proj. Dose:                       0.00
Threshold:                        0 dB  Threshold:                        0 dB
Criterion:                        0 dB  Criterion:                        0 dB
Exchange Rate:                    3 dB  Exchange Rate:                    3 dB
Min:     45.1     18-Dec-2003 14:29:08  Min:     45.1     18-Dec-2003 14:29:08
Max:     67.5     18-Dec-2003 14:30:12  Max:     67.5     18-Dec-2003 14:30:12
Peak-1:  94.5     18-Dec-2003 14:30:12  Peak-1:  94.5     18-Dec-2003 14:30:12
Peak-2:  84.2     18-Dec-2003 14:24:17  Peak-2:  84.2     18-Dec-2003 14:24:17

L    (1.67)  64.8
L    (8.33)  61.7
L   (33.33)  58.1
L   (50.00)  56.6
L   (66.67)  55.0
L   (90.00)  50.5

Detector:   Slow
Weighting:  A
Oba Filter: 1000 Hz
SPL Exceedance Level 1:  115.00          Exceeded: 0 times
SPL Exceedance Level 2:     120          Exceeded: 0 times
Peak-1 Exceedance Level:    140          Exceeded: 0 times
Peak-2 Exceedance Level:    140          Exceeded: 0 times
Hysteresis:                2
Overloaded:                0
Pause Count:               0             Pause Time: 00:00:00.0

Calibrated:       12-Dec-2003 15:24:31   Offset:   8.8 dB
Checked:          12-Dec-2003 15:24:31   Level:   91.9 dB
Calibrator:       LD 0504
Level:            114.0
Cal Record Count:   0

Interval Records:   Enabled              Number Interval Records:           1
Time History:       Enabled              Number History Records:           18

814 Memory:           524288
Free Memory:          290553             Percent Free:  55.42%
Battery Level:           70%             Source: INT
```

```
Sound Level Meter Summary
Translated: 08-Mar-2004 14:15:28
--------------------------------------------------------------------------------
File Translated:  C:\Documents and Settings\MBrown.LAV-1\My Documents\Projects\10579-01
Newport Beach GP\Noise Monitoring Data\Location 8.slmdl
Model Number:     814
Serial Number:    A0174
Firmware Rev:     1.026
Software Version: 1.070
Name:             EIP Associates
Descr1:           12301 Wilshire Blvd. Suite 430
Descr2:           Los Angeles, CA 90025
Setup:            15Minute.slm
Setup Descr:      15 Minute
Octave Filters:   None

Location:         Newport Beach Location 8
Note 1:
Note 2:

Overall Measurement                    Current Measurement
-------------------------------------- --------------------------------------
Start Time:       18-Dec-2003 14:40:15  Start Time        18-Dec-2003 14:40:15
Elapsed Time:               00:15:00.0  Elapsed Time                00:15:00.0
Leq:                              61.7  Leq:                              61.7
SEL:                              91.3  SEL:                              91.3
Dose:                             0.00  Dose:                             0.00
Proj. Dose:                       0.00  Proj. Dose:                       0.00
Threshold:                        0 dB  Threshold:                        0 dB
Criterion:                        0 dB  Criterion:                        0 dB
Exchange Rate:                    3 dB  Exchange Rate:                    3 dB
Min:     45.2     18-Dec-2003 14:53:09  Min:     45.2     18-Dec-2003 14:53:09
Max:     78.8     18-Dec-2003 14:53:42  Max:     78.8     18-Dec-2003 14:53:42
Peak-1: 108.3     18-Dec-2003 14:53:43  Peak-1: 108.3     18-Dec-2003 14:53:43
Peak-2:  92.7     18-Dec-2003 14:53:42  Peak-2:  92.7     18-Dec-2003 14:53:42

L    (1.67)  72.1
L    (8.33)  64.6
L   (33.33)  58.7
L   (50.00)  56.4
L   (66.67)  53.4
L   (90.00)  48.6

Detector:   Slow
Weighting:  A
Oba Filter: 1000 Hz
SPL Exceedance Level 1:  115.00          Exceeded: 0 times
SPL Exceedance Level 2:     120          Exceeded: 0 times
Peak-1 Exceedance Level:    140          Exceeded: 0 times
Peak-2 Exceedance Level:    140          Exceeded: 0 times
Hysteresis:                2
Overloaded:                0
Pause Count:               0             Pause Time: 00:00:00.0

Calibrated:       12-Dec-2003 15:24:31   Offset:   8.8 dB
Checked:          12-Dec-2003 15:24:31   Level:   91.9 dB
Calibrator:       LD 0504
Level:            114.0
Cal Record Count:   0

Interval Records:   Enabled              Number Interval Records:           1
Time History:       Enabled              Number History Records:           18

814 Memory:           524288
Free Memory:          290553             Percent Free:  55.42%
Battery Level:           70%             Source: INT
```

```
Sound Level Meter Summary
Translated: 08-Mar-2004 14:15:44
--------------------------------------------------------------------------------
File Translated:  C:\Documents and Settings\MBrown.LAV-1\My Documents\Projects\10579-01
Newport Beach GP\Noise Monitoring Data\Location 9.slmdl
Model Number:     814
Serial Number:    A0174
Firmware Rev:     1.026
Software Version: 1.070
Name:             EIP Associates
Descr1:           12301 Wilshire Blvd. Suite 430
Descr2:           Los Angeles, CA 90025
Setup:            15Minute.slm
Setup Descr:      15 Minute
Octave Filters:   None

Location:         Newport Beach Location 9
Note 1:
Note 2:

Overall Measurement                    Current Measurement
-------------------------------------- --------------------------------------
Start Time:       18-Dec-2003 15:18:07  Start Time        18-Dec-2003 15:18:07
Elapsed Time:               00:15:00.0  Elapsed Time                00:15:00.0
Leq:                              63.1  Leq:                              63.1
SEL:                              92.7  SEL:                              92.7
Dose:                             0.00  Dose:                             0.00
Proj. Dose:                       0.00  Proj. Dose:                       0.00
Threshold:                        0 dB  Threshold:                        0 dB
Criterion:                        0 dB  Criterion:                        0 dB
Exchange Rate:                    3 dB  Exchange Rate:                    3 dB
Min:     48.0     18-Dec-2003 15:18:37  Min:     48.0     18-Dec-2003 15:18:37
Max:     77.4     18-Dec-2003 15:26:33  Max:     77.4     18-Dec-2003 15:26:33
Peak-1: 102.4     18-Dec-2003 15:26:32  Peak-1: 102.4     18-Dec-2003 15:26:32
Peak-2:  97.2     18-Dec-2003 15:19:50  Peak-2:  97.2     18-Dec-2003 15:19:50

L    (1.67)  70.8
L    (8.33)  66.9
L   (33.33)  62.3
L   (50.00)  59.8
L   (66.67)  57.0
L   (90.00)  52.6

Detector:   Slow
Weighting:  A
Oba Filter: 1000 Hz
SPL Exceedance Level 1:  115.00          Exceeded: 0 times
SPL Exceedance Level 2:     120          Exceeded: 0 times
Peak-1 Exceedance Level:    140          Exceeded: 0 times
Peak-2 Exceedance Level:    140          Exceeded: 0 times
Hysteresis:                2
Overloaded:                0
Pause Count:               0             Pause Time: 00:00:00.0

Calibrated:       12-Dec-2003 15:24:31   Offset:   8.8 dB
Checked:          12-Dec-2003 15:24:31   Level:   91.9 dB
Calibrator:       LD 0504
Level:            114.0
Cal Record Count:   0

Interval Records:   Enabled              Number Interval Records:           1
Time History:       Enabled              Number History Records:           18

814 Memory:           524288
Free Memory:          290553             Percent Free:  55.42%
Battery Level:           70%             Source: INT
```

```
Sound Level Meter Summary
Translated: 08-Mar-2004 14:15:58
--------------------------------------------------------------------------------
File Translated:  C:\Documents and Settings\MBrown.LAV-1\My Documents\Projects\10579-01
Newport Beach GP\Noise Monitoring Data\Location 10.slmdl
Model Number:     814
Serial Number:    A0174
Firmware Rev:     1.026
Software Version: 1.070
Name:             EIP Associates
Descr1:           12301 Wilshire Blvd. Suite 430
Descr2:           Los Angeles, CA 90025
Setup:            15Minute.slm
Setup Descr:      15 Minute
Octave Filters:   None

Location:         Newport Beach Location 10
Note 1:
Note 2:

Overall Measurement                     Current Measurement
--------------------------------------- ---------------------------------------
Start Time:       18-Dec-2003 15:39:06  Start Time        18-Dec-2003 15:39:06
Elapsed Time:              00:15:00.0  Elapsed Time               00:15:00.0
Leq:                             60.5  Leq:                             60.5
SEL:                             90.1  SEL:                             90.1
Dose:                            0.00  Dose:                            0.00
Proj. Dose:                      0.00  Proj. Dose:                      0.00
Threshold:                       0 dB  Threshold:                       0 dB
Criterion:                       0 dB  Criterion:                       0 dB
Exchange Rate:                   3 dB  Exchange Rate:                   3 dB
Min:     50.3     18-Dec-2003 15:49:50  Min:     50.3     18-Dec-2003 15:49:50
Max:     78.7     18-Dec-2003 15:44:49  Max:     78.7     18-Dec-2003 15:44:49
Peak-1:  97.4     18-Dec-2003 15:44:48  Peak-1:  97.4     18-Dec-2003 15:44:48
Peak-2:  96.8     18-Dec-2003 15:44:48  Peak-2:  96.8     18-Dec-2003 15:44:48

L    (1.67)  67.2
L    (8.33)  64.4
L   (33.33)  59.5
L   (50.00)  57.6
L   (66.67)  56.0
L   (90.00)  53.7

Detector:   Slow
Weighting:  A
Oba Filter: 1000 Hz
SPL Exceedance Level 1:  115.00          Exceeded: 0 times
SPL Exceedance Level 2:     120          Exceeded: 0 times
Peak-1 Exceedance Level:    140          Exceeded: 0 times
Peak-2 Exceedance Level:    140          Exceeded: 0 times
Hysteresis:                2
Overloaded:                0
Pause Count:               0             Pause Time: 00:00:00.0

Calibrated:       12-Dec-2003 15:24:31   Offset:   8.8 dB
Checked:          12-Dec-2003 15:24:31   Level:   91.9 dB
Calibrator:       LD 0504
Level:            114.0
Cal Record Count:   0

Interval Records:   Enabled              Number Interval Records:           1
Time History:       Enabled              Number History Records:           18

814 Memory:           524288
Free Memory:          290553             Percent Free:  55.42%
Battery Level:           69%             Source: INT
```

Sound Level Meter Summary
Translated: 08-Mar-2004 14:16:09

File Translated: C:\Documents and Settings\MBrown.LAV-1\My Documents\Projects\10579-01 Newport Beach GP\Noise Monitoring Data\Location 11.slmdl

Model Number:	814
Serial Number:	A0174
Firmware Rev:	1.026
Software Version:	1.070
Name:	EIP Associates
Descr1:	12301 Wilshire Blvd. Suite 430
Descr2:	Los Angeles, CA 90025
Setup:	15Minute.slm
Setup Descr:	15 Minute
Octave Filters:	None

Location:	Newport Beach Location 11
Note 1:	
Note 2:	

Overall Measurement			Current Measurement		
Start Time:		19-Dec-2003 11:22:04	Start Time		19-Dec-2003 11:22:04
Elapsed Time:		00:15:00.0	Elapsed Time		00:15:00.0
Leq:		59.4	Leq:		59.4
SEL:		88.9	SEL:		88.9
Dose:		0.00	Dose:		0.00
Proj. Dose:		0.00	Proj. Dose:		0.00
Threshold:		0 dB	Threshold:		0 dB
Criterion:		0 dB	Criterion:		0 dB
Exchange Rate:		3 dB	Exchange Rate:		3 dB
Min:	42.4	19-Dec-2003 11:29:33	Min:	42.4	19-Dec-2003 11:29:33
Max:	69.9	19-Dec-2003 11:27:46	Max:	69.9	19-Dec-2003 11:27:46
Peak-1:	96.0	19-Dec-2003 11:22:56	Peak-1:	96.0	19-Dec-2003 11:22:56
Peak-2:	93.8	19-Dec-2003 11:22:56	Peak-2:	93.8	19-Dec-2003 11:22:56

L	(1.67)	67.4
L	(8.33)	64.4
L	(33.33)	58.6
L	(50.00)	54.2
L	(66.67)	49.7
L	(90.00)	43.0

Detector:	Slow	
Weighting:	A	
Oba Filter:	1000 Hz	
SPL Exceedance Level 1:	115.00	Exceeded: 0 times
SPL Exceedance Level 2:	120	Exceeded: 0 times
Peak-1 Exceedance Level:	140	Exceeded: 0 times
Peak-2 Exceedance Level:	140	Exceeded: 0 times
Hysteresis:	2	
Overloaded:	0	
Pause Count:	0	Pause Time: 00:00:00.0

Calibrated:	12-Dec-2003 15:24:31	Offset: 8.8 dB
Checked:	12-Dec-2003 15:24:31	Level: 91.9 dB
Calibrator:	LD 0504	
Level:	114.0	
Cal Record Count:	0	

Interval Records:	Enabled	Number Interval Records:	1
Time History:	Enabled	Number History Records:	18

814 Memory:	524288	
Free Memory:	290553	Percent Free: 55.42%
Battery Level:	68%	Source: INT

```
Sound Level Meter Summary
Translated: 08-Mar-2004 14:16:23
--------------------------------------------------------------------------------
File Translated:  C:\Documents and Settings\MBrown.LAV-1\My Documents\Projects\10579-01
Newport Beach GP\Noise Monitoring Data\Location 12.slmdl
Model Number:     814
Serial Number:    A0174
Firmware Rev:     1.026
Software Version: 1.070
Name:             EIP Associates
Descr1:           12301 Wilshire Blvd. Suite 430
Descr2:           Los Angeles, CA 90025
Setup:            15Minute.slm
Setup Descr:      15 Minute
Octave Filters:   None

Location:         Newport Beach Location 12
Note 1:
Note 2:

Overall Measurement                     Current Measurement
--------------------------------------- ---------------------------------------
Start Time:       19-Dec-2003 11:52:00  Start Time        19-Dec-2003 11:52:00
Elapsed Time:               00:15:00.0  Elapsed Time                00:15:00.0
Leq:                              60.5  Leq:                              60.5
SEL:                              90.1  SEL:                              90.1
Dose:                             0.00  Dose:                             0.00
Proj. Dose:                       0.00  Proj. Dose:                       0.00
Threshold:                        0 dB  Threshold:                        0 dB
Criterion:                        0 dB  Criterion:                        0 dB
Exchange Rate:                    3 dB  Exchange Rate:                    3 dB
Min:     50.0     19-Dec-2003 11:58:43  Min:     50.0     19-Dec-2003 11:58:43
Max:     75.6     19-Dec-2003 11:55:39  Max:     75.6     19-Dec-2003 11:55:39
Peak-1:  97.6     19-Dec-2003 11:55:39  Peak-1:  97.6     19-Dec-2003 11:55:39
Peak-2:  91.7     19-Dec-2003 11:53:35  Peak-2:  91.7     19-Dec-2003 11:53:35

L    (1.67)  66.8
L    (8.33)  63.7
L   (33.33)  60.2
L   (50.00)  58.3
L   (66.67)  56.4
L   (90.00)  53.4

Detector:   Slow
Weighting:  A
Oba Filter: 1000 Hz
SPL Exceedance Level 1:  115.00          Exceeded: 0 times
SPL Exceedance Level 2:     120          Exceeded: 0 times
Peak-1 Exceedance Level:    140          Exceeded: 0 times
Peak-2 Exceedance Level:    140          Exceeded: 0 times
Hysteresis:                2
Overloaded:                0
Pause Count:               0             Pause Time: 00:00:00.0

Calibrated:       12-Dec-2003 15:24:31   Offset:   8.8 dB
Checked:          12-Dec-2003 15:24:31   Level:   91.9 dB
Calibrator:       LD 0504
Level:            114.0
Cal Record Count:   0

Interval Records:   Enabled              Number Interval Records:           1
Time History:       Enabled              Number History Records:           18

814 Memory:           524288
Free Memory:          290553             Percent Free:  55.42%
Battery Level:            69%            Source: INT
```

```
Sound Level Meter Summary
Translated: 08-Mar-2004 14:16:36
--------------------------------------------------------------------------------
File Translated:  C:\Documents and Settings\MBrown.LAV-1\My Documents\Projects\10579-01
Newport Beach GP\Noise Monitoring Data\Location 13.slmdl
Model Number:     814
Serial Number:    A0174
Firmware Rev:     1.026
Software Version: 1.070
Name:             EIP Associates
Descr1:           12301 Wilshire Blvd. Suite 430
Descr2:           Los Angeles, CA 90025
Setup:            15Minute.slm
Setup Descr:      15 Minute
Octave Filters:   None

Location:         Newport Beach Location 13
Note 1:
Note 2:

Overall Measurement                     Current Measurement
--------------------------------------- ---------------------------------------
Start Time:       19-Dec-2003 12:24:05  Start Time        19-Dec-2003 12:24:05
Elapsed Time:               00:15:00.0  Elapsed Time                00:15:00.0
Leq:                              56.0  Leq:                              56.0
SEL:                              85.6  SEL:                              85.6
Dose:                             0.00  Dose:                             0.00
Proj. Dose:                       0.00  Proj. Dose:                       0.00
Threshold:                        0 dB  Threshold:                        0 dB
Criterion:                        0 dB  Criterion:                        0 dB
Exchange Rate:                    3 dB  Exchange Rate:                    3 dB
Min:     43.0     19-Dec-2003 12:37:35  Min:     43.0     19-Dec-2003 12:37:35
Max:     72.4     19-Dec-2003 12:25:33  Max:     72.4     19-Dec-2003 12:25:33
Peak-1:  94.5     19-Dec-2003 12:33:55  Peak-1:  94.5     19-Dec-2003 12:33:55
Peak-2:  87.0     19-Dec-2003 12:24:12  Peak-2:  87.0     19-Dec-2003 12:24:12

L    (1.67)  64.6
L    (8.33)  59.3
L   (33.33)  54.5
L   (50.00)  52.8
L   (66.67)  51.3
L   (90.00)  48.3

Detector:   Slow
Weighting:  A
Oba Filter: 1000 Hz
SPL Exceedance Level 1:  115.00          Exceeded: 0 times
SPL Exceedance Level 2:     120          Exceeded: 0 times
Peak-1 Exceedance Level:    140          Exceeded: 0 times
Peak-2 Exceedance Level:    140          Exceeded: 0 times
Hysteresis:                2
Overloaded:                0
Pause Count:               0             Pause Time: 00:00:00.0

Calibrated:       12-Dec-2003 15:24:31   Offset:   8.8 dB
Checked:          12-Dec-2003 15:24:31   Level:   91.9 dB
Calibrator:       LD 0504
Level:            114.0
Cal Record Count:   0

Interval Records:   Enabled              Number Interval Records:           1
Time History:       Enabled              Number History Records:           18

814 Memory:           524288
Free Memory:          290553             Percent Free:  55.42%
Battery Level:           67%             Source: INT
```

Sound Level Meter Summary
Translated: 08-Mar-2004 14:17:03

File Translated: C:\Documents and Settings\MBrown.LAV-1\My Documents\Projects\10579-01 Newport Beach GP\Noise Monitoring Data\Location 14.slmdl

Model Number:	814
Serial Number:	A0174
Firmware Rev:	1.026
Software Version:	1.070
Name:	EIP Associates
Descr1:	12301 Wilshire Blvd. Suite 430
Descr2:	Los Angeles, CA 90025
Setup:	15Minute.slm
Setup Descr:	15 Minute
Octave Filters:	None

Location:	Newport Beach Location 14
Note 1:	
Note 2:	

Overall Measurement			Current Measurement		
Start Time:		19-Dec-2003 12:55:06	Start Time		19-Dec-2003 12:55:06
Elapsed Time:		00:15:00.0	Elapsed Time		00:15:00.0
Leq:		61.8	Leq:		61.8
SEL:		91.4	SEL:		91.4
Dose:		0.00	Dose:		0.00
Proj. Dose:		0.00	Proj. Dose:		0.00
Threshold:		0 dB	Threshold:		0 dB
Criterion:		0 dB	Criterion:		0 dB
Exchange Rate:		3 dB	Exchange Rate:		3 dB
Min:	47.0	19-Dec-2003 13:05:09	Min:	47.0	19-Dec-2003 13:05:09
Max:	81.1	19-Dec-2003 13:03:05	Max:	81.1	19-Dec-2003 13:03:05
Peak-1:	99.7	19-Dec-2003 13:03:05	Peak-1:	99.7	19-Dec-2003 13:03:05
Peak-2:	94.1	19-Dec-2003 13:03:04	Peak-2:	94.1	19-Dec-2003 13:03:04

L	(1.67)	70.1
L	(8.33)	65.3
L	(33.33)	58.5
L	(50.00)	55.1
L	(66.67)	53.0
L	(90.00)	50.1

Detector:	Slow	
Weighting:	A	
Oba Filter:	1000 Hz	
SPL Exceedance Level 1:	115.00	Exceeded: 0 times
SPL Exceedance Level 2:	120	Exceeded: 0 times
Peak-1 Exceedance Level:	140	Exceeded: 0 times
Peak-2 Exceedance Level:	140	Exceeded: 0 times
Hysteresis:	2	
Overloaded:	0	
Pause Count:	0	Pause Time: 00:00:00.0

Calibrated:	12-Dec-2003 15:24:31	Offset: 8.8 dB
Checked:	12-Dec-2003 15:24:31	Level: 91.9 dB
Calibrator:	LD 0504	
Level:	114.0	
Cal Record Count:	0	

Interval Records:	Enabled	Number Interval Records:	1
Time History:	Enabled	Number History Records:	18

814 Memory:	524288	
Free Memory:	290553	Percent Free: 55.42%
Battery Level:	67%	Source: INT

```
Sound Level Meter Summary
Translated: 08-Mar-2004 14:17:22
--------------------------------------------------------------------------------
File Translated:  C:\Documents and Settings\MBrown.LAV-1\My Documents\Projects\10579-01
Newport Beach GP\Noise Monitoring Data\Location 15.slmdl
Model Number:     814
Serial Number:    A0174
Firmware Rev:     1.026
Software Version: 1.070
Name:             EIP Associates
Descr1:           12301 Wilshire Blvd. Suite 430
Descr2:           Los Angeles, CA 90025
Setup:            15Minute.slm
Setup Descr:      15 Minute
Octave Filters:   None

Location:         Newport Beach Location 15
Note 1:
Note 2:

Overall Measurement                   Current Measurement
------------------------------------- -------------------------------------
Start Time:       19-Dec-2003 13:20:46  Start Time        19-Dec-2003 13:20:46
Elapsed Time:               00:15:00.0  Elapsed Time                00:15:00.0
Leq:                              40.2  Leq:                              40.2
SEL:                              69.7  SEL:                              69.7
Dose:                          4256.00  Dose:                          4256.00
Proj. Dose:                       0.00  Proj. Dose:                       0.00
Threshold:                        0 dB  Threshold:                        0 dB
Criterion:                        0 dB  Criterion:                        0 dB
Exchange Rate:                    3 dB  Exchange Rate:                    3 dB
Min:     33.4     19-Dec-2003 13:27:59  Min:     33.4     19-Dec-2003 13:27:59
Max:     53.8     19-Dec-2003 13:34:37  Max:     53.8     19-Dec-2003 13:34:37
Peak-1:  91.3     19-Dec-2003 13:29:09  Peak-1:  91.3     19-Dec-2003 13:29:09
Peak-2:  79.8     19-Dec-2003 13:25:42  Peak-2:  79.8     19-Dec-2003 13:25:42

L    (1.67)  47.3
L    (8.33)  44.0
L   (33.33)  39.2
L   (50.00)  37.8
L   (66.67)  36.8
L   (90.00)  35.3

Detector:   Slow
Weighting:  A
Oba Filter: 1000 Hz
SPL Exceedance Level 1:  115.00          Exceeded: 0 times
SPL Exceedance Level 2:     120          Exceeded: 0 times
Peak-1 Exceedance Level:    140          Exceeded: 0 times
Peak-2 Exceedance Level:    140          Exceeded: 0 times
Hysteresis:                2
Overloaded:                0
Pause Count:               0             Pause Time: 00:00:00.0

Calibrated:       12-Dec-2003 15:24:31   Offset:   8.8 dB
Checked:          12-Dec-2003 15:24:31   Level:   91.9 dB
Calibrator:       LD 0504
Level:            114.0
Cal Record Count:   0

Interval Records:   Enabled              Number Interval Records:           1
Time History:       Enabled              Number History Records:           18

814 Memory:           524288
Free Memory:          290553             Percent Free:  55.42%
Battery Level:           66%             Source: INT
```

```
Sound Level Meter Summary
Translated: 08-Mar-2004 14:17:39
--------------------------------------------------------------------------------
File Translated:  C:\Documents and Settings\MBrown.LAV-1\My Documents\Projects\10579-01
Newport Beach GP\Noise Monitoring Data\Location 16.slmdl
Model Number:     814
Serial Number:    A0174
Firmware Rev:     1.026
Software Version: 1.070
Name:             EIP Associates
Descr1:           12301 Wilshire Blvd. Suite 430
Descr2:           Los Angeles, CA 90025
Setup:            15Minute.slm
Setup Descr:      15 Minute
Octave Filters:   None

Location:         Newport Beach Location 16
Note 1:
Note 2:

Overall Measurement                   Current Measurement
------------------------------------- -------------------------------------
Start Time:       19-Dec-2003 13:45:36  Start Time        19-Dec-2003 13:45:36
Elapsed Time:              00:15:00.0  Elapsed Time               00:15:00.0
Leq:                             66.0  Leq:                             66.0
SEL:                             95.6  SEL:                             95.6
Dose:                            0.00  Dose:                            0.00
Proj. Dose:                      0.00  Proj. Dose:                      0.00
Threshold:                       0 dB  Threshold:                       0 dB
Criterion:                       0 dB  Criterion:                       0 dB
Exchange Rate:                   3 dB  Exchange Rate:                   3 dB
Min:     41.8     19-Dec-2003 13:54:45  Min:     41.8     19-Dec-2003 13:54:45
Max:     82.3     19-Dec-2003 13:51:21  Max:     82.3     19-Dec-2003 13:51:21
Peak-1: 101.4     19-Dec-2003 13:51:21  Peak-1: 101.4     19-Dec-2003 13:51:21
Peak-2:  96.0     19-Dec-2003 13:51:21  Peak-2:  96.0     19-Dec-2003 13:51:21

L    (1.67)  74.0
L    (8.33)  69.7
L   (33.33)  65.1
L   (50.00)  62.8
L   (66.67)  59.6
L   (90.00)  53.7

Detector:   Slow
Weighting:  A
Oba Filter: 1000 Hz
SPL Exceedance Level 1:  115.00          Exceeded: 0 times
SPL Exceedance Level 2:     120          Exceeded: 0 times
Peak-1 Exceedance Level:    140          Exceeded: 0 times
Peak-2 Exceedance Level:    140          Exceeded: 0 times
Hysteresis:                2
Overloaded:                0
Pause Count:               0             Pause Time: 00:00:00.0

Calibrated:       12-Dec-2003 15:24:31   Offset:   8.8 dB
Checked:          12-Dec-2003 15:24:31   Level:   91.9 dB
Calibrator:       LD 0504
Level:            114.0
Cal Record Count:   0

Interval Records:   Enabled              Number Interval Records:          1
Time History:       Enabled              Number History Records:          18

814 Memory:           524288
Free Memory:          290553             Percent Free:  55.42%
Battery Level:           67%             Source: INT
```

```
Sound Level Meter Summary
Translated: 08-Mar-2004 14:17:51
-------------------------------------------------------------------------------
File Translated:  C:\Documents and Settings\MBrown.LAV-1\My Documents\Projects\10579-01
Newport Beach GP\Noise Monitoring Data\Location 17.slmdl
Model Number:     814
Serial Number:    A0174
Firmware Rev:     1.026
Software Version: 1.070
Name:             EIP Associates
Descr1:           12301 Wilshire Blvd. Suite 430
Descr2:           Los Angeles, CA 90025
Setup:            15Minute.slm
Setup Descr:      15 Minute
Octave Filters:   None

Location:         Newport Beach Location 17
Note 1:
Note 2:

Overall Measurement                    Current Measurement
-------------------------------------- --------------------------------------
Start Time:       19-Dec-2003 14:09:55  Start Time        19-Dec-2003 14:09:55
Elapsed Time:               00:15:00.0  Elapsed Time                00:15:00.0
Leq:                              66.1  Leq:                              66.1
SEL:                              95.7  SEL:                              95.7
Dose:                             0.00  Dose:                             0.00
Proj. Dose:                       0.00  Proj. Dose:                       0.00
Threshold:                        0 dB  Threshold:                        0 dB
Criterion:                        0 dB  Criterion:                        0 dB
Exchange Rate:                    3 dB  Exchange Rate:                    3 dB
Min:     47.2     19-Dec-2003 14:19:12  Min:     47.2     19-Dec-2003 14:19:12
Max:     85.2     19-Dec-2003 14:11:33  Max:     85.2     19-Dec-2003 14:11:33
Peak-1: 108.4     19-Dec-2003 14:19:44  Peak-1: 108.4     19-Dec-2003 14:19:44
Peak-2:  96.3     19-Dec-2003 14:11:32  Peak-2:  96.3     19-Dec-2003 14:11:32

L    (1.67)  73.8
L    (8.33)  69.1
L   (33.33)  63.6
L   (50.00)  61.5
L   (66.67)  58.6
L   (90.00)  54.2

Detector:   Slow
Weighting:  A
Oba Filter: 1000 Hz
SPL Exceedance Level 1:  115.00          Exceeded: 0 times
SPL Exceedance Level 2:     120          Exceeded: 0 times
Peak-1 Exceedance Level:    140          Exceeded: 0 times
Peak-2 Exceedance Level:    140          Exceeded: 0 times
Hysteresis:                2
Overloaded:                0
Pause Count:               0             Pause Time: 00:00:00.0

Calibrated:       12-Dec-2003 15:24:31   Offset:   8.8 dB
Checked:          12-Dec-2003 15:24:31   Level:   91.9 dB
Calibrator:       LD 0504
Level:            114.0
Cal Record Count:   0

Interval Records:   Enabled              Number Interval Records:           1
Time History:       Enabled              Number History Records:           18

814 Memory:           524288
Free Memory:          290553             Percent Free:  55.42%
Battery Level:           66%             Source: INT
```

```
Sound Level Meter Summary
Translated: 08-Mar-2004 14:18:06
-------------------------------------------------------------------------------
File Translated:  C:\Documents and Settings\MBrown.LAV-1\My Documents\Projects\10579-01
Newport Beach GP\Noise Monitoring Data\Location 18.slmdl
Model Number:     814
Serial Number:    A0174
Firmware Rev:     1.026
Software Version: 1.070
Name:             EIP Associates
Descr1:           12301 Wilshire Blvd. Suite 430
Descr2:           Los Angeles, CA 90025
Setup:            15Minute.slm
Setup Descr:      15 Minute
Octave Filters:   None

Location:         Newport Beach Location 18
Note 1:
Note 2:

Overall Measurement                     Current Measurement
--------------------------------------- --------------------------------------
Start Time:       19-Dec-2003 14:37:01  Start Time        19-Dec-2003 14:37:01
Elapsed Time:               00:15:00.0  Elapsed Time                00:15:00.0
Leq:                              64.9  Leq:                              64.9
SEL:                              94.4  SEL:                              94.4
Dose:                             0.00  Dose:                             0.00
Proj. Dose:                       0.00  Proj. Dose:                       0.00
Threshold:                        0 dB  Threshold:                        0 dB
Criterion:                        0 dB  Criterion:                        0 dB
Exchange Rate:                    3 dB  Exchange Rate:                    3 dB
Min:     53.2     19-Dec-2003 14:41:11  Min:     53.2     19-Dec-2003 14:41:11
Max:     75.1     19-Dec-2003 14:41:58  Max:     75.1     19-Dec-2003 14:41:58
Peak-1: 101.3     19-Dec-2003 14:39:02  Peak-1: 101.3     19-Dec-2003 14:39:02
Peak-2:  94.3     19-Dec-2003 14:47:20  Peak-2:  94.3     19-Dec-2003 14:47:20

L    (1.67)  70.7
L    (8.33)  67.5
L   (33.33)  65.2
L   (50.00)  63.9
L   (66.67)  62.6
L   (90.00)  59.4

Detector:   Slow
Weighting:  A
Oba Filter: 1000 Hz
SPL Exceedance Level 1:  115.00          Exceeded: 0 times
SPL Exceedance Level 2:     120          Exceeded: 0 times
Peak-1 Exceedance Level:    140          Exceeded: 0 times
Peak-2 Exceedance Level:    140          Exceeded: 0 times
Hysteresis:                2
Overloaded:                0
Pause Count:               0             Pause Time: 00:00:00.0

Calibrated:       12-Dec-2003 15:24:31   Offset:   8.8 dB
Checked:          12-Dec-2003 15:24:31   Level:   91.9 dB
Calibrator:       LD 0504
Level:            114.0
Cal Record Count:   0

Interval Records:   Enabled              Number Interval Records:           1
Time History:       Enabled              Number History Records:           18

814 Memory:           524288
Free Memory:          290553             Percent Free:  55.42%
Battery Level:           66%             Source: INT
```

Sound Level Meter Summary
Translated: 08-Mar-2004 14:18:21

File Translated: C:\Documents and Settings\MBrown.LAV-1\My Documents\Projects\10579-01 Newport Beach GP\Noise Monitoring Data\Location 19.slmdl

Model Number:	814
Serial Number:	A0174
Firmware Rev:	1.026
Software Version:	1.070
Name:	EIP Associates
Descr1:	12301 Wilshire Blvd. Suite 430
Descr2:	Los Angeles, CA 90025
Setup:	15Minute.slm
Setup Descr:	15 Minute
Octave Filters:	None

Location:	Newport Beach Location 19
Note 1:	
Note 2:	

Overall Measurement			Current Measurement		
Start Time:		19-Dec-2003 15:01:04	Start Time		19-Dec-2003 15:01:04
Elapsed Time:		00:15:00.0	Elapsed Time		00:15:00.0
Leq:		62.8	Leq:		62.8
SEL:		92.4	SEL:		92.4
Dose:		0.00	Dose:		0.00
Proj. Dose:		0.00	Proj. Dose:		0.00
Threshold:		0 dB	Threshold:		0 dB
Criterion:		0 dB	Criterion:		0 dB
Exchange Rate:		3 dB	Exchange Rate:		3 dB
Min:	47.0	19-Dec-2003 15:08:21	Min:	47.0	19-Dec-2003 15:08:21
Max:	73.0	19-Dec-2003 15:05:40	Max:	73.0	19-Dec-2003 15:05:40
Peak-1:	100.1	19-Dec-2003 15:15:07	Peak-1:	100.1	19-Dec-2003 15:15:07
Peak-2:	86.7	19-Dec-2003 15:05:39	Peak-2:	86.7	19-Dec-2003 15:05:39

L	(1.67)	70.0
L	(8.33)	66.5
L	(33.33)	62.5
L	(50.00)	61.0
L	(66.67)	59.7
L	(90.00)	55.2

Detector:	Slow	
Weighting:	A	
Oba Filter:	1000 Hz	
SPL Exceedance Level 1:	115.00	Exceeded: 0 times
SPL Exceedance Level 2:	120	Exceeded: 0 times
Peak-1 Exceedance Level:	140	Exceeded: 0 times
Peak-2 Exceedance Level:	140	Exceeded: 0 times
Hysteresis:	2	
Overloaded:	0	
Pause Count:	0	Pause Time: 00:00:00.0

Calibrated:	12-Dec-2003 15:24:31	Offset: 8.8 dB
Checked:	12-Dec-2003 15:24:31	Level: 91.9 dB
Calibrator:	LD 0504	
Level:	114.0	
Cal Record Count:	0	

Interval Records:	Enabled	Number Interval Records:	1
Time History:	Enabled	Number History Records:	18

814 Memory:	524288	
Free Memory:	290553	Percent Free: 55.42%
Battery Level:	65%	Source: INT

```
Sound Level Meter Summary
Translated: 08-Mar-2004 14:12:08
--------------------------------------------------------------------------------
File Translated:  C:\Documents and Settings\MBrown.LAV-1\My Documents\Projects\10579-01
Newport Beach GP\Noise Monitoring Data\Location 20.slmdl
Model Number:     814
Serial Number:    A0174
Firmware Rev:     1.026
Software Version: 1.070
Name:             EIP Associates
Descr1:           12301 Wilshire Blvd. Suite 430
Descr2:           Los Angeles, CA 90025
Setup:            15Minute.slm
Setup Descr:      15 Minute
Octave Filters:   None

Location:         Newport Beach Location 20
Note 1:
Note 2:

Overall Measurement                     Current Measurement
--------------------------------------- ---------------------------------------
Start Time:       19-Dec-2003 15:31:26  Start Time        19-Dec-2003 15:31:26
Elapsed Time:               00:15:00.0  Elapsed Time                00:15:00.0
Leq:                              63.3  Leq:                              63.3
SEL:                              92.8  SEL:                              92.8
Dose:                             0.00  Dose:                             0.00
Proj. Dose:                       0.00  Proj. Dose:                       0.00
Threshold:                        0 dB  Threshold:                        0 dB
Criterion:                        0 dB  Criterion:                        0 dB
Exchange Rate:                    3 dB  Exchange Rate:                    3 dB
Min:     50.4     19-Dec-2003 15:44:09  Min:     50.4     19-Dec-2003 15:44:09
Max:     78.9     19-Dec-2003 15:34:15  Max:     78.9     19-Dec-2003 15:34:15
Peak-1: 102.5     19-Dec-2003 15:34:15  Peak-1: 102.5     19-Dec-2003 15:34:15
Peak-2:  95.5     19-Dec-2003 15:42:54  Peak-2:  95.5     19-Dec-2003 15:42:54

L    (1.67)  72.3
L    (8.33)  66.6
L   (33.33)  61.4
L   (50.00)  59.5
L   (66.67)  57.8
L   (90.00)  54.8

Detector:   Slow
Weighting:  A
Oba Filter: 1000 Hz
SPL Exceedance Level 1:  115.00          Exceeded: 0 times
SPL Exceedance Level 2:     120          Exceeded: 0 times
Peak-1 Exceedance Level:    140          Exceeded: 0 times
Peak-2 Exceedance Level:    140          Exceeded: 0 times
Hysteresis:                2
Overloaded:                0
Pause Count:               0             Pause Time: 00:00:00.0

Calibrated:       12-Dec-2003 15:24:31   Offset:   8.8 dB
Checked:          12-Dec-2003 15:24:31   Level:   91.9 dB
Calibrator:       LD 0504
Level:            114.0
Cal Record Count:   0

Interval Records:   Enabled              Number Interval Records:           1
Time History:       Enabled              Number History Records:           18

814 Memory:           524288
Free Memory:          290553             Percent Free:  55.42%
Battery Level:           66%             Source: INT
```

TRAFFIC NOISE LEVELS AND NOISE CONTOURS

Project Number: 10579-01
Project Name: Newport Beach General Plan Update

Background Information

Model Description:	FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels.		
Source of Traffic Volumes:	Meyer, Mohaddes & Associates		
Community Noise Descriptor:	L_{dn}: ____	CNEL: X	

Assumed 24-Hour Traffic Distribution:	Day	Evening	Night
Total ADT Volumes	77.70%	12.70%	9.60%
Medium-Duty Trucks	87.43%	5.05%	7.52%
Heavy-Duty Trucks	89.10%	2.84%	8.06%

Analysis Condition				Design		Vehicle Mix		Distance from Centerline of Roadway[1]			
Roadway, Segment	Lanes	Median Width	ADT Volume	Speed (mph)	Alpha Factor	Medium Trucks	Heavy Trucks	CNEL at 100 Feet	Distance to Contour 70 CNEL	65 CNEL	60 CNEL
Existing Traffic Volumes											
16th Street											
Irvine Avenue to Dover Drive	2	12	5,000	35	0.5	1.8%	0.7%	55.7	-	-	52
32nd Street											
west of Newport Boulevard	2	12	8,000	35	0.5	1.8%	0.7%	57.7	-	-	71
east of Newport Boulevard	2	12	3,000	35	0.5	1.8%	0.7%	53.5	-	-	-
Avacado Avenue											
north of San Miguel Drive	2	12	5,000	30	0.5	1.8%	0.7%	54.6	-	-	44
south of San Miguel Drive	4	12	12,000	45	0.5	1.8%	0.7%	62.2	-	65	140
north of Coast Highway	4	12	11,000	45	0.5	1.8%	0.7%	61.8	-	61	132
Balboa Boulevard											
south of Coast Highway	4	0	18,000	30	0.5	1.8%	0.7%	60.3	-	48	104
Bayside Drive											
south of Coast Highway	4	12	10,000	30	0.5	1.8%	0.7%	57.8	-	-	71
Birch Street											
Jamboree Road to Von Karman Avenue	4	12	12,000	40	0.5	1.8%	0.7%	61.0	-	54	116
Von Karman Avenue to MacArthur Boulevard	4	12	15,000	40	0.5	1.8%	0.7%	61.9	-	63	135
west of MacArthur Boulevard	4	12	16,000	40	0.5	1.8%	0.7%	62.2	-	65	141
north of Bristol Street North	4	12	23,000	40	0.5	1.8%	0.7%	63.8	-	83	179
Bristol Street North to Bristol Street South	4	12	19,000	40	0.5	1.8%	0.7%	63.0	-	73	158
south of Bristol Street South	4	12	15,000	40	0.5	1.8%	0.7%	61.9	-	63	135
Bison Avenue											
Jamboree Road to MacArthur Boulevard	6	12	13,000	40	0.5	1.8%	0.7%	61.6	-	-	128
MacArthur Boulevard to SR-73 Freeway	6	12	7,000	40	0.5	1.8%	0.7%	58.9	-	-	84
Bonita Canyon Dr.											
east of MacArthur Boulevard	4	12	26,000	50	0.5	1.8%	0.7%	66.7	60	130	279
west of SR-73 Freeway	4	12	17,000	50	0.5	1.8%	0.7%	64.8	-	98	210
Bristol Street North											
west of Campus Drive	4	0	28,000	40	0.5	1.8%	0.7%	64.6	-	94	202
Campus Drive to Birch Street	4	0	23,000	40	0.5	1.8%	0.7%	63.7	-	82	177
east of Birch Street	4	0	22,000	40	0.5	1.8%	0.7%	63.5	-	80	172
west of Jamboree Road	4	0	16,000	40	0.5	1.8%	0.7%	62.1	-	64	139
west of Campus Drive/Irvine Drive	4	0	28,000	40	0.5	1.8%	0.7%	64.6	-	94	202
Campus Drive to Birch Street	4	0	17,000	40	0.5	1.8%	0.7%	62.4	-	67	145

Newport Boulevard to Riverside Avenue	6	12	53,000	55	0.5	1.8%	0.7%	71.1	118	254	548
Riverside Avenue to Tustin Avenue	5	12	45,000	55	0.5	1.8%	0.7%	70.2	103	223	480
Tustin Avenue to Dover Drive	5	12	42,000	55	0.5	1.8%	0.7%	69.9	99	213	459
Dover Drive to Bayside Drive	4	12	63,000	55	0.5	1.8%	0.7%	71.6	127	274	591
Bayside Drive to Jamboree Road	7	12	51,000	55	0.5	1.8%	0.7%	71.1	118	255	549
Jamboree Road to Newport Center Drive	8	12	42,000	55	0.5	1.8%	0.7%	70.5	107	232	499
Newport Center Drive to Avocado Avenue	6	12	35,000	55	0.5	1.8%	0.7%	69.3	89	193	415
Avocado Avenue to MacArthur Boulevard	6	12	36,000	55	0.5	1.8%	0.7%	69.4	91	196	423
MacArthur Boulevard to Goldenrod Avenue	4	12	40,000	55	0.5	1.8%	0.7%	69.6	94	203	436
Goldenrod Avenue to Marguerite Avenue	2	0	39,000	55	0.5	1.8%	0.7%	69.3	90	194	417
Marguerite Avenue to Poppy Avenue	4	12	35,000	55	0.5	1.8%	0.7%	69.0	86	185	399
Poppy Avenue to Newport Coast Drive	6	12	28,000	55	0.5	1.8%	0.7%	68.3	77	166	358
east of Newport Coast Drive	6	12	35,000	55	0.5	1.8%	0.7%	69.3	89	193	415
Dover Drive											
Irvine Drive to Westcliff Drive	2	0	9,000	30	0.5	1.8%	0.7%	57.1	-	-	65
Westcliff Drive to 16th Street	2	0	22,000	40	0.5	1.8%	0.7%	63.4	36	79	169
16th Street to Cliff Drive	2	0	25,000	40	0.5	1.8%	0.7%	64.0	40	86	184
Cliff Drive to Coast Highway	2	0	29,000	40	0.5	1.8%	0.7%	64.6	44	94	204
Eastbluff Drive											
west of Jamboree Road at University Drive	4	12	10,000	45	0.5	1.8%	0.7%	61.4	-	58	124
west of Jamboree Road at Ford Road	5	12	15,000	45	0.5	1.8%	0.7%	63.3	-	77	166
Ford Road											
Jamboree Road to MacArthur Boulevard	4	12	9,000	45	0.5	1.8%	0.7%	61.0	-	54	116
Goldenrod Avenue											
north of Coast Highway	2	0	2,000	45	0.5	1.8%	0.7%	54.2	-	-	41
Highland Drive											
east of Irvine Avenue	2	0	2,000	45	0.5	1.8%	0.7%	54.2	-	-	41
Hospital Road											
Placentia Avenue to Newport Boulevard	4	12	13,000	35	0.5	1.8%	0.7%	60.0	-	-	100
east of Newport Boulevard	4	12	7,000	35	0.5	1.8%	0.7%	57.3	-	-	66
Irvine Avenue											
Bristol Street South to Mesa Drive	4	12	27,000	35	0.5	1.8%	0.7%	63.2	-	75	162
Mesa Drive to University Drive	4	12	31,000	35	0.5	1.8%	0.7%	63.8	-	83	178
University Drive to Santa Isabel Avenue	4	12	33,000	35	0.5	1.8%	0.7%	64.0	-	86	186
Santa Isabel Avenue to Santiago Drive	4	12	29,000	35	0.5	1.8%	0.7%	63.5	-	79	170
Santiago Drive to Highland Drive	4	12	27,000	35	0.5	1.8%	0.7%	63.2	-	75	162
Highland Drive to Dover Drive	4	12	27,000	35	0.5	1.8%	0.7%	63.2	-	75	162
Dover Drive to Westcliff Drive	4	12	22,000	35	0.5	1.8%	0.7%	62.3	-	66	142
Westcliff Drive to 16th Street	4	12	12,000	35	0.5	1.8%	0.7%	59.6	-	-	95
Jamboreee Road											
Campus Drive to Birch Street	6	12	36,000	55	0.5	1.8%	0.7%	69.4	91	196	423
Birch Street to MacArthur Boulevard	6	12	42,000	55	0.5	1.8%	0.7%	70.1	101	218	469
MacArthur Boulevard to Bristol Street North	6	12	36,000	55	0.5	1.8%	0.7%	69.4	91	196	423
Bristol Street North to Bristol Street South	6	12	47,000	55	0.5	1.8%	0.7%	70.6	109	235	506
Bristol Street South to Bayview Way	6	12	47,000	55	0.5	1.8%	0.7%	70.6	109	235	506
Bayview Way to University Drive	6	12	47,000	55	0.5	1.8%	0.7%	70.6	109	235	506
University Drive to Bison Avenue	6	12	37,000	55	0.5	1.8%	0.7%	69.5	93	200	431
Bison Avenue to Ford Road	6	12	39,000	55	0.5	1.8%	0.7%	69.7	96	207	446
Ford Road to San Joaquin Hills Road	6	12	46,000	55	0.5	1.8%	0.7%	70.5	107	231	498
San Joaquin Hills Road to Santa Barbara Dr	6	12	34,000	55	0.5	1.8%	0.7%	69.2	88	189	407
Santa Barbara Drive to Coast Highway	6	12	32,000	55	0.5	1.8%	0.7%	68.9	84	182	391
Coast Highway to Bayside Drive	4	12	12,000	55	0.5	1.8%	0.7%	64.4	-	91	196
MacArthur Boulevard											
Campus Drive to Birch Street	6	12	27,000	55	0.5	1.8%	0.7%	68.1	75	162	349
Birch Street to Von Karman Avenue	6	12	22,000	55	0.5	1.8%	0.7%	67.3	66	141	305
Von Karman Avenue to Jamboree Road	6	12	26,000	55	0.5	1.8%	0.7%	68.0	73	158	341

Coast Highway to Via Lido	6	12	48,000	30	0.5	1.8%	0.7%	64.9	-	98	211
Via Lido to 32nd Street	6	12	36,000	30	0.5	1.8%	0.7%	63.6	-	81	174
south of 32nd Street	6	12	29,000	30	0.5	1.8%	0.7%	62.7	-	70	151
Newport Center Drive											
north of Coast Highway	6	12	14,000	45	0.5	1.8%	0.7%	63.1	-	75	162
Newport Coast Drive											
SR-73 Freeway to San Joaquin Hills Road	4	12	17,000	40	0.5	1.8%	0.7%	62.5	-	68	147
south of San Joaquin Hills Road	6	12	15,000	40	0.5	1.8%	0.7%	62.2	-	65	140
north of Coast Highway	6	12	12,000	40	0.5	1.8%	0.7%	61.2	-	-	121
Placentia Avenue											
north of Superior Avenue	4	12	12,000	40	0.5	1.8%	0.7%	61.0	-	54	116
Superior Avenue to Hospital Road	4	12	7,000	40	0.5	1.8%	0.7%	58.6	-	-	81
Poppy Avenue											
north of Coast Highway	2	0	2,000	40	0.5	1.8%	0.7%	53.0	-	-	34
Riverside Avenue											
north of Coast Highway	2	0	9,000	30	0.5	1.8%	0.7%	57.1	-	-	65
San Joaquin Hills Road											
Jamboree Road to Santa Cruz Road	6	12	16,000	45	0.5	1.8%	0.7%	63.7	-	82	177
Santa Cruz Road to Santa Rosa Road	6	12	11,000	45	0.5	1.8%	0.7%	62.1	-	64	138
Santa Rosa Road to MacArthur Boulevard	6	12	21,000	45	0.5	1.8%	0.7%	64.9	-	98	212
MacArthur Boulevard to San Miguel Road	5	12	19,000	45	0.5	1.8%	0.7%	64.3	-	90	194
San Miguel Road to Marguerite Avenue	6	12	18,000	45	0.5	1.8%	0.7%	64.2	-	89	191
Marguerite Avenue to Spyglass Hill Road	6	12	12,000	45	0.5	1.8%	0.7%	62.5	-	68	146
Spyglass Hill Road to Newport Coast Drive	4	12	12,000	45	0.5	1.8%	0.7%	62.2	-	65	140
San Miguel Drive											
north of Spyglass Hill Road	4	12	7,000	40	0.5	1.8%	0.7%	58.6	-	-	81
south of Spyglass Hill Road	4	12	7,000	40	0.5	1.8%	0.7%	58.6	-	-	81
north of San Joaquin Hills Road	4	12	12,000	40	0.5	1.8%	0.7%	61.0	-	54	116
San Joaquin Hills Road to MacArthur Boulev	4	12	12,000	45	0.5	1.8%	0.7%	62.2	-	65	140
MacArthur Boulevard to Avocado Avenue	4	12	19,000	45	0.5	1.8%	0.7%	64.2	-	88	191
west of Avocado Avenue	4	12	10,000	45	0.5	1.8%	0.7%	61.4	-	58	124
Santa Barbara Drive											
east of Jamboree Road	4	12	10,000	40	0.5	1.8%	0.7%	60.2	-	-	103
Santa Cruz Drive											
south of San Joaquin Hills Road	4	12	8,000	40	0.5	1.8%	0.7%	59.2	-	-	89
Santa Rosa Drive											
south of San Joaquin Hills Road	4	12	11,000	40	0.5	1.8%	0.7%	60.6	-	51	110
Santiago Drive											
Tustin Avenue to Irvine Avenue	2	12	5,000	45	0.5	1.8%	0.7%	58.3	-	-	77
east of Irvine Avenue	2	12	3,000	45	0.5	1.8%	0.7%	56.0	-	-	54
Spyglass Hill Road											
San Miguel Drive to San Joaquin Hills Road	2	12	4,000	40	0.5	1.8%	0.7%	56.1	-	-	55
Superior Avenue											
north of Placentia Avenue	4	12	17,000	40	0.5	1.8%	0.7%	62.5	-	68	147
Placentia Avenue to Hospital Road	4	12	22,000	40	0.5	1.8%	0.7%	63.6	-	81	174
Hospital Road to Coast Highway	4	12	24,000	40	0.5	1.8%	0.7%	64.0	-	86	184
Tustin Avenue											
north of Coast Highway	2	0	2,000	40	0.5	1.8%	0.7%	53.0	-	-	34
University Drive											
east of Irvine Avenue	4	12	3,000	55	0.5	1.8%	0.7%	58.3	-	-	78
east of Jamboree Road	4	12	11,000	55	0.5	1.8%	0.7%	64.0	-	86	185
Via Lido											
east of Newport Boulevard	4	12	8,000	35	0.5	1.8%	0.7%	57.9	-	-	72
Von Karman Avenue											
Campus Drive to Birch Street	4	12	14,000	40	0.5	1.8%	0.7%	61.6	-	60	129
Birch Street to MacArthur Boulevard	4	12	12,000	40	0.5	1.8%	0.7%	61.0	-	54	116
Westcliff Drive											
Irvine Avenue to Dover Drive	4	12	16,000	35	0.5	1.8%	0.7%	60.9	-	53	115

[1] Distance is from the centerline of the roadway segment to the receptor location.
"-" = contour is located within the roadway right-of-way.