CHAPTER 9 - SAFETY ELEMENT

The Safety Element is a required General Plan Element that is to provide information "for the protection of the community from unreasonable risks associated with the effects of seismically induced surface rupture, ground shaking, ground failure, and dam failure; slope instability leading to landslides, subsidence and other geological hazards; flooding; wildland and urban fire; and hazardous material accidents" (Gov. Code, Sec. 65302 [g]).

9.1 GEOLOGIC AND SEISMIC HAZARDS

In the Vacaville planning area, as in most of the Bay Area, liquefaction potential and landsliding due to seismic activity are significant constraints to development. USGS geologic mapping and maps should be consulted for specific locations of fault activity and ground instability.

Nearly all earthquake damage is due to ground shaking and the secondary effects of ground shaking, including ground failure and fire damage. Figure 9-1 shows relative susceptibility to landsliding as determined by overlaying geologic units and slope, while Figure 9-2 designates areas susceptible to liquefaction. Only the flat floors of the valleys are generally stable. Much of the land which is marginally to generally unstable is designated as Open Space.

Guiding Policies

9.1-G 1 Investigate and mitigate geologic and seismic hazards or locate development away from such hazards in order to preserve life and protect property.

9.1-G 2 Require financial protection for public agencies and individuals as a condition of development approval where geologic conditions indicate a potential for high maintenance costs.

9.1-G 3 Give primary consideration to geologic conditions in the selection of land use and in the design of development in Vacaville. Retain high-risk areas in low-occupancy or open forms of use where potential risks are unmitigable.

Implementing Policies

9.1-I 1 Evaluate proposed extension of urban or suburban land uses into areas characterized by slopes from 15 to 25 percent and/or generally unstable land with regard to the geologic and soil hazards prior to a land-use decision, including General Plan amendments, rezoning, or project approvals.

9.1-I 2 Analyze proposed development sites at the earliest stage of the detailed planning process to determine geologic suitability. The analysis should include the structural engineering for the actual site and possible impacts of the project on adjacent lands.

If a project is allowed to proceed through the approval process before conditions are fully known, adequate mitigation may be more difficult to achieve. Information available for preparation of the General Plan map is not sufficiently detailed to allow a presumption of geologic suitability in all hillside areas designated for residential or other urban uses.

9.1-I 3 Require geotechnical studies prior to approval of rezoning, specific plans, or subdivision maps in areas of low damage susceptibility designated 2 through 4 and areas of high damage susceptibility as shown on the Relative Susceptibility to Landsliding Map (Figure 9-1) within a quarter-mile of a known fault. Require comprehensive geologic and engineering studies of critical structures regardless of location.

Critical structures are those most needed following a disaster. They include utility centers and substations, hospitals, fire stations, police and emergency communications facilities, and bridges and overpasses. Flood-hazard potential makes any dam a critical structure.

9.1-I 4 To the extent practicable, do not allow critical facilities, structures involving high occupancies, and public facilities to be sited in areas of high damage susceptibility. Where such location is deemed essential to the public welfare, these structures will be sited, designed and constructed with due consideration of the potential for earthquake damage due to ground shaking, associated ground deformation, seismically triggered flooding, liquefaction and landslide.

9.1-I 5 Ridges and slopes at or exceeding 25 percent, shall remain undeveloped in order to maintain agricultural grazing areas, protect the public health and safety and to provide for community separation or open space.

9.1-I 6 Appoint a registered engineering geologist to be available at the discretion of the City Engineer to review reports submitted by applicants.

9.1-I 7 Do not locate structures intended for human occupancy over an active fault or potentially active trace. To the extent practical, do not locate such structures over

the trace of an inactive fault. Allow roads to be built over active faults only where alternatives are impractical.

9.1-I 8 Establish setbacks from active and potentially active fault traces for structures intended for human occupancy.

Setback areas (ordinarily 100 feet, 50 feet for a single-story wood frame building) should be occupied by uses that could experience displacement without endangering large numbers of people. Examples are landscaped areas, parking lots, and noncritical storage.

9.1-I 9 Require preparation of a soils report prior to issuing a building permit, except where the Building Official determines that a report is not needed.

The report would not be necessary for minor additions to buildings or where soils' characteristics are well known.

9.1-I 10 Limit cut slopes to 2:1 (50 percent slope) except where an engineering geologist can establish that a steeper slope would perform satisfactorily over the long term. Where practicable, require more gentle slopes than the 2:1 standard. Encourage use of retaining walls, rock-filled crib walls, or stepped-in buildings as alternatives to high cut slopes.

Flatter slopes also are more adaptable to revegetation and are less likely to have an engineered look.

9.1-I 11 Require contour rounding and revegetation to preserve natural qualities of sloping terrains and mitigate the artificial appearance of engineered slopes, and control erosion.

Plant materials should not be limited to hydroseeding and mulching with annual grasses. Trees add structure to the soil and take up moisture while adding color and diversity.

9.1-I 12 Consider forming geological hazard abatement districts or other methods to abate geologic hazards prior to development approval, where appropriate, to ensure that geotechnical mitigation measures are maintained over the long term, and that financial risks are equitably shared among owners and not borne by the City of Vacaville.

Without such risk-sharing, an individual homeowner could suffer disastrous loss, and a landslide could cause damage to a street exceeding the City's annual street maintenance budget.

9.1-I 13 Evaluate the feasibility of implementing a hazard reduction program for existing development in high-risk zones. This would include inspection of structures for

conformance with the Building Code giving priority for inspection to emergency and critical facilities, older structures and public facilities.

9.2 FLOODING AND STORM DRAINAGE

The Planning Area includes two major drainage areas formed by Alamo, and Ulatis creeks. Primary tributaries for these creeks are Laguna and Encinosa creeks which flow into Alamo Creek, and Horse and Gibson Canyon creeks which flow into Ulatis Creek. The existing drainage system is largely composed of open channels fed by a combination of street runoff and underground storm drains. Inundation of areas due to tsunami or seiche was determined to not be an issue in the planning area.

The creeks flow in a general east-southeasterly direction and ultimately drain to the Sacramento River via Cache Slough.

These creeks are generally in their natural state and alignment through the City. The channels are generally unlined and vary considerably in width and depth. There is one existing reservoir, Lagoon Valley Lake, which is tributary to Laguna Creek, draining a portion of Lower Lagoon Valley. Under existing conditions, considerable amounts of overbank flow occur along Laguna Creek during major storms in areas where channel or bridge capacities are exceeded. The overbank flows generally occur as shallow ponding, which can be accommodated under existing undeveloped conditions.

In the eastern portion and downstream of the City, the creeks were improved by the U.S. Soil Conservation Service in the 1960s to provide a 10-year level of protection for the agricultural areas east of the City. The improved channels of Alamo and Ulatis Creeks downstream of the City are already at maximum capacity and do not have any available capacity to handle increased runoff from new development.

Development of the General Plan will increase peak flows in the creeks due to greater site runoff and elimination of existing ponding areas. The higher peak flows will impact not only the creeks within the City but also the downstream improved channels.

The most recent mapping of areas subject to flooding, shown in Figure 9-3, was commissioned by the Federal Emergency Management Agency (FEMA) as part of the revision of the Flood Insurance Rate Maps (FIRM). This shows the boundaries of the 100-year flood plain, including the floodway into which no encroachment should be permitted and the flood fringe where some development may be allowed. These maps were used to delineate areas that must be maintained as open space for purposes of flood control. FEMA most recently updated these maps, in 1997.

The City is responsible for responding to drainage maintenance in incorporated areas. The Solano County Water Agency (formerly the Solano County Flood Control and Water Conservation District) is responsible for flood control maintenance of the improved channels.

The major proposed drainage improvements for the General Plan consist of a series of regional drainage detention basins throughout the City which will accommodate increased flows from planned new development. These basins are funded by drainage fees on all development. In addition, upstream detention basins on Ulatis and Alamo creeks located in the Vaca Mountains east of the City are proposed to reduce flooding in existing developed areas. These improvements are consistent with the recommendations for alternative plans for future conditions discussed in the Ulatis Creek Watershed Study (February 1990). The proposed detention basins are shown on Figure 9-3.

The proposed drainage improvements focus on Alamo Creek, with its tributaries Encinosa and Laguna creeks, and Ulatis Creek. These creeks experience flooding problems under existing conditions, and would experience greater problems under the General Plan unless the proposed improvements are implemented. The other major creeks within the City planning area, Horse Creek and Gibson Canyon Creek, with existing and planned detention, are not anticipated to experience problems with buildout of the General Plan.

The upstream basins would reduce the 10-year peak flows upstream and downstream of existing development. The proposed locations of the upstream basins, as shown on Figure 9-3, could be modified if necessary so long as the same hydraulic effect (peak flow attenuation) could be achieved downstream. The upstream reservoirs would minimize channel and structure improvements through Vacaville. In addition, it would be possible to consider designing the upstream reservoirs to also attenuate the peak flows of less frequent storm events, such as the 100-year storm, in order to provide a higher level of protection for the City.

If all the upstream basins in the Vaca Mountains are not built at the same time, staged implementation (of one or several locations) would provide incremental benefits until all reservoirs could be constructed. However, all the upstream basins are needed to mitigate fully existing problems.

The upstream reservoirs would provide at least a 10-year level of protection. However, new development in Vacaville must provide a 100-year level of protection to meet certain criteria such as: ensuring that finished floor elevations of structures are above the 100-year water surface elevation; and ensuring that new development does not worsen downstream conditions for the 100-year peak flows. New development also is responsible for all necessary in-tract drainage improvements.

Guiding Policies

9.2-G 1 Locate development outside mapped flood-prone areas unless mitigation of flood risk is assured.

9.2-G 2 Continue to develop a comprehensive system of drainage improvements to minimize flood hazard.

9.2-G 3 The additional runoff caused by development shall be mitigated.

Implementing Policies

9.2-I 1 Develop a financing plan and construct upstream detention flood basins.

9.2-I 2 Evaluate storm-drainage needs for each project in the context of demand and capacity when the drainage area is fully developed. Continue to require Development Impact Fees for new development to construct planned regional drainage detention basins to accommodate increased flow. In the Alamo Creek watershed upstream of Peabody Road, which includes Alamo, Laguna and Encinosa creeks, require post-development 10-year and 100-year peak flows to be reduced to 90 percent of predevelopment levels. For the remainder of the study area, for development involving new connections to the creeks, peak flows shall not exceed predevelopment levels for a 10- and 100-year peak flow.

This is required to reduce downstream flood hazard.

9.2-I 3 Continue to cooperate with the Solano County Water Agency on developing a comprehensive stormwater management program to accommodate additional development outside the existing urban area.

9.2-I 4 Assure through a Master Drainage Plan and development ordinances that proposed new development adequately provides for development of on-site and downstream off-site mitigation of potential flood hazards and drainage problems and require development fees to fund the required improvements.

9.2-I 5 Encourage the formation of flood control assessment districts or consider fees for those areas in which flooding and drainage problems exist, to mitigate flooding through physical improvements.

9.3 WILDLAND AND URBAN FIRES

Fire hazard could be increased by General Plan proposals that increase the number of homes adjoining open space. The hills surrounding Vacaville are covered with trees and brush which, as is normal for the Bay Area and much of California, are brown and dry much of the year. This creates an extreme fire hazard for development on steep slopes and high hazard in adjacent areas, according to the wildland fire rating system of the California Division of Forestry. (See Figure 9-4)

The fire hazard severity rating system used in Figure 9-4 is based on two sources. The first is based on a method specified by the State of California Resources Agency, Department of Conservation, Division of Forestry, in a well-known 1973 publication, *A Fire Hazard Severity Classification System for California's Wildlands*. This system determines the rating by considering three factors locally: slope, ground cover, and weather conditions, and is commonly used within Local Responsibility Areas. The second is the State of California, Department of Forestry and Fire Protection's classifications, as illustrated on the Department's Fire Hazard Severity Zone map; the most recent available version of Vacaville and vicinity is 1985. The map identifies State Responsibility areas. The method is based on a version of the rating system mentioned above, with the addition of factors such as history of fires in the area.

Guiding Policies

9.3-G 1 Reduce the risk of wildfires by implementing policies restricting development in Extreme and High Hazard areas.

9.3-G 2 Ensure adequate funding is available to provide fire protection services, equipment, and maintenance as new development takes place.

Implementing Policies

9.3-I 1 Establish Mello-Roos Community Facilities districts or other funding mechanisms to provide standby fire protection services, if necessary, because adequate funding will not otherwise be assured.

9.3-I 2 Implement Agricultural Hillside development standards in the zoning ordinance, as appropriate, to reduce the risk of structure fire in extreme or high fire danger areas.

The Department of Forestry recommends enforcement of strict building codes, implementation of fire safe practices, proper road construction, and adequate water systems.

9.3-I 3 Coordinate fire protection services with the other agencies to ensure minimum coverage for all areas within Vacaville's Planning Area.

9.3-I 4 Provide adequate access to and fire breaks adjoining open space areas subject to fire hazard as part of new developments.

9.4 HAZARDOUS MATERIALS

Solano County has taken the lead in preparing and adopting a hazardous waste management plan for all wastes projected to be generated in the County.

State law requires all businesses to prepare an inventory of hazardous materials they use and store. The County's Department of Environmental Management will receive this information and distribute it to local fire protection agencies.

Guiding Policies

9.4-G 1 Work with Solano County and other public agencies to inform consumers about household use and disposal of hazardous materials.

9.4-G 2 Cooperate with Solano County on implementation of the Hazardous Waste Management Plan and review proposals for hazardous waste facilities for consistency with that Plan.

Implementing Policies

9.4-I 1 Do not encourage industries which rely extensively on use of hazardous materials unless an acceptable use, storage and disposal program is approved by the appropriate agencies.

9.4-I 2 Ensure that development proposals involving hazardous waste facilities are consistent with the Solano County Hazardous Waste Management Plan.

9.4-I 3 Continue to implement a hazardous materials information disclosure program.

9.5 DISASTERS

The Solano County Office of Emergency Services is working on a Multiple Hazard Functional Planning Guide that will assess hazards, assign responsibilities, and prescribe evacuation routes. This could serve as a foundation for further planning.

Guiding Policies

9.5-G 1 Provide a safe environment and ensure the safety of Vacaville residents.

Implementing Policies

9.5-I 1 Adopt a comprehensive disaster response plan in coordination with adjoining communities. The plan should include procedures to follow after a major earthquake, wildland fire, or hazardous substance event.

9.5-I 2 Work with adjoining jurisdictions to coordinate and implement a disaster response plan.

Amendments and Corrections to Safety Element

November 9, 1999	Resolution 1999-143; Technical update to the General Plan: Text and policies amended to note collection of drainage fees to construct sub-regional detention basins (9.2-I 1, 9.2-I 2); adoption of hillside development policy noted, policy 9.3-I 2; Figure 9-3. Flood Hazard updated by revised FEMA mapping and showing location of sub-regional detention basins; Figure 9-4, Fire Hazard updated to remove Extreme/Very High Fire Hazard designation from land annexed by the City. (GP-1-99)
November 9, 1999	Resolution 1999-143; Technical update to the General Plan: delete summary of Implementation Actions, Policies 2.1-I 1through 10.6-I 24. (GP-1-99)

Fig. 9 - 1

Vacaville - Relative Susceptibility to Landsliding

December 2007

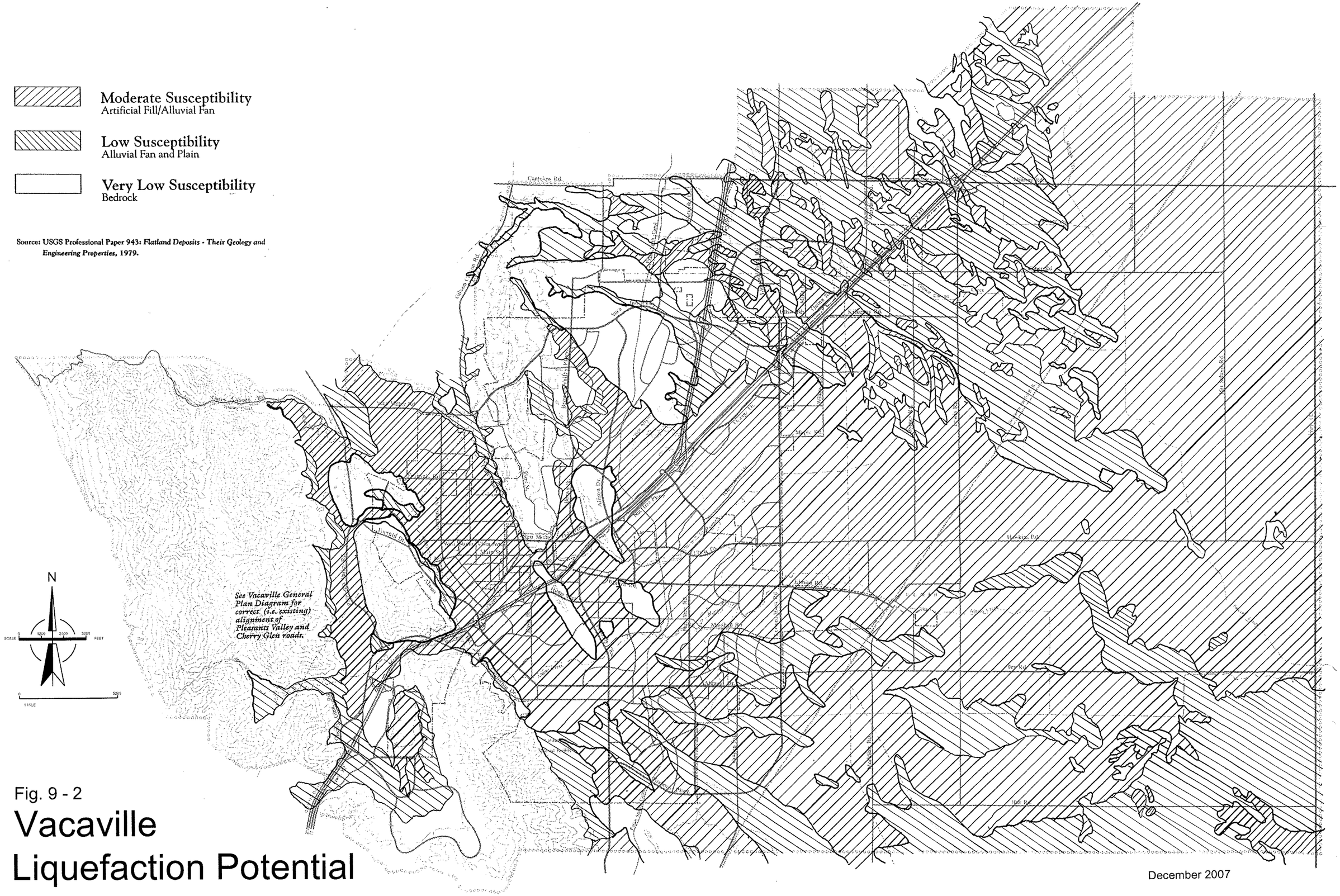

Fig. 9 - 2

Vacaville Liquefaction Potential

December 2007

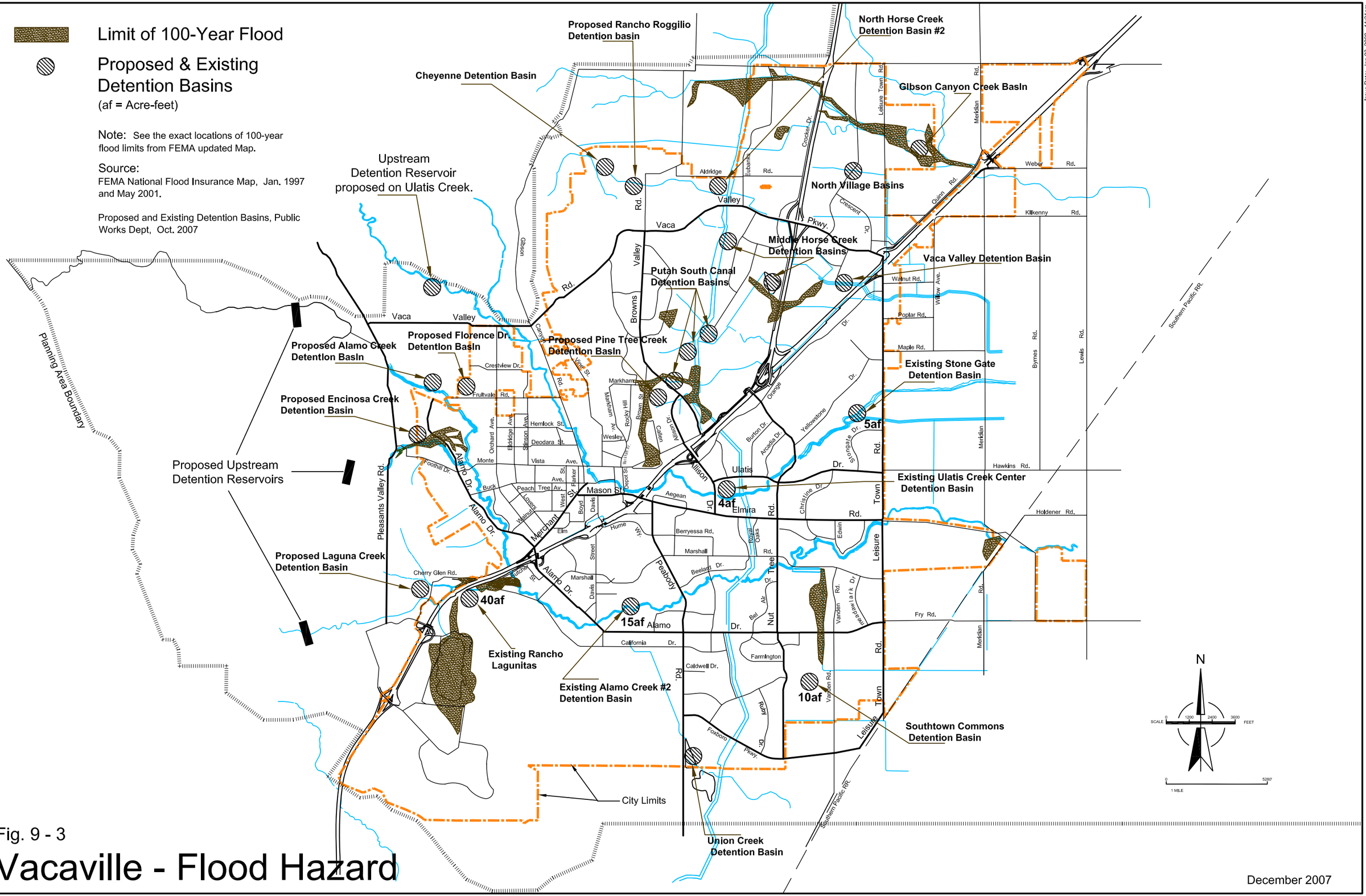

Fig. 9 - 3

Vacaville - Flood Hazard

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Extreme/Very High Hazard Area

High Hazard Area

Moderate Hazard Area

Boundary of State Responsibility Area for Fire Protection

Source: USGS Topological Maps. State and Local Responsibility Area Maps for Fire Hazard Severity, 1985. A Fire Hazard Severity Classification System for California's Wildlands - Department of Conservation, Division of Forestry, 1973.

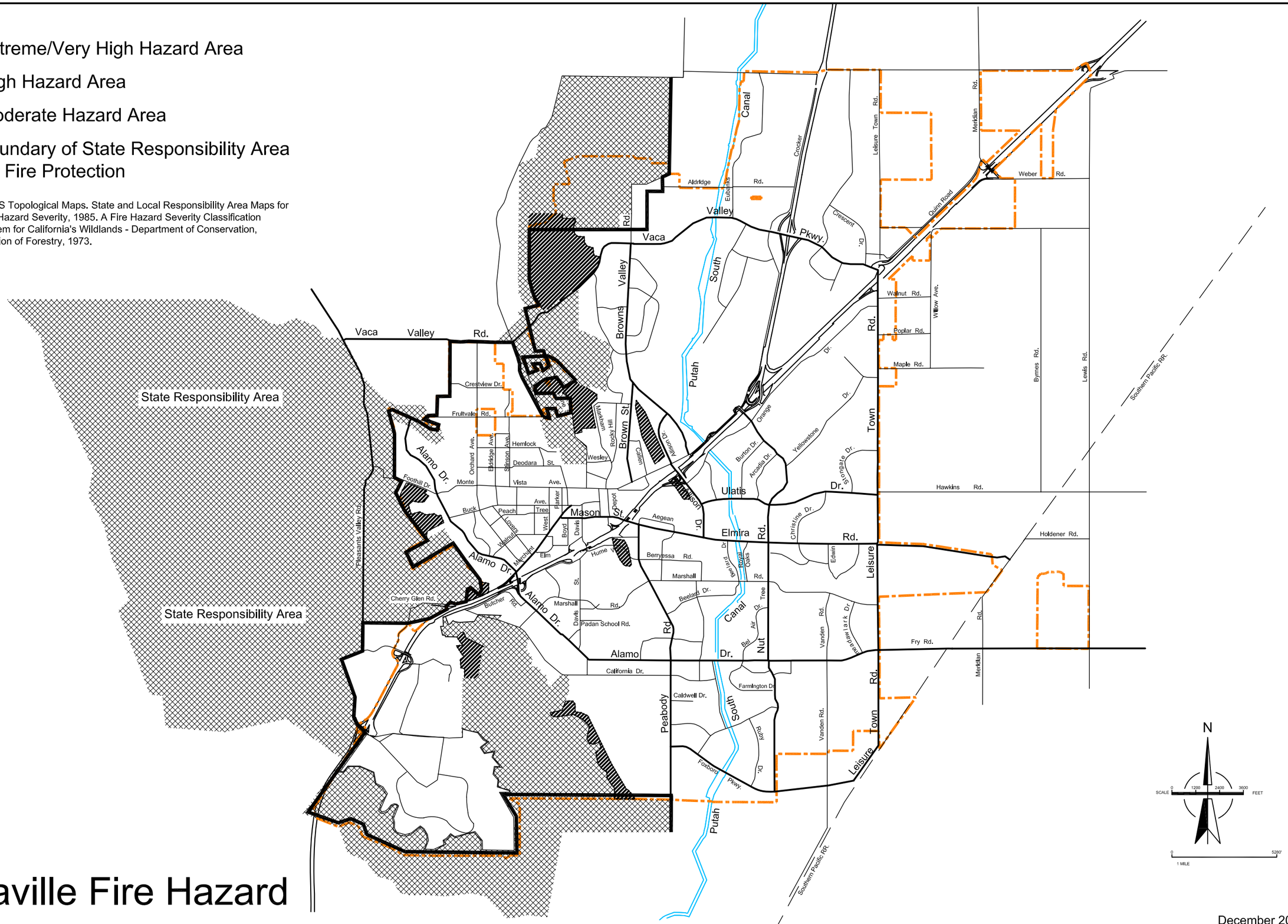

Fig. 9 - 4

Vacaville Fire Hazard

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