City of Avalon

Local Hazard Mitigation Plan (LHMP)

November 4, 2004

Table of Contents

LHMP Evaluation Requirements Cross Reference Table

Category of Requirement	Federal Emergency Management Agency (FEMA) / California Office of Emergency Services (OES) Evaluation Requirement & Statutory Authority	Avalon LHMP Response
Prerequisite	Adoption by Local Governing Body: §201.6(c)(5)	Precedes Table of Contents
Planning Process	Documentation of the Planning Process: §201.6(b) and §201.6(c)(1)	Pages 3 – 4
	Local Capabilities Assessment: §201.4(c)(ii) and §201.6(c)(1) – OPTIONAL REQUIREMENT	Pages 5 – 13
Risk Assessment	Identifying Hazards: §201.6(c)(2)(i)	Pages 23 – 25
	Profiling Hazards: §201.6(c)(2)(i)	Pages 27 – 82
	Assessing Vulnerability: Overview: §201.6(c)(2)(ii)	Pages 27 – 82
	Assessing Vulnerability: Structures: §201.6(c)(2)(ii)(A)	Pages 27 – 82
	Assessing Vulnerability: Estimating Potential Losses: §201.6(c)(2)(ii)(B)	Pages 27 – 82
	Assessing Vulnerability: Analyzing Development Trends: §201.6(c)(2)(ii)(C)	Page 26
Mitigation Strategy	Local Hazard Mitigation Goals: §201.6(c)(3)(i)	Pages 83 - 90
	Identification and Analysis of Mitigation Actions: §201.6(c)(3)(ii)	Pages 83 – 90
	Implementation of Mitigation Actions: §201.6(c)(3)(iii)	Pages 85 – 90
Plan Maintenance Process	Monitoring, Evaluating, and Updating the Plan: §201.6(c)(4)(i)	Pages 91 – 92
	Incorporation into Existing Planning Mechanisms: §201.6(c)(4)(ii)	Pages 91 – 92
	Continued Public Involvement: §201.6(c)(4)(iii)	Pages 91 – 92

1. Purpose / Vision / Values

Purpose of LHMP

The City of Avalon has developed this Local Hazard Mitigation Plan (LHMP) to create a safer community. The Avalon LHMP is the representation of Avalon's commitment to reduce risks from natural and other hazards, and serves as a guide for decision-makers as they commit resources to reducing the effects of natural and other hazards. The Avalon LHMP serves as a basis for State OES to provide technical assistance and to prioritize project funding. (See IFR §201.6.)

While the Disaster Mitigation Act of 2000 ("DMA 2000") requires that local communities address only natural hazards, the Federal Emergency Management Agency (FEMA) recommends that local comprehensive mitigation plans address man-made and technological hazards to the extent possible. Towards that goal, Avalon has addressed an expansive set of hazards.

For disasters declared after November 1, 2004, Avalon must have an LHMP approved pursuant to §201.6 in order to receive FEMA Pre-Disaster Mitigation (PDM) project grants or to receive post-disaster Hazard Mitigation Grant Program (HMGP) project funding. The LHMP is written to meet the statutory requirements of DMA 2000 (P.L. 106-390), enacted October 30, 2000 and 44 CFR Part 201 – Mitigation Planning, Interim Final Rule, published February 26, 2002.

Support of Broader City Vision

The LHMP supports the broader vision and values of the City of Avalon, reflected in Avalon Vision 2020, adopted August 19, 2003, by the City of Avalon Planning Commission and the Avalon City Council:

> AVALON: A healthy, small town island community - A quality cultural resort - A model ecological town
>
> Avalon is distinguished from other small towns by the natural beauty of its island location and its historic ambiance. Residents are enthusiastic about their community, value their cultural diversity, and take care to preserve their rich history and local traditions. It is a friendly, close-knit community, whose members feel responsible to and for each other and work together to improve their quality of life.
>
> The town is clean and safe. Residents have access to dignified, affordable housing, good school facilities, a variety of post high school educational opportunities, and abundant recreational, cultural, and social facilities and

programs. The limited land is used wisely for the benefit of residents and visitors. Infrastructure is adequate and well maintained. Laws and codes, including aesthetic standards, are enforced. Drug and alcohol abuse are not tolerated. Excellent medical and public safety services are provided to residents and visitors.

The community is un-crowded, and has the resident population and annual visitor density necessary for the generation of sufficient economic activity to fund community priorities and support its residents. Vehicle congestion and noise is limited. An affordable public transportation system reduces the reliance on personal vehicles.

As a resort, Avalon offers its visitors a unique, quiet, peaceful, high-quality vacation experience. The community continually strives for excellence in cleanliness, customer service and product quality. Recreational opportunities abound on water and land.

Avalon exemplifies environmental awareness and stewardship. The community strives to use technologies, products, and practices that are energy efficient, reduce pollution and waste, conserve water, and protect the environment of the island and the natural features and open spaces of the town. Avalon Bay is a national model for water quality. The community seeks to reduce its dependency on fossil fuels, both for the generation of electricity and in powering vehicles, with a comprehensive energy plan.

Wise planning and creative solutions are the hallmarks of the community's efforts to realize its vision for its residents and visitors.

Value Statements:

- A caring cooperative community where citizens are safe and enjoy abundant hope and opportunity
- Honoring the dignity of every person
- Cherishing our children
- Celebrate the variety of ethnic traditions that enrich our community
- Government is distinguished by competence and character
- A robust economy that attracts investment and promotes the prosperity of our families and City
- Treasuring, respecting and preserving nature’s gifts

2. The Planning Process

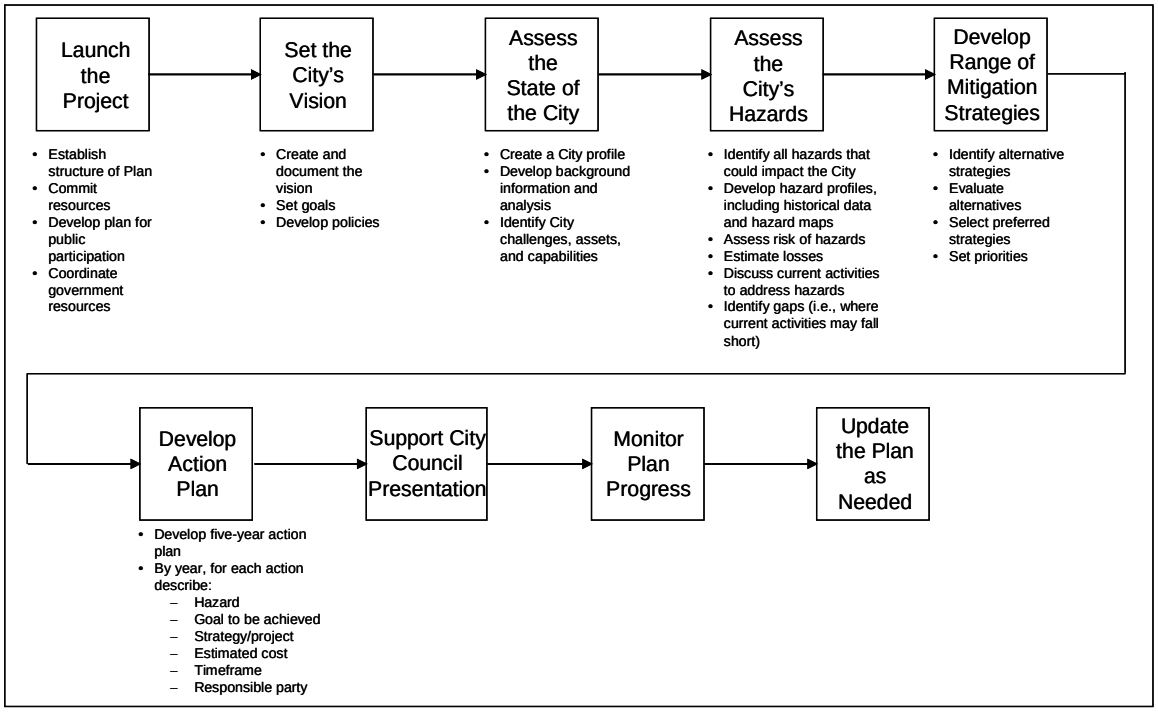
Planning Process Requirements Cross-Reference Table

Element	Requirement	Avalon LHMP Response
A	Narrative Description of the Process Followed to Prepare the Plan	Pages 3 – 4
B	Documentation of Who Was Involved in the Planning Process	Page 3 – 4
C	Documentation of How Public was Involved in Process	Page 4
D	Documentation of Opportunity for Neighboring Communities, Agencies, Businesses, Academia, Nonprofits, and Other Interested Parties to be Involved in the Planning Process	Page 3 – 4
E	Description of Review and Incorporation, if Appropriate, of Existing Plans, Studies, Reports, and Technical Information	Page 4

The City of Avalon Fire Department was responsible for the development of the LHMP. The City Fire Department hired a consultant, Bluecrane Inc., to assist in the preparation of the plan. The Fire Department formed a Planning Team with representatives from:

- City of Avalon (Assistant City Manager)
- City of Avalon Fire Department
- County of Los Angeles Fire Department
- County of Los Angeles Sheriff's Department
- Avalon Harbor Patrol
- Southern California Edison (water, electricity, and propane gas utility)
- United Water
- SBC
- Santa Catalina Island Company
- City of Avalon Historical Society
- Catalina Island Museum

The planning process utilized by Avalon is depicted in the figure below.



Following City Council approval of the project, the effort was launched in late July 2004 in a meeting of the Planning Team. The Planning Team has participated actively in the LHMP's development, meeting every two to three weeks throughout the process to review draft documents and assess progress on the plan.

In addition to the steps shown in the diagram above, an effort was made to solicit public input during the planning process by allowing the completed plan to be viewed for 10 days per the Brown Act, by the public prior to going in front of the City Council for review.

The City of Avalon currently utilizes comprehensive land use planning, capital improvements planning, and building codes to guide and control development within the City. In addition, in May 2004, a report entitled "Santa Catalina Island Draft Final Municipal Service Review" was prepared for the Local Agency Formation Commission (LAFCO) for Los Angeles County. The report for LAFCO of Los Angeles County provided a review of municipal services delivered on Santa Catalina Island. Since Avalon is the only incorporated city on the island, it was the focus of much of the report. These existing mechanisms were considered by and integrated into the City's LHMP process.

Local Capabilities Inventory

Although a Local Capabilities Assessment is an optional requirement of the LHMP process, the City of Avalon is taking this opportunity to document an inventory of key capabilities and assets. The tables below summarize the capabilities data collected during the development of the LHMP.

City of Avalon Fire Department	
Asset / Capability	**Inventory**
Rolling Stock	• 1 patrols • 2 engines • 1 ladder truck (quint ladder plus pump) • 2 ambulances • 2 mobile command vehicles • 1 air and light trailer
Personnel	• 11 full-time positions (3-person shifts) • 25 reserve firefighters • 2 Los Angeles County Fire Department Paramedics per shift
Facilities	• Main station with communications ad Command Post capabilities
Other Asset	• 1 Disaster Trailer with supplies

Los Angeles County Fire Department	
Asset / Capability	**Inventory**
Rolling Stock	• 2 patrols (FS-55 and Middle Ranch) • 2 engines (FS-55 and FS-155) • 3 water tenders (Quarry, Middle Ranch, and Two Harbors) • 1 Suburban command vehicle (FS-55)
Personnel	• 1 full-time Captain • 1 full-time Firefighter Specialist • 10 paid-call Firefighters at FS-55 (6 active) • 4 paid-call Firefighters at FS-155 (4 active)
Technical Assets – the availability of most of the equipment listed here is dependent on the use of the first item on the list, namely, the USN hovercraft; the average deployment time during the Airport Fire of January 2003 was 2 – 3 hours for resources to arrive on Catalina Island; the Incident Commander must forecast needs well ahead of time, and may consider utilizing Catalina Express and related providers to transport resources, personnel, equipment, and patients	• Landing Craft Air Cushion (LCAC) (Hovercraft) • USAR Task Force • Hazmat Task Force • Health Hazmat Technicians • K-9 resources for search and rescue • Heavy-duty paramedic squads for multi-casualty incidents • Incident management teams • Cranes • PIOs • Mass Decontamination vehicle • Critical stress debriefing unit • Communications trailer • Hospital Emergency Response Team (HERT) • Coroner strike teams / task forces
Technical Assets – Aircraft	• 2 Blackhawk / Firehawk helicopters • 4 Bell Jet Ranger helicopters • 1 206 Bell Jet Ranger helicopter (reconnaissance only) • 2 fixed-wing aircraft (Quebec-1 and -2)

Avalon Station – Los Angeles County Sheriff's Department	
Asset / Capability	**Inventory**
Facilities	• Emergency Services Dispatch • Criminal Emergency Response Equipment • Sub-Emergency Operations Center • Jail
Communications	• Sheriff's Radio • City Radio • Ham Radio • Computer Communications • Emergency Management Information System (EMIS) • Satellite Phones, SBC Phone Service, Cell Phones
Rolling Stock	• 6 4-wheel drive SUVs and 1 4-wheel drive van • 1 patrol sedan vehicle • 1 2-wheel drive pick-up truck • 2 golf carts • 3 patrol bicycles
Personnel	• 1 Lieutenant, 3 Sergeants, 10 Deputies, 2 Summer Deputies, 6 Techs and Dispatchers, 1 Secretary • 29 volunteers (23 CERT, 3 HAM Radio operators, 3 admin)
Technical Assets	• 12 computers with T-1 access to mainland • Wireless computer network mobile video system

Harbor Patrol	
Asset / Capability	**Inventory**
Vessels	• 6 patrol boats (21-foot to 24-foot) • 1 32-foot fire/rescue boat • 215-foot utility skiffs
Rolling Stock	• 1 Flat/Dump Bed Truck • Mobile Mechanic Van • 3 Transportation Vehicles
Other Equipment	• 15-ton mobile crane • 10 Ton fixed Crane on Cabrillo Mole • 2 Ton fixed Crane on Pier • Bomb Carrier Hoist Truck • 2 Ingersoll-Rand Air compressors • 2 mobile Pressure washers • Forklift, welder, boat trailers • 5000 Watt Portable Generator
Facilities	• 24 Hour Office with automatic back up generator
Communications	• City Radio (Base, Mobile and Handheld) • Marine VHF Radios (Base, Mobile and Handheld) • Wireless Computer Communications
Personnel	• 1 Harbor Master, 1 Assistant Harbor Master, 11 F/T Harbor Patrol Officers, 9 P/T Harbor Patrol Officers, 1 Secretary • 3 Mechanics • 3 Maintenance Workers • 5 P/T Sanitation Workers
Technical Assets	• 3 computers with wireless internet access

Santa Catalina Island Company	
Asset / Capability	**Inventory**
Facilities	• Casino Building (ballroom is over 29K sq. ft.; theater has over 1100 seats) • Gas station • Vehicle garage • Maintenance shop • Pavilion (only for extreme emergencies; 73 rooms) • Atwater (100 rooms) • Hermit Gulch Campground (10 tent cabins, each sleeps 6)
Rolling Stock	• Avalon o 4 tractors (driver + 1) o 4 trailers (52 seats) o 2 minibus trams with trailer (54 seats each) o 1 International Aero Elite (33 seats) o 1 Ford ADA bus (16 seats + 2 wheelchairs) o 2 Flex buses (33 seats) o 10 vans/trucks o 1 dump truck o 1 propane delivery vehicle o 1 forklift o 1 Gail skid steer tractor (backhoe, bucket, forklift, broom) • Ranch o 3 trucks • Two Harbors o 22 trucks o 1 Hummer o 2 buses (20 seats each) o 10-wheel water truck o 6000 gallon fuel tank trailer o 4 tractors o 2 dumpster trucks o 2 dump trucks o 3 pump trucks o 1 propane truck o 3 forklifts o 1 forklift truck o 1 grader o 1 front-end loader o 1 backhoe o 1 cement truck o 1 rough terrain crane o 3 dozers o 4 boat trailers o 1 Kawasaki mule

Santa Catalina Island Company (continued)	
Asset / Capability	**Inventory**
Vessels	• Avalon o 1 semi-submersible (46 passengers + 3 crew) o 1 semi-submersible (49 passengers + 3 crew) o 1 Moonstone (47 passengers + 2 crew) o 1 Blanch W (98 passengers + 2 crew) o 1 Nautilus (29 passengers + 2 crew) • Two Harbors o 1 Garibaldi (64 passengers + 2 crew) o 1 Captain's Gig (25 passengers + 2 crew) o 1 Commodore's Gig (36 passengers + 1 crew) o 1 Admiral's Barge (36 passengers + 1 crew) o 1 Avalon Shoreboat VIII (34 passengers + 1 crew) o 1 Avalon Shoreboat IX (34 passengers + 1 crew) o 12 Harbor Patrol vessels o 1 Island Supplier o 1 Pump-a-Head o 1 Kingfisher III o 1 Sandpiper o 7 skiffs o 1 salad bowl
Personnel	• Avalon (base of 250 minimum employees) o 7 CERT-trained employees o 7 CPR/First Aid certified employees o 1 30-hour OSHA certified employee o 3 Class-C drivers with Hazmat endorsement o 12 Class-A drivers o 5 mechanics o 4 MIS employees o 5 Captains (minimum) • Two Harbors (base of 75 minimum employees) o 1 Class-A driver o 4 Class-B drivers with Hazmat endorsement o 40 CPR/First Aid certified employees o 3 Haz Woppers o 3 mechanics o 23 Captains o 4 heavy equipment operators o 1 certified welder o 6 certified SCUBA divers (2 instructors) o 10 Class-B drivers with passenger endorsements o 3 in/out-board mechanics

SBC	
Asset / Capability	**Inventory**
Rolling Stock	• 1 32-foot bucket truck • 1 4-wheel drive utility pick-up • 1 2-wheel drive utility truck • 1 15-passenger van
Personnel	• 2 full-time employees live on the island • Note: construction crews, emergency radio personnel, and re-supplies come from mainland
Facilities	• Central office on Whitley Avenue • Radio site at Dakin Peak • Isthmus communication hut (with no AC back-up and over 8 hours drain time) • Remote terminal sites with no AC back-up and 4-hours battery time at USC sea labs, Toyon Bay, CBS, Middle Ranch, Blackjack, and Airport in the Sky • Network Operations Centers – monitor equipment 24x7
Assets	• 75kW back-up generator, 1500-gallon diesel tank, battery plant with over 8 hours drain time at central office • 75kW back-up generator, 500-gallon diesel tank, battery plant with over 8 hours drain time at radio site • 2 911 trunks with Caller-ID and Callback features at Sheriff's Station (using L.A. County back-up AC power) • 12 miles of fiber cable from Avalon Central Office through Dakin Peak, near Blackjack Mountain, Rancho Escondido, Empire Landing, Fourth of July Cove, and Cherry Cove

Catalina Express	
Asset / Capability	**Inventory**
Vessels	Jet Cat Express-388 Passengers Starship Express- 302 Passengers Catalina Jet- 499 Passengers Cat Express- 360 Passengers Islander Express- 149 Passengers Catalina Express- 149 Passengers Avalon Express- 149 Passengers Super Express- 149 Passengers Two Harbors Express- 149 Passengers

Catalina Passenger Service	
Asset / Capability	**Inventory**
Vessels	Catalina Flyer- 600 Passengers

Catalina Classic Cruises	
Asset / Capability	**Inventory**
Vessels	Catalina Monarch- 700 Passengers Catalina King- 700 Passengers

Catalina Explorer	
Asset / Capability	**Inventory**
Vessels	Catalina Explorer- 149 Passengers

Seaplanes Inc.	
Asset / Capability	**Inventory**
Vessels	Grey Lady II- 149 Passengers

In addition, there are assets and capabilities available from other sources including:

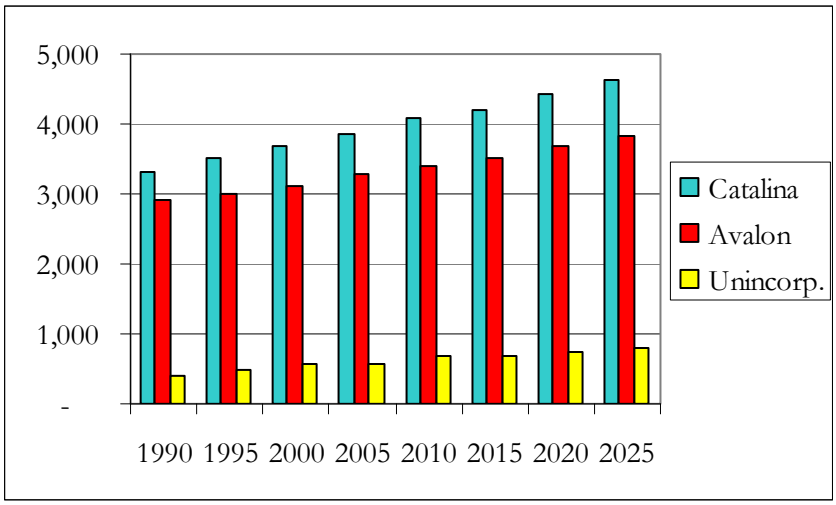
- Catalina Island Conservancy
- Southern California Edison (SCE)
- Jordahl Construction
- Connolly Pacific
- Island Express Helicopters
- Island Navigation
- Catalina Adventure Tours

3. Avalon Community Profile

Background on Catalina Island

Catalina Island is 76 square miles in area, 88% of which is owned by the non-profit Catalina Island Conservancy, to be maintained in its natural state in perpetuity. Catalina Island is part of Los Angeles County. The island's primary industry is tourism.

The following table shows the residential population of the island and of the City of Avalon, which has been and is projected to continue to be the location of the vast majority of the island's population.



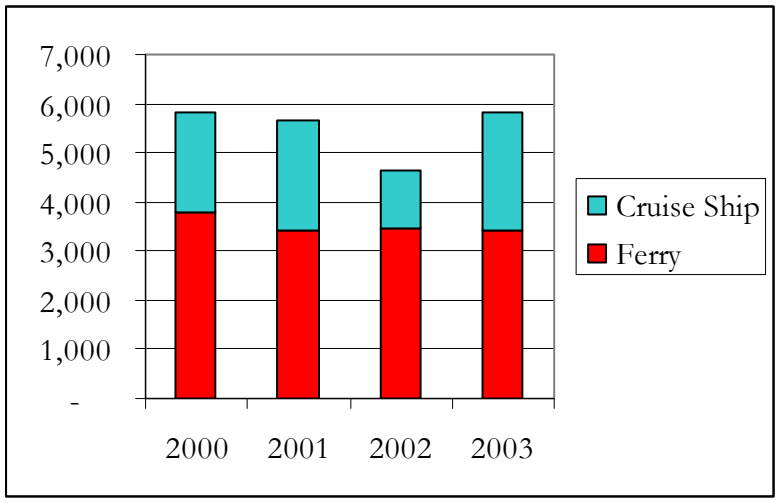
The map on the following page provides a perspective on the size of the island, and the location of the City of Avalon.


Santa Catalina Island
Primary Road
Secondary Roads
Maintenance Roads and Trails
Campgrounds
.5 1 2 3
Map Courtesy of the
Catalina Island Conservancy
© 1995 Catalina Island Conservancy
All rights reserved
N
W
E
S
Starlight Beach
Parsons Landing
Emerald Bay
Howlands Landing
Silver Peak el. 1802
4th of July Cove
Iron Bound Bay
Isthmus Cove
Two Harbors
Lobster Bay
Catalina Harbor
Empire Landing
Ripper's Cove
Catalina Airport
Long Point
Whites Landing
Little Harbor
Mt. Black Jack el. 2006
COTTONWOOD CANYON
Mt. Orizaba el. 2097
Mt. Banning el. 1736
Ben Weston Beach
CAPE CANYON
MIDDLE CANYON
PULLUSH CANYON
Willow Cove
Toyon Bay
Gallagher Beach
Frog Rock
Hamilton Cove
Microwave Tower el. 1563
Avalon
Cactus Peak el. 1553
SILVER CANYON
Pebbly Beach
China Point
Santa Verde Point
East Peak el. 1684
Seal Rocks
Church Rock

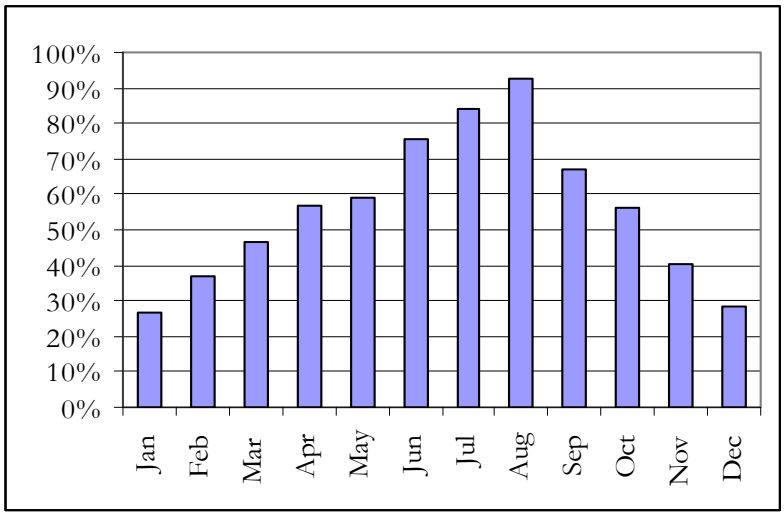
Incorporated on June 26, 1913, Avalon is the only city on Santa Catalina Island. Situated on the easterly portion of the island, Avalon is 22 miles south/southwest of the Los Angeles Harbor breakwater.

With a permanent population of approximately 3,500, Avalon is a little over 2 2/3 square miles in size. The annual visitor count for Avalon is close to one million.

Peak-day arrivals in Avalon were down a bit in 2002, but rebounded to historical levels in 2003.



Tourism is seasonal, as the following chart shows:



The climate is mild and seldom gets above 85 degrees in the summer. Usually, the temperature gets no lower than the 50's in the winter. Because the City hugs the water, evenings can be cool during the summer and very cold in the winter. Avalon has no smog and the waters of the bay, as well as surrounding the island, are crystal clear.

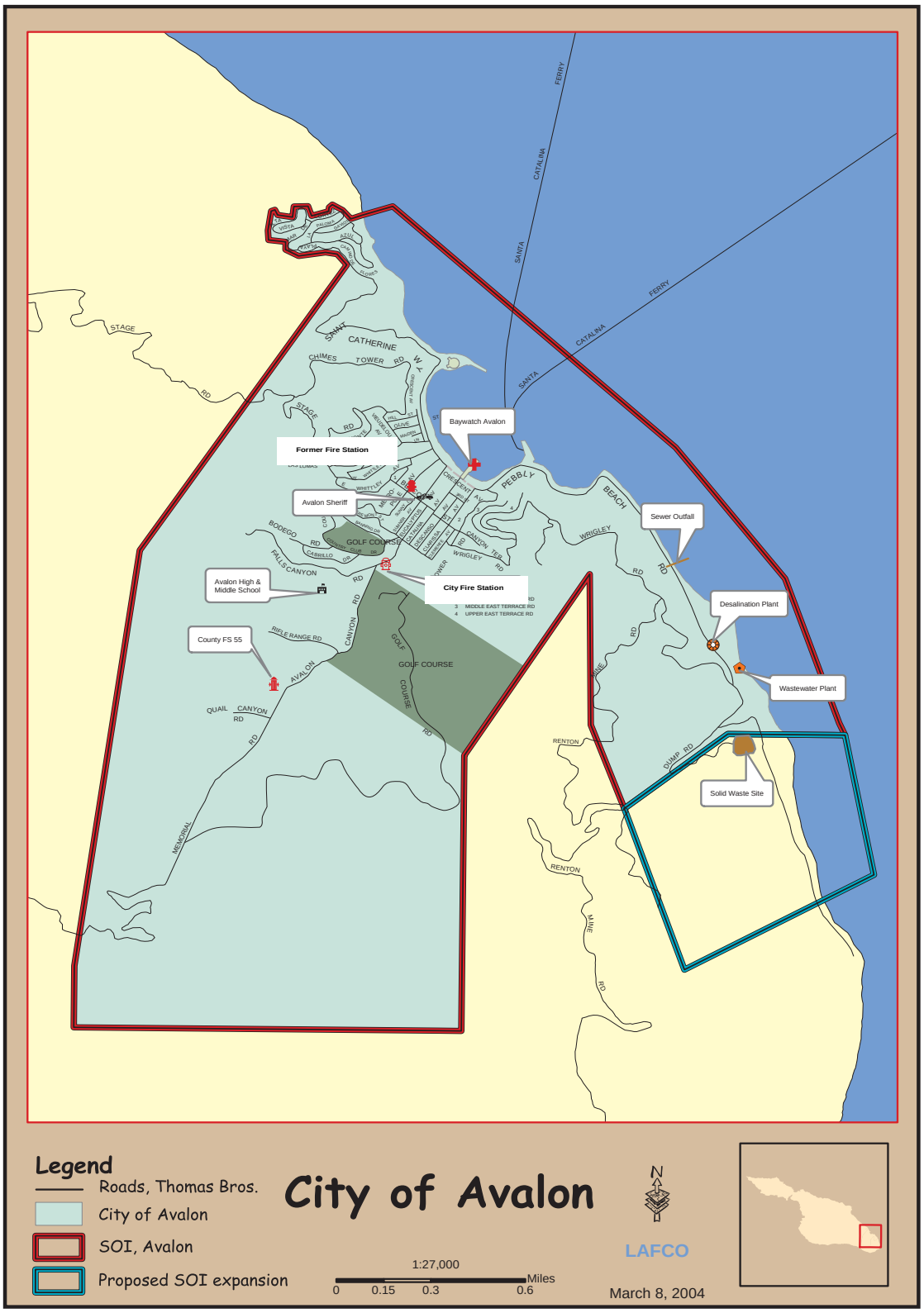
Housing is at a premium in Avalon. Rents are comparable to those in the Southern California beach areas for year-round units. Avalon is noted for its quality of life, ease of getting around, casual lifestyle, and friendly people. In the City, there are:

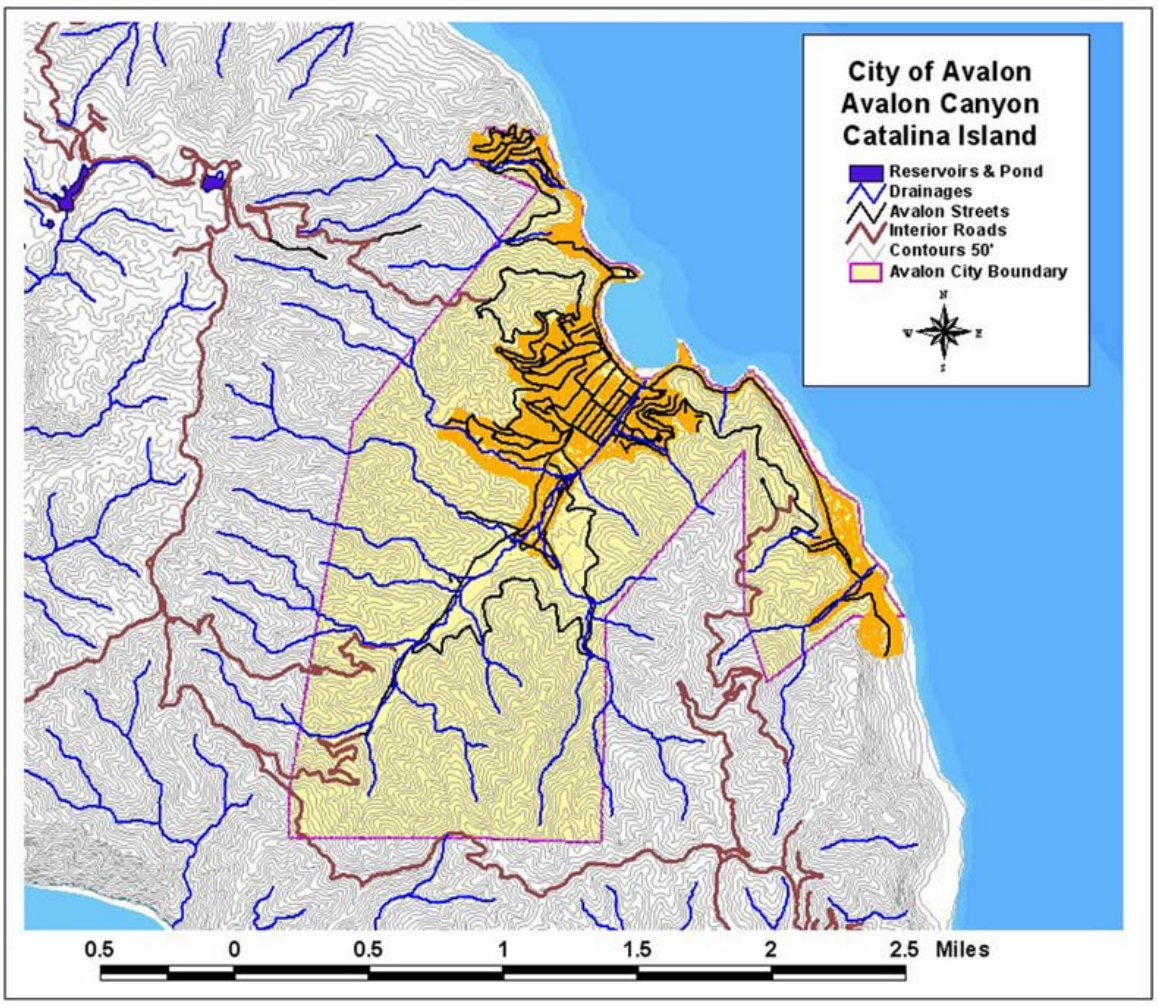
- Two grocery stores
- One hospital
- Dental facilities
- Five churches
- A Christian School
- Post office box mail service
- Regular and cable television
- SBC telephone service
- Southern California Edison utility service

Recreational opportunities in and around Avalon include camping, hiking, golf, SCUBA diving, and fishing. There are several small shops for clothing, gifts, jewelry, and artwork in the City.

In addition to walking, popular forms of transportation around Avalon include gas and electric golf carts, bicycles, mopeds, and motorcycles. Avalon controls the size and number of vehicles by requiring a permit for all forms of transportation and has a defined number of automobiles allowed on the island at any given time. Tram and taxi services are available.

The following two maps provide an outline of the City's boundaries and reservoirs and drainage in and near the City.


Baywatch Avalon
Former Fire Station
Avalon Sheriff
City Fire Station
Avalon High & Middle School
County FS 55
Sewer Outfall
Desalination Plant
Wastewater Plant
Solid Waste Site
GOLF COURSE
Legend
Roads, Thomas Bros.
City of Avalon
SOI, Avalon
Proposed SOI expansion
City of Avalon
1:27,000
0 0.15 0.3 0.6 Miles
LAFCO
March 8, 2004


City of Avalon
Avalon Canyon
Catalina Island
Reservoirs & Pond
Drainages
Avalon Streets
Interior Roads
Contours 50'
Avalon City Boundary
0.5 0 0.5 1 1.5 2 2.5 Miles

Avalon is considered a very safe city in which to live. Violent crime is practically non-existent.

The City's annual budget is approximately $15,000,000. Avalon has a Community Improvement Agency whose annual budget is an average of approximately $7,000,000.

Even though Catalina is a part of Los Angeles County, Avalon schools belong to the Long Beach Unified School District.

Historical Setting

Catalina Island was discovered in 1542 by Cabrillo, a Portuguese explorer. It was named in 1602 by the Spanish explorer, Sebastian Vizcaino. It was used by various peoples as a base for hunting sea otters. In 1863, the town experienced a small gold rush. In 1919, William Wrigley, Jr., chewing gum magnate and owner of the Chicago Cubs, purchased the island and established a conservation program for the island that still exists today.

For 30 years following Wrigley's purchase, the island was the site of the Chicago Cubs spring training camp. Members of the Wrigley family turned their holdings over to the Santa Catalina Island Conservancy in 1975.

Catalina Island was the filming location for the 1935 movie "Mutiny on the Bounty" and the 1992 movie "Far and Away."

Well-known residents have included:

- Marilyn Monroe, actress
- Zane Grey, writer
- Tom Mix, cowboy actor

Well-Known Visitors have included:

- President Coolidge
- President Hoover
- President Reagan
- President Nixon
- Sir Arthur Conan Doyle

Governing Body

Avalon has a Council/Manager form of government. The Mayor is elected separately from the rest of Council. Avalon is a general law city operating its own fire department and harbor patrol, and contracts with Los Angeles County Sheriff's Department for law enforcement. The City Council is the legislative body of the City, serves as its corporate board of directors, and is responsible for establishing City policy. The Mayor is elected for a term of two years, and Council members are elected to serve four-year terms. The City Clerk and the City Treasurer are elected officers. There are approximately 48 full-time employees with the City of Avalon, and an additional 30 employees for the summer season.

Avalon Facts of Interest

- Population (2000 Census): 3,127 (1990 Census: 2,918)
- Population Density (2000 Census): 2,233.6 persons per square mile
- Population over age 64 (2000 Census): 10.1% (1990 Census: 11.7%)
- Population under age 18 (2000 Census): 30.3% (1990 Census: 25.4%)
- Catalina is an island 22 miles long and 8 miles wide
- County: Los Angeles
- Nearest city with pop. 50,000+: Huntington Beach, CA (33.2 miles, pop. 189,594).
- Nearest city with pop. 200,000+: Long Beach, CA (34.1 miles, pop. 461,522).
- Nearest city with pop. 1,000,000+: Los Angeles, CA (51.6 miles, pop. 3,694,820).
- Nearest cities:
    - Rolling Hills, CA (29.0 miles)
    - Rancho Palos Verdes, CA (29.0 miles)
    - Rolling Hills Estates, CA (30.0 miles)
    - Palos Verdes Estates, CA (31.2 miles)
    - Lomita, CA (31.3 miles)
    - Huntington Beach, CA (33.2 miles)
    - Seal Beach, CA (33.5 miles)
    - West Carson, CA (33.7 miles)

4. Hazards Facing Avalon

List of Risk Assessment Requirements

Element	Requirement	Avalon LHMP Response
Identifying Hazards – A	Description of the Types of Hazards Affecting the City of Avalon	See following table for page numbers by hazard
Profiling Hazard Events – A	Location of Hazards Identified	See following table for page numbers by hazard
Profiling Hazard Events – B	Extent of Hazards Identified	See following table for page numbers by hazard
Profiling Hazard Events – C	Information on Previous Occurrences	See following table for page numbers by hazard
Profiling Hazard Events – D	Probability of Future Events	See following table for page numbers by hazard
Assessing Vulnerability: Overview – A	Overall Summary Description of City of Avalon's Vulnerability	See following table for page numbers by hazard
Assessing Vulnerability: Overview – B	Impact of Each Hazard on the City of Avalon	See following table for page numbers by hazard
Assessing Vulnerability: Identifying Structures – A	Description of Vulnerability in Terms of Types and Numbers of Existing Buildings, Infrastructure, and Critical Facilities Located in Identified Hazard Areas	See following table for page numbers by hazard
Assessing Vulnerability: Identifying Structures – B	Description of Vulnerability in Terms of Types and Numbers of Future Buildings, Infrastructure, and Critical Facilities Located in Identified Hazard Areas	See following table for page numbers by hazard
Assessing Vulnerability: Estimating Potential Losses - A	Description of Vulnerability in Terms of an Estimate of Potential Dollar Losses to Existing Buildings, Infrastructure, and Critical Facilities Located in Identified Hazard Areas	See following table for page numbers by hazard
Assessing Vulnerability: Estimating Potential Losses - B	Description of Vulnerability in Terms of an Estimate of Potential Dollar Losses to Future Buildings, Infrastructure, and Critical Facilities Located in Identified Hazard Areas	See following table for page numbers by hazard
Assessing Vulnerability: Analyzing Development Trends – A	Description of Land Uses and Development Trends	Page 26

Risk Assessment Requirements Cross-Reference Table

Hazard	Location, Extent, History, Future Event Probability	Vulnerability: General Impact on People, Structures, and Infrastructure	High-level Discussion of Potential Losses
Wildfire	Pages 27 – 33	Pages 31 – 33	Pages 31 – 33
Flooding	Pages 34 – 37	Pages 35 – 37	Pages 35 – 37
Earthquakes	Pages 38 – 46	Pages 40 – 46	Pages 40 – 46
Coastal Storm / Coastal Erosion	Pages 47 – 50	Pages 49 – 50	Pages 49 – 50
Landslides / Rockslides	Pages 51 – 52	Pages 51 – 52	Pages 51 – 52
Naturally-Occurring Biological Threats	Pages 53 – 58	Pages 57 – 58	Pages 57 – 58
Insect Infestation	Pages 59 – 60	Page 60	Page 60
Dam failure	Pages 61 – 62	Page 62	Page 62
Hazardous Materials (Hazmat) Incidents	Pages 63 – 65	Pages 64 – 65	Pages 64 – 65
Transportation Emergencies	Pages 66 – 68	Pages 67 – 68	Pages 67 – 68
Blackout	Pages 69 – 70	Pages 69 – 70	Pages 69 – 70
Toxic pollution	Pages 71 – 72	Pages 71 – 72	Pages 71 – 72
Nuclear incidents	Pages 73 – 74	Page 74	Page 74
Terrorism	Pages 75 – 78	Pages 77 – 78	Pages 77 – 78

Identification of Hazards

The City of Avalon is subject to potential negative impacts from a broad range of hazards and threats. There are three broad categories of hazards that threaten the City, namely:

- Natural hazards
- Technological hazards
- Domestic security threats

Natural hazards include:

- Wildfires
- Floods
- Earthquakes
- Coastal Storm / Coastal Erosion
- Landslides / Rockslides
- Naturally-Occurring Biological Threats
- Insect Infestation

Technological hazards include:

- Dam Failure
- Hazardous Materials (Hazmat) Incidents
- Transportation Emergencies
- Blackout
- Toxic Pollution
- Nuclear Incidents

Domestic security threats include:

- Terrorism (CBRNE)
    - Chemical
    - Biological
    - Radiological
    - Nuclear
    - Explosive

The following table describes how and why the hazards listed above were identified by the City of Avalon in preparing its LHMP.

Hazard	How and Why Identified
Wildfire	History of events
Flooding	History of events
Earthquakes	History of events; presence of fault line and geologic activity
Coastal Storm / Coastal Erosion	History of events
Landslides / Rockslides	History of events
Naturally-Occurring Biological Threats	Awareness of relatively close incidents of West Nile Virus
Insect Infestation	History of events
Dam Failure	Vulnerability due to presence of dams at reservoirs
Hazardous Materials (Hazmat) Incidents	History of events; heightened vulnerability due to dependence on dock/pier operations
Transportation Emergencies	• Vulnerability due to number of commercial flight paths over and near the island • Vulnerability to cross channel carrier and cruise ship incidents
Blackout	History of events
Toxic pollution	Vulnerability due to presence of pollution in air, water, and soil
Nuclear Incidents	Vulnerability due to transportation routes and relative proximity of San Onofre Nuclear Generating Station (SONGS)
Terrorism	Heightened sense of awareness since September 2001

Land Use and Development Trends

Future development is regulated by strict fire and building codes designed to ensure that the risks associated with the addition of new buildings will be minimized.

Current, major proposed developments include an addition of 88 units at Hamilton Cove and a 100 – 250 room resort at Descanso Beach, not far from the Casino.

In May 2004, the City of Avalon requested an increase to its sphere of influence (SOI). The City desires to expand its SOI to include an uninhabited industrial area southwest of the city limits where Avalon's solid waste disposal site is located. The City's warehouses may also be relocated to this area to create more space for the expansion of the Avalon School. The City of Avalon and the Island Company are the only property owners in the recommended SOI expansion area, and both have agreed to the SOI expansion recommendation. The recommended SOI expansion area is zoned for industrial use. There is an eight-acre solid waste disposal facility in the SOI expansion area. There is a canyon on the City's current boundary in this area that is a potential site for municipal warehouses.

Hazard: Wildfires

Severity: Very High	Probability: Very High

Hazard Definition

A wildfire is an uncontrolled fire spreading through vegetative fuels, posing danger and destruction to property. Wildfires can occur in undeveloped areas and spread to urban areas where structures and other human development are more concentrated.

While some wildfires start by natural causes, humans cause four out of every five wildfires. Wildfires started by humans are usually the result of debris burns, arson, or carelessness. As a natural hazard, a wildfire is often the direct result of a lightning strike that may destroy personal property and public land areas, especially on state and national forest lands. The predominate dangers from wildfires are:

- the destruction of timber, property, wildlife; and
- injury or loss of life to people living in the affected area or using the area for recreational facilities.

History

Catalina Island has a history of wildfire incidents occurring outside of the city limits of Avalon. Two relatively recent events include:

- A January 2003 wildfire ("The Airport Fire") that was started when an electrical line snapped in a fierce windstorm. The wildfire burned for two days.

- A July 1999, 320-acre wildfire ("The Goat Harbor Fire"). This wildfire was expensive in terms of the equipment and human power used to contain and control it. Although structures and human lives were not threatened, oak and ironwood groves and countless other shrubs that offer wildlife food and shelter were lost. Ironwoods are a particular concern due to their very limited range. These trees are found primarily on northeast facing slopes on Catalina Island and nowhere else in the world.

It is difficult to discuss the natural hazard of wildfire in and near the City of Avalon without considering structural fires as well, because of the density of structures within the City. If any kind of fire reaches structures within the City, it is likely to spread to adjacent structures and rapidly cause catastrophic damage.

Although "normally" Avalon is not directly affected by wildfire, there have been a few rare instances of wildfire approaching the City and one instance of a devastating structural fire in the City. On November 29, 1915, a fire destroyed most of Avalon, which included nine hotels. Almost all of Avalon's most impressive and historic structures were destroyed in the blaze, including the Hotel Metropole and the private Pilgrim Club.

The following pictures show some of the destruction left behind by the 1915 fire:

The following table shows a history of incidents from 1915 to 2000 involving fire that have affected the City of Avalon:

Aircraft Incidents	20
Fuel and or Vehicle Incidents	37
Marine Incidents Involving Fire	1
Intentional Incidents	1
Fireworks and Flare Incidents	13
Accidental Fire and Campfire Incidents	125
Electrical Incidents	30
Natural and Lightning Incidents	45
Structure and Unknown Cause Dump Incidents	44
TOTAL INCIDENTS	316

The following table provides causes for structural fire incidents:

Fuel and or Vehicle Incidents Leading to Structure Fires	5
Accidental Fire and Campfire Incidents Leading to Structure Fires	16
Electrical Incidents Leading Structure Fire	9
TOTAL STRUCTURE INCIDENTS	74

The following table provides information on four wildfire events that affected between 20 and 100 acres each over the past 45 years. These four events are the only documented fires that have reached the size of between 20 and 100 acres. Without proper control, any fire on the Island is a direct threat to the City of Avalon.

Year	Type	Size	Cause	Location
Late 1980's/Early 1990's	Brush	10-50 acres	Arson	Behind housing at Pebbly Beach
1986	Brush	40 acres	Unknown	Middle Ranch - mechanics shop to Bump Gate, up hill
1984	Brush	50 acres	Aircraft (USN-FA-18)	White's landing
1959	Brush	4 separate fires - one 20 acres, one 1/2 acre	Power line down	Sweetwater Canyon - went up over hill

The following table provides information on five wildfire events since 1920 that affected more than 100 acres. These events are the only documented fires that have reached this magnitude on the island. There is the potential for one of these fires to get out of hand and, even though it did not originate within the Avalon city limits, to affect Avalon as it moves across the island.

Year	Type	Size	Cause	Location
2003	Trees/brush/grass	143 acres	Downed power line	Airport area
1999	Trees/brush/ grass	300 acres	Illegal campfire	Goat Harbor area - Started in Cabrillo Harbor
1982	Grass	400 acres	Fireworks/firecrackers	Cat Harbor south side
Late 1950's	Brush/grass	100 acres	Power line down	Pensioner's pasture (Escondido)
1921	grass	400-500 acres		Vicinity of White Rock Springs
1920	grass	200 acres	cook stove	Near Quarry at Isthmus

Risk Assessment

Wildfires pose a risk on Catalina Island, but historically the risk has been minimal to the City of Avalon. However, the Los Angeles County Fire Department recently concluded:

> Due to recent fire behavior observed during the most recent brush fires on the mainland, ongoing drought conditions on Catalina, along with 30-plus-year-old fuels throughout the island, there is a strong potential for a wind or fire behavior driven fire that could threaten the City of Avalon.

In terms of probability, structure fires are the greatest fire threat to the safety of the people of Avalon. The small area of dense population on the island has the potential for fire to spread very rapidly with potential for massive loss of life and property damage. Some of the houses positioned in the hills surrounding the City have the potential to lead to a wildfire or be consumed by one.

- **Effects of fire on people and housing.** Most of the wildfires on Catalina Island have been in rural areas, and the effects on people and housing have been minimal. The City of Avalon has never lost a substantial amount of structures to wildfire. The large events of structure losses have been because of structurally-originated fires.

- **Effects on commercial and industrial structures.** Commercial and industrial structures are affected in a very similar way to the residential housing as they are

so close together. In the instance of the Edison plant and the wastewater treatment plant, they are separated by a considerable distance from any groups of other commercial and residential structures.

- **Effects on infrastructure.** Past wildfires have had minimal impact on infrastructure as they often occur out of range of the population center. However, a key vulnerability is the fiber cable for communications which is strung in the air for approximately 3 miles from Canyon Hotel to a microwave tower atop a mountain on the island. It is estimated that if the fiber burns, Avalon will lose 75% of its communications capability with the mainland.

Risk assessment conclusion. Although a wildfire could conceivably spread to the City of Avalon (and as the Los Angeles County Fire Department has pointed out, the conditions are such that the risk is higher than normal), the natural resistance of the off-shore winds blowing across the City and towards the inland reaches of the island make it highly unlikely that a wildfire would reach the City's borders. However, the Island Conservancy has recently reviewed fire history on the island and, after removing overlapping records, counted 224 total ignitions, of which 107 were in the Avalon/Pebbly Beach area.

Due to the close proximity of the land mass of the island to a source of water and to airports on the mainland as well, fire drops can be accomplished relatively easily, pending availability of equipment. However, due to the close proximity of buildings in the City, if fire response is delayed due to a water issue, the number of losses could be devastating to the City.

A key risk for the City of Avalon is loss of the vast majority of its communications capability with the mainland. This is due to the fact that the fiber cable from Canyon Hotel to the microwave tower is a "single-point-of-failure" in the communications infrastructure.

Relationship to Other Hazards – Cascading Effects

Flooding and erosion. Major wildfires can completely destroy brush and trees which hold the mountainous ground of the island together. If heavy rains follow a major fire, flash floods, heavy erosion, landslides, rockslides, and mudflows can occur. Sedimentation and flooding could have devastating effects on both the City of Avalon and, if the area around Thompson Reservoir were to burn, on the primary freshwater source for the town.

Plans and Programs

To achieve fire protection for all residents, the City of Avalon works closely with the County of Los Angeles Fire Department to create and enforce safety standards as they review building plans and conduct building inspections. Additional programs that are implemented to ensure compliance with established fire standards include:

- The Los Angeles County Fire Department provides annual maintenance of firebreaks surrounding the City of Avalon. Maintenance occurs for one week every June, utilizing one bulldozer, one grader, and one "hand crew."

- The provision of uniform fire improvement standards for various land uses.

- Continued updating of the Fire Protection Master Plan.

The City has a Brush Clearance Program. The Fire Department is adding equipment and staff, and conducts regular inspections. The City has a project underway to improve the pumping system for water for fire suppression. There is an $800,000 upgrade underway to increase the size of one reservoir. In addition, there have been upgrades to the building code to require sprinklers in residential and commercial applications.

The Catalina Island Conservancy is working on a Fire and Fuel Management Plan. Phase One of the Plan considers the whole island. Avalon is in one of the fire management zones.

Southern California Edison (SCE) conducts annual:

- circuit patrols;
- overhead / underground inspections;
- weed abatement; and
- tree trimming.

In addition, SCE has a fire extinguisher plan and works with the Fire Department to enforce code.

Hazard: Flooding

Severity: Medium-to-Low	Probability: Medium

Hazard Definition

A flood is defined as an overflowing of water onto an area of land that is normally dry. Floods generally occur from natural causes, usually weather-related, such as a sudden snow melt, often in conjunction with a wet or rainy spring or with sudden and very heavy rainfalls. Floods can, however, result from human causes as a dam impoundment bursting.

For floodplain management purposes, the following discussion describes the Federal Emergency Management Agency (FEMA) definition of “100-year flood.” The term "100-year flood" is misleading. It is not a flood that will occur once every 100 years. Rather, it is the flood elevation that has a 1 percent chance of being equaled or exceeded each year. Thus, a 100-year flood could occur more than once in a relatively short period of time. The 100-year flood, which is the standard used by most federal and state agencies, is used by the National Flood Insurance Program (NFIP) as the standard for floodplain management and to determine the need for flood insurance. A structure located within a special flood hazard area shown on a map has a 26 percent chance of suffering flood damage during the term of a 30-year mortgage.

History

A large portion of the developed area of Avalon is located within the Avalon Canyon floodplain, where soil has moderately low infiltration rates and moderately high runoff rates. During the rainy season between December and March, drainage flows to the valley floor in the golf course and is then directed through swales into a channel that runs along the eastern side of Avalon Canyon. In order to protect the quality of water in Avalon Bay, the City directs drainage runoff from all the mains in the City via gravity flow to the wastewater treatment facility.

Development tends to increase runoff when the area of paved surfaces is increased, as the storm water is unable to seep into the soil. The City requires developers to mitigate flood effects to the standards established by FEMA in its study of flooding in the Avalon vicinity. With respect to proposed development, the City has conducted an Environmental Impact Report (EIR) and established flood drain standards and requirements to mitigate the impact.

The following table provides data on past flood events in the City:

Year	Month	Cause	Location	Details
1995	Winter	El Nino	Avalon Harbor	El Nino caused flooding in conjunction with damage to the harbor.
1983	March	Flooding	Little Harbor and Middle Canyon	Heavy runoff from a storm damaged Little Harbor and Middle Canyon
1944	Winter	Flooding	Avalon Canyon and the golf course	A flood in the city damaged Avalon Canyon, the golf course and several buildings

Risk Assessment

Floods that affect the City of Avalon can be attributed to three different types of storm events, namely:

- A general winter storm that brings high-intensity rainfall to already saturated soil,
- A tropical storm out of the Pacific Ocean, and
- Failure of a major water system

Although the City of Avalon has experienced periods of drought, the City can experience substantial rainfall. The soil in the City is generally not able to effectively absorb water quickly, nor is it able to absorb a large volume of water at one time and therefore depends on man-made infrastructure to prevent flooding.

When the City of Avalon does experience heavy rain, or rain over a period of days or weeks, flooding is of definite concern. This kind of event can occur even during a drought. A heavy rain can occur, and create flash floods, without relieving the overall drought conditions.

Storms with high volumes of precipitation in a short period of time have occurred in the City causing floods, contaminated drinking water, disrupted electrical service, and damaged homes and businesses.

- **Effects on people and housing.** The houses in the City of Avalon are essentially in a canyon (Avalon Canyon). Because the canyon is a direct path for water

runoff, the City is susceptible to flooding if the drainage system fails. There are several plateaus that could experience particularly significant problems, including the one containing the golf course and the one containing houses and shops closest to the waterfront.

- **Effects on commercial and industrial structures.** Depending on the geographic area involved and the economic and demographic characteristics of the area, the effects on industry and commerce may be significant. For example, the waterfront is in an area where massive flood water will pass through if the infrastructure fails, and this is where the majority of businesses are located.

- **Effects on infrastructure.** A slow-rising flood situation will progress through a series of stages, beginning with minor rainfall and evolving to a major event such as substantial flooding. Once flooding begins, personnel will be needed to assist in rescuing persons trapped by flood waters, securing utilities, cordoning off flood areas, and controlling traffic. These actions may overtax local agencies, and additional personnel and resources may be required. It is anticipated that existing mutual aid resources would be used as necessary to augment local resources. Many essential public and quasi-public facilities and hazardous materials sites are located within the 100- or 500-year flood zones of the City of Avalon, including the Edison Plant.

Risk assessment conclusion: Flooding due to heavy precipitation or dam failure is a potential hazard in the City of Avalon, with the resultant possibilities for damage to property and loss of life. Severe flooding can be particularly costly. In a relative sense, flooding due to precipitation does not present the degree of danger posed by other hazards such as fire. On the other hand, if there is flooding due to dam failure and high precipitation, the danger could be cataclysmic.

Relationship to Other Hazards – Cascading Effects

Floods can cause many cascading effects. Fire can break out as a result of dysfunctional electrical equipment. Hazardous materials can also get into floodways, causing health concerns and polluted water supplies. In many instances during a flood, the drinking water supply will be contaminated. With the non-redundant communications facilities in the City, it may be very difficult to get the message to all of the City's residents.

In addition, land that has been stripped of foliage and trees due to fire or human activity will experience serious erosion. Excessive precipitation can inundate soil in slopes causing mudslides, landslides, and in particular in Avalon, rockslides. These events can destroy homes, block highways, and destroy power lines. Due to the mountainous terrain around the City of Avalon, roadways are very susceptible to flooding, blockage, and destruction of access routes to certain areas. The roads to Pebbly Beach and

Hamilton Cove have experienced repeated rockslides over the years, and are prime candidates for mitigation efforts.

The City of Avalon depends on several dams and reservoirs on the island. Excessive rainfall can stress these systems to the point of failure, causing serious damage to property and possible loss of life. Dam Failure is discussed in a separate section of this LHMP.

Plans and Programs

Much effort has been put into precluding flood damage by the Department of Flood Control. Storm drains are in place, and there is a storm drain improvement program underway. Flood control channels exist behind the golf course and behind the Edison plant ("Roaring Canyon Flood Channel"). Flood Control work in Roaring Canyon Flood Channel has included channel clearing and a concrete liner.

Edison conducts annual dam safety inspections.

In addition, the County Department of Building and Safety and the County Fire Department enforce codes and standards as they review building plans and conduct building inspections.

Hazard: Earthquakes

Severity: High	Probability: Low

Hazard Definition

An earthquake is a sudden, rapid shaking of the ground caused by the breaking and shifting of rock beneath the Earth's surface. For hundreds of millions of years, the forces of plate tectonics have shaped the Earth as the huge plates that form the Earth's surface move slowly over, under, and past each other. Sometimes the movement is gradual. At other times, the plates are locked together, unable to release the accumulating energy. When the accumulated energy grows strong enough, the plates break free causing the ground to shake. Most earthquakes occur at the boundaries where the plates meet; however, some earthquakes occur in the middle of plates.

The major form of direct damage from most earthquakes is damage to construction. Bridges are particularly vulnerable to collapse, and dam failure may generate major downstream flooding. Buildings vary in susceptibility, dependent upon construction and the types of soils on which they are built. Earthquakes destroy power and telephone lines; gas, sewer, or water mains; which, in turn, may set off fires and/or hinder firefighting or rescue efforts.

The hazard of earthquakes varies from place to place, dependent upon the regional and local geology. Ground shaking may occur in areas 65 miles or more from the epicenter (the point on the ground surface above the focus).

Ground shaking can change the mechanical properties of some fine grained, saturated soils, whereupon they *liquefy* and act as a fluid (liquefaction).

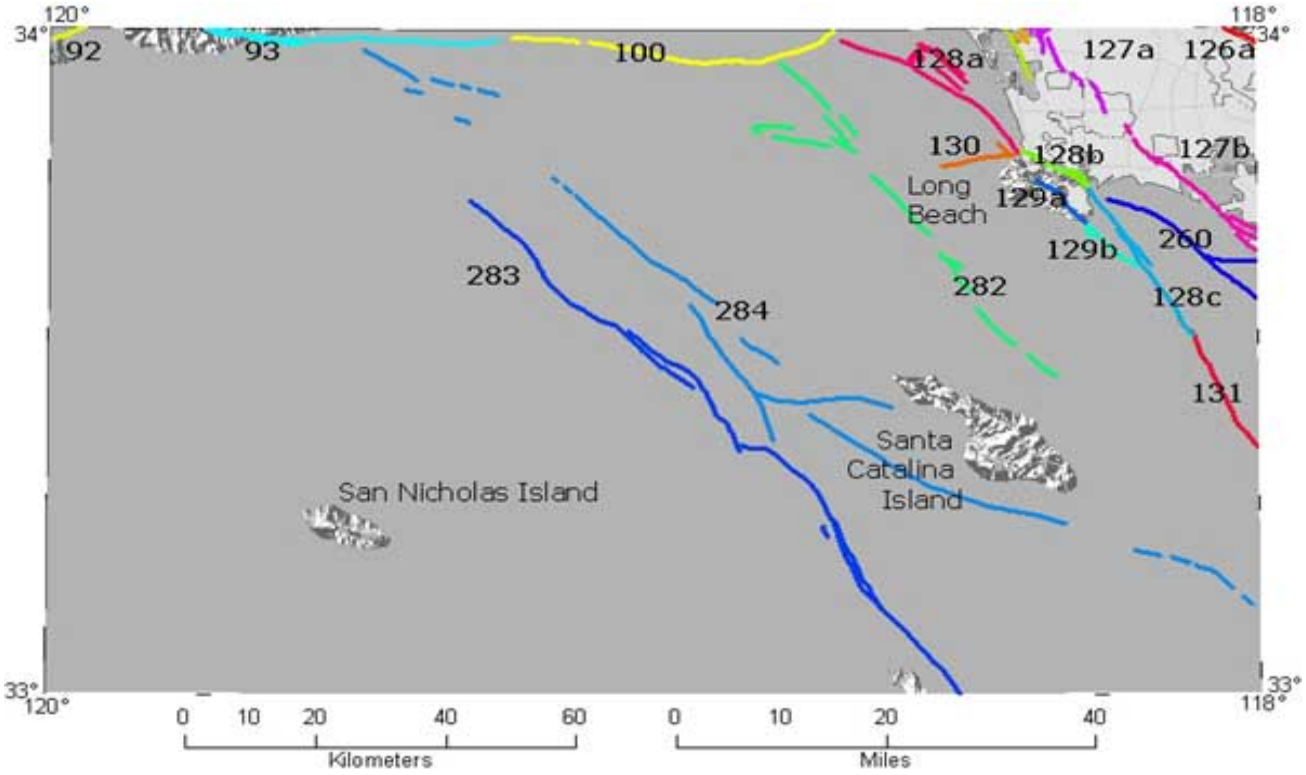
Where earthquakes have struck before, they will strike again. Earthquakes strike suddenly, without warning. Earthquakes can occur at any time of the year and at any time of the day or night.

Ground movement during an earthquake is seldom the direct cause of death or injury. Most earthquake-related injuries result from collapsing walls, flying glass, and falling objects as a result of the ground shaking, or people trying to move more than a few feet during the shaking. Much of the damage in earthquakes is predictable and preventable.

History

The City of Avalon and Catalina Island generally have been very isolated from earthquake activity. However, as the following map shows, the island is not entirely removed from known fault lines.

Note: For LHMP purposes, fault colors on this map only differentiate the faults.



In addition, Catalina Island has been impacted in the past by earthquakes occurring elsewhere in the Pacific Ocean. On March 27, 1964, following the large Alaskan Earthquake, a tsunami drew all of the water out of Catalina Harbor and left boats sitting on exposed, dry ocean floor.

Risk Assessment

While the potential for an earthquake that impacts the City of Avalon cannot be ignored, the hazard of earthquake is lower in terms of risk than many other hazards.

- **Effects on people and housing.** In any earthquake, the primary consideration is saving lives. Time and effort must also be dedicated to providing for mental health by reuniting families, providing shelter to displaced persons, and restoring basic needs and services. Major efforts will be required to remove debris and clear roadways, demolish unsafe structures, assist in reestablishing public services and utilities, and provide continuing care and temporary housing for affected citizens.

- **Effects on commercial and industrial structures.** After any earthquake, individuals are likely to lose wages due to the inability of businesses to function because of damaged goods and/or facilities. With business losses, the City of Avalon will lose revenue. Economic recovery from even a minor earthquake will be critical to the communities involved.

- **Effects on infrastructure.** The damage caused by both ground breaking and ground shaking can lead to the paralysis of the local infrastructure: police, fire, medical and governmental services.

Risk assessment conclusion. The effects of an earthquake can be far-reaching and devastating. However, in relative terms, earthquake is not a high risk for the City of Avalon.

Relationship to Other Hazards – Cascading Effects

Earthquakes can cause many cascading effects such as fires, flooding, hazardous material spills, utility disruptions, landslides, transportation emergencies, and the possible failure of dams. Earthquakes may cause landslides and rupture dams. Ground shaking may cause seiche, the rhythmic sloshing of water in reservoirs and other bodies of water. As noted above, earthquakes elsewhere in the Pacific have the ability to generate tsunamis that impact Catalina Island.

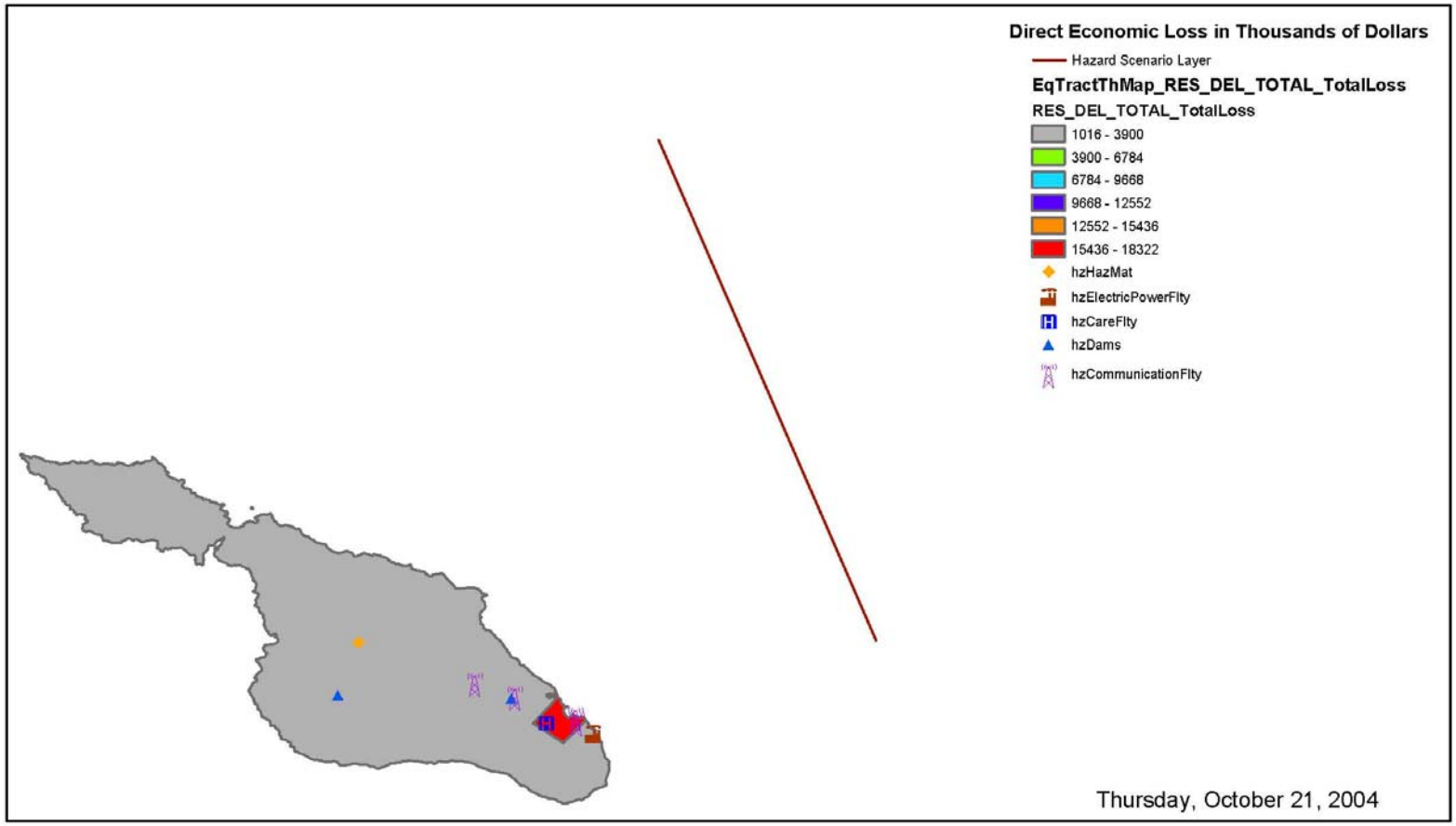
HAZUS Analysis

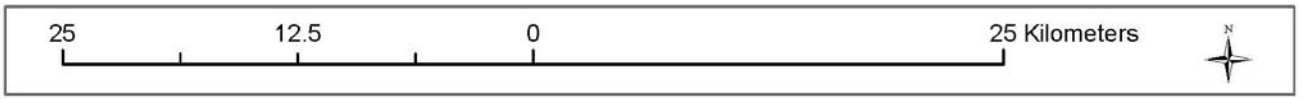
As part of the development of this LHMP, an earthquake scenario was created in HAZUS-MH, the FEMA-approved software program for estimating potential losses from disasters. For the scenario here, a magnitude 6.9 earthquake on the Palos Verdes Fault was simulated with an epicenter relatively close to the island of Catalina.

The results produced by HAZUS are reported by census tract. The summarized results for the City of Avalon, along with a map of relative ground motion, are presented on the pages immediately following.

The map on the following page shows relative ground motion for the simulated earthquake. "Red" represents the most severe ground motion at one extreme and "grey" represents the least severe ground motion at the other extreme.

Study Region : City of Avalon
Hazard Scenario : Palos Verdes Fault Earthquake 6.9





SUMMARIZED HAZUS RESULTS

Jurisdiction: City of Avalon

Scenario: Palos Verdes Fault Earthquake 6.9

Direct Economic Loss Estimates (thous. $)	
Structural Damage	$1,833.05
Non-Structural Damage	$9,784.17
Building Damage	$11,617.24
Contents Damage	$3,339.84
Inventory Loss	$36.45
Relocation Cost	$52.25
Income Loss	$1,513.93
Rental Income Loss	$1,235.40
Wage Loss	$1,542.96
Total Loss	$19,338.06

Commercial Casualties for Daytime Event	
Medical Aid	1
Hospital Treatment	0
Life-Threatening Severity	0
Death	0

Commuting Casualties for Daytime Event	
Medical Aid	0
Hospital Treatment	0
Life-Threatening Severity	0
Death	0

Educational Casualties for Daytime Event	
Medical Aid	0
Hospital Treatment	0
Life-Threatening Severity	0
Death	0

Hotels Casualties for Daytime Event	
Medical Aid	0
Hospital Treatment	0
Life-Threatening Severity	0
Death	0

Industrial Casualties for Daytime Event	
Medical Aid	0
Hospital Treatment	0
Life-Threatening Severity	0
Death	0

Other Residential Casualties for Daytime Event	
Medical Aid	0
Hospital Treatment	0
Life-Threatening Severity	0
Death	0

Single Family Casualties for Daytime Event	
Medical Aid	0
Hospital Treatment	0
Life-Threatening Severity	0
Death	0

Total Casualties for Daytime Event	
Medical Aid	1
Hospital Treatment	0
Life-Threatening Severity	0
Death	0

Plans and Programs

Comprehensive hazard mitigation programs include prudent planning and enforcement of building codes. Retrofit projects have been conducted at the hospital and at Edison

Coastal Storm / Coastal Erosion

Severity: High	Probability: Medium

Hazard Definition

Coastal Storm

Coastal storms may have hurricane-force winds and may cause similar kinds and amounts of damage; however, they are not classified as hurricanes because they do not originate in the tropics.

NOAA Scientists define a “nor'easter” (or northeaster) as any reasonably strong wind blowing from the northeast for an extended period of time. Nor’easters usually do most of their damage at the coast, in the form of beach erosion and flooding. The northeast winds come from a low-pressure system offshore.

The most destructive nor’easters occur when a high-pressure system over northeastern New England or in the northern Atlantic blocks the northward movement of the low. Winds blow clockwise around a high. Winds circulate counterclockwise around a low. When the low stops moving, its winds combine with those of the high to blow in one direction over a long period of time, which creates huge waves. The duration of a nor’easter — the number of high tides through which it persists — can be the most significant measure of its destructiveness.

Coastal Erosion

Coastal erosion is a natural geological process caused by currents, storms, earthquakes, winds, waves, tides, and the gradual movement of tectonic plates. It may take place slowly over thousands of years, or it may occur dramatically, as with landslides or severe storms. Coastal erosion rates can be accelerated by sea level rise.

Driven by a rising sea level, large storms, flooding, and powerful ocean waves, erosion wears away the beaches and bluffs along shorelines. Erosion undermines waterfront houses, businesses, and public facilities, eventually rendering them uninhabitable or unusable. By moving the shoreline inland, erosion also brings nearby structures ever closer to the water, often putting them at greater risk than either their owners or insurers recognize.

An April 2000 study sponsored by FEMA predicts that over the next 60 years, erosion may claim one out of four houses within 500 feet of the U.S. shoreline. To the homeowners living within this narrow strip, the risk posed by erosion is comparable to the risk from flooding, especially in beach areas.

History

Catalina Island has a history of tropical storms that have affected major support systems, destroyed personal property, and injured residents of the island. These storms are generally seen in the winter months and are more of an issue in an El Nino year. The storms that affect Avalon are called Northeastern Storms because they come in from the northeast. Tropical Storms and Tropical Depressions as far away as Mexico can have an effect on the City of Avalon.

Strong northeast and southeast winds in Avalon have caused an extreme amount of damage to the waterfront piers and structures, and have flooded businesses on Crescent Street at times, depending on the tide height. Numerous vessels have broken off their moorings during these types of storms and have caused a significant amount of damage to the vessels and loss of life.

The table below provides data on historical severe weather events over the past century:

Year	Month	Cause	Details
1997	December	Northeaster Storm	Several boats were lost; however, there were no injuries.
1995	Winter Months	El Nino	Damage not reported.
1988	February	Northeaster Storm	Storm led to extremely high winds; damage along shore-side buildings, plus damage to road and pier.
1983	August	Extreme High Tides	Record high tide and surge washed over Avalon's beaches onto Crescent Avenue; all shops required sandbags.
1983	February	Northeaster Storm	Storm ripped up planks at fuel dock and destroyed railings along Casino Way. Pilings were lost at Catalina Island Yacht Club. Piers at White's Landing and Camp Fox were also destroyed.
1983	January	High winds	Damage not reported.
1982	December	Northeaster Storm	Pebbly Beach Road was severely damaged and shore-side installations on Crescent Avenue were damaged.
1966	January	Northeaster Storm	Injuries occurred and 14 boats were destroyed.
1944	Winter	Northeaster Storm	Many boats were destroyed in a storm, which also caused flooding. Buildings along the shore line were destroyed, and roads and piers were also damaged.
1930	Winter	Northeaster Storm	Damage not reported.
1919	November	Northeaster Storm	Damage not reported.

Risk Assessment

Coastal storms are a recurring hazard for the City of Avalon.

- **Effects on people and housing.** Historically, there has been little loss of life or injury in the City of Avalon due to Coastal Storms. The primary impacts have been economic in nature. A severe weather event can effect people in the City of Avalon by crippling one or more key elements of infrastructure that serve them (wastewater treatment plant, Edison plant, supply docks, etc.)

- **Effects on commercial and industrial structures.** The heart of the business district of Avalon directly borders the harbor, less than 100 yards from the water. In times of extreme tides and large tropical storms, that area is susceptible to flooding and damages. Tourism, the primary industry of Avalon, is severely hampered by severe weather events.

- **Effects on infrastructure.** Key elements of the critical infrastructure of the City are inland and at a slightly higher elevation than the waterfront. However, the main road to the Edison plant near Pebbly Beach runs very close to the ocean, where erosion and rockslides can limit or even eliminate access.

Risk assessment conclusion. The threat of Coastal Storms to the City of Avalon is high, and often leads to considerable damage. Often, the damage is caused by a cascading effect such as one or more rockslides.

Moreover, because Avalon is dependent on barges from the mainland for food supplies and because Avalon's largest industry is tourism, Coastal Storms wreak economic havoc. When barges and passenger ferries cannot operate between the mainland and Avalon, the food supply dwindles and the local economy suffers.

Relationship to Other Hazards – Cascading Effects

High surf caused by coastal storms can damage or even destroy docks and piers in the Avalon Harbor and other places including the Edison Plant. Many of these docks and piers contain electrical and gas lines. This combination can lead to fires in the City.

High winds and large quantities of precipitation that come with a large tropical storm can cause rockslides. The areas most likely to be affected by rockslides are the access roads to Pebbly Beach and Hamilton Cove.

Plans and Programs

Rip-rap is in place at the Edison plant.

Hazard: Landslides / Rockslides

Severity: High	Probability: High

Hazard Definition

A landslide is a geologic hazard where the force of gravity combines with other factors to cause earth material to move or slide down an incline. Some landslides move slowly and cause damage gradually, whereas others move so rapidly that they can destroy property and take lives suddenly and unexpectedly. Slopes with the greatest potential for sliding are between 34 degrees and 37 degrees. Although steep slopes are commonly present where landslides occur, it is not necessary for the slopes to be long.

Landslides, rockfalls, and debris flows occur continuously on all slopes; some processes act very slowly, while others occur very suddenly, often with disastrous results. As human populations expand over more of the land surface, these processes become an increasing concern.

There are predictable relationships between local geology and landslides, rockfalls, and debris flows. Knowledge of these relationships can improve planning and reduce vulnerability. Slope stability is dependent on many factors and their interrelationships, including rock type, pore water pressure, slope steepness, and natural or man-made undercutting.

History

Catalina Island has a recurring history of landslides and rockslides. It is not unusual for the access roads to the Edison Plant near Pebbly Beach and to Hamilton Cove to be washed-out every 2-3 years.

Risk Assessment

The risk of landslides and rockslides in the City of Avalon is high. These events are recurring in nature and disrupt access to critical elements of the City's infrastructure.

- **Effects on people and housing.** People and housing are at risk from landslides and rockslides in Avalon. For the most part, past incidents have not resulted in significant injuries, but have disrupted transportation routes and caused considerable inconvenience.

- **Effects on commercial and industrial structures.** Landslides and rockslides in Avalon are most likely to occur on the access roads to Pebbly Beach and Hamilton Cove. There are a number of industrial structures on the Pebbly Beach road, including the Edison plant. Hamilton Cove is a residential community, most of which is commercially available for rent by tourists.

- **Effects on infrastructure.** As has been noted, the road to Pebbly Beach provides access to much of Avalon's critical infrastructure facilities, including the Edison plant and the wastewater treatment plant.

Risk assessment conclusion. Landslides and rockslides are a high risk in the City of Avalon. Not only are there risks of injury to people and loss of property, there are even higher risks to maintaining access to critical infrastructure facilities of the City.

Relationship to Other Hazards – Cascading Effects

Landslides are usually a cascading effect of severe weather.

Plans and Programs

The City has implemented retaining walls near key roadways. In addition, plastic K-rail is used next to key roadways when landslide/rockslide risks increase.

Hazard: Naturally-Occurring Biological Threats

Severity: High-to-Medium	Probability: Medium

Hazard Definition

Public Health-related hazards may be the result of a naturally occurring event or terrorism. Key hazards of concern to the City of Avalon today are described below.

Hantavirus infection is caused by a group of viruses that can infect humans with two serious illnesses: hemorrhagic fever with renal syndrome (HFRS) and Hantavirus pulmonary syndrome (HPS). Hantaviruses are found without causing symptoms within various species of rodents and are passed to humans by exposure to the urine, feces, or saliva of those infected rodents. Ten different hantaviruses have been identified as important in humans.

Lyme Disease (Borrelia burgdorferi) is a systemic, tickborne disease with protean manifestations, including dermatologic, rheumatologic, neurologic, and cardiac abnormalities. The best clinical marker for the disease is an initial skin lesion that occurs in 60%-80% of patients.

Botulism is a serious paralytic illness caused by a nerve toxin that is produced by the bacterium Clostridium botulinum. There are three main kinds of botulism. Food borne botulism is caused by eating foods that contain the botulism toxin. Wound botulism is caused by toxin produced from a wound infected with Clostridium botulinum. Infant botulism is caused by consuming the spores of the botulinum bacteria, which then grow in the intestines and release toxin. All forms of botulism can be fatal and are considered medical emergencies. Food borne botulism can be especially dangerous because many people can be poisoned by eating a contaminated food.

Campylobacter jejuni (Pronounced "camp-e-low-back-ter j-june-eye") was not recognized as a cause of human food borne illness prior to 1975. Now, the bacterial organism is known to be the most common cause of food borne illness in the U.S. (Salmonella is the second most common cause). Food is the most common vehicle for the spread of Campylobacter and poultry is the most common food implicated. Some case-control studies indicate that up to 70% of sporadic cases of campylobacteriosis are associated with eating chicken. Surveys by the USDA demonstrated that up to 88% of the broiler chicken carcasses in the U.S. are contaminated with Campylobacter while a recent Consumer Reports study identified Campylobacter in 63% of more then 1000 chickens obtained in grocery stores. Other identified food vehicles include unpasteurized milk, undercooked meats, mushrooms, hamburger, cheese, pork, shellfish, and eggs.

E. coli is found in the family of bacteria named Enterobacteriaceae, which is informally referred to as the enteric bacteria. Most forms of E. coli are harmless; however, there are strains that cause serious illness. Other enteric bacteria are the Salmonella bacteria (also a very large family, with many different members), Klebsiella pneumoniae, and Shigella, which many people consider to be part of the E. coli family.

Hepatitis A is one of five human hepatitis viruses that primarily infect the human liver and cause human illness. The other known human hepatitis viruses are hepatitis B, C, D, and E. Hepatitis A is relatively unusual in nations with developed sanitation systems such as the U.S. Nevertheless, it continues to occur here. Each year, an estimated 100 persons die as a result of acute liver failure in the U.S. due to hepatitis A. Approximately 30 - 50,000 cases occur yearly in the U.S. and the direct and indirect costs of these cases exceed $300 million. Hepatitis A is totally preventable, and need not occur.

Listeria monocytogenes is a pathogenic (disease-causing) bacterium that is food-borne and causes an illness called listeriosis. It is frequently overlooked as a possible cause of illness due to its unique growth capabilities. First, it is somewhat difficult for laboratories to grow, and when they do so, Listeria can be confused with common harmless contaminants and disregarded. Second, most bacteria grow poorly when temperatures fall below 40°F, while Listeria survives at in temperatures from below freezing (20°F) to body temperature and it grows best at O°F to 50°F, including the temperature range that we use for refrigeration. As a result, Listeria may be transmitted in ready-to-eat foods that have been kept properly refrigerated.

Monkeypox is a rare viral disease that occurs mostly in central and western Africa. It is called “monkeypox” because it was first found in 1958 in laboratory monkeys. Monkeypox was reported in humans for the first time in 1970. In early June 2003, monkeypox was reported among several people in the U.S. Most of these people got sick after having contact with pet prairie dogs that were sick with monkeypox. This was the first time that there had been an outbreak of monkeypox in the U.S. The disease is caused by Monkeypox virus. It belongs to a group of viruses that includes the smallpox virus (variola), the virus used in the smallpox vaccine (vaccinia), and the cowpox virus. In humans, the signs and symptoms of monkeypox are like those of smallpox, but usually they are milder. Another difference is that monkeypox causes the lymph nodes to swell.

Norwalk virus is a virus that attaches to the outside of cells lining the intestine. Once attached, it transfers its genetic material into that cell. There it reproduces, finally killing the human cell to release new copies of it that attach to more cells of in intestine's lining. Common names of the illness caused by the Norwalk and other small round structured or caliciviruses are viral gastroenteritis, acute nonbacterial gastroenteritis, food poisoning, and food borne infection. This illness occurs worldwide. Humans are the only known hosts. The viruses are passed in the stool of infected persons. Of viruses, only the common cold is reported more often than viral gastroenteritis. Norwalk and Norwalk-

like viruses are increasingly being recognized as leading causes of food-borne disease in the United States. People most often get Norwalk virus infection by swallowing infected food or water. Outbreaks in the U.S. are often linked to eating raw shellfish, especially oysters and clams. Steaming does not kill the virus or prevent its transmission.

Plague is a disease caused by Yersinia pestis (Y. pestis), a bacterium found in rodents and their fleas in many areas around the world. Pneumonic plague is different from the bubonic plague. Both are caused by Yersinia pestis, but they are transmitted differently and their symptoms differ. Pneumonic plague can be transmitted from person to person; bubonic plague cannot. Pneumonic plague affects the lungs and is transmitted when a person breathes in Y. pestis particles in the air. Bubonic plague is transmitted through the bite of an infected flea or exposure to infected material through a break in the skin. Symptoms include swollen, tender lymph glands called buboes. Buboes are not present in pneumonic plague. If bubonic plague is not treated, however, the bacteria can spread through the bloodstream and infect the lungs, causing a secondary case of pneumonic plague. Patients usually have fever, weakness, and rapidly developing pneumonia with shortness of breath, chest pain, cough, and sometimes bloody or watery sputum. Nausea, vomiting, and abdominal pain may also occur. Without early treatment, pneumonic plague usually leads to respiratory failure, shock, and rapid death.

Salmonella is a type of bacteria that causes typhoid fever and many other infections of intestinal origin. Typhoid fever, rare in the U.S., is caused by a particular strain designated Salmonella typhi. But illness due to due to other Salmonella strains, just called "salmonellosis," is common in the U.S. Today, the number of known strains of this bacteria total over 2300.

SARS is a respiratory illness of unknown cause that has recently been reported in a number of countries. According to the World Health Organization (WHO), the main symptoms and signs of SARS include a fever greater than 100.5° F (38° C), and cough, shortness of breath, or difficulty breathing. The cause of SARS is not known at this time. Researchers at CDC and around the world are working to find the cause of SARS. At this early stage of the investigation, it seems more likely that SARS is caused by an organism that we have less experience with rather than a commonly occurring, known organism.

The **Shigella** germ is a bacteria that can cause sudden and severe diarrhea (gastroenteritis) in humans. Shigella lives in the human intestine and is commonly spread both through food and by person-to-person contact. The illness is also known as "bacillary dysentery." About 25,000 or so laboratory confirmed cases of shigellosis are reported each year in the U.S. However, many cases go undiagnosed and/or unreported, and the best estimates are that 450,000 cases of Shigella infection actually occur annually in the U.S.

Tularemia is a potentially serious illness that occurs naturally in the U.S. It is caused by the bacterium Francisella tularensis found in animals (especially rodents, rabbits, and hares). Tularemia, also known as "rabbit fever." Tularemia is usually a rural disease and has been reported in all U.S. states except Hawaii. Tularemia is a widespread disease in animals. About 200 human cases of tularemia are reported each year in the U.S. Most cases occur in the south-central and western states.

West Nile Virus (WNV) is a mosquito-borne virus that has been found in parts of Asia, Eastern Europe, Africa, and the Middle East. The virus arrived in the Western Hemisphere in 1999 in New York City. The more severe forms of West Nile virus are West Nile encephalitis, West Nile meningitis, and West Nile meningoencephalitis. Encephalitis refers to an inflammation of the brain, meningitis is an inflammation of the membrane around the brain and the spinal cord, and meningoencephalitis refers to inflammation of the brain and the membrane surrounding it.

Canine Distemper is a viral disease of young dogs characterized by high fever and respiratory inflammation. It can affect wild animals and island pets.

Other animal diseases which can affect humans include rabies and toxoplasmosis (an opportunistic infection caused by the microscopic parasite Toxoplasma gondii, found in raw or undercooked meat and cat feces), as well as parasites such as roundworms, whipworms, hookworms, ringworms, and mange.

History

Los Angeles County Public Health has done rodent trapping for Hantavirus on the island. One mouse has tested positive.

A researcher for the Catalina Island Conservancy has submitted samples over the past few years to Los Angeles County Public Health to test for plague. All tests have been negative.

Los Angeles County Public Health has recently met with City of Avalon officials and has begun to test for West Nile Virus. Public Health tested for mosquito larvae in areas of standing water on the island. Of five species present that were identified, two are of the type that are known carriers of West Nile Virus. Whether or not any of the mosquitoes actually carry the virus is unknown as of the writing of this initial LHMP.

Los Angeles County Public Health collects ticks on the island biannually to check for Lyme Disease. Public Health focuses on areas of human interface, including campgrounds and trails. In 2003, Public Health found a small number of ticks which

carried the disease. There have been no confirmed cases of the disease on the island, although a few cases are under investigation.

There is no history of a biological disaster on the island; however, the possibility of one is very real. Due to the large and consistent influx of visitors to the island from all over the world and the close proximity of the residents of the City, the spread of disease could be very rapid.

In 1999, there was a distemper incident that put the island fox on the endangered species list. The fox population on Catalina went from 1300 to 100. It is thought that the disease was transmitted by a pet on the island. The Island Conservancy started a recovery program for the fox, which is now listed as a Federally Endangered Species. The Conservancy, Humane Society, and Institute for Wildlife Studies started a quarterly vaccination clinic to prevent future outbreaks. Outbreaks affect not only island wildlife and pets, but also have the potential to disrupt tourism, especially ecotourism, as well.

Risk Assessment

The risk of diseases that can pose a serious threat to human life can be rated across the entire spectrum from low to high. This is because disease can range in effect from as little as mild discomfort to severe illness and sudden death, or it can range from very rare to pandemic.

West Nile Virus is a disease of particular concern. The situation is changing daily on the nearby mainland, particularly in Los Angeles County, Riverside County, and San Bernardino County, as this report is being prepared.

A particular vulnerability for the City of Avalon is the water supply behind Thompson Reservoir, Wrigley Reservoir, and Baker Dam. If the supply is compromised, the City's fresh water supply may be jeopardized.

Further, if the salt water supply contained in Fall Canyon is compromised, the City¹s water supply for its sewage system and fire suppression may also become unusable.

Where animal diseases and parasites are concerned, a system of required proof of vaccinations for pets brought onto the island, or a quarantine period, could address these concerns.

- **Effects on people and housing.** Humans are susceptible to the effects of Naturally-Occurring Biological Threats.

Risk assessment conclusion. Because the risk for a pandemic outbreak of a lethal disease does exist, preparedness should be maintained at a high level.

Plans and Programs. To address this issue the hospital in Avalon has constructed one isolation room. In addition, as noted above, Los Angeles Vector Control and Public Health are actively testing for plague and West Nile Virus.

Hazard: Insect Infestation

Severity: Medium	Probability: Medium

Hazard Definition

Insect infestation occurs when an undesirable type of insect inhabits an area in a manner that causes serious harm to: cash crops, livestock, or poultry; wild land trees, plants, or animals; or humans. Countless insects live on, in, and around plants, animals, and humans in all environments. Many are harmless, while others can cause fatal damage. Under some conditions, insects that have been present and relatively harmless can become hazardous. For example, severe drought conditions can weaken trees and make them more susceptible to destruction from insect attacks.

The major forms of insects are:

Chewing insects are defoliating insects. They generally strip plants of green matter such as leaves. Caterpillars and beetles make up the largest proportion of chewing insects. Under normal conditions, trees can usually bounce back from an attack of these defoliators, though repeat infestation will weaken a tree and can eventually kill it by starving it of energy.

Boring, or tunneling, insects cause damage by boring into the stem, roots, or twigs of a tree. Some lay eggs which then hatch and the larvae burrow more deeply into the wood, blocking off the water-conducting tissues of the tree. Boring insects generally feed on the vascular tissues of the tree. If the infestation is serious, the upper leaves are starved of nutrients and moisture, and the tree can die. Signs of borer infestation include entry/exit holes in the bark, small mounds of sawdust at the base, and sections of the crown wilting and dying.

Sucking insects do their damage by sucking out the liquid from leaves and twigs. Many sucking insects are relatively immobile, living on the outside of a plant and forming a hard protective outer coating while they feed on the plant's juices. Quite often they will excrete a sweet, sticky substance known as honeydew which contains unprocessed plant material. Honeydew can cause sooty mold to form on leaves and can become a nuisance. Signs of infestation include scaly formations on branches, dieback of leaves, and honeydew production.

Also, while not technically an "insect," it is worth noting that pathogens such as **fungi** can kill large stands of trees. For example, *Phytopthora ramorum*, the cause of Sudden

Oak Death, which is devastating not only for oaks, but for many other species of trees as well, is spreading rapidly.

In conjunction with the above outlined problems, insects can carry and spread disease to plants, animals, and people.

History

Catalina Island has experienced an infestation of bark beetles, which targeted groves of Eucalyptus trees. Eucalyptus trees are made of a very oily wood that combusts very rapidly and easily. A bark beetle has the potential to kill large quantities of these trees and greatly increase their fire potential.

Risk Assessment

Catalina Island has a demonstrated vulnerability to insect infestation, although the effects within the City of Avalon have been minimal. The climate makes it possible for insects to reproduce with little natural hindrance to their proliferation.

- **Effects on people and housing.** In the case of the Bark Beetle, the fire hazard it creates can cost loss of homes and life.

Risk assessment conclusion. Insect infestation is an ongoing threat. The effects on people and property can be disastrous and costly.

Not only do dead stands of trees increase the fuel available to wildfires, they have a negative effect on ecotourism as well.

Relationship to Other Hazards – Cascading Effects

The recent Bark Beetle infestation in the "Inland Empire" area of Southern California is a classic example of cascading effects. The insect killed hundreds of thousands of trees, increasing the wildfire hazard, which resulted in the unfortunate devastation of the fall fires of 2003 in that area.

Plans and Programs. There is an annual program to trap bees outside of the City of Avalon (at a cost of $30,000 per year). As noted under the hazard of Naturally-Occurring Biological Hazards, Los Angeles County Vector Control and Public Health are testing for plague and West Nile Virus.

Hazard: Dam Failure

Severity: Very High-to-High	Probability: Low

Hazard Definition

A dam failure is the partial or complete collapse of an impoundment, with the associated downstream flooding. Flooding of the area below the dam may occur as the result of structural failure of the dam, overtopping, or a seiche. Dam failures are caused by natural and manmade conditions. The list of causes includes earthquake, erosion of the face or foundation, improper siting, structural/design flaws, and prolonged rainfall and flooding. The primary danger associated with a dam failure is the swift, unpredictable flooding of those areas immediately downstream of the dam.

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There are three general types of dams: earth and rock fill, concrete arch or hydraulic fill, and concrete gravity. Each of these types of dams has different failure characteristics. The earth/rock fill dam will fail gradually due to erosion of the breach; a flood wave will build gradually to a peak and then decline until the reservoir is empty. A concrete arch or hydraulic fill dam will fail almost instantaneously; with a very rapid build-up to a peak and then a gradual decline. A concrete gravity dam will fail somewhere in between instantaneous and gradual, with corresponding build-up of flood wave.

History

There are several dams on Catalina Island. These dams include:

- Thompson Reservoir – fresh water
- Wrigley Reservoir – fresh water
- Baker Dam – fresh water
- Fall Canyon Reservoir – salt water
- Buena Vista Point Reservoir – salt water

The worst flood in the City of Avalon's history occurred when the Baker Dam incident occurred on January 17, 1995. The incident occurred following a series of significant storms. The concrete dam itself did not fail. However, the fencing above the dam failed due to the accumulation of debris.

Risk Assessment

There is the potential for widespread inundation in Avalon Canyon should any of the dams on Catalina Island fail. This was the case with the incident at Baker Dam.

If Thompson Dam were to fail, the City of Avalon would lose its primary source of fresh water supply.

- **Effects on people and housing.** The effects on people and housing can be significant. Loss of life and loss of property are very real risks. The shelter requirements for displaced persons can be enormous.

- **Effects on commercial and industrial structures.** Similarly, commercial and industrial structures face risks running the gamut from significant damage to total loss.

Risk assessment conclusion. Although dam failure incidents have not historically been a problem for the City of Avalon, there is the potential for another incident as significant as or worse than the Baker Dam failure.

Relationship to Other Hazards – Cascading Effects

Dam failure obviously causes downstream flooding. It may also lead to power failures and downed power lines. The secondary effects of dam failure can include the disruption of the local and state economies by damage to buildings and roads, the severance of communications, the disruption of supply and delivery mechanisms, additional welfare, and emergency aid to the recovering economy.

Dam failure may be caused by other hazards, including earthquakes and seasonal flooding.

Plans and Programs

Annual inspections and maintenance are conducted at the dams on the island. In particular, maintenance is ongoing at Baker Dam to avoid a repeat of the debris problem that occurred in 1995.

Hazard: Hazardous Materials

Overall Severity: Very High	Overall Probability: High
Gas Plant Explosion: Low	Gas Plant Explosion: Very High

Hazard Definition

Hazardous materials (Hazmat), consist of substances that by their nature, lack of containment, and reactivity, have the capability for inflicting harm. Hazmat poses a threat to health and the environment when improperly managed. Hazmat can be toxic, corrosive, flammable, explosive, reactive, an irritant, or a strong sensitizer. Hazmat substances also include certain infectious agents, radiological materials, oxiders, oil, used oil, petroleum products, and industrial solid waste substances.

Hazardous materials can pose a threat where they are manufactured, stored, transported or used. They are used in almost every manufacturing operation and by retailers, service industries, and homeowners.

Hazardous material incidents are one of the most common technological threats to public health and the environment. Incidents may occur as the result of natural disasters, human error, and/or accident.

Hazmat incidents typically take three forms:

- Fixed facility incidents
    - It is reasonably possible to identify and prepare for a fixed site incident, because laws require those facilities to notify state and local authorities about what is being used or produced there.
- Transportation incidents
    - Transportation incidents are more difficult to prepare for because it is impossible to know what material(s) could be involved until an accident actually happens.
- Pipeline incidents
    - Pipelines carry natural gas and petroleum. Breakages in pipelines carry differing amounts of danger, depending on where and how the break occurs, and what is in the pipe.

History

Historically, there have been only relatively small, localized hazmat events. All events have been managed by civilian personnel or by the Avalon Fire Department.

Risk Assessment

The City of Avalon has a number of fixed facility hazardous materials sites, including underground fuel tanks next to the Casino, LPG tanks near the Casino, and at least six homes with 500 gallon LPG tanks. In addition, there are landfills and underground fuel tanks around Thompson Reservoir, the City's primary source of freshwater.

The Edison plant handles a number of hazardous materials and maintains a number of mitigation and emergency preparedness plans of its own.

In addition, the City is vulnerable to marine accidents, including collisions with the island, involving barges transporting project materials, fuels, and other hazardous items. In particular, LPG is brought from the mainland by barge to Catalina Freight, located between Pebbly Beach and the Edison plant. Catalina Freight transports the LPG to the tank farm at the Edison plant, where the gas is vaporized and sent into the City of Avalon via pipeline.

In a similar manner, diesel and urea (a non-hazardous chemical) are transported from the mainland by barge to Catalina Freight, which in turn transports the materials to the Edison plant.

- **Effects on people and housing.** People may be evacuated when a Hazmat incident occurs. Relative to some of the other natural hazards assessed earlier in this LHMP, the numbers of people affected by Hazmat incidents are usually less. However, in the City of Avalon, a disruption of operations at the Edison plant could impact – or at least inconvenience – every citizen of the City.

- **Effects on commercial and industrial structures.** There may be economic consequences due to Hazmat incidents, but the damage is generally limited to clean-up of facilities and grounds, or simply interruption of business due to evacuation.

- **Effects on infrastructure.** Hazmat materials may impact waterways and drainage systems, and incidents can lead to the evacuation of schools, business districts, and residential areas. Again, in the City of Avalon, a disruption of operations at the Edison plant would impact the infrastructure of the entire City.

Risk assessment conclusion. Although the point of hazard in a Hazmat incident can have serious property damage and even loss of life, Hazmat accidents do not generally affect extremely large areas. Hazmat incidents present a real danger and are highly unpredictable in terms of determining when or where they will occur, but they generally do not pose a serious threat to the ability of the City of Avalon to respond. Reasonable preparation by law enforcement, the fire department, and the medical community enables the City to deal with the majority of likely events. Many emergency workers prepare for Hazmat events as part of their ongoing training. Agencies and facilities are also routinely equipped to deal with most events that might occur.

Relationship to Other Hazards – Cascading Effects

Besides the immediate effect of a hazardous materials incident at the scene of the emergency, there are ancillary effects as well. For instance, there may be impacts on waterways and drainage systems, and the evacuation of schools, business districts, and residential areas

Plans and Programs

The Edison Plant maintains a number of mitigation and emergency preparedness plans, including:

- Spill Prevention Control and Containment Plan
- Marine Oil Spill Contingency Plan
- Business Emergency Plan and Annual Hazmat Plan
- Gas System Operations and Maintenance, with emergency response sections
- Petroleum Gas Pipeline System Security Plan
- Security Plan for Generation Facility
- Internal Response and Recovery Plan

The Catalina Island Conservancy is digging up old pits and incinerator sites (including one in the Avalon schoolyard). Materials are shipped to the mainland for recycling. Underground fuel tanks are being cleaned up. In addition, recently a World War II – vintage mortar was discovered near a roadway and disposal was carried out.

Hazard: Transportation Emergencies

Severity: Very High-to-High	Probability: Low

Hazard Definition

Aircraft Crashes

In the context of the City of Avalon, the primary concern is the occurrence of an incident resulting from an airliner crash with attendant multiple injuries to and deaths of passengers, crew, and individuals on the ground.

Cross Channel Carrier /Cruise Ship Incidents

In the context of the City of Avalon, the primary concerns are fire, explosions, sinking, and/or running aground of a cross-channel carrier or a cruise ship.

Other

There are other potential Transportation Emergencies of concern to the City of Avalon, including:

- Run-away tour bus on the Old Stage Road and/or interior roadways, and
- Over-the-side of a cliff multi-casualty incident involving a tour bus.

While incidents such as these would be catastrophic to the persons involved, could cause significant property damage, and could lead to other cascading effects such as fires, they are relatively "self-contained" incidents that are handled by emergency services personnel in the normal course of their business. As such, they are not assessed for purposes of this LHMP.

History

Aircraft Crashes

In the last 40 years, there have been 96 reported general aviation incidents. Of these, 30 landed in water, causing localized hazard events. The remaining incidents were emergencies, with a few causing localized fire events. Fortunately, to-date there have been no incidents involving airliners. However, the January 31, 2000 crash of Alaska

Airlines Flight 261 off the coast of California was a confirmation that such an event is possible. Flight 261 was a twin-engine MD-83 carrying 83 passengers and 5 crewmembers, all of whom perished when the jet nosedived into the Pacific Ocean about 10 miles from Point Mugu, California, not far from the Anacopa Islands.

In 1984, a USN FA-18 crashed at White's Landing, northwest of the City of Avalon. While not directly affecting the City of Avalon, the military jet crash demonstrates the very real possibility of a jet incident in or very near the City.

Cross Channel Carrier /Cruise Ship Incidents

Historically there have been numerous incidents of small craft running aground on the island causing localized events.

On September 22, 1999, a tanker on a barge was punctured.

Risk Assessment

The risk of a major transportation emergency in the City of Avalon is not trivial. If one occurs, the consequences are likely to be significant.

- **Effects on people and housing.** Injuries and deaths in the event of a commercial jet crash in the City of Avalon or an incident involving a cross channel carrier or cruise ship are likely to be numerous.

- **Effects on commercial and industrial structures.** The risk of damage to commercial or industrial structures is relatively low. However, a commercial airliner crash in the City or a marine incident near the Edison plant could have significant consequences.

- **Effects on infrastructure.** An airliner crash or marine incident at or near the Edison plant would have a serious impact on the City's infrastructure.

Risk assessment conclusion. While the overall risk of a major transportation emergency in the City of Avalon is low, the impact of an airliner crash or a cross channel carrier or cruise ship incident would be significant.

Relationship to Other Hazards – Cascading Effects

An airliner crash or incident involving a cross channel carrier or cruise ship is likely to involved fire and fire-related injuries and deaths.

Plans and Programs

The Los Angeles County Sheriff's Department and Avalon Harbor Department are creating an Avalon Port Security Plan.

In addition, LAX has donated a number of lifeboats to Avalon.

Hazard: Blackout

Severity: Medium-to-High	Probability: Medium-to-Low

Hazard Definition

A blackout is a total loss of power and light. A blackout is caused by an interruption or loss of electrical service due to disruption of power generation or transmission caused by an accident, sabotage, natural hazard, equipment failure, or fuel shortage. More common interruptions are caused by power grid failure, fire, or severe weather. These interruptions can last anywhere from a few seconds to several days or weeks.

History

Historically, Avalon has sustained only sporadic and brief outages.

Risk Assessment

The possibility of catastrophic damage to property or loss of life due directly to power failure is slight. An individual could lose their life if they come into contact with a downed power line. Although the risk of power outage is high, the direct damage potential is low.

On the other hand, blackouts or interrupted service often occur during electrical storms and high winds. Wildfires could cause blackouts on the island, although the risk to the City of Avalon is minimal.

- **Effects on people and housing.** Impacts due directly to power failure are slight.
- **Effects on commercial and industrial structures.** Impacts due directly to power failure are slight.
- **Effects on infrastructure.** Impacts to the ability of infrastructure in the area of failure to support emergency response may be significant, although not permanent.

Risk assessment conclusion. The City needs to be prepared to restore power should there be a failure due to downed lines caused by another hazardous condition.

Relationship to Other Hazards – Cascading Effects

As noted, other hazards such as earthquake, wildfire, electrical storms, and high winds may be causes of blackouts.

Plans and Programs

Southern California Edison maintains its own mitigation plans.

Hazard: Toxic Pollution

Severity: Very High-to-Low	Probability: Very Low

Hazard Definition

People are exposed to toxic pollutants in many ways that can pose health risks:

- Breathing contaminated air
- Eating contaminated food products, such as fish from contaminated waters; meat, milk, or eggs from animals that fed on contaminated plants; and fruits and vegetables grown in contaminated soil
- Drinking water contaminated by toxic pollutants
- Ingesting contaminated soil. Young children are especially vulnerable because they often ingest soil from their hands or from objects they place in their mouths
- Touching (making skin contact with) contaminated soil, dust, or water (for example, during recreational use of contaminated water bodies)

History

With limited industrial sites, limited automobiles and prevailing winds the City of Avalon has a relatively high air quality. However when certain atmospheric conditions prevail, air quality high levels of carbon monoxide, ozone and particulate matter will be present.

Water quality is a bigger concern for the City, with its dependency on limited natural resources on the island (one major source) and the desalination operations of the Edison plant. In addition to residential population growth, water demand in the City of Avalon is driven by the visitor population, economic growth among commercial and agricultural water uses (especially in other parts of Catalina Island), temperature, rainfall, household size, conservation efforts, and pricing.

In 1999, a small portion of Avalon Beach was closed for a period of six days due to elevated bacterial levels of enterococci, fecal coliform caused by an unknown source. There continue to be numerous beach postings every couple of weeks during the summer months. The beaches were also closed for about 7-10 days in May 2004 due to the back-up of a sewer line that caused sewage flow directly into Avalon Bay.

Risk Assessment

Water supply, water quality, and adequate water facilities will continue to be critical issues for the City of Avalon. As the May 2004 report to LAFCO for Los Angeles County concluded: "The island's growth is constrained by its limited fresh water supply. Any future major development must finance new wells to taps groundwater resources, new reservoirs or other storage facilities, and/or expansion of the seawater desalination facilities prior to construction."

- **Effects on people and housing.** The quality of the air that people breathe and water that they drink directly affects their health, environment, economy and quality of life. An overabundance of pollutants in air or water can cause mild to severe health effects, including increased hospitalization and emergency room visits, respiratory illnesses, increased risk of developing cancer, decreased breathing capacity, lung inflammation, difficulty in exercising, and even a reduction in life-span.

- **Effects on commercial and industrial structures.** Pollutants may cause damage to property. Certain air pollutants are responsible for discoloring painted surfaces, eating away at stones used in buildings, dissolving the mortar that holds bricks together, and cracking tires and other items made from rubber.

Risk assessment conclusion. While air pollution is not a concern, water pollution is a significant hazard for the City. Some members of the LHMP Planning Team questioned the City's vision of a community that is un-crowded and not congested. These same members raised concerns about water quality, pointing out that there have been numerous beach closures due to high bacteria counts.

Relationship to Other Hazards – Cascading Effects

Cascading effects of toxic pollution are limited.

Hazard: Nuclear Incidents

Severity: Very High	Probability: Very Low

Hazard Definition

There are two general situations that could affect the City of Avalon, namely:

- A situation involving nuclear weapons, which is discussed in the Terrorism section of this LHMP;
- An incident involving the San Onofre Nuclear Generating Station (SONGS).

As will be discussed in the Terrorism section of this LHMP, the possibility exists that a terrorist organization might acquire the capability of creating a small nuclear detonation. A single nuclear detonation in the United States would likely produce fallout affecting an area many times greater than that of the blast itself. There is also the possibility that a terrorist will construct a "dirty bomb", a bomb that is used to distribute nuclear contaminated materials. It would have less of an effect than a "traditional" nuclear bomb, but the terror effect on the population would be great.

SONGS is located on the Pacific Coast in northwestern San Diego County, approximately 4 miles southeast of the City of San Clemente. Surrounding San Onofre is a Basic Emergency Planning Zone, approximately 10 miles in radius within which certain precautionary actions must be taken and specific precautionary plans must be prepared. This zone does not include any portion of Catalina Island. Beyond this zone is a Public Education Zone (PEZ) approximately 20 miles in radius in a northeasterly direction that also does not include any portion of Catalina Island. Within this area, residents are provided a public education program concerning the related hazards and protective actions that might result from an accident at SONGS. Beyond this zone is an area that could be affected by radioactive fallout being deposited in such a manner as to detrimentally affect the human food chain, which does include Catalina Island. This area is identified as the Ingestion Pathway Zone. Specifically, the primary threat is that of radioactive iodine 131 being deposited upon fodder consumed by dairy cows and subsequently appearing in the milk at the public marketplace. Avalon is outside the SONGS 50-mile radius designation, therefore, is unlikely to be significantly affected.

History

Fortunately, Catalina Island has not yet experienced a nuclear accident.

Risk Assessment

A detailed discussion of radiation hazards and their effects on humans along with a description of the operation of a nuclear power generating facility and the hazards posed thereby are contained in the State of California Nuclear Power Plant Emergency Response Plan and in other documents.

- **Effects on people and housing.** Depending on levels of radiation exposure, the effects could range from minimal to devastating.

- **Effects on commercial and industrial structures.** Depending on levels of radiation exposure, the effects could range from minimal to devastating.

- **Effects on infrastructure.** Depending on levels of radiation exposure, the effects could range from minimal to devastating.

Risk assessment conclusion. Catalina Island and the City of Avalon are far enough away from nuclear power plants that cataclysmic exposure is not likely. The many miles of ocean between the nearest plant (San Onofre) and strong wind currents over the ocean could further mitigate the effects of an accident. However, a strong southeast wind may be able to push fallout to Catalina Island.

Relationship to Other Hazards – Cascading Effects

Cascading effects of a nuclear incident could include contaminated water, air, and soil.

Plans and Programs

Since 9/11, numerous anti-terrorism programs and policies have been put into effect by law enforcement, fire, public health, and other departments.

Hazard: Terrorism

Severity: Very High	Probability: Low

Hazard Definition

Terrorism is the use of force or violence against persons or property in violation of the criminal laws of the United States for purposes of intimidation, coercion or ransom. Terrorists often use threats to create fear among the public, to try to convince citizens that their government is powerless to prevent terrorism, and to get immediate publicity for their causes.

Terrorist acts or and acts of war may cause casualties, extensive property damage, fires, flooding, and other ensuing hazards.

Terrorism takes many forms, including:

- Chemical
- Biological
- Radiological
- Nuclear
- Explosive
- Cyber-terrorism

Chemical. Chemical weapons have been used primarily to terrorize an unprotected civilian population and not as a weapon of war. This is because of fear of retaliation and the likelihood that the agent would contaminate the battlefield for a long period of time.

Some analysts suggest that the possibility of a chemical attack would appear far more likely than either the use of nuclear or biological materials, largely due to the easy availability of many of the necessary precursor substances needed to construct chemical weapons. Additionally, the rudimentary technical knowledge needed to build a working chemical device is taught in every college level chemistry course in the world.

Some chemical agents are odorless and tasteless and are difficult to detect. They can have an immediate effect (a few seconds to a few minutes) or a delayed effect (several hours to several days).

Biological. Biological weapons are defined as any infectious agent such as a bacteria or virus used to produce illness or death in people, animals, or plants. This definition is often expanded to include biologically-derived toxins and poisons. Biological agents can

be dispersed as aerosols or airborne particles. Terrorists may use biological agents to contaminate food or water because the agents are extremely difficult to detect.

Radiological. A radioactive material is a material made up of unstable atoms which give off excess energy in the form of radiation through the process of radioactive decay. Radiation cannot be detected by human senses. Wherever radioactive materials are used, transported, or stored there is a potential for a radiological accident to occur. Some of their most common uses include use:

- By doctors to detect and treat serious diseases.
- By educational institutions and companies for research.
- By the military to power large ships and submarines.
- By companies in the manufacture of products.
- As a critical base material to help produce the commercial electrical power that is generated by a nuclear power plant.
- As one of the critical components in nuclear weapons, which are relied upon to help deter the threat of war.

Nuclear. The possibility exists that a terrorist organization might acquire the capability of creating a small nuclear detonation. A single nuclear detonation in the United States would likely produce fallout affecting an area many times greater than that of the blast itself. There is also the possibility that a terrorist will construct a "dirty bomb", a bomb that is used to distribute nuclear contaminated materials. It would have less of an effect than a "traditional" nuclear bomb, but the terror effect on the population would be great.

Explosive. The possibility exists that a terrorist may attack with conventional explosives, particular in a public setting. Innumerable incidents have occurred around the world involving car bombs, truck bombs, and bombs attached directly to terrorist individuals.

Cyber-terrorism. Cyber-terrorism is the use of computer network tools to shut down critical government infrastructures such as energy, transportation, and government operations, or to coerce or intimidate a government or civilian population. The premise of cyber terrorism is that as nations and critical infrastructure became more dependent on computer networks for their operation, new vulnerabilities are created. A hostile nation or group could exploit these vulnerabilities to penetrate a poorly secured computer network and disrupt or even shut down critical public or business operations.

The goal of cyber terrorism is believed to be aimed at hurting the economy of a region or country, and to amplify the effects of a traditional physical terrorist attack by causing additional confusion and panic.

History

Fortunately, The City of Avalon has no history of incidents of chemical, biological, radiological, nuclear, or explosive terrorism.

The City has been impacted – as has the rest of the world – by recent computer viruses and worms and has experienced several incidents of arson.

Risk Assessment

Chemical. A terrorist would not have to build a complicated chemical release device. During favorable weather conditions an already existing chemical plant could be sabotaged or bombed releasing a toxic cloud to drift into a populated area. The result could be just as dangerous as having placed a smaller chemical device in a more confined space. This type of incident would cause the maximum amount of fear, trepidation, and potential panic among the civilian population...and thus achieve a major terrorist objective.

Biological. The agents are cheap, easy to make, and simple to conceal. Even small amounts, if effectively deployed, could cause massive injuries and overwhelm emergency rooms. The production of biological weapons can be carried out virtually anywhere — in simple laboratories, on a farm, or even in a home.

However, experts say it remains very difficult to transform a deadly virus or bacterium into a weapon that can be effectively dispersed. A bomb carrying a biological agent would likely destroy the germ as it explodes. Dispersing the agents with aerosols is challenging because biomaterials are often wet and can clog sprayers. Most agree that, while a biological attack could be devastating in theory, in reality, the logistical challenges of developing effective agents and then dispersing them make it less likely a terrorist could carry out a successful widespread assault.

Radiological/Nuclear. Under extreme circumstances an accident or intentional explosion involving radiological materials can cause very serious problems. Consequences may include death, severe health risks to the public, damage to the environment, and extraordinary loss of, or damage to, property.

Explosive. While generally more limited in the extent of the damage inflicted, explosive terrorist attacks may have consequences including death and damage to property.

The City of Avalon is particularly vulnerable to such a terrorist attack. With ferry boats carrying 350 – 450 passengers arriving in Avalon Harbor frequently throughout the day, cruise ships with 2500 passengers anchored nearby, and large numbers of swimmers in the water along the beachfront, the City must be vigilant to this risk.

Cyber-terrorism. Like all jurisdictions today, the City is vulnerable to cyber-terrorism.

- **Effects on people and housing.** Depending on levels of contamination and exposure, effects could range from minimal to devastating. The effects of an explosive attack or "active shooter" incident could be devastating.

- **Effects on commercial and industrial structures.** Depending on levels of contamination and exposure, effects could range from minimal to devastating. The effects of an explosive attack or "active shooter" incident would be devastating to Avalon's largest source of commerce, namely, tourism.

- **Effects on infrastructure.** Nuclear, radiological, and cyber-terrorism can have profound effects on infrastructure.

Risk assessment conclusion. Due to recent events such as the 9/11 Twin Towers attack and the declared war against terrorism, national and local governments have assigned high priority to terrorist attack preparedness.

Plans and Programs

The Los Angeles County Sheriff's Department is:

- Updating all of the County Emergency Operations Plans pertaining to Catalina Island;
- Updating the School Safety Plan for Avalon School; and
- Creating an Avalon Port Security Plan, in cooperation with the Avalon Harbor Department.

Southern California Edison (SCE) conducts daily checks and regularly scheduled testing of water. Security plans – which are obviously sensitive in nature – are in place.

The City and participating agencies conduct drills and have plans in place for marine security. These plans will be enhanced by the Port Security Plan currently under development.

5. Goals, Objectives, and Mitigation Strategies

Mitigation Strategy Requirements Cross-Reference Table

Element	Requirement	Avalon LHMP Response
Local Hazard Mitigation Goals - A	Description of Mitigation Goals to Reduce or Avoid Long-Term Vulnerabilities to the Identified Hazards	Wildfire – page 80 Flooding page 80 Earthquakes – page 81 Coastal Erosion/ Landslides – page 81 Naturally-Occurring Biological Threats – page 82 Terrorism – page 82
Identification and Analysis of Mitigation Actions - A	Identification and Analysis of a Comprehensive Range of Specific Mitigation Actions and Projects for Each Hazard	
Identification and Analysis of Mitigation Actions - B	Explain How Identified Actions and Projects Address Reducing the Effects of Hazards on New Buildings and Infrastructure	
Identification and Analysis of Mitigation Actions - C	Explain How Identified Actions and Projects Address Reducing the Effects of Hazards on Existing Buildings and Infrastructure	

Chapter 4 of this document documented how hazards have affected the City of Avalon in the past and assessed the risks these and emerging hazards pose to the City's people and physical assets. This chapter outlines the City's goals. Objectives, and mitigation strategies.

Hazard: Wildfire

Wildfire Goal 1: Reduce risks of wildfires.

Objectives
- Minimize the amount of fuel in areas prone to wildfires.
-

Strategies:
- Continue aggressive weed abatement and inspection programs.
- Propose project to complete Fire and Fuel Management Plan that is already well-underway, but short of required funds.

Wildfire Goal 2: Reduce risks of structural fires due to wildfires.

Objectives
- Better prepare to mitigate severity.

Strategies:
- Propose project to improve tanks and saltwater system to mitigate severity when fire spreads to dense structures in the City of Avalon.

Hazard: Flooding

Flooding Goal 1: Reduce risks of flooding .

Objectives
- Improve drainage.

Strategies:
- Propose a project to improve inspections, improvements, and maintenance of storm drains so as to protect the vulnerable facilities and structures in the City of Avalon, especially key assets in Avalon Canyon including the school, the hospital, and many others.

Hazard: Earthquakes

Earthquakes Goal 1: Improve emergency communications.

Objectives
- Reduce severity of incident by having adequate emergency communications.

Strategies:
- Propose a project to improve emergency communications, as communications is a key element of infrastructure that was identified as highly vulnerable during the development of this LHMP; the vulnerability of current communications stems from a single-point-of-failure issue with the fiber cable on the island.
- Establish a mobile command post.

Earthquakes Goal 2: Provide improved evacuation routes.

Objectives
- Provide more secure evacuation paths for Avalon residents.

Strategies:
- Upgrade the road to the airport.
- Upgrade the airport runway.

Earthquakes Goal 3: Provide more survivable structures.

Objectives
- Reduce severity of incident by improving survivability of buildings.

Strategies:
- Retrofit critical structures.

Hazards: Coastal Erosion / Landslides

Coastal Erosion / Landslide Goal 1: Protect roadways to critical infrastructure.

Objectives
- Improve access to critical infrastructure facilities.

Strategies:
- Implement netting along Pebbly Beach Road.

Hazard: Naturally-Occurring Biological Threats

Naturally-Occurring Biological Threats Goal 1: Prevent agents from entering the island.

Objectives
- Secure the island from unintentional, as well as intentional, introduction of biological agents.

Strategies:
- Implement and manage a screening program for pets, plants, and produce entering the island to protect the island's ecosystem and highly vulnerable tourism industry.

Hazard: Terrorism

Terrorism Goal 1: Reduce probability and severity of incidents through better preparation.

Objectives
- Secure the island and its vulnerable tourism industry from terrorist disruption.

Strategies:
- Increase drills and training for incident procedures.

Terrorism Goal 2: Detect explosives early.

Objectives
- Mitigate an explosive terrorist incident by identifying explosives early.

Strategies:
- Obtain scanners and sniffers, and implement a program. (Note that sniffers are already in use on cruise ships.)

Terrorism Goal 3: Improve surveillance at critical facilities.

Objectives
- Mitigate incidents by detecting suspect activity early.

Strategies:
- Use video monitoring at vulnerable critical facilities.

6. Avalon Action Plan

Mitigation Action Plan Requirements Cross-Reference Table

Element	Requirement	Avalon LHMP Response
Implementation of Mitigation Actions - A	Mitigation Strategy Includes How Actions are Prioritized	Page 83
Implementation of Mitigation Actions - B	Mitigation Strategy Addresses How Actions will be Implemented and Administered	Page 84
Implementation of Mitigation Actions - C	Prioritization Process Includes an Emphasis on the Use of a Cost-Benefit Review	Page 83

The process used to prioritize mitigation strategies involved lengthy discussions with various City stakeholders, followed by citizen and community review. The end result is a hazard mitigation action plan with a prioritized list of strategies that Avalon expects to carryout during the next five years.

Prioritizing Strategies

The process used by the City first prioritized goals and their respective objectives based on priority maps created during the risk assessments. Available resources and public input were also considered. The City next assessed each strategy listed under the prioritized list of goals. In assessing and evaluating each strategy, Avalon considered the following factors:

1. The cost was justified
2. Financial resources were available; local or outside resources
3. Staff resources were adequate
4. Minimal impact on City department functions
5. Strategies mitigate risks for the riskiest hazard events
6. Strategies reflect the goals and objectives

Avalon then prepared a draft action plan that listed goals followed by a prioritized list of strategies which included the principal contact and cooperating parties, the cost, and the time involved in carrying out the strategy. This step involved lengthy discussions with City departments and staff.

Implementation

Each year the action plan will be revisited and the first year will be dropped as those activities are completed and another year will be added so that the action plan always reflects a five-year time frame and remains current. Strategies undertaken and completed will be evaluated as to their effectiveness. Those activities not completed during the first year will be re-evaluated and included in the first year of the new action plan if still appropriate.

Even though individual strategies have been assigned a principal contact to ensure implementation, overall responsibility, oversight, and general monitoring of the action plan has been assigned to the Avalon Fire Chief. The Fire Chief will provide periodic updates to the City Council.

The Fire Chief will work with the principal contact agency of each action to develop a cost/benefit analysis and detailed implementation timeline for each specific action prior to initiating work on the action.

This action plan serves as a guide to spending priorities but will be adjusted annually to reflect current needs and financial resources. Some strategies will require outside funding to implement. If outside funding is not available, then the strategy will be set aside until new sources of funding can be identified.

Action Plan

Hazard	Goal / Strategy	Action	Priority	Responsible Party
Wildfire	Reduce the risks of wildfire	Complete the Fire and Fuel Management Plan	High	Catalina Island Conservancy
Earthquakes, Fires, and Terrorism	Mitigate severity of incident	Implement an adequate emergency communications system that would not depend on the current infrastructure and its single-point-of-failure vulnerability	High	Fire Department, L.A. County Sheriff's Dept., and other key agencies
Naturally-Occurring Biological Threats	Minimize risk of introduction of agents to island	Implement and manage a screening program for pets, plants, and agriculture	High	TBD
Terrorism	Detect explosives early	Implement GE Ion Track Vapor Tracer and GE Ion Track Entry Scan Explosives Detector for entry to island	High	L.A. County Sheriff's Dept. and other key agencies

Communications continues to be an area of primary concern for emergency operations personnel in the City of Avalon who are working to mitigate the severity of hazardous incidents. As noted several times in this LHMP, the single-point-of-failure in the island's

communications systems and the isolation of the island from the mainland are critical concerns.

The Los Angeles County Sheriff's Department Avalon Station has drafted some very specific communications equipment needs, much of which could be shared with the Avalon Harbor Patrol and the Avalon Fire Department. While this equipment would not mitigate the occurrence of a natural hazard (although it may mitigate the occurrence of an act of terrorism), it would be instrumental in mitigating the severity of various types of incidents, particularly given the island's isolation from the mainland.

Specifics recommended by the Sheriff's Department include:

- Tac-Pac "Emergency Operations Center (EOC) in a briefcase" (5 sets) (or similar communications/information/computer-communications system combination)
    - A command post in a box gives users a total communications and disaster management system in one field portable case. This system provides: a rugged lap top computer with 3-D GIS imaging software and HAZMAT Operations Software, color printer/copier, Fax machine, cellular phones for voice and computer communication using wireless capabilities, Global Positioning System, built in light, Satellite telephone can be used for primary or back up voice and computer communications, virtual WAN hub, Wireless LAN connection, solar power back up power supply. These systems can tie together all command post, critical facilities and sub-EOC locations in a field environment without having to rely on a static power supply along with providing main communications in an emergency where a total failure of primary communications and utilities have occurred.
- Nida NC-11 Radio Console containing 3 Orion 1700 radios (2)
    - These radio console would be used for communication with Avalon Harbor Patrol, Avalon Fire Department and Sheriff's Department units. Each console with its power supply is portable and can be moved from a static location to a location with portable antennas. One would be used in the Sheriff's Station sub-EOC and one would be kept with the Mobile Command Vehicle. The Sheriff's station has no communication system currently that ties together all the Avalon Emergency Services.

In addition, the Sheriff's Department has offered proposals for trace explosives detectors, given the particular vulnerabilities that Avalon has as a center of tourism:

- GE Ion Track Vapor Tracer
    - The Track Vapor Tracer can scan bodies and luggage for traces of explosives by analyzing the air around the person or luggage and detecting the particles associated with explosives. This piece of equipment can be deployed as a terrorism deterrent at any time, during MARSEC 3 or during an actual terrorism incident. It also can be used for dual law enforcement purposes in narcotics detection as well as explosives.

- GE Ion Track Entry Scan Explosives Detector
    - This is a walk through entry portal that offers maximum security with minimum disruption. Fully automated visible and audible instructions direct passengers when to enter and leave. Self diagnostics for maintenance ensure performance stays at its peak. Easy to set up and quiet during operation, since the natural flow of air generated by the body draws in particles and vapors, eliminating the need for fans that stir up dust and contaminants. This unit can be used for random passenger checks as a terrorism deterrent or for screening passengers during a local MARSEC level change. This unit can be used in narcotics detection as well.
        - Both of these pieces of equipment can be invaluable to a remote location as Avalon when used in terrorism deterrent operations prior to a raise in the MARSEC level.

How the Mitigation Actions Identified Address Existing and New Buildings and Infrastructure

The matrices on the following pages cross references the mitigation actions enumerated above to the specific hazards, buildings, and infrastructure that are addressed by the actions.

How the Mitigation Actions Identified Address Existing and New Buildings and Infrastructure (page 1 of 2)

	Existing Infrastructure							New Infrastructure		
	Desalinization Plant	Electrical Plant	Dams and Water Management	Communication Facilities	Critical Roads	Avalon Harbor	City Structures	Costal Hamilton Cove Development	Desconso Beach Resort	Bird Park Housing
Wildfire Goal 1: Reduce risks of wildfires ***Wildfire Mitigation Action Plan*** *Complete the Fire and Fuel Management Plan*	X	X	X	X	X		X	X	X	X
Wildfire Goal 2: Reduce risks of structural fires due to wildfires. ***Wildfire Mitigation Action Plan*** *Complete the Fire and Fuel Management Plan*	X	X		X			X	X	X	X
Flooding Goal 1: Reduce risks of flooding . ***Flooding Mitigation Action Plan*** *To Be Developed*	X	X	X	X	X		X	X	X	X
Earthquakes Goal 1: Improve emergency communications. ***Earthquake Mitigation Action Plan:*** *Implement an adequate emergency communications system that would not depend on the current infrastructure and its single-point-of-failure vulnerability.*	X	X	X	X	X	X	X	X	X	X
Earthquakes Goal 2: Provide improved evacuation routes. ***Earthquake Mitigation Action Plan:*** *mplement an adequate emergency communications system that would not depend on the current infrastructure and its single-point-of-failure vulnerability.*	X	X	X	X	X	X	X	X	X	X
Earthquakes Goal 3: Provide more survivable structures. ***Earthquake Mitigation Action Plan:*** *Implement an adequate emergency communications system that would not depend on the current infrastructure and its single-point-of-failure vulnerability.*	X	X	X	X			X	X	X	X

How the Mitigation Actions Identified Address Existing and New Buildings and Infrastructure (page 2 of 2)

	Existing Infrastructure							New Infrastructure		
	Desalinization Plant	Electrical Plant	Dams and Water Management	Communication Facilities	Critical Roads	Avalon Harbor	City Structures	Costal Hamilton Cove Development	Desconso Beach Resort	Bird Park Housing
Coastal Erosion / Landslide Goal 1: Protect roadways to critical infrastructure. ***Costal Erosion / Landslide Mitigation Action Plan:*** *To Be Developed*	X	X	X	X	X	X	X	X	X	X
Naturally-Occurring Biological Threats Goal 1: Prevent agents from entering the island. ***Naturally Occuring Biological Threats Mitigation Action Plan:*** *Implement and manage a screening program for pets, plants, and agriculture.*	X		X			X				
Terrorism Goal 1: Reduce probability and severity of incidents through better preparation. ***Terrorism Mitigation Action Plan:*** *Implement GE Ion Track Vapor Tracer and GE Ion Track Entry Scan Explosives Detector for entry to island.*	X	X	X	X	X	X	X	X	X	X
Terrorism Goal 2: Detect explosives early. ***Terrorism Mitigation Action Plan:*** *Implement GE Ion Track Vapor Tracer and GE Ion Track Entry Scan Explosives Detector for entry to island.*	X	X	X	X	X	X	X	X	X	X
Terrorism Goal 3: Improve surveillance at critical facilities. ***Terrorism Mitigation Action Plan:*** *Implement GE Ion Track Vapor Tracer and GE Ion Track Entry Scan Explosives Detector for entry to island.*	X	X	X	X	X	X	X	X	X	X

7. Plan Maintenance

Plan Maintenance Requirements Cross-Reference Table

Element	Requirement	Avalon LHMP Response
Monitoring, Evaluating, and Updating the Plan – A	Description of the Method and Schedule for Monitoring Plan	Pages 91 – 92
Monitoring, Evaluating, and Updating the Plan – B	Description of the Method and Schedule for Evaluating the Plan	Pages 91 – 92
Monitoring, Evaluating, and Updating the Plan – C	Description of the Method and Schedule for Updating the Plan within the Five-Year Cycle	Pages 91 – 92
Incorporation into Existing Planning Mechanisms - A	Identification of Other Local Planning Mechanisms Available for Incorporating the Requirements of the Mitigation Plan	Pages 91 – 92
Incorporation into Existing Planning Mechanisms - B	Identification of Process by Which Avalon will Incorporate the Requirements of Other Plans, When Appropriate	Pages 91 – 92
Continued Public Involvement – A	Explanation of How Continued Public Participation will Be Obtained	Pages 91 – 92

The City of Avalon has developed a method to ensure that regular review and update of its Local Hazard Mitigation Plan (LHMP) occurs. FEMA regulations require an update every five years. The City of Avalon Fire Department will poll agencies that participated in the development of the LHMP ("Planning Team") to see if they want to continue to participate and if their elements of the plan are up-to-date.

The Planning Team will review each goal and objective to determine its:

- Relevance to the evolving situation in Avalon
- Consistency with changes in State and Federal policy
- Relevance to current and expected conditions.

The Planning Team will review the risk assessment portion of the plan to determine if the information should be updated or modified. The parties responsible for the various implementation actions will report on:

- Status of their projects
- Implementation processes that worked well
- Any difficulties encountered
- How coordination efforts are proceeding
- Which strategies should be revised.

Avalon is committed to involving the public in the continual reshaping and updating of the Local Hazard Mitigation Plan. The Planning Team members are responsible for the review and update of the plan. Although they represent the public to some extent, the public will be able to directly comment on and provide feedback about the plan.

Avalon currently uses comprehensive land use planning, capital improvements planning, and building codes to guide and control development within the City. This LHMP will be provided to those responsible for the City's General Plan development mechanisms to insure that consistency is maintained. Whenever there are substantive changes to this LHMP, those involved in other relevant planning mechanisms in the City will be included the review process.

Copies of the plan will be kept on hand at City Hall and the library. The existence and location of these copies will be publicized. These copies of the plan will include the address and phone number of the City staff member responsible for tracking public comment.