SECTION 8. WINDSTORM

The Nature of the Windstorm Threat

Severe windstorms pose a significant risk to life and property by creating conditions that disrupt essential systems such as public utilities, telecommunications, and transportation routes. High winds have the potential to cause damage to local homes and businesses from falling trees and debris. In addition, windstorms increase the risk of wildfire as the moisture content decreases in brush and vegetation on hillsides, especially in urban interface areas.

Causes and Characteristics of Windstorms in the Las Virgenes-Malibu Region

Windstorm events in the Las Virgenes-Malibu Region can be caused by short term, topographically influenced, high wind gusts as well as extended duration Santa Ana wind conditions. "Santa Ana Winds" typically occur between October and February. Santa Ana winds are characterized by strong dry offshore winds originating from the Great Basin and Upper Mojave Desert. Wind temperatures can range from extremely hot to cold. Damage can occur directly from the high wind speeds generated or from the secondary effects of very low humidity, which increases the threat of wildfires, particularly in the fire-prone chaparral country.

Windstorm Hazard Identification

Given the location and topography of the area, severe windstorms are a possibility. While the historic occurrence of these events on the Las Virgenes-Malibu Region has been minimal (when they occur) these events do pose a threat to life, property, utility delivery systems, infrastructure, and transportation. Furthermore, if a severe windstorm results in a prolonged utility disruption, it may be necessary to utilize private and public resources to aid in the care and sheltering of displaced residents. In addition, the economic impact of providing shelter, conducting repairs, and the disruption to local businesses can result in economic losses to the entire area. Finally, a severe windstorm can cause the loss of historic trees in the area and require the services of certified arborists.

The risk of trees falling is one of the more significant hazards resulting from high wind events. The leafy canopy and structural elements of a tree crown present a drag type barrier to winds. Trees naturally minimize wind drag through the re-orientation of leaves and through the independent motion of limbs and branches, thus reducing the transfer of uniform sway motion forces to the trunk. The Beaufort Wind Scale (BWS) specifically notes problems with trees as wind speeds increase. The BWS references the likelihood of whole tree motion as wind speeds exceed 32 miles per hour (MPH), twig breakage at 39 MPH and whole tree wind-throw as wind speeds exceed 55 MPH. The susceptibility of trees to wind-throw can be influenced by the general structural condition of the trees, the location of the trees in reference to wind patterns and the level and frequency of pruning maintenance.

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The following chart depicts the Beaufort scale which is used to estimate wind strengths.

Beaufort Force	Speed (MPH)	Wind Description - State of Sea - Effects on Land
0	Less 1	Calm - Mirror-like - Smoke rises vertically
1	1-3	Light - Air Ripples look like scales; No crests of foam - Smoke drift shows direction of wind, but wind vanes do not
2	4-7	Light Breeze - Small but pronounced wavelets; Crests do not break - Wind vanes move; Leaves rustle; You can feel wind on the face
3	8-12	Gentle Breeze - Large Wavelets; Crests break; Glassy foam; A few whitecaps - Leaves and small twigs move constantly; Small, light flags are extended
4	13-18	Moderate Breeze - Longer waves; Whitecaps - Wind lifts dust and loose paper; Small branches move
5	19-24	Fresh Breeze - Moderate, long waves; Many whitecaps; Some spray - Small trees with leaves begin to move
6	25-31	Strong Breeze - Some large waves; Crests of white foam; Spray - Large branches move; Telegraph wires whistle; Hard to hold umbrellas
7	32-38	Near Gale - White foam from breaking waves blows in streaks with the wind - Whole trees move; Resistance felt walking into wind
8	39-46	Gale - Waves high and moderately long; Crests break into spin drift, blowing foam in well-marked streaks - Twigs and small branches break off trees; Difficult to walk
9	47-54	Strong Gale - High waves with wave crests that tumble; Dense streaks of foam in wind; Poor visibility from spray - Slight structural damage
10	55-63	Storm - Very high waves with long, curling crests; Sea surface appears white from blowing foam; Heavy tumbling of sea; Poor visibility - Trees broken or uprooted; Considerable structural damage
11	64-73	Violent Storm - Waves high enough to hide small and medium sized ships; Sea covered with patches of white foam; Edges of wave crests blown into froth; Poor visibility - Seldom experienced inland; Considerable structural damage
12	>74	Hurricane - Sea white with spray. Foam and spray render visibility almost non-existent – Widespread damage. Very rarely experienced on land.

Table 118: Beaufort Scale

Estimated Impact of an Event

If a severe windstorm were to occur, the consequences to local populations and housing could be significant. The table below provides the estimated impact of a disaster using a 1% loss baseline.

Category	Agoura Hills	Calabasas	Hidden Hills	Malibu	Westlake Village	Impact if a 1% Loss Occurs
Population	20,330	23,058	1,856	12,645	8,270	660
Total Housing Units	7,681	8,686	606	6,252	3,322	265
Median Home Value	$740,200	$962,700	More than $1,000,000	More than $1,000,000	More than $1,000,000	More than $265M

Table 119: Estimated Population and Economic Loss of a Windstorm

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Based on a 1% loss projection, more than 660 people could be significantly impacted and more than 265 homes damaged resulting in over $265 million in losses (see Community Profile section for population, housing, and economic data).

Windstorm Vulnerabilities

Windstorms can result in damage to structures, disrupt utilities, and require emergency tree services (i.e. limb failures, clearance of private property trees fallen into roadways, etc.). In regards to wind related damage to structures; the Las Virgenes-Malibu Region has not experienced significant damage due to windstorms during the last decade. Nevertheless, the impact of a severe windstorm can be significant and mitigation planning can reduce losses if an event were to occur. Specific windstorm related issues are outlined below.

Life and Property

Detached tree limbs and building elements present a hazard to life and property as well as infrastructure. Furthermore, utility providers and emergency services can be overwhelmed during a major event. At risk populations include assisted care facilities and home-bound residents that are dependent on electrical power (see Utilities and Infrastructure section below). For example, in December 2011, the City of Pasadena, California experienced a severe windstorm with reported gusts near 100 MPH. The resulting power outages and debris impacted residents for weeks.

Utilities and Infrastructure

Windstorms can cause structural damage to buildings and other critical infrastructure. Overhead electrical and telephone lines are particularly vulnerable to damage from wind and debris as are microwave and satellite facilities. High winds commonly occur during winter storms and can cause trees to bend, sag, or fail (tree limbs or entire trees) which then come into contact with nearby power lines. Fallen trees can cause short-circuiting and conductor overloading. Wind-induced damage to the power system causes power outages to customers, incurs cost to make repairs, and in some cases can lead to ignitions that start wild land fires. In order to prepare for such events, Southern California Edison (SCE) has developed its own Hazard Mitigation Plan.

Transportation

Windblown debris, tree limbs and wind thrown trees can damage traffic control apparatus, block roadways, damage vehicles, and cause extreme traffic congestion - impeding emergency and vehicles and hampering repair efforts.

Increased Fire Threat

The Las Virgenes-Malibu Region is subject to Santa Ana Winds with regards to their impact on fire conditions. Winds can serve as a catalyst in the canyons to spread fire at a rapid rate. Prolonged winds during the warmer months of the year can decrease vegetation moisture levels and increase the ignition potential in dry underbrush. When urban/wildland interface fires occur, Santa Ana Wind conditions can drive flames and increase the spread speed and severity of the fire. This is a significant concern near homes, especially where brush clearance has been lax.

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Windstorm Mitigation Strategies

Interagency Efforts

In the case of buildings and structures, the likelihood of structural element detachment is influenced by local building code requirements, the location of buildings in reference to wind patterns and in the level of maintenance and upkeep. In addition, one of the strongest and most widespread existing mitigation strategies pertains to tree clearance.

Currently, California State Law and LA County Fire Code requires utility companies to maintain specific clearances (depending on the type of voltage running through the line) between electric power lines and all vegetation (Fire Code section 325.1 Electrical Transmission Lines). Furthermore, homeowners are required to allow a utility company to comply with the law.

Failure to provide access to utility power lines can result in liability to the homeowner for damages or injuries resulting from a vegetation hazard. Many insurance companies do not cover these types of damages if the policy owner has refused to allow the hazard to be eliminated.

Continuous upgrades to engineering design criteria based on the latest industrial progress, geotechnical findings, and Code revisions are being conducted. For instance, Dynamic Shake Table Tests were recently made mandatory for certain equipment in addition to analytical design.

LVMCOG Mitigation Activities

Agoura Hills

In order to mitigate the impact of windstorms, the City of Agoura Hills tracks 8,000 trees that it maintains according to standards regarding public safety. Codes on tree pruning were recently reviewed and updated and new codes regarding tree maintenance were implemented.

In 2011 Agoura Hills signed a professional tree maintenance contract with West Coast Arborists Inc. to maintain all City owned trees. Since there is a great deal of individual attention required for adequate tree maintenance to ensure an increase in the health of city trees and enhance public safety this separate contract ensures that detailed maintenance logs and inventories are kept resulting in improved care, which can help reduce the City's liability. Under this new contract, every City owned tree is assessed every three years. Additionally, the City offers free hazardous oak tree pruning and removal permits and reduced fees for preventive oak tree pruning permits for potentially hazardous oak trees.

Calabasas

The Environmental Commission of the City of Calabasas among other duties is responsible for maintaining the Urban Forestry Master Plan and making recommendations to carry out the policies and goals of that plan. The Urban Forestry Master Plan includes the monitoring and maintenance of the city's tree population.

Additionally, the City has a program that grants free Healthy Oak Tree permits. The intent of this program is to encourage proper maintenance of privately owned oak trees in order to reduce safety hazards.

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Hidden Hills

The City of Hidden Hills has had no incidents of loss of property or life due to windstorm activity therefore it does not take any steps in regards to current mitigation activities.

Malibu

The City of Malibu has begun a citywide tree pruning program. In addition, the City is using aerial photographs to update their GIS and map every tree on public property.

Westlake Village

The City of Westlake Village has completed a census and assessment of all trees on public property. Hazardous trees were removed. The City is in the process of mapping all of its trees using a GIS program.

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