

Workstream 3 | Pacific Palisades Wildfires Recovery

Wildfire Resilience Planning

City of Los Angeles | February, 2026

AECOM



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Executive Summary

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The Wildfire Resilience Planning document ("WRP") for Pacific Palisades is being developed by the City of Los Angeles (the "City") and AECOM, with support from the community, Los Angeles County ("County"), and state agencies, to enhance community resilience to future wildfires. The WRP includes an analysis of baseline conditions and a vulnerability assessment followed by strategies for fuel mitigation, water supply, energy systems, road network and traffic management systems, and evacuation capabilities.

A steering committee of City department representatives informed the plan as did individual meetings with City and County departments, California State Parks, private-sector utilities, and other stakeholders; and engagement with residents of Pacific Palisades.

The Pacific Palisades WRP focus area consists of the area within the Pacific Palisades Community Council (PPCC) boundary, the larger Brentwood-Pacific Palisades Community Plan Area (CPA), and additional surrounding areas outside of the City's jurisdiction. See Figure ES.1.

Baseline Conditions and Vulnerability Assessment

Baseline Conditions

Adjusted to the PPCC area boundary, approximately 24,636 people lived in the area burned by the Palisades Fire. Prior to the wildfire, the Brentwood-Palisades CPA had a total population of 57,064. The population was predominantly white (81%), and the average household income was $374,808. The median age of the population (48 years) was higher than the national median age (38.9 years) (U.S. Census, 2023a).

Topography in Pacific Palisades is defined by coastal bluffs, steep canyons, and expansive ridgelines with views of the Pacific Ocean. Three climate and weather drivers contributed to the fire – enhanced vegetation growth from wet winters, prolonged dry conditions and climate whiplash with wet winters followed by record-low amounts of precipitation, and Santa Ana winds that intensified wildfire mobility. A dense network of narrow streets and number of homes and residents relative to the street network's capacity often cause congestion during peak commuting hours on Sunset Boulevard and the Pacific Coast Highway (PCH), major thoroughfares which connect the neighborhood to the rest of the City.

The focus area is designated as a California Department of Forestry and Fire Protection (CAL FIRE) Very High Fire Hazard Severity Zone Area, an area with dense vegetation, steep slopes, strong winds, and high potential for rapid fire spread. The focus area is also in an area designated by the City and County as a Local Responsibility Area (LRA); the City and the Los Angeles Fire Department (LAFD) are responsible for implementing fire safety regulations in LRAs. Additional City, County, and State regulations apply to the area including wildfire-specific plans, hazard mitigation plans, vegetation management and defensible space regulations, and utilities and infrastructure regulations.

24,636 people lived in the area burned by the Palisades Fire

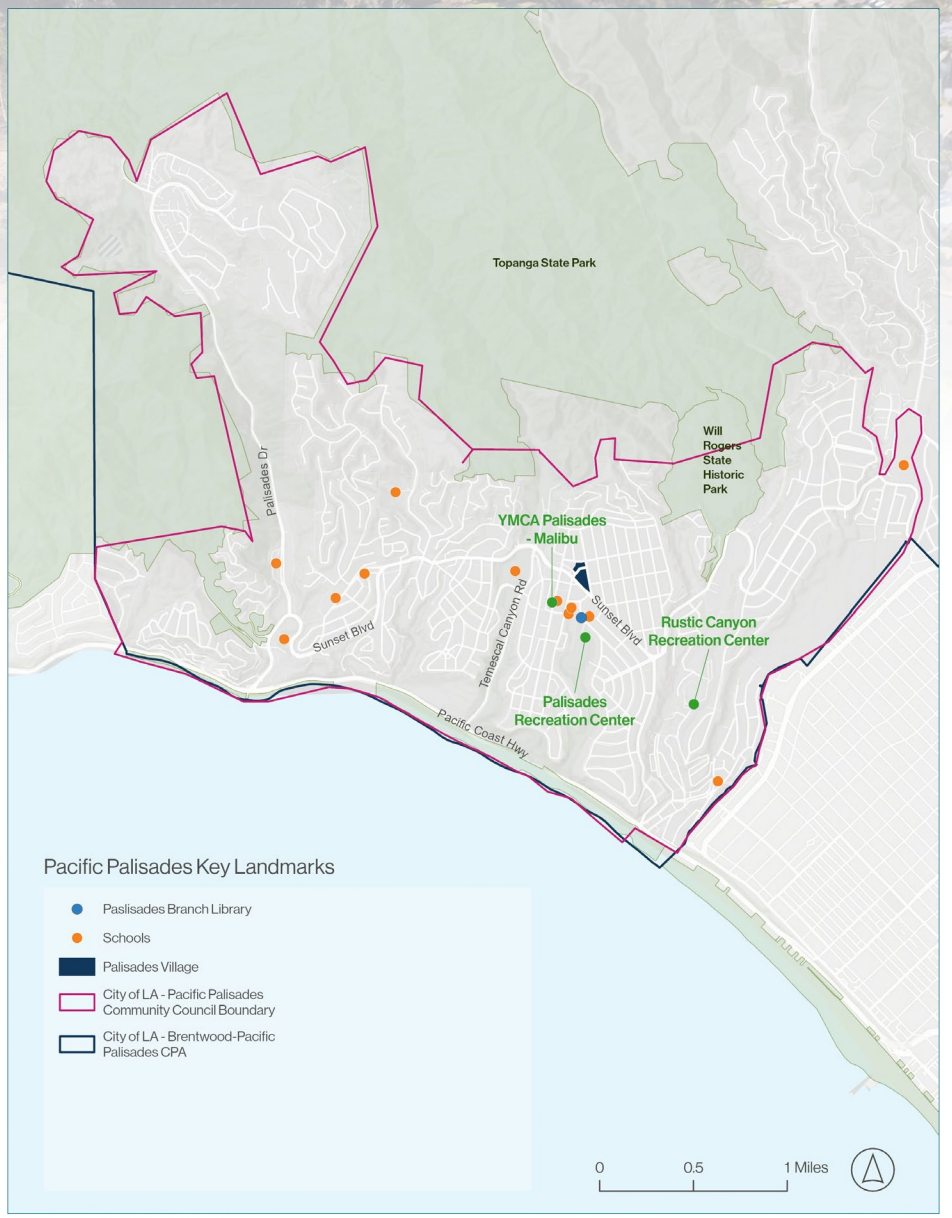
57,064 the Brentwood-Palisades CPA total population prior to fire

$374,808 average household income

81% predominantly white population

48 median age (higher than national average: 38.9)

Figure ES.1: Pacific Palisades Key Landmarks



Vulnerability Assessment

Prior to the fire, homes in the PPCC area were an average of 60 years old and pre-date fire resilient construction approaches. Newer construction integrated more fire-resistant materials, but many homes retain legacy elements such as wooden frames, decks, fences, and balconies, which were more likely to connect with flammable landscaping. The fire destroyed 6,837 structures in Pacific Palisades, Malibu, and Topanga, including 5,421 single-family homes, 135 multi-unit homes, 158 commercial buildings, and several community assets and critical infrastructure facilities (CAL FIRE Damage Inspection Data, 2025).

Populations most vulnerable to wildfire in Pacific Palisades are older individuals and households with disabilities. Advanced age and disabilities can both impair an individual's ability to evacuate, and underlying health conditions make individuals more susceptible to health risks from unhealthy air and wildfire smoke. Approximately 21% of the population impacted by the Palisades Fire was over 65 years old.

The vulnerability of the natural environment before and after the Palisades Fire was assessed using a wildland fire fuel model. Based on the pre-fire vegetation environment and Palisades Fire burn severity data, results indicate a temporary reduction in fuels, while exposure and suppression factors related to roads, Wildland-Urban Interface (WUI), infrastructure, and terrain have not changed. These results illustrate how post-fire landscapes exhibit temporarily lower modeled fire intensity and spread potential but also highlight that vulnerability is not eliminated. Without active fuel management or greenspace restoration, chaparral landscapes in this region typically re-accumulate hazardous fuels within 5 to 10 years, returning to pre-fire levels. The rapid return to pre-fire levels underscores the importance of using post-fire periods strategically to implement targeted fuel treatments, firebreak construction, and vegetation management measures to prevent re-establishment of high hazard conditions.

Wildfire Resilience Planning Approaches

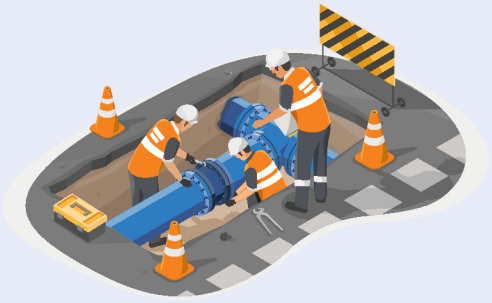
The WRP includes wildfire resilience planning approaches across four different disciplines – vegetation management, water supply, electrical energy system, and evacuation capabilities – focused on physical infrastructure strategies and operational evacuation strategies. These potential approaches could enhance future resiliency. No studies have been conducted to measure the impact that these potential approaches could have made during the January 2025 Palisades Fire or any other event. Tables ES.1 through ES.4 include a full breakdown of outlined approaches for each discipline, ranging from short-term initial actions for City consideration to longer-range infrastructural investments.

Vegetation Management



Steep terrain, canyon topography, and dense chaparral contribute to hazardous fire conditions in Pacific Palisades. Effective fuel management requires a multi-pronged strategy combining defensible space measures with new community-scale treatments, strategically placed fuel breaks, roadside clearance, and targeted programs to support defensible space for private landowners. Longer term resilience approaches include invasive species control and restoration practices that prevent species type conversion to fire-prone annual grasslands. Aligning vegetation management approaches with critical infrastructure facilities such as reservoirs, substations, and community resilience centers can support fire response and community protection efforts. Potential approaches are summarized on the following pages and described in more detail in Table ES.1.

Water Supply



The primary water supply for the Pacific Palisades is imported water from the Los Angeles Aqueduct and purchased water from the Metropolitan Water District of Southern California (MWD). Water is delivered to Pacific Palisades via a single trunk line (Westgate Trunk Line) that begins at the Stone Canyon Reservoir (LADWP, 2025a; 2025c). All water within the system is potable, there is not a separate network for drinking water and fire protection. Although the system provides water for firefighting, no municipal water systems are built to extinguish large-scale wildfires (LADWP, 2025d; and Pierce et al., 2025). Water supply approaches for firefighting in the Pacific Palisades are summarized on the following pages and described in more detail in Table ES.2.

Electrical Power System



A resilient energy system is important to mitigate future wildfires and in the event of a wildfire, back up power sources be available if needed. Key approaches have been identified referencing the Blue Ribbon Commission on Climate Action and Fire-Safe Recovery alongside best or innovative practices implemented by other electric utilities (Blue Ribbon Commission, 2025). These approaches were compared to existing planning documents such as LADWP's 2025 Wildfire Mitigation Plan (LADWP, 2025b). The ambition is to determine approaches for integration into utility practices and buildout plans to mitigate the potential for wildfire ignition and reduce the spread of wildfire in the future. Potential approaches are summarized in Table ES.3

Evacuation Capabilities



Mass evacuations, especially for short-notice events such as wildfire, present distinct and significant challenges to public safety agencies. Even under the best of circumstances, mass evacuations are difficult to conduct, have challenging time constraints, and impose significant demands on available personnel and resources. Approaches in this section are grouped into two categories. Physical infrastructure strategies that explore road networks and signaling systems and operational strategies such as public alerts and development of a framework for evacuation management. These approaches are not intended to supersede or replace the City's existing plans and procedures for mass evacuations but to inform future updates or revisions to materials and support ancillary preparedness activities. Potential approaches are summarized below and described in more detail in Table ES.4.

Vegetation Management

These vegetation management approaches are industry standard practices that may be applicable to areas within Pacific Palisades, and surrounding areas under City, County, State, or Federal jurisdiction. These approaches are identified for their potential to reduce the likelihood of wildfire ignition, the rate of wildfire spread, and the level of wildfire impact to communities, natural resources, buildings, and critical infrastructure in Pacific Palisades.

Community Defensible Space

Pacific Palisades lies at the intersection of steep topography, dense vegetation, and highly exposed residential neighborhoods within the WUI. In these areas, individual parcel-level treatments alone are insufficient to meaningfully reduce wildfire risk. Effective protection requires coordinated vegetation management and defensible space strategies that extend across property boundaries and tie directly into landscape-scale fuel break systems.

Community defensible space refers to coordinated vegetation management by adjacent landowners to create continuous zones of defensible space. These efforts are often neighborhood-driven and supported by public agencies. Approaches may include plant selection, home hardening efforts, and brush clearance. Community fuel breaks, or planned thinning of tree cover and brush removal, located strategically across the landscape can support community-wide suppression operations and are usually implemented through public agency coordination.

Fuel Modification Practices

Fuel modification practices refer to the suite of vegetation management methods designed to alter fuel characteristics to reduce fire intensity and control effectiveness. Fuel modification is a cornerstone of the fuel break concept and encompasses both temporary and permanent treatments aimed at influencing fire behavior across strategic portions of the landscape. These treatments can be applied at varying scales depending on terrain, vegetation type, and management objectives. The most common objectives include: reduction of fine-fuel continuity, elimination of ladder fuels that contribute to crown fire development, and establishment of stable, low-flammability vegetation covers on critical control features such as ridgetops and access corridors.

- **Fuel Breaks** refer to strategically located strips or blocks of modified vegetation designed to reduce fire intensity and improve suppression effectiveness
- **Contingency Firelines** refer to breaks in fuel made by cutting, scraping, or digging with a bulldozer or hand tools
- **Green (Vegetated) Buffers** refer to strategically managed low-flammability zones at the interface between residential development and adjacent wildland areas to reduce ember transmission, radiant heat exposure, and direct flame contact to structures during a wildfire event
- **Roadside Fuel Treatments** can protect evacuees and firefighters and reduce the likelihood that fires will jump across narrow canyon roads. Regular maintenance of urban and fire roads can support future wildfire resiliency.

Restoration and Maintenance

The Palisades Fire burned large portions of coastal sage scrub and chaparral, leaving bare soil and openings now susceptible to nonnative and invasive annual grasses and forbs. The loss of native vegetation has increased erosion hazards on steep slopes, weakened ecological resilience, and elevated future wildfire risk through the accumulation of flashy fuels. A habitat restoration approach can reduce wildfire risk by removing highly flammable invasive vegetation and re-establishing native species with lower fire susceptibility.

Integration with Critical Infrastructure

Fuel reduction treatments near critical infrastructure and facilities are essential to safeguarding vital systems that communities depend on during wildfire events. Treatments adjacent to reservoirs, schools, substations, community resilience centers, and other key facilities can support fire response and community protection efforts by improving access for suppression operations, preserving water supplies, maintaining power delivery to homes and emergency facilities, and mitigating cascading effects of wildfire damage on essential services.

Prioritization Considerations

Given the scale of the challenge and the limited resources available, prioritization is an important first step in the planning and implementation of fuel treatments. Prioritization criteria should consider the immediate benefits to life safety, levels of hazard risk, levels of neighborhood vulnerability, and feasibility of treatment.



Life Safety. Consider which treatments most directly impact life safety, such as fuels reduction along evacuation corridors and buffer zones around schools, fire stations, and critical water infrastructure. These sites not only protect residents during emergencies but also support firefighting operations during major fire events.



Hazard Risk. Consider which treatments reduce fire behavior potential in areas of greatest hazard, such as ridgelines and canyon rims where chaparral fuels drive high flame lengths and embers are lofted into neighborhoods. Fuel breaks in these locations can significantly alter fire spread and improve suppression effectiveness (Green, 1963; Syphard and Keeley, 2011).



Vulnerability. Consider which treatments target high vulnerability neighborhoods where housing density and direct exposure to wildland fuels create compounded risk, or where there is a concentration of seniors, schools, or persons with disabilities.



Feasibility. Consider which treatments are most feasible, addressing areas accessible to mechanical thinning, grazing, or prescribed fire first. More complex or constrained zones may require phased approaches.

Funding

Due to the costs associated with ongoing vegetation management, securing consistent funding sources is required for successful implementation. Funding sources may include CAL FIRE wildfire prevention grants, establishing joint-funded vegetation management programs (VMPs), and others. Tax-based approaches that provide a consistent funding stream can be particularly effective, such as in Contra Costa County in Northern California, where a half-cent sales tax funds extensive mitigation and educational measures.

Water Supply



Existing system enhancements include opportunities to update the existing conveyance and distribution system for upsizing, looping, or modernizing to strengthen fire defense capabilities. These approaches include replacing vulnerable assets, creating a hydraulic model to augment the system's conveyance capacity, and installing a regulation station which can increase the ability to regulate pressure without endangering staff.



Enhancement of water system reliability includes implementing backflow prevention, adopting seismic resilient piping, and providing backup power to ensure continuing operation of critical infrastructure during an emergency.



System enhancements for emergency responders are approaches that enhance the ability of emergency personnel to respond effectively during a wildfire event and gain or maintain access to wildfire water supplies during a wildfire event. Approaches include installing real-time pressure tracking to ensure water availability and prevent dry hydrants while sharing real-time data with firefighters and installing remote-controlled isolation valves to preserve pressure and limit contamination by quickly sectioning off damaged areas.



Enhancement of the water supply supports redundant water sources and the addition of community-scale water storage facilities to provide alternative water supply sources. Approaches include exploring alternatives for long-term solutions to improve operational configuration of the Santa Ynez Reservoir, adding a seawater pumping station, exploring resources for emergency supply such as privately owned water assets and assets in neighboring communities, evaluating uses of non-potable water, evaluating the potential to construct a new potable tank, and continuing participation in the Santa Monica Groundwater Sustainability Agency to explore the addition of a new well. Collaborative partnerships and inter-local agreements between agencies can support the expansion of total local water available in the region.



Coordination measures such as discussing emergency fill points with LAFD and coordinating with LAFD to pre-plan the use of limited water supply can support faster and more efficient response for future disasters based on data-driven decision making.

Electrical Energy System

Electrical system approaches focus on system resiliency for the future. LADWP is seeking approval to increase the voltage of the distribution system, which provides key wildfire mitigation benefits. Approaches for updating the electrical energy system include strategies for undergrounding or hardening power lines, vegetation management, advanced conductors, and technological and operational modernization.

- Fire resiliency can be increased through strategies such as undergrounding power lines to protect them from extreme weather and vegetation contact, covering conductors when underground is not feasible, or implementing a Ground Level Distribution System (GLDS) that can be used when traditional undergrounding is not possible.
- Other enhancements and updates to electrical systems such as replacing wood poles and advanced conductors can support system resiliency and reduce wildfire impacts or risk of sparks.
- Vegetation management is also an important element to consider by utilizing strategies such as Light Detection and Ranging (LiDAR) imagery management in wildfire-prone areas to understand vegetation growth, utilities can make plans to manage vegetation that may cause outages or ignition.
- Other technologies, such as line sensors that monitor voltage and flow and artificial intelligence tools can further promote resiliency through data collection, data analysis, and virtual modeling.
- Distributed energy resources (DERs) can provide back-up generation during a power outage to support critical infrastructural needs.
- Finally, Public Safety Power Shutoffs (PSPS) can be used as a proactive approach to de-energize electrical lines in circumstances where high heat, wind, or vegetation interaction increases the potential risk of fire, although PSPS events can leave vulnerable communities and essential facilities without power.

Evacuation Capabilities

Physical Infrastructure Strategies. The Pacific Palisades road network presents significant challenges for conducting an emergency evacuation easily and effectively. The area's topography and historical development patterns have led to a



- Roadway widths and turnarounds
- Intersection designs
- Traffic Signals and Signage Systems
- Street Network

Physical Infrastructure Strategies



- Evacuation Management framework
- Public alert and warning
- Pacific Palisades-specific management tactics
- Public education

Operational Strategies

dense network of numerous narrow streets connecting to only a few larger capacity streets. Strategies for modifications to Pacific Palisades' physical transportation infrastructure to improve evacuation capabilities involve roadway widths and turnarounds, intersection designs, traffic signals and signage systems, and street network.

Roadway width and turnaround strategies. These strategies include increasing roadway widths and on-street parking prohibition to satisfy Fire Code requirements. Although road widening may be challenging, prohibiting parking or increasing enforcement where parking is already prohibited may be a more immediate approach to consider. Another approach could be to convert streets into one-way traffic, although additional studies are needed to determine where these conversions may be appropriate.

Intersection design strategies. Intersectons that have a higher likelihood of creating significant bottlenecks for traffic during an evacuation were identified through a network assessment. Specific strategies are outlined for particular areas including additional turn lanes, traffic flow simplifications, turn prohibitions, "keep clear" zones, and replacement of deteriorated lane striping.

Traffic signal and signage system strategies. These strategies include potential modifications and expansions to the existing traffic-signal systems affecting Pacific Palisades. These changes, which are focused on priority intersections more prone to congestion, could help improve traffic flow, both during an evacuation and under everyday conditions. Approaches include signalization of unsignalized intersections which could support benefits in day-to-day operations as well as making egress out of side streets easier by allocating dedicated green time to make these moves while the major street is stopped. This strategy could prove particularly important during a mass evacuation event because it may be difficult to find large enough gaps in traffic to exit safely onto major arterials. Coordinating between City and California Department of Transportation (Caltrans)-maintained signal systems along the PCH could allow prioritization of green time and minimize delays in the case of an evacuation. Allowing manual override or control of traffic signals remotely would leverage technology to reduce staffing needs and improve efficiency. Evacuation-specific signal timing plans could be programmed for an evacuation event. Dynamic message signs could support informing evacuees of evacuation routes, roadway closures, and other important information.

Street network strategies include street network design and operational principles to facilitate evacuation and fire response. Approaches include considering opening streets and rights-of-way with the Pacific Palisades that were mapped but have not been fully built out or have been partially closed or unused to provide an added level of redundancy in the street network. Side streets could also be used as alternative evacuation routes. Working with the Bel-Air Bay Club to formalize an agreement for public access on a temporary basis during evacuations could alleviate pressure on Sunset Boulevard and Temescal Canyon Road by providing a third option to access PCH via Arno Way. Turning movement restrictions at intersections could remove potential traffic conflicts and increase evacuation route capacity. Directing evacuees from specific subareas to specific evacuation routes can support maximizing use of the available roadway capacity.

Operational Evacuation Strategies. A mass evacuation effort in Pacific Palisades potentially involves numerous City, County, and State agencies. Mass evacuations require coordination across jurisdictional boundaries and encompass a wide range of response activities, likely all within a demanding time frame. Mass evacuations also present the City and participating agencies with significant operational challenges. Strategies for operational planning and activities related to a mass evacuation are an evacuation management framework, Pacific Palisades-specific traffic management tactics, public alert and warning, and public education.

These operational strategies may help support evacuation planning for the City generally and Pacific Palisades specifically. The management framework includes strategies identified based on an analysis of existing City emergency planning documents related to evacuation and could be incorporated, as desired, into future updates of those plans and procedures. Approaches include volunteer management plans, evacuation decision-making, family reunification, clearly defined geographic scope and populations served, integrating weather and fire-behavior forecasting into wildfire evacuation planning, interjurisdictional coordination planning, developing a visual evacuation flowchart, planning for populations with transportation needs, determining places of refuge if evacuation is not possible, and developing a tactical evacuation guide specific to Pacific Palisades. Traffic management tactics include identifying appropriate evacuation routes and dispatch plans for traffic control staff. Public alert and warning strategies focus on clear and timeline communication building on existing City public alert systems through a variety of tactics such as hardwired systems and supplemental wireless systems. Timing, consistency of messaging, and on-the-ground tactics are also important. Public education focuses on consistent messaging, regular reinforcement, messaging through multiple communications channels, and utilizing grassroots approaches.

Summary of Approaches and Next Steps for Consideration

Many prcjects identified in this document are currently in preliminary stages of the prcject development process, and may still be pending funding, final approvals, and/or permitting. All prcjects are subject to change in scope, schedule, and cost until they are fully approved. Some of the prcjects, strategies, and efforts described in this report may not be possible for the City to complete without additional funding from the Federal and State governments as well as philanthropy, which may or may not be forthcoming.

Table ES.1: Potential Approaches for Vegetation Management

Potential Approach	Description	Benefits	Challenges	Next Steps for Consideration by the City
Community Defensible Space	Coordinate vegetation management to create community defensible space; Create community fuel break area; Create community chipping program for disposal of cut vegetation; Create Fire Protection District; Perform home hardening	Reduces ignition risk and fire intensity at parcel and neighborhood scale; Increases structure survivability and firefighter safety; Creates unified fuel management zones across multiple parcels.	Requires landowner cooperation across property lines; Enforcement and funding coordination.	A medium- to long-term strategy that requires the development of outreach, cost share, and improvements for compliance/educational programs; City and State coordination to promote wildfire resiliency is a cornerstone of Urban Forest Management in Very High and High Fire Hazard Severity Zones; Secure funding to assist homeowners with Zones 2 and extended Zones where necessary.
Fuel Modification Practices	Create fuel breaks ; Treat roadside fuels; Create Vegetated; Greenspace Buffers.	Provides operational anchor lines for suppression; Reduces flame length and rate of spreadatlandscapescale; Connects WUI areas to roads, ridges, and critical infrastructure; Requires continuous maintenance to remain effective.	High implementation and maintenance costs; Environmentalpermitting (CaliforniaEnvironmental Quality Act [CEQA], Coastal Commission).	Conduct advanced fire modeling torefine fuelbreak placement; Gather post-fire data / conduct field verificationofsiteconditions; A medium- to long-term strategy that requires securing funding and environmental clearances; CAL FIRE Wildfire Prevention Grants for Hazardous Fuel Reduction.

Potential Approach	Description	Benefits	Challenges	Next Steps for Consideration by the City
Restoration and Maintenance	Remove highly flammable nonnative vegetation and re-establish native species with lower fire susceptibility; Treat compacted soils to improve infiltration and seed-to-soil contact; Stabilize slopes.	Sustains effectiveness of existing treatments over time; Reduces regrowth of hazardous fuels; Stabilizes soils and restores native vegetation.	Recurring costs and long-term maintenance obligations; Potential environmental constraints.	A short-to-medium strategy that requires gathering post-fire data / conduct field verification of site conditions; Develop integrated erosion control and native restoration plans; Establish maintenance cycles (annual/biannual); Identify opportunities for short-term action within City-owned land in the Palisades, such as land maintained by Rec and Parks, surrounding infrastructure assets, and hillside areas along streets.
Integration with Critical Infrastructure	Prioritize fuel reduction immediately adjacent to critical infrastructure, such as reservoirs, substations, community resilience centers, and others.	Protects water, power, and transportation systems during wildfire events; Increases community resilience; Provides access for suppression operations.	Multi-agency coordination required; Site access and utility coordination issues.	Identify infrastructure co-location opportunities (e.g., fuel breaks near utility corridors); Coordinate with LADWP and other infrastructure operators. Identify opportunities for short-term action surrounding City-owned infrastructure assets; Identify opportunities for short-term action surrounding City-owned infrastructure assets

Readers of this report should be aware that the report recognizes that infrastructure project development is a dynamic process which is influenced by many factors, including the degree of importance, the operability of the assets which are addressed by the project, funding and funding sources, material and labor resource availability, demand for the service provided by the project or the assets, public and worker safety, the ability or inability to complete work concurrently with other work, and competition from other projects

Information in this report about the City's ongoing and planned efforts was gathered from the City's Departments between July and October 2025, and reflects the City's planning efforts and understanding as of the date of the report.

This report does not consider the factors of funding and funding sources or the need of the City to maintain operations elsewhere in its discussion of project scheduling. This report considers all infrastructure within the Palisades, but readers should be aware that certain systems, including Natural Gas service and all forms of Telecommunications service (telephone, cable TV, and internet service), are provided by private, for-profit companies which operated under a license and maintain their systems according to their own operating standards. The City cannot make or require repairs or improvements to these privately owned systems.

This report is complementary to other documents published by the City about the recovery from the January 2025 wind and fire disaster, but serves its own unique purpose. As a result of this, information about infrastructure projects may be organized in ways that are similar, but not identical, to other documents, reflecting the differing purposes and audiences for these documents.

Table ES.2: Potential Approaches for Water System

This report is not making any assessments as to whether if any of these potential approaches had been available during the fire, that they would have had any effect on the availability of water to firefighters during the event.

Potential Approach	Description	Benefits	Challenges	Next Steps for Consideration by the City
Potential Approaches for Existing Water System Enhancements				
Replace Vulnerable Assets	Replacing any vulnerable assets with fire-resistant pipe materials	Mitigates failures; Aligns with existing sewer replacement tiers; increases resilience	Cost; Timing with emergency repairs	Identify if there are any potentially vulnerable assets. Can be actioned in the medium- to long-term; medium if expedited planning process identifies asset as critical and vulnerable; requires coordination with other city departments and additional planning to prioritize projects with other rebuild efforts.
Augment System Conveyance Capacity	Augment the system capacity by increasing the size of pipelines or the number of pipelines in the water system.	Improves water pressure; Provides additional capacity; increases resilience	Cost; Potential impacts to distribution water quality during normal operating conditions	Create hydraulic model to test design and operation. Requires additional feasibility analysis and in-depth evaluation of potential options.
Install a permanent regulation station	Install a regulating valve from the 1345' SZ to the 1137' SZ to increase water pressure in the higher elevations in Pacific Palisades	Increases ability to regulate pressure without endangering staff	Faster drainage from higher to lower pressure zones in some cases	Currently planned by LADWP..
Potential Approaches for Enhancing Water System Reliability				
Upgrade Reservoirs to Fire-Resistant Designs	Convert geomembrane-lined reservoirs to fire-resistant designs.	Strengthens long-term capacity	Cost	Requires additional feasibility analysis and in-depth evaluation of potential options.
Implement Backflow Prevention and Zoning	Install backflow devices and use network zoning to confine risks of Post-fire backflow contamination and speed potable water restoration.	Confines risks; Speeds potable water restoration	Cost	Requires additional feasibility analysis and in-depth evaluation of potential options.
AdoptSeismic-Resilient Piping	Expand use of Earthquake-resilient ductile iron pipe (ERDIP) to address both seismic and wildfire-related ground stresses and extend asset life and system reliability.	Extends asset life and system reliability	Cost	Requires additional feasibility analysis and in-depth evaluation of potential options.

See document disclaimer. All approaches require detailed feasibility analysis by LADWP

Potential Approach	Description	Benefits	Challenges	Next Steps for Consideration by the City
Potential Approaches for System Enhancements for Emergency Responders				
Deploy Pressure Monitoring Systems	Install Real-time pressure tracking to ensure water availability and prevent dry hydrants by streaming live data to fire crews throughout the network during emergencies.	Provides real-time pressure tracking to ensure water availability throughout the network during emergencies	Cost; Availability of utility power and telecommunication networks being operational during an emergency	Requires additional feasibility analysis and in-depth evaluation of potential options and coordination with LAFD.
Provide Remote-Controlled Isolation for Fire Support	Install remote isolation valves to preserve pressure and limit contamination by quickly sectioning off damaged areas.	Preserves pressure and limits contamination	Cost; Lack of availability of fire-resistant materials for smart controls at individual services; and Potential negative impacts of shutting off supply to entire sections of affected services during emergencies	Requires additional feasibility analysis and in-depth evaluation to identify which valves would benefit from this technology. Coordination with LAFD is required.
Potential Approaches to Enhance Water Supplies				
Explore Long-term Improvements for Santa Ynez Reservoir	Continue to explore alternatives for a long-term solution to improve operational configuration of Santa Ynez Reservoir.	Maximizes potential of existing resources; adds redundancy	Cost	Complete planned Alternative Evaluation Study
Add a Sea Water Pump Station	Add a seawater pump station as an emergency source to refill Santa Ynez Reservoir (or another storage location or emergency fill point) during extended wildfires.	Provides large quantity of nearby water supply	Equipment corrosion and potential harm to coastal ecosystem due to salinity; Cost of installing and maintaining a duplicate piping/hydrant system, and/or feasibility of conveyance "via hoses" to the fire	Requires additional feasibility analysis and in-depth evaluation of potential use.
Explore Resources for Emergency Supply	Evaluate privately owned water assets and assets in neighboring communities such as wells, storage tanks, and ponds that could be used to support firefighting or emergency response operations.	Maximizes potential of existing resources; adds redundancy	Requires pre-arranged agreement and potential costs to adapt operations	Requires additional feasibility analysis and in-depth evaluation of potential options.

See document disclaimer. All approaches require detailed feasibility analysis by LADWP

Potential Approach	Description	Benefits	Challenges	Next Steps for Consideration by the City
Potential Approaches to Enhance Water Supplies				
Provide Interconnections From Neighboring Communities	Explore options for new interconnections for Pacific Palisades or the Westside Region of LADWPs system to see if additional interconnections with neighboring communities could provide redundancy.	Adds redundancy	LADWP has already explored interconnections-options for new connections may be limited; cost	Requires additional feasibility analysis and in-depth evaluation of potential options and coordination with neighboring communities.
Provide Non-Potable Water Access	Evaluate the use of non-potable water, such as treated wastewater and collected stormwater, to fight wildfires. Identify opportunities to combine non-potable water storage opportunities with environmental enhancement (nature-based solutions) or recreational opportunities.	Adds redundancy; Adds local resilient water supplies	Cost: New infrastructure for the storage and transportation needed; Water quality risks to health or environment during its use	Requires additional feasibility analysis and in-depth evaluation of potential options.
Construct New Potable Tanks	Construct new potable tanks, placed outside fire-prone zones, to add redundancy and help maintain water service during and after wildfires.	Adds redundancy; Increases resiliency	Cost; Operational constraints to locate potential new storage at appropriate grade	Requires additional feasibility analysis and in-depth evaluation of potential options.
Add a Well in the Santa Monica Basin	Explore the potential for groundwater to be used in Pacific Palisades to maintain water supply or pressure during emergencies.	Adds redundancy; Adds local resilient water supplies	Potentially unavailable resource; water quality; Cost	Requires coordination with the Santa Monica Groundwater Sustainability Agency and member agencies of this GSA.
Potential Coordination Measures				
Provide Additional Emergency Fill Points.	Discuss with LAFD the number and locations of the fill points to determine if additional emergency fill points would be beneficial to LAFD.	Provides rapid response, enhanced fire suppression, and resilience in emergencies	LADWP and LAFD already use this as a strategy; Additional access points may be limited	Review existing plans in the lens of the January 2025 fires to determine additional needs or areas for improvement; requires additional analysis and coordination with LAFD.
Pre-plan Use of Limited Water Supply	Coordinate with LAFD to make decisions and prioritize in advance of the next wildfire how limited water resources should be used.	By making decisions in advance, allows for more streamlined responses	Coordination; Making difficult decisions that will need to be defensible	Coordination with key partners and develop strategy; requires additional analysis and coordination with LAFD.

See document disclaimer. All approaches require detailed feasibility analysis by LADWP

Table ES.3: Potential Approaches for Electrical Energy System

Potential Approach	Description	Benefits	Challenges	Next Steps for Consideration by the City
Voltage Conversion from 4.8 kV to 12 kV	Increase electric distribution system voltage.	Grounded neutral and fault isolation; Arc-flash and safety	Cost; Rollout difficulty	Design & planning are currently being implemented. Investigating funding opportunities is a near-term action.
Undergrounding	Underground electrical distribution lines.	Fire protection and prevention, mitigate energized lines contacting vegetation	Cost; Land and right-of-way availability; Rollout difficulty	Design & planning are currently being implemented. Investigating funding opportunities is required to support planning efforts.
Covered Conductor	Enclose exposed electric conductors with a protective layer.	Mitigate energized lines contact with animals or vegetation	Reduction in useful life due to increased corrosion rate of the metallic conductor	Near-term opportunity to develop a plan to cover remaining permanent overhead conductors in Pacific Palisades.
Ground Level Distribution System	Enclose electric distribution equipment along ground level encasements instead of overhead or underground.	Alternative to undergrounding where technical limitations exist	Technology in the pilot stages, regulatory barriers	This is a long-term strategy to evaluate the feasibility to convert remaining overhead system to GLDS. Coordination efforts can begin in the near term to learn from other utilities on the pilot learnings of the technology.
Replacement of Wood Poles	Use alternative materials for overhead poles that can better withstand wildfire temperatures.	Increased resilience from corrosion and other weather events	Structural integrity concerns during high-temperature fires	LADWP is currently evaluating the feasibility to wrap permanent overhead poles.
Advanced Conductors	Use high-performance electrical conductor materials.	Increase in thermal limits replacing the steel core with lighter, stronger composite materials; Reduced line sag.	Upfront cost	Determine priority transmission lines in wildfire hazard zones for reconducting. LADWP is currently implementing this strategy through their Wildfire Mitigation Plan.
Advanced Vegetation Management	Use advanced tools to proactively monitor and manage vegetation near electric systems.	Mitigate energized lines contacting vegetation	Staff training with new technologies	Test and train staff on using LiDAR to monitor vegetation. LADWP is currently implementing this strategy through their Wildfire Mitigation Plan.
Technological and Operational Modernization	Use advanced sensors to monitor grid systems and potential risks.	Rapid response to monitor grid health and de-energize lines	Data management; Upfront costs; Security concerns	Determine sensor locations. LADWP is currently implementing this strategy through their Wildfire Mitigation Plan.

See document disclaimer. All approaches require detailed feasibility analysis by LADWP

Potential Approach	Description	Benefits	Challenges	Next Steps for Consideration by the City
Leveraging AI and Digital Tools	Use advanced tools to model impact of various approaches to increase wildfire resilience.	Proactive mitigation assessment	Data management; Software capabilities and accuracy	Continue to collaborate with industry leaders on leveraging Artificial Intelligence for wildfire mitigation efforts; Consider pilot to test offering. This is a long term action that will require further coordination with technology partners.
Resiliency through Distributed Energy Resources	Energy assets that can provide electricity even in the event of a power outage.	Continued operation of critical facilities during outages	Upfront cost; Land availability	Deploy Battery Energy Storage System to back-up hydrant pump systems; Investigate funding opportunities. Further coordination with LAFD is needed for short-term action.
Public Safety Power Shutoff (PSPS) Protocol	Protocol to intentionally de-energize electrical lines.	Fire prevention by de-energizing lines	Health and safety risks of cutting off power for vulnerable populations; Communication logistics; difficult protocol decisions	Continue research efforts on PSPS protocols; Gain feedback from stakeholders on PSPS protocols. This strategy is currently being investigated. Further collaboration with CPUC and sharing learnings from other utilities is needed.

Table ES.4: Potential Approaches for Road Network and Traffic Management Systems

Potential Approach	Description	Benefits	Challenges	Next Steps for Consideration by the City
Roadway Widths and Turnarounds Can be actioned in the short-term for parking restrictions; long-term for roadway widths, where possible.	Increase Roadway Width and On-Street Parking Prohibition	Keeps streets unobstructed to facilitate fire response and evacuation	Public support; Enforcement and compliance	Detailed needs analysis to identify specific streets or areas for implementation
	Turnarounds and On-Street Parking Prohibition	Facilitates egress for fire apparatus along dead-end streets	Public support; Enforcement and compliance	Detailed needs analysis to identify specific streets or areas for implementation
Intersection Designs Can be actioned in the medium- to long-term; requires coordination with LADOT.	Additional Southbound Right Turn Lane at Sunset Boulevard and Palisades Drive	Increases egress capacity from the Highlands	Lead time and staff availability to set up temporary traffic controls during evacuation	Identify staffing and traffic controls needs
	Additional Southbound Left Turn Lane at Sunset Boulevard and Baylor Street / Marquez Avenue	Increases egress capacity from Marquez Knolls	Lead time and staff availability to set up temporary traffic controls during evacuation	Identify staffing and traffic controls needs
	Extended Southbound Left Turn Lane Storage at PCH and Temescal Canyon Road	Increases storage capacity of left-turn pocket	Lead time and staff availability to set up temporary traffic controls during evacuation	Identify staffing and traffic controls needs
	Overlap Phasing and Additional Southbound Left Turn Lane at PCH and Temescal Canyon Road	Increases egress capacity onto PCH	Signal modifications; Pedestrian and bicyclist safety; Lead time and staff availability to set up temporary traffic controls during evacuation	Coordinate with Caltrans on design and implementation of necessary signal modifications; Identify staffing and traffic controls needs
	Traffic Flow Simplification at PCH and Chautauqua Boulevard / W. Channel Road	Reduces potential traffic conflicts and potentially increases intersection capacity	Cost; Property and right-of-way acquisition; Pedestrian and bicyclist safety; Lead time and staff availability to set up temporary traffic controls during evacuation	Identify staffing and traffic controls needs; Coordinate with Caltrans on potential short-term improvements; Begin planning and outreach for longer-term permanent improvements
	Left-turn Prohibition at Selected Locations	Removes potential traffic conflicts and increases intersection and evacuation route capacity	Lead time and staff availability to set up temporary traffic controls during evacuation; Public support and compliance (if permanent)	Identify staffing and traffic controls needs; Design and install signage and other permanent infrastructure
	"KEEP CLEAR" Zones at Selected Locations	Prevents blockage of key driveways and side streets	Potential design and compliance challenges for some locations	Design and implement necessary pavement markings
	Replacement of Deteriorated Lane Striping at Selected Locations	Ensures efficient use of existing roadway capacity	Periodic maintenance and repair	Install replacement striping; Establish inspection and repair regimen

Potential Approach	Description	Benefits	Challenges	Next Steps for Consideration by the City
Traffic Signals and Signage Systems Can be actioned in the medium- to long-term; requires coordination with LADOT.	Signalization of Unsignalized Intersections	Improves side-street access	Cost; Regular maintenance needs	Detailed needs analysis to identify specific locations for implementation
	Coordination between City- and Caltrans-maintained Signal Systems	Improves evacuation efficiency and reduces delays and congestion; Potentially improves fire response	Cost; Technological compatibility; Interagency coordination and communication	Coordinate with Caltrans on identifying appropriate solutions and establishing appropriate protocols
	Remote Override and Control	Improves evacuation efficiency and reduces delays and congestion; Potentially improves fire response	Cost; Technological capability; Staff availability	Detailed feasibility and implementation study
	Evacuation-Specific Signal Timing Plans	Improves evacuation efficiency and reduces delays and congestion	Technological capability	Detailed feasibility and implementation study
	Dynamic Message Signs	Disseminates critical information concerning evacuation routes	Cost; Public support; Regular maintenance needs (if permanent); Property or right-of-way acquisition or easements (if permanent); Staging areas (if temporary); Lead time and staff availability to set up signage during evacuation (if temporary)	Detailed needs analysis to identify specific locations for implementation
Street Network Strategies Can be actioned in the medium- to long-term, where feasible; requires coordination with LADOT.	Expanded Redundancy in the Street Network	Improves fire response and evacuation by increasing the capacity and redundancy of the street network	Cost; Property and right-of-way acquisition; Public support; Potential environmental challenges; Pedestrian and bicyclist safety	Detailed feasibility and implementation study
	Side Streets as Alternative Evacuation Routes	Improves fire response and evacuation by increasing the capacity and redundancy of the street network	Lead time and staff availability to set up temporary traffic controls during evacuation	Identify staffing and traffic controls needs
	Bel-Air Bay Club Through Access	Formalizes an additional evacuation route onto PCH	Potential concerns from property ownership team; Liability; Public support	Coordination with Caltrans on potential concerns; Planning and negotiation with property ownership team
	Turning Movement Restrictions at Intersections	Removes potential traffic conflicts and increases intersection and evacuation route capacity	Lead time and staff availability to set up temporary traffic controls during evacuation; Public support and compliance (if permanent)	Identify staffing and traffic controls needs; Design and install signage and other permanent infrastructure
	Evacuation Route Assignment	Segregates traffic flows to reduce conflicts and minimize delays	Lead time and staff availability to set up temporary traffic controls during evacuation; Public notification and awareness; Coordination with third-party GIS navigation platforms; Compliance	Detailed feasibility and implementation study

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Acronyms and Other Abbreviations

The Acronyms and Other Abbreviations list is a singular list that contains entries that appear in one or more of the planning documents. Note that entries shown in this list may not appear in the current document.

° °F	degrees Fahrenheit
AB (California)	Assembly Bill
ABS	Acrylonitrile Butadiene Styrene
ACS	Alliance for Community Solutions; American Community Survey
ACSR	Aluminum Conductor Steel Reinforced
ADA	Americans with Disabilities Act of 1990
ADU	Accessory Dwelling Unit
AI	Artificial Intelligence
aka	also known as
ALERT	Automated Local Evaluation in Real Time
AMI	Advanced Metering Infrastructure
API	Application Programming Interface
ATSAC	Automated Traffic Surveillance and Control
BC	British Columbia
BCA	Los Angeles Department of Public Works, Bureau of Contract Administration
BIA	Business Impact Analysis
BMP	Best Management Practice
BOE	Bureau of Engineering; Los Angeles Department of Public Works, Bureau of Engineering
BOF	Board of Forestry and Fire Protection
BPA	Bonneville Power Administration
CA	California
CAL FIRE	California Department of Forestry and Fire Protection
CalEPA	California Environmental Protection Agency
Caltrans	California Department of Transportation
CalVTP	California Vegetation Treatment Program
CAN-SPAM	Controlling the Assault of Non-Solicited Pornography And Marketing Act of 2003
CAO	City Administrative Officer
CBD	Canopy Bulk Density
CBH	Canopy Base Height
CC	Canopy Cover
CCCPFD	Contra Costa County Fire Protection District
CCCWMP	Contra Costa County Wildfire Mitigation Program
CCPA	California Consumer Privacy Act
CCR	California Code of Regulations
CD 11	Council District 11
CDFW	California Department of Fish and Wildlife
CDOT	Colorado Department of Transportation
CDP	Coastal Development Permit
CEOC	County Emergency Operations Center
CEQA	California Environmental Quality Act
CERT	Community Emergency Response Team
CGC	California Government Code
CGS	California Geological Survey
CH	Canopy Height
ch/h	chains per hour
CHP	California Highway Patrol
CIP	Capital Improvement Program
CIPR	Cold in Place Recycling
City	City of Los Angeles Government
CIWQS	California Integrated Water Quality System
CNRA	California Natural Resources Agency
County	Los Angeles County
COW	Cell on Wheels
CPA (Brentwood-Pacific Palisades)	Community Plan Area
CPUC	California Public Utilities Commission
CREAT	Climate Resilience Evaluation and Awareness Tool
CRZ	Critical Root Zone
CTPZ	Community-Based Temporary Parking Zone
CWNCD	Clean Water North Collection Division
CWS	Community Water Systems
CWSCD	Clean Water North Collection Division
DA	Distribution Automation
DAFN	Disability, Access, and Functional Needs
DBH	Diameter at Breast Height
DCU	Data Collector Units
DEM	Digital Elevation Model
DER	Distributed Energy Resource
DERMS	Distributed Energy Resource Management System
DFOS	Distributed Fiber-Optic Sensing
DIMP	Distribution Integrity Management Program
DOC	Department Operations Center
DOE	U.S. Department of Energy

DPH	Los Angeles County Department of Public Health
DS	Distributing Station
DSD	Distribution System Development
DTSC	Department of Toxic Substances Control
DWP	Department of Water and Power
DWR	California Department of Water Resources
EAS	Emergency Alert System
EBL	Eastbound Left
EBR	Eastbound Right
EFWS	Emergency Firefighting Water System
EMAC	Emergency Management Assistance Compact
EMD	Emergency Management Department
EO	Executive Order
EOC	Emergency Operations Center
EOP	Emergency Operations Plan
EPA	Environmental Protection Agency
EPP	Environmental Protection Plan
EPRI	Electric Power Research Institute
ERDIP	Earthquake Resistant Ductile Iron Pipe
ERDIP	Earthquake-Resilient Distribution Pipe
EV	Electric Vehicle
EVC	Existing Vegetation Cover
EVH	Existing Vegetation Height
EVT	Existing Vegetation Type
EWMP	Enhanced Watershed Management Program
FBFM40	LANDFIRE Fire Behavior Fuel Model
FCC	Federal Communications Commission
FCD	Fire Control District
FDR	Full Depth Reclamation
FEMA	Federal Emergency Management Agency
FHSZ	Fire Hazard Severity Zone
Fire	Palisades Fire
First Step	First Step: Developing an Urban Forest
FLISR	Fault Location, Isolation, and Service Restoration
FP	Fire Plan
FR	Fire Road
Frames	Fire Research and Management Exchange System
FRP	Fiberglass-Reinforced Pipe
FS	Fire Station
ft	foot, feet
FTTH	Fiber to the Home
FY	Fiscal Year
g/c	green per cycle
GB	Gigabytes
GEER	Geotechnical Extreme Event Reconnaissance Association
GEO	Geostationary
GIS	Geographic Information System
GLDS	Ground Level Distribution System
GO	General Order
GPM	Gallons per Minute
GR	Grass
GS	Grass-Shrub
GSA	Groundwater Sustainability Agency
HDPE	High-Density Polyethylene
HFC	Hybrid Fiber-Coaxial
HHW	Household Hazardous Waste
HIZEP	Home Ignition Zone Evaluation Program
HOA	Homeowners Association
HRDIP	Hazard Resistant Ductile Iron Pipe
HSC	California Health and Safety Code
HUC	Hydrologic Unit Code
IBC®	International Building Code®
IC	Incident Command
ICC	International Code Council
ICP	Incident Command Post
ICS	Incident Command System
IDE	Initial Damage Estimate
IPAWS	Integrated Public Alert and Warning System
IROC	Interagency Resource Ordering Capability
IRP	Infrastructure Restoration Plan
IRU	Indefeasible Right of Use
ISP	Internet Service Provider
IT	information Technology
ITA	Information Technology Agency
JADU	Junior Accessory Dwelling Units
KPI	Key Performance Indicator
kV	Kilovolt
LA	Los Angeles
LAA	Los Angeles Aqueduct

LABOE	Los Angeles Bureau of Engineering
LACDPW	Los Angeles County Department of Public Works
LACoFD	Los Angeles County Fire Department
LACP	Los Angeles City Planning
LADBS	City of Los Angeles Department of Building and Safety; Los Angeles Department of Building and Safety
LADOT	Los Angeles Department of Transportation
LADRP	Los Angeles Department of Regional Planning
LADWP	Los Angeles Department of Water and Power
LAFD	Los Angeles Fire Department
LAMC	Los Angeles Municipal Code
LANDFIRE	Landscape Fire and Resource Management Planning Tools
LAPD	Los Angeles Police Department
LASAN	Bureau of Sanitation; Los Angeles Department of Public Works, Bureau of Sanitation; Los Angeles Sanitation and Environment
LASD	Los Angeles County Sheriff's Department
LAUSD	Los Angeles Unified School District
LCP	Local Coastal Program
LCS	Lane Closure System
LCSS	Lane Closure Scheduling System
LEO	Low-Earth Orbit
LFD	Low-Flow Diversion
LIDAR	Light Detection and Ranging
LOS	Level of Service
LRA	Local Responsibility Area; Local Responsibility Areas
MAF	Million Acre-Feet
MFSZ	Mobile Food Service Zone
MG	Megagallons
ML	Machine Learning
MOU	Memorandum of Understanding
mph	miles per hour
MRCA	Mountains Recreation and Conservation Authority
MRT	Mountains Restoration Trust
MSMU	Mount Saint Mary's University
MTA	Metropolitan Transportation Authority
MTBS	Monitoring Trends in Burn Severity
MTTR	Mean Time to Restore
MVA	Megavolt-Ampere
MWD	Metropolitan Water District
n.d.	no date
NBT	Northbound Through
NDA	Non-Disclosure Agreement
NEMA	National Emergency Management Association
NERC	North American Electric Reliability Corporation
NFPA	National Fire Protection Association
NIFC	National Interagency Fire Center
NOAA	National Oceanic and Atmospheric Administration
NotifyLA	The City's Emergency System
NPDES	National Pollutant Discharge Elimination System
NSOA	Non-State-of-the-Art
NWS	National Weather Service
OA	Operational Area
OAEOC	Operational Area Emergency Operations Center
OES	Office of Emergency Services
OFM	Office of Forest Management
OH	Overhead
OR	Oregon
OWTS	On-Site Wastewater Treatment System
PA	Public Assistance (Program)
PALMS	Palisades Applied Logistics Management System
PCC	Portland Cement Concrete
PCCT	Palisades Community Communication Tool
PCH	Pacific Coast Highway
PE	Polyethylene
PG&E	Pacific Gas and Electric; Pacfic Gas and Electric Company
PII	Personally Identifiable Information
PIO	Public Information Officer
Plan	Logistics and Traffic Management Plan
PPCC	Pacific Palisades Community Council
PROW	Public Right of Way
PSA	Public Service Announcement
PSEP	Pipeline Safety Enhancement Plan
PSPS	Public Safety Power Shutoff
PSPS	Public Safety Power Shutoffs
PTDS	Pole-Top Distributing Stations
PVC	Polyvinyl Chloride
PWRS	Public Way Reservation System

RAP	Recreation and Parks
RCP	Reinforced Concrete Pipe
Rebuild	Palisades Rebuild
RPZ	Root Protection Zone
RS	Receiving Station
RSS	Recovery Support Strategy
RYLAN	Ready My LA Neighborhood
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
SatCOLTs	Satellite Cell On Light Trucks
SB	Senate Bill
SBL	Southbound Left
SBR	Southbound Right
SBS	Soil Burn Severity
SBT	Southbound Through
SCAG	Southern California Association of Governments
SCE	Southern California Edison
SCG	Southern California Gas Company
SCWP	Safe, Clean Water Program
SDG&E	San Diego Gas & Electric
SEMS	Standardized Emergency Management System
SFPUC	San Francisco Public Utilities Commission
SGMA	Sustainable Groundwater Management Act
SIG	Special Implementation Group
SLA	Service-Level Agreement
SMC	Service to Main Connection
SOTL	Scattergood-Olympic Transmission Line
SPF	Seismic Steel Pipe
SPOT	Satellite Picocell on a Trailer
SRA	State Responsibility Area
SRF	Self-Realization Fellowship
SSMP	Sewer System Management Plan
StreetsLA	Bureau of Street Services; Los Angeles Department of Public Works, Bureau of Street Services
SWP	State Water Project
SWRCB	State Water Resources Control Board
SZ	Service Zone
T&D	Transmission and Distribution
TAS	Thermally-Activated Shutoff Valves
TAZ	Traffic Analysis Zone; Transportation Analysis Zone
TCO	Traffic Control Officer
TL	Timber Litter
TMPZ	Temporary Managed Parking Zones
TU	Timber Understory
TWLTL	Two-Way Left-Turn Lane
UCLA	University of California, Los Angeles
UFD	Urban Forestry Division
UFMP	Urban Fire Management Plan
UG	Underground
ULI	Urban Land Institute
USACE	U.S. Army Corps of Engineers
USBR	U.S. Bureau of Reclamation
USC	University of Southern California
USGS	U.S. Geological Survey
UUAD	Utility Undergrounding Assessment Districts
UUROC	Unified Utilities Rebuild Operations Center
UV	Ultraviolet
UWMP	Urban Water Management Plan
VGB	Vegetated Green Buffer
VHFHSZ	Very High Fire Hazard Severity Zone
VMP	Vegetation Management Program
vph	vehicles per hour
VPP	Virtual Power Plant
VSAT	Very Small Aperture Terminal
WA	Washington
WARN	Water and Wastewater Agency Response Network
WBL	Westbound Left
WBR	Westbound Right
WEA	Wireless Emergency Alert
WECC	Wireless Emergency Communication Center
WERT	Watershed Emergency Response Team
WPG	Wildfire Prevention Grant
WRF	Water Research Foundation
WRP	Wildfire Resilience Planning
WS	Workstream
WUI	Wildland-Urban Interface
ZIMAS	Zoning Information and Map Access System



1. Introduction



The Pacific Palisades Wildfire Resilience Planning document ("the WRP") provides fuel mitigation, protection, and response infrastructure strategies for the Pacific Palisades to mitigate the vulnerabilities and potential impacts from future wildfire events. Commissioned by the City of Los Angeles (City) Bureau of Engineering (BOE), the WRP integrates forward-looking mitigation strategies across vegetation (fuel) management, water supply, energy systems, and evacuation management. Vegetation management sections of the WRP are focused on vegetation in the public right-of-way within and outside City of Los Angeles boundaries.

The WRP, developed under Workstream 3 (WS3), operates in coordination with other workstreams: WS1, which defines the project management and governance structure; WS2, which develops the Infrastructure Restoration Plan; and WS4, which focuses on Logistics and Traffic Management. This integrated framework ensures that datasets, assessments, and recommendations are shared across teams to produce cohesive, actionable deliverables that advance recovery efforts holistically.

The document is organized into two primary sections, beginning with a baseline conditions and vulnerability assessment, followed by a discussion of fire mitigation, protection, and response infrastructure strategies. These strategies are organized into sections on fuel mitigation, alternative wildfire water supply, energy systems, road network and traffic management systems, and evacuation capabilities.

1.1. Purpose and Scope of Wildfire Resilience Planning

The WRP provides a framework to guide wildfire resilience planning for Pacific Palisades. The WRP is part of a larger effort to streamline recovery and response efforts, coordinate funding, and prioritize investments to help Pacific Palisades recover efficiently, safely, and with greater resilience to future wildfire threats.

The WRP focuses primarily on the area within the Pacific Palisades Community Council (PPCC) boundary, which encompasses the neighborhood known to be Pacific Palisades within the City; however, some sections of the WRP also include data from the Brentwood-Pacific Palisades Community Plan Area (CPA) and adjacent land beyond the City's boundaries. The expanded scope is necessary because fire risks and ecological conditions in Pacific Palisades are influenced by surrounding natural environments outside the City boundaries, particularly issues related to vegetation management.



1.2. Pacific Palisades Background

The Brentwood-Pacific Palisades CPA is a 24,354-acre coastal community on the western edge of the City that encompasses seaside and hillside neighborhoods (see Figure 1.1). The neighborhood known as Pacific Palisades and defined by the PPCC boundary is 5,186 acres in the southwestern portion of the Brentwood-Pacific Palisades CPA. Pacific Palisades is bordered by the neighborhood of Brentwood and the City of Santa Monica to the east, the Pacific Ocean to the south, and the City of Malibu to the west. To the north and west, Pacific Palisades is surrounded by State-owned public lands within the City of Los Angeles' jurisdictional boundary, including Topanga State Park and Will Rogers Historic State Park, and open spaces managed by the Mountains Recreation & Conservation Authority and Santa Monica Mountains Conservancy. Because much of this public land surrounding Pacific Palisades is owned and managed by the State, the City and State will need to coordinate closely to achieve resiliency goals for the area.

Following early settlement and development, the neighborhood of Pacific Palisades originated in 1922, envisioned as a utopian oasis focused on spirituality and education (SWCA Environmental Consultants, 2019). The neighborhood grew steadily throughout the 1920s as more residential areas were built (Pacific Palisades Historical Society, 2024).Traffic and development increased after the Pacific Coast Highway (PCH) was developed and Sunset Boulevard was paved in 1925. The Riviera Country Club and Bel-Air Bay Club were constructed in 1927 and 1930, respectively (SWCA Environmental Consultants, 2019). The Olmsted Brothers designed a local business district at the center of the community around a small public park called the Village Green. The village has served as the community's downtown for decades; most recently, a $200 million redevelopment of a portion of the business district was completed in 2018.

Before the fire, Pacific Palisades was a thriving, close-knit community with a mix of single-family homes, condominium and apartment buildings, three mobile home parks, the bustling Palisades Village shopping center with community-serving amenities and civic institutions, several schools, the Palisades Recreation Center and Palisades Branch Library, and a smaller commercial node at Sunset Boulevard and PCH (see Figure 1.2). The area is home to architectural landmarks including the Getty Villa and Eames House. The neighborhood also provides important access to natural resources, including miles of trails in Topanga State Park and Will Rogers Historic State Park, which provide habitat for mountain lions, deer, coyotes, and diverse plant and bird species.

Figure 1.1: Pacific Palisades neighborhood in 2023 (Dhoomil Sheta, Unsplash)

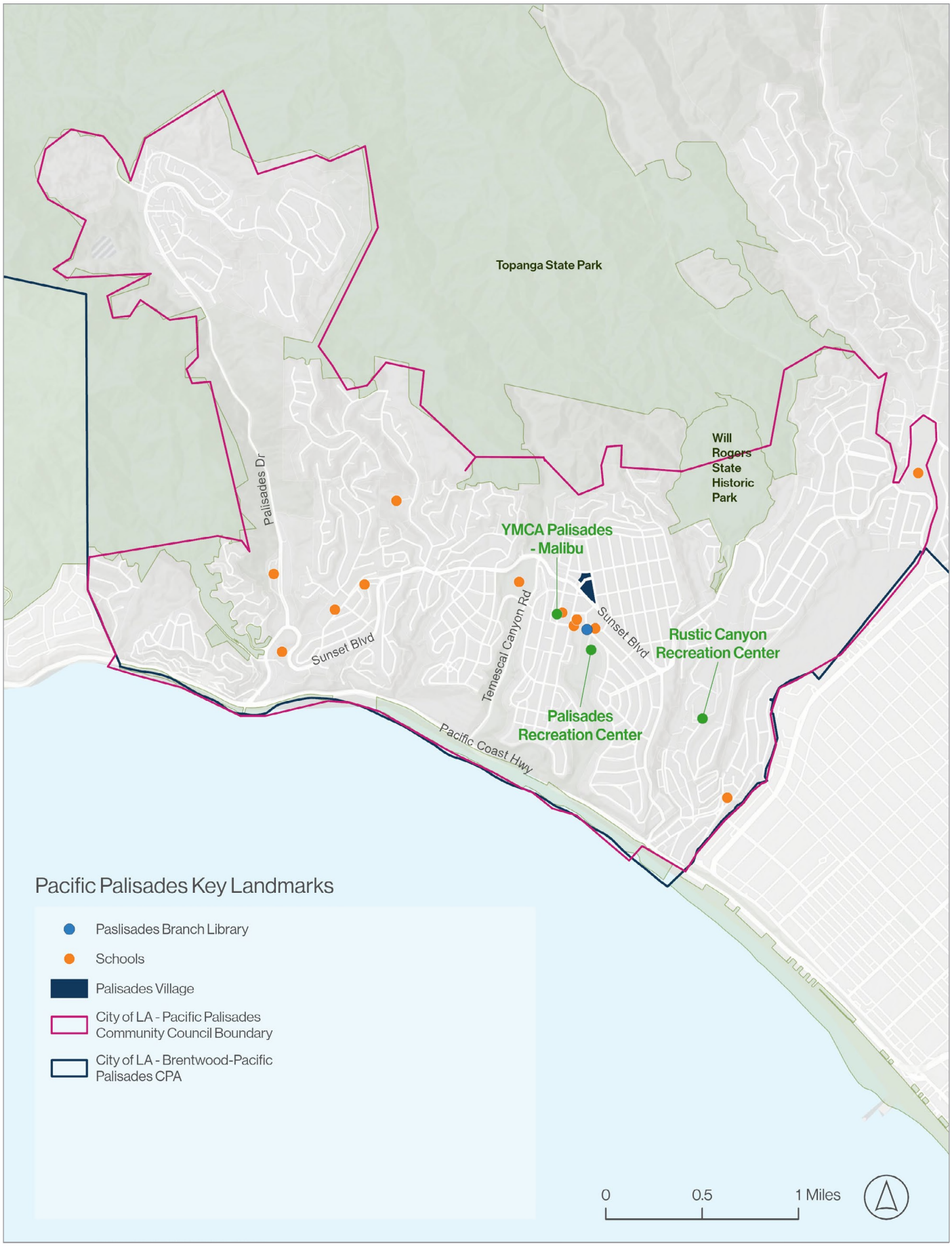


1.3. Palisades Fire

The Palisades Fire likely began as a small underground blaze on New Year's Day 2025 that was quickly contained but continued to smolder. A powerful Santa Ana windstorm on January 7 with winds reaching 60 to 90 mph reignited the fire, which spread rapidly across 23,400 acres and lasted 24 days. The fire resulted in 12 fatalities and the destruction of over 6,800 structures, including homes, schools, and businesses. The fire's severity was driven by heavy vegetation growth from wet winters in 2023 and 2024, followed by a hot, dry summer in 2024, which left the landscape highly flammable.



Figure 1.2: Pacific Palisades Key Landmarks



1.4. Development of the Wildfire Resilience Planning Document

The development of the WRP was informed by stakeholder engagement including a steering committee of City department representatives, and individual meetings with City departments, State and Los Angeles County (County) departments, private-sector utilities, and Pacific Palisades community members. A full list of meetings is included in Table 1.1. The meetings provided information about ongoing fire mitigation efforts and systems to better understand baseline conditions and inform assessments and recommendations, improve the WRP's integration with existing City plans and recovery support functions, and improve the WRP's ability to support City, County, and State agency coordination.

The steering committee, composed of representatives from City departments including the Los Angeles Fire Department (LAFD), Los Angeles Department of Water and Power (LADWP), the Emergency Management Department (EMD), and the Executive Office, Deputy Director of Planning, met every other week to provide input and feedback to the project team as the plan was developed. The project team also held focused meetings, separate from the steering committee, with City departments including EMD, Los Angeles City Planning (LACP), Los Angeles Department of Public Works, Bureau of Street Services (StreetsLA), the Los Angeles Police Department (LAPD), and the Los Angeles Department of Public Works, Bureau of Contract Administration (BCA).

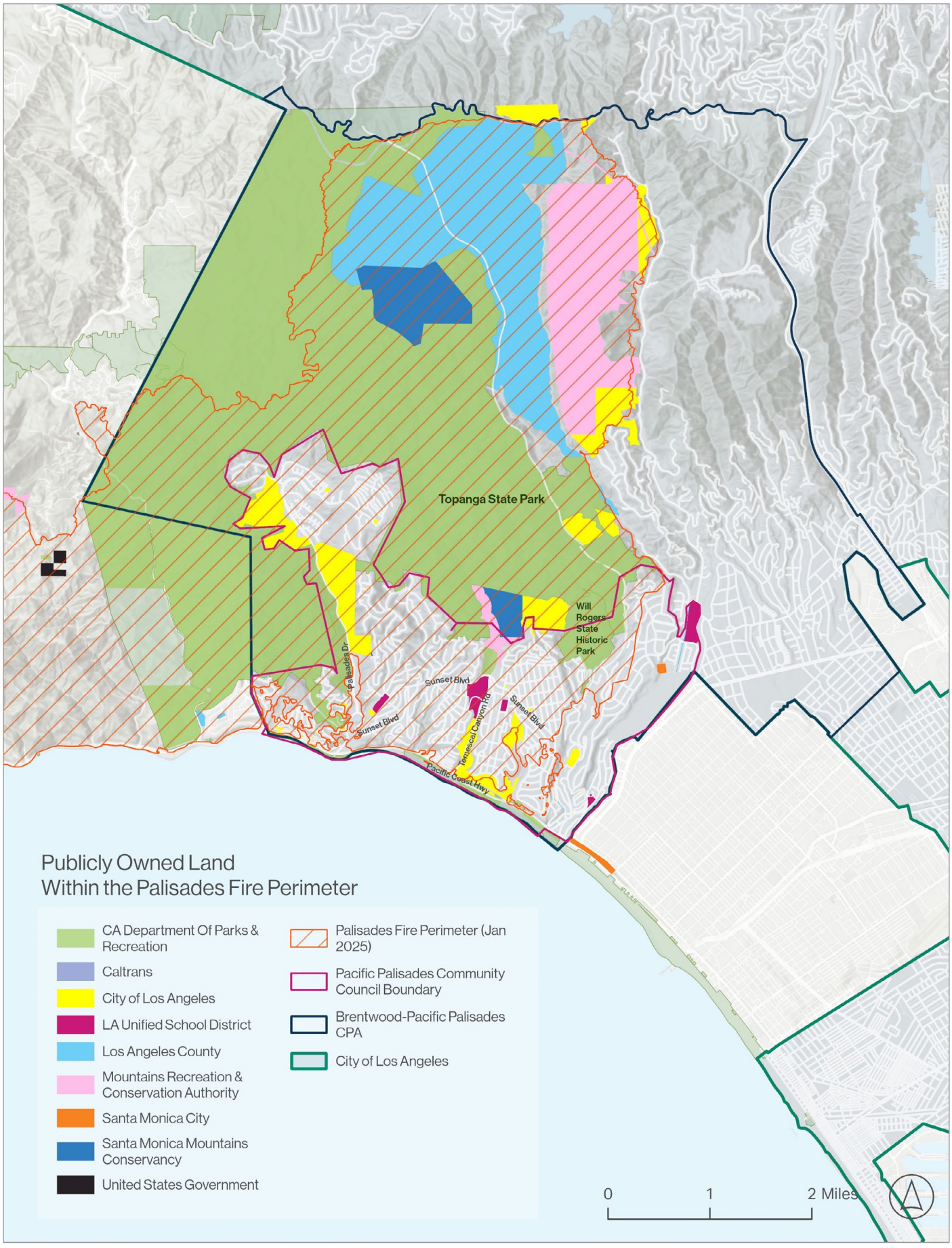
More than 30 meetings have been facilitated by the City and AECOM since November 2025.

The project team also held focused meetings with California State Parks and the Los Angeles County Fire Department (LACoFD) to learn about and coordinate with wildfire recovery and risk mitigation strategies being planned and implemented on County- and State-owned properties adjacent to Pacific Palisades, both within and outside the City of Los Angeles' boundaries, identified in Figure 1.3.

Table 1.1: Agency Coordination & Community Engagement

Department/Group	Meeting Date
Palisades Leaders Kickoff Meeting	July 25, 2025
LACP	August 8, 2025
StreetsLA	August 11, 2025
Team Palisades Listening Session	August 12, 2025
California State Parks	August 13, 2025
Park Advisory Board (PAB) Listening Session	August 13, 2025
PALIPOWER Listening Session	August 13, 2025
Steering Committee, Meeting 1	August 13, 2025
Southern California Gas Company	August 14, 2025
Palisades Recovery Coalition (PRC) Listening Session	August 14, 2025
PALISTRONG Listening Session	August 14, 2025
BCA	August 19, 2025
Steering Committee, Meeting 2	August 27, 2025
Tahitian Terrace HOA Listening Session	September 2, 2025
Resilient Palisades Listening Session	September 4, 2025
Steering Committee, Meeting 3	September 10, 2025
LAPD	September 10, 2025
LAPD	September 18, 2025
WS2 Community Leaders Technical Work Session	September 19, 2025
WS3 Community Leaders Technical Work Session	September 19, 2025
WS4 Community Leaders Technical Work Session	September 22, 2025
Steering Committee, Meeting 4	September 24, 2025
EMD	September 29, 2025
LA County Fire Department	September 30, 2025
Community Stakeholder Evacuation Planning	October 3, 2025
PALISTRONG Evacuation Work Session	October 7, 2025
Community Stakeholder Evacuation Planning	October 7, 2025
PRC Evacuation Work Session	October 8, 2025
Community Stakeholder Evacuation Planning	October 8, 2025
Steering Committee, Meeting 5	November 5, 2025

Figure 1.3: Publicly owned land within the Palisades Fire perimeter



1.5. Document Organization

The document is organized as follows:

Section 1	Why wildfire resilience planning is needed, background on Pacific Palisades and the Palisades Fire, and the development process for the plan
Section 2	Baseline conditions that are relevant to the plan and vulnerability assessment of the natural environment, built environment community assets, and social conditions (demographics)
Section 3	Fire mitigation, protection, and response infrastructure strategies related to fuel mitigation, community defensible space, green space buffers, strategies for private landowners, fire roads, alternatives for wildfire firefighting water, energy systems, and road network and traffic management systems
Section 4	Existing water supply system and sources of water in Pacific Palisades used for firefighting and potential alternative water supplies for future fire fighting
Section 5	Key approaches to supporting and advancing resilience in the electrical power system
Section 6	Evacuation capability strategies related to evacuation management, public alert and warning systems, and public education
Section 7	References
Appendices	Fuel treatment locations for further analysis, Pacific Palisades Evacuation Tactical Guide, and assessment of the transportation network





2. Baseline Conditions and Vulnerability Assessment

Understanding baseline (pre-fire) conditions helps assess risk (vulnerability) and supports recovery and the development of strategies that are aligned with community goals to rebuild stronger and safer, reduce future risk, and enhance ecological health.



2.1. Baseline Conditions

The baseline conditions presented in this section are based on current and future conditions, including housing and demographics, transportation, weather and climate, vegetation, wildfire history, California Department of Forestry and Fire Protection (CAL FIRE) Fire Hazard Severity Zones in the Palisades Fire area, and wildfire-related regulations.

2.1.1. Current and Future Conditions

Understanding demographic, natural, and climate conditions prior to the Palisades Fire helps predict potential vegetation growth patterns, guide restoration efforts, and inform how climate change-induced warming may shift the severity and frequency of wildfires.

2.1.1.1. Weather and Climate

Los Angeles has a Mediterranean climate characterized by hot, dry summers and mild, wet winters. Pacific Palisades is defined by unique coastal geography and topographical diversity. The landscape is defined by coastal bluffs, steep canyons, and expansive ridgelines offering sweeping views of the Pacific Ocean. Elevation in the area ranges from approximately 7 feet above sea level along the coastline to nearly 2,000 feet in Topanga State Park, which borders Pacific Palisades to the north. The variation in elevation creates a complex microclimate where cooler marine air can generate moderate temperatures in lower lying areas, while higher elevations are more exposed to inland heat and wind patterns.

Unprecedented greenhouse gas emissions as a result of human activity are increasing atmospheric temperatures and exacerbating wildfire risk. Globally, 2024 was the second warmest year on record, after 2023. Warming of the atmosphere comes with a host of cascading climate impacts, including longer and more extreme heat waves, more intense storms and hurricanes, less precipitation falling as snow, and more frequent and severe wildfires. Human-induced warming is estimated to be responsible for approximately two-thirds of the increase in wildfire severity (Zhuang et al., 2021).

Pacific Palisades is situated predominantly in a Wildland-Urban Interface (WUI). WUI is a designation referring to the zone where human development meets or intermingles with natural vegetation, which increases the risk of wildfire ignition and spread.

The WUI is growing rapidly as human development expands into natural areas. Between 1990 and 2020, the size of the WUI in the U.S. increased by 69,000 square miles, the size of Washington state. As of 2020, 9.4% of the land area and almost a third of houses in the continental U.S. were in WUI areas.

The expansion of the WUI combined with more frequent and intense wildfires as a result of climate change increases the risk of damaging and destructive wildfires. As the WUI expands into the Santa Monica Mountains, the landscape is burning much more frequently: an estimate of once every eight 8 years rather than once every 30 to 130 years (National Park Service, 2015)

Three climate and weather conditions combined to drive the Palisades Fire:

- **Enhanced vegetation growth from wet winters**. The winters of 2022–2023 and 2023–2024 brought unusually high levels of precipitation, which significantly boosted vegetation growth across the region.
- **Prolonged dry conditions and climate whiplash.** The wet winters were followed by record-low amounts of precipitation during the summer of 2024, which dried out the abundant vegetation and created a fuel load primed to ignite a massive wildfire. A pattern characterized by shorter, more intense bursts of precipitation followed by extended dry spells is known as "climate whiplash." In addition, La Niña conditions on the West Coast led to higher-than-average dry conditions in November and December, exacerbating risk.
- **Santa Ana winds that intensified wildfire mobility.** Dry and powerful Southern California Santa Ana winds of over 90 mph in some areas carried embers and rapidly expanded the wildfire, intensifying its destructive potential (Climate.gov, 2025).

2.1.1.2. Housing and Demographics

Prior to the wildfire, the Brentwood-Palisades CPA had a total population of 57,064. The demographic makeup reflected a predominantly white population (81%) and smaller representations of Asian (6.4%), Hispanic or Latino (3.8%), Black or African American (0.8%), and individuals identifying with two or more races (9%) (U.S. Census, 2023a).

Households in the area averaged about 2.3 people, spread across 24,496 homes. The community was notably prosperous, with an average household income of $374,808. Residents tended to be older (average age of 48), suggesting a mature and established population (U.S. Census, 2023a).

In 2024, the Southern California Association of Governments (SCAG) produced population, employment, and housing projections to forecast growth and inform future development decisions. For areas within the PPCC area boundaries, SCAG projected the population to decrease between 2019 and 2035 and then decrease further between 2035 and 2050, while household and employment numbers are projected to increase (SCAG, 2024). The SCAG projections, however, do not account for recent changes to state law, such as Senate Bill 9 (SB 9), which increase development capacity on single-family zoned properties through broader allowance of Accessory Dwelling Units (ADUs) and lot splits. In July 2025, Governor Gavin Newsom's Executive Order N-32-25, followed by Mayor Karen Bass' Executive Order 9, exempted the Palisades Fire burn area from SB 9 requirements, but the exception will only remain in place during the state of emergency declaration period. The City will need to consider whether to apply to an exception that would prohibit SB 9 and/or ADU construction in the future. The allowance of SB 9- and ADU-related construction may increase the population in the PPCC area.

2.1.1.3. Road Network, Transportation, and Transit

Pacific Palisades is structured around three main roads. Sunset Boulevard connects Downtown Los Angeles to the PCH. The business district of the Pacific Palisades Village is on Sunset Boulevard. The PCH runs along the coastline, connecting Malibu to Santa Monica. Temescal Canyon Road connects Sunset Boulevard to the PCH and provides access to Temescal Gateway Park.

Driving passenger vehicles is the dominant form of transportation in Pacific Palisades because the area is largely residential and has limited public transportation options. Many residents own multiple vehicles and have long commutes if they work in Downtown Los Angeles or the San Fernando Valley. Traffic is often congested during peak commuting hours on Sunset Boulevard and PCH, the two large roads that connect the neighborhood to the rest of the City and to adjacent cities. There are two bus routes that run through Pacific Palisades, but they are not used by many residents because of the high rates of car ownership and most residents living at least one mile from a transit stop (Moovit, 2025).

- Big Blue Bus Route 9 connects Santa Monica to Pacific Palisades and operates daily from 6:30 a.m. to 9 p.m. on weekdays and slightly fewer hours on weekends
- Metro Bus Line 602 runs along Sunset Boulevard from Westwood to Pacific Palisades and passes through PCH before turning around

Walking is common in the main downtown district of the Pacific Palisades, known as the "Village," and surrounding areas. Biking is less common because of the steep terrain and limited bike infrastructure though residents near the beach and parks use bikes more frequently.

2.1.1.4. Water Supply System

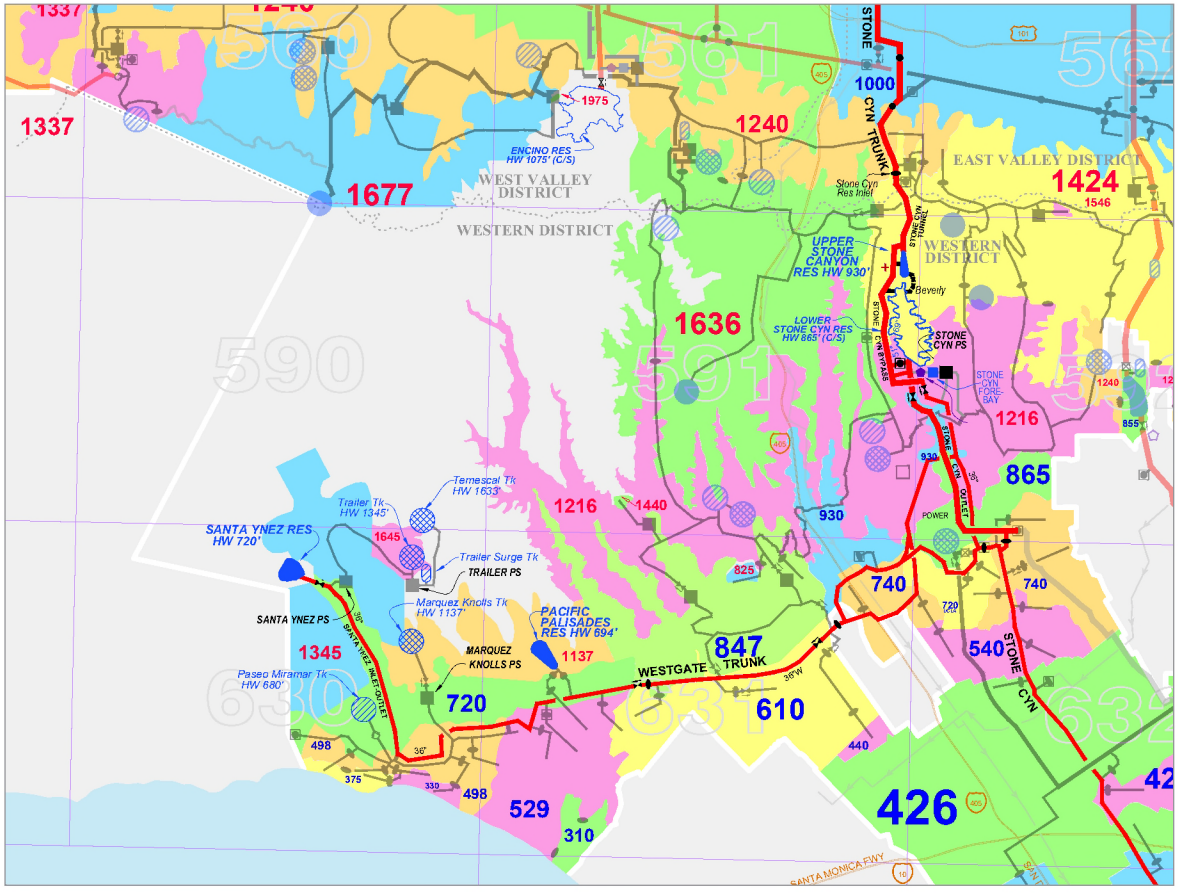
Water is delivered to Pacific Palisades via a single trunk line (Westgate Trunk Line) (LADWP, 2025a; 2025c). Trunk lines are the large pipes that make up the backbone of the City's water supply system. As shown in Figure 2.1, the trunk line begins at the Stone Canyon Reservoir in the upper right corner of the figure. From Stone Canyon Reservoir, the water first goes to the Stone Canyon Filtration Plant for treatment before distribution. From the filtration plant, water flows into other trunk lines (shown in red in the figure) that extend through the service area and connect to smaller distribution pipes, supplying homes, businesses, and fire hydrants. All water within this system is potable; there are no separate networks for drinking water and fire protection (LADWP, 2025a; 2025c). Although the system provides water for firefighting, no municipal water systems are built to extinguish large-scale wildfires (LADWP, 2025d; and Pierce et al., 2025).

The Pacific Palisades water supply network is divided into pressure zones that are determined by elevation (LADWP, 2025a; 2025c). Water flows to low elevation zones (indicated by blue numbers in Figure 2.1) mostly through gravity pipes, while water for high elevation zones (indicated by red numbers in the figure) is directed through three pumping stations.

These pumping stations use pressure to pump the water to higher elevations where it is stored in tanks to be used for future distribution into their corresponding pressure zone. If pressure in the system is not adequate, the pumps do not work properly and shut down to avoid cavitation (LADWP, 2025a). The Marquez Knoll pump station pumps water into the Marquez Knoll Tank, the Santa Ynez pump station pumps water into the Trailer Tank, and the Trailer pump station pumps water into the Temescal Tank.

At the end of the Westgate Trunk Line is the Santa Ynez Reservoir. The Santa Ynez Reservoir creates redundancy in the Pacific Palisades water system by receiving and storing excess water from the Westgate Trunk Line for future distribution (LADWP, 2025c).

Figure 2.1: Pacific Palisades water supply network (LADWP, 2025e)



2.1.1.5. Pre-Fire Vegetation Composition

Vegetation in the Pacific Palisades area reflects the characteristics of a Mediterranean climate in that it is dominated by chaparral and coastal scrub—plant communities that are both fire-adapted and fire-dependent. Many species in these ecosystems have evolved to survive and regenerate after fire events. For example, obligate seeders rely on fire to trigger seed germination, while obligate resprouters regenerate underground after their above-ground biomass is burned.

Over 60% of the PPCC area lacks vegetation that would be classified as wildfire fuel as shown in Table 2.1. Most of the area burned by the Palisades Fire was shrub or grass-shrub, which aligns with the known ecology of the region. Shrubs support high flame lengths and rapid spread, while grass-shrub fuels can create fast-spreading surface fire potential during fire weather conditions such as high temperatures, low humidity, and strong winds.

Table 2.1: LANDFIRE Pre-Fire Landcover in the PPCC Area, CFA Area, and the Area Burned by the Palisades Fire

Category	PPCC Area		CPA Area		Burn Area	
	Acres	Percent	Acres	Percent	Acres	Percent
Barren	34.9	1%	45.4	0%	39.6	0%
Grass	194.3	4%	726.3	3%	211.8	1%
Grass-Shrub	762.8	15%	3,640.0	15%	4,453.2	19%
Litter	398.0	8%	1,456.3	6%	1,106.2	5%
Open Water	4.8	0%	5.1	0%	4.7	0%
Shrub	423.6	8%	10,325.2	42%	12,866.7	53%
Timber-Shrub	56.8	1%	1,178.5	5%	1,369.3	6%
Urban / Developed	3,311.1	64%	6,977.7	29%	3,998.9	17%
Total	**5,186.5**	**100%**	**24,354.5**	**100%**	**24,050.4**	**100%**

Source: U.S. Forest Service (2023)

2.1.1.6. Past Wildfires

Understanding historical wildfire activity is essential for assessing fire frequency, behavior, and characteristics. Since 2002, the City has experienced at least one wildfire every year that warranted a Presidential disaster declaration. While neighboring communities such as Malibu and Topanga have endured multiple wildfires over the years, the area impacted by the 2025 Palisades Fire had largely been spared from such events. The relative immunity is likely attributable to a combination of coastal climatic influences, such as cooler temperatures and higher humidity, and the topography of the Santa Monica Mountains, which partially shield the area from the strong, fire-driving Santa Ana winds (LAFD, 2025c).

Table 2.2 provides a summary of significant wildfires that have occurred within a 20-mile radius of the Palisades Fire boundary since 1985. The wildfires include the Station Fire (2009), which burned 160,000 acres in 2009 and was the 9th largest wildfire in California history at the time and now ranks 15th by acreage burned, and the Woolsey Fire (2018), which is recognized as one of the most destructive and costly wildfires in the County. According to Cal Fire, the Palisades Fire is the third most destructive wildfire in California, following the Camp and Eaton fires, which destroyed 18,804 and 9,413 structures respectively. Within the County, it is the second most destructive fire after the Eaton Fire. The Palisades Fire burned over 23,707 acres and destroyed 6,833 structures (CAL FIRE, 2025a). The deadliest fire in the County to date is the Griffith Park Fire in 1933 (29 fatalities), followed by the Eaton Fire in 2025 (19 fatalities), followed by the Palisades Fire in 2025 (12 fatalities) (CAL FIRE, 2025a).

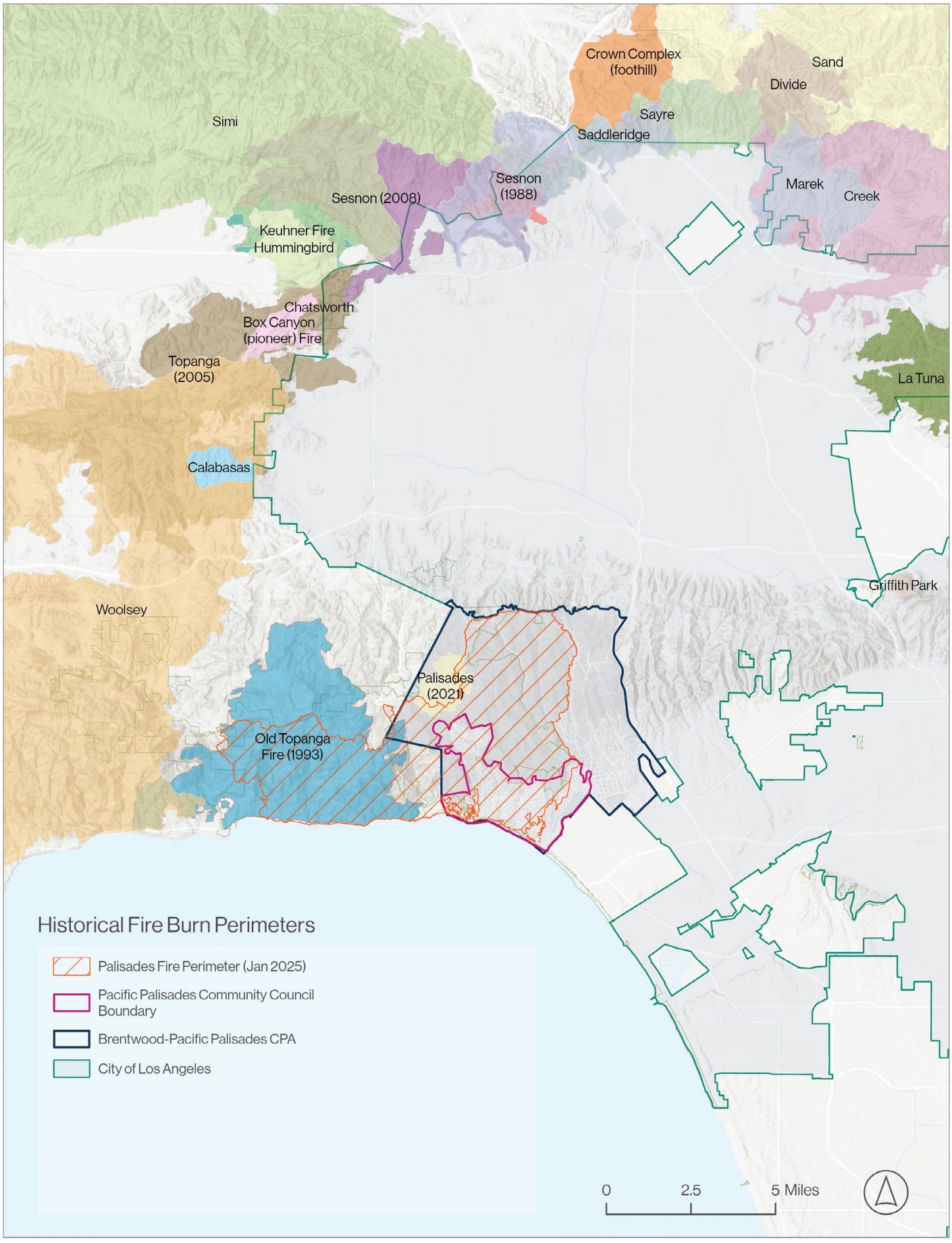
Several smaller fires have also occurred within the 2025 Palisades Fire perimeter, including the Lachman Fire, which is believed to have initiated the Palisades Fire. The Lachman Fire ignited on January 1, 2025, and was contained after burning 8 acres, but it continued to smolder underground, and on January 7, strong winds reignited the fire, leading to its rapid expansion and transformation into the Palisades Fire. Figure 2.2 shows the boundaries of wildfires within 20 miles of the PPCC from 1980 to 2024.

Table 2.2: Significant Wildfires Within and Adjacent to the Palisades Fire Boundary

Fire Name	Acreage	Ignition Date	Structures Destroyed	Fatalities
Station	160,577	8/26/09	209	2
Simi	108,204	10/25/03	315	0
Woolsey	96,949	11/8/18	1,643	3
Sand	41,386	7/22/16	116	1
Topanga	24,175	9/28/05	10	0
Palisades Fire	23,448	1/7/25	6,837	12
Old Topanga Fire	16,780	11/2/93	359	3
Creek	15,619	12/5/17	123	0
Sesnon	14,703	10/13/08	78	1
Calabasas	12,513	10/21/96	5	0
Sayre	11,262	11/14/08	600	0
Saddle Ridge	8,799	10/10/19	19	1
La Tuna	7,194	9/1/17	5	0
Rye	6,049	12/5/17	6	0
Piuma	5,425	10/14/85	2	0
Corral	4,901	11/24/07	53	0
Marek	4,824	10/12/08	65	1
Canyon	4,330	10/21/07	2	0
Franklin	4,037	12/9/24	21	0
Magic	2,824	10/22/07	3	0
Palisades	1,202	5/15/21	0	0
Topanga	55	6/29/17	0	0
Palisades	42	10/21/19	0	0
Lachman Fire	8	1/1/25	0	0

Source: USGS (2022) (USGS et al., 2025) and CAL FIRE

Figure 2.2: Fire perimeters, 1985 to 2024 (MTBS and CAL FIRE)

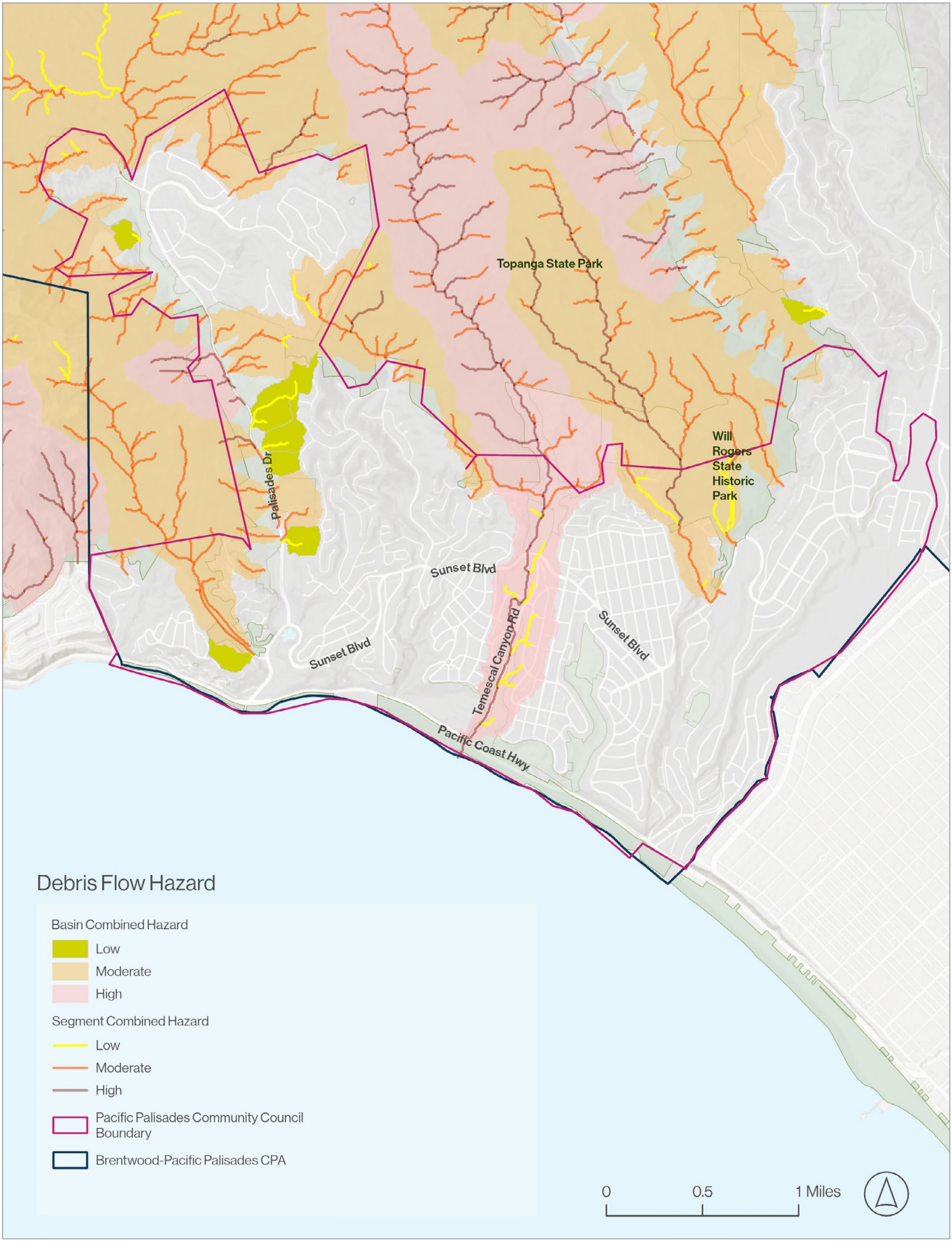


2.1.1.7. Post-Fire Debris Flow Hazard

For 2 to 5 years after a wildfire, the lack of vegetation can destabilize the soil, which increases the risk of mudslides, also known as debris flows, after a heavy rain event. Wildfire can also cause soil to become hydrophobic (retain less water), which heightens the likelihood of debris flows. One month after the 2017 Thomas Fire in Montecito, intense rainfall (0.25 inches in 15 minutes) over the burn scar triggered a debris flow that mobilized boulders and mud nearly 15 feet deep and resulted in 23 deaths, 163 injuries, and widespread property damage. Debris flows are an active risk in the Pacific Palisades area. The Los Angeles region has experienced seven storms since the Palisades Fire, all of which prompted evacuation warnings for most of Pacific Palisades, and evacuation orders for specific addresses within Pacific Palisades. Alerts were distributed through NotifyLA on February 2, March 11, October 13, November 12, December 22, and December 30, 2025, and January 2, 2026 (NotifyLA, 2026).

The U. S. Geological Survey (USGS) creates hazard maps showing the likelihood and potential magnitude of debris flows to help localities mitigate risks following wildfire. USGS uses data on basin shape and drainage, burn severity, soil properties, and rainfall intensity and duration to estimate the likelihood that a debris flow will occur and the volume of the flow if it occurs (USGS, n.d.b). The debris flow model does not take infrastructure into account, but improved stormwater drainage systems, retaining walls, and debris basins can mitigate the risk of debris flow (USGS, n.d.a). Brown and red areas are more likely to experience debris flow during a heavy precipitation event.

Figure 2.3: USGS post-fire debris flow hazard



2.1.2. CAL FIRE Fire Hazard Severity Zones

This section describes CAL FIRE's Fire Hazard Severity Zone (FHSZ) designations and summarizes State, County, and City responsibilities for fire protection in FHSZs.

Wildland fire protection in California is a shared responsibility among state, local, and federal agencies, each overseeing different jurisdictions based on land use, ownership, and population density. CAL FIRE is the state-level hazard response team that serves and protects the people, property, and resources of California (State of California, 2025a). CAL FIRE responds to daily emergencies, including wildfires, serves in 36 out of 58 of the state's counties, and protects over 31 million acres of wildlands. In addition to response, CAL FIRE oversees vegetation management programs, enforces fire-safe building standards, and designates Fire Hazard Severity Zones (FHSZs). These zones are used to identify areas that are most likely to experience wildfires over the next 30 to 50 years using a science-based model. Areas that fall under the State's purview are called State Responsibility Areas (SRAs) and areas that fall under a local jurisdiction's purview are called Local Responsibility Areas (LRAs). Both SRAs and LRAs are subject to the same requirements for ignition-resistant construction and defensible space. The most recent LRA map update was in March 2025 (CAL FIRE, 2025b), and the most recent SRA update was in April 2024 (CAL FIRE, 2025b).

FHSZ designations are based on environmental and historical factors that include but are not limited to the following:

- **Vegetation type and density:** Fine fuels such as grasses, needles, and leaves ignite quickly and burn rapidly, while heavier fuels such as tree branches and logs take longer to ignite but can sustain fire for longer periods. Fuel type is the main determinant of flame length, rate of spread, and ember production, which can lead to spot fires ahead of the main blaze.
- **Slope and terrain:** Steeper slopes increase the rate of spread; fire moves faster uphill because it preheats fuels ahead of the main blaze. Barriers such as roads, rivers, and lakes can stop, or slow fire spread while canyons and valleys can channel wind and intensify fire behavior.
- **Fire history, typical fire weather, and wind patterns:** Areas with frequent fires may have less fuel accumulation. High temperatures, low humidity, and dry conditions all increase fire risk. Wind patterns determine oxygen delivery and can drive fire spread.

FHSZs are a critical tool for guiding land use planning, building codes, insurance underwriting, and fire risk analysis. "Wildfire hazard" refers to the potential for wildfire occurrence and extreme fire behavior, not risk. Risk also considers mitigation efforts such as defensible space and fire-resistant construction.

FHSZs have the following three levels:

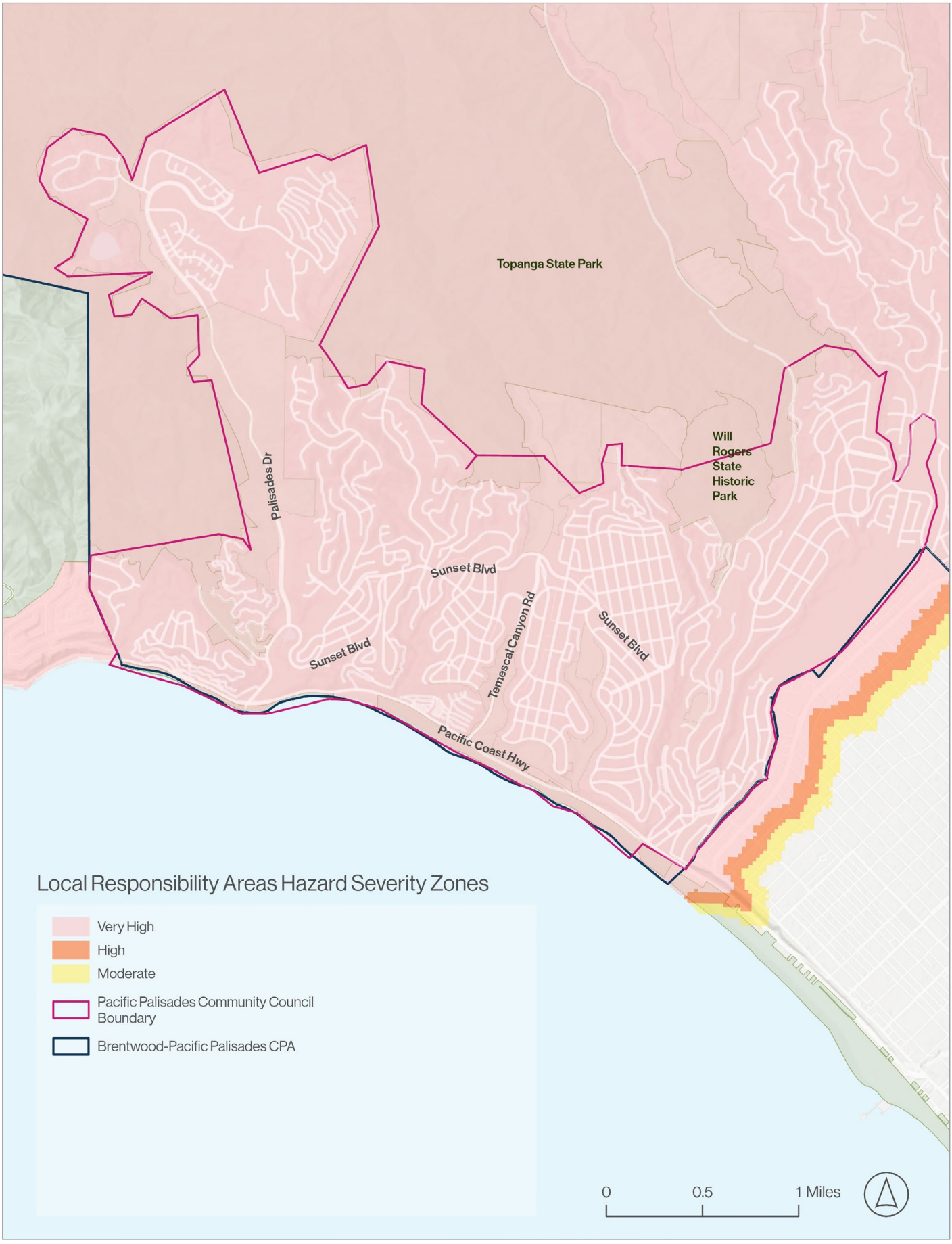
- **Moderate:** Areas with lower vegetation density, fewer ignition sources, and less frequent wildfire activity
- **High:** Areas with dry conditions, moderate vegetation, and increased wildfire frequency
- **Very High:** Areas with dense vegetation, steep slopes, strong winds, and a high potential for rapid fire spread

In Los Angeles County, SRAs are managed by CAL FIRE and include rural unincorporated lands, state parks, and forested areas; SRAs also cover large portions of the Angeles National Forest and Santa Monica Mountains National Recreation Area, where Cal Fire works with the US Forest Service and National Park Service, respectively to manage wildfire risk. LRAs are managed by local governments, including the County and incorporated cities such as Los Angeles. Pacific Palisades is in an LRA that is designated as a Very High Fire Hazard Severity Zone (VHFHSZ) as shown in Figure 2.4. The City and LAFD are responsible for implementing fire safety regulations in the LRA.

Under California Government Code (CGC) § 51179, local agencies are required to adopt the LRA maps by ordinance within 120 days of release and enforce building and vegetation management standards for properties within VHFHSZs (CGC § 51179). A person who owns, leases, controls, operates, or maintains an occupied structure within a VHFHSZ must ensure the following:

- New buildings use ignition-resistant construction materials including fire-resistant roofing and siding and non-combustible decks and fences per California Building Code Chapter 7A (State of California, 2023)
- Must maintain defensible space up to 100 feet from all sides of your structure (front, back, and sides)

Figure 2.4: CAL FIRE Fire Hazard Severity Zones within the PPCC and Brentwood-Pacific Palisades CFA boundaries (CAL FIRE, 2025b)



2.1.3. Existing Wildfire Mitigation Plans

2.1.3.1. LADWP Wildfire Mitigation Plan

The Los Angeles Department of Water and Power (LADWP) 2025 Wildfire Mitigation Plan details the measures LADWP is taking to mitigate wildfire threats that could be caused by electrical equipment (LADWP, 2025b). The plan is updated annually in compliance with California Public Utilities Code § 8387, which mandates that local publicly owned electric utilities and electrical cooperatives develop annual Wildfire Mitigation Plans that identify risks and drivers for wildfires, protocols for de-energization, metrics for evaluating effectiveness, and community outreach procedures. Wildfire mitigation measures in the plan include enhanced vegetation clearance around power lines, annual inspections of overhead lines, and public education campaigns on fire safety and preparedness.

2.1.3.2. City of Los Angeles Hazard Mitigation Plan

The City's 2024 Local Hazard Mitigation Plan (City of Los Angeles, 2024) describes actions the City can take to reduce damage and risks from a wide variety of disasters, including civil disorder, hazardous material release, geomagnetic storms, smoke and air pollution, and wildfires. The plan identifies over 112,000 structures with an estimated $77 billion valuation and 616,000 residents (15.9% of the City's population) in FHSZs. The plan details planning efforts, policy changes, and infrastructure improvement projects the City can take to reduce the impact of hazards. Alternatives include creating defensible space around developed structures, clearing fuels on private property, locating new development outside FHSZs, and requiring higher regulatory standards for building materials and roofing. The plan outlines citywide hazards but does not include strategies specific to the Pacific Palisades.

2.1.4. Existing Wildfire Fuel Treatment Activities

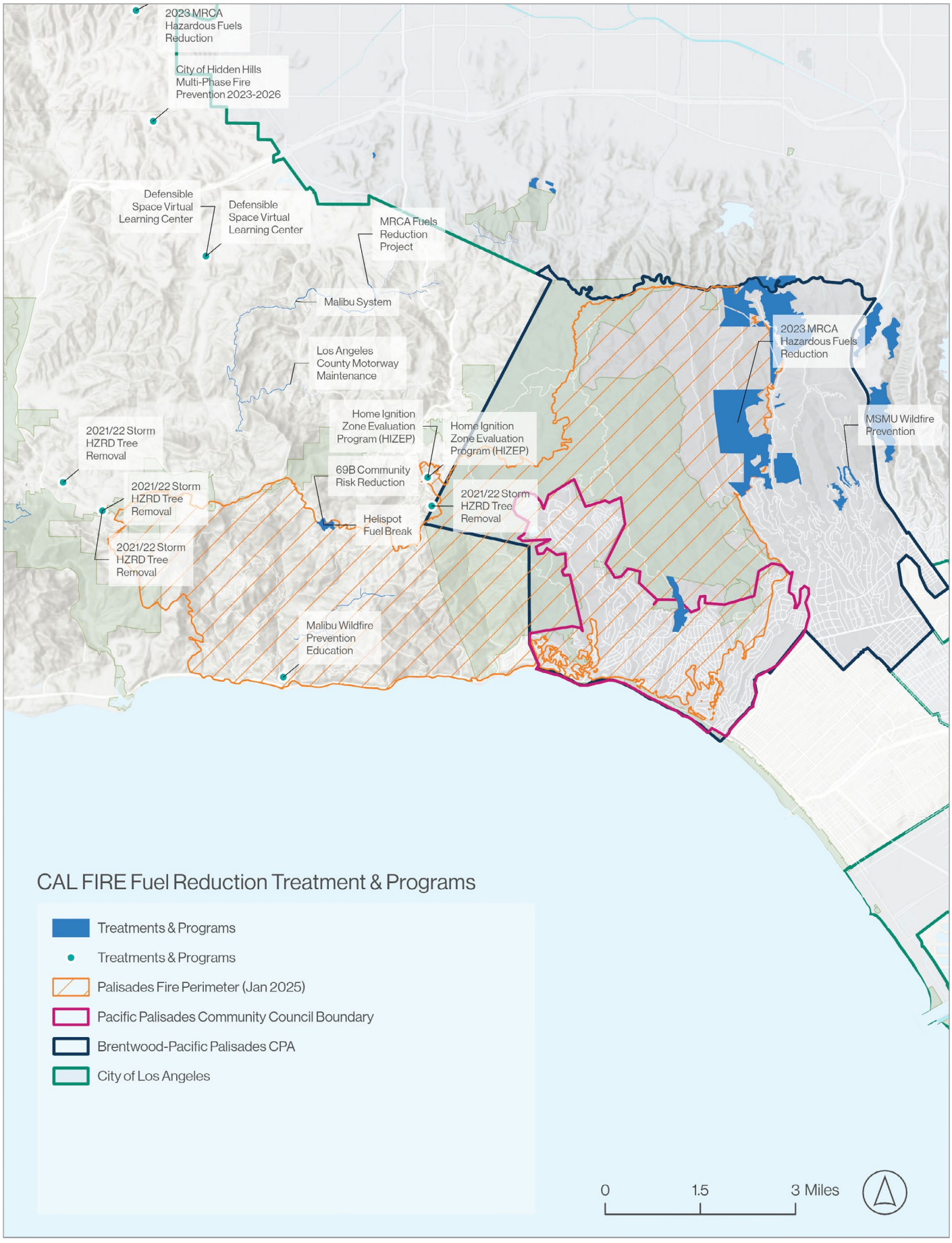
2.1.4.1. CAL FIRE Fuel Reduction Projects

As part of CAL FIRE's Wildfire Prevention Grants (WPG) Program and Fire Plan (FP) Program, LACoFD has conducted the fuel reduction treatment activities listed in Table 2.3 and shown in Figure 2.5 in areas within and surrounding the Palisades Fire perimeter to remove overgrown vegetation.

Table 2.3: CAL FIRE Fuel Reduction Prcjects in Areas in and Surrounding the Palisades Fire Perimeter

Project	Project Status	Acres Treated to Date	Activity	Program	Active Work Time Frame
2021/22 Storm Hazard Tree Removal	Active	—	Trees felled	FP	January 2022
Mountains and Recreation Conversation Authority (MRCA) Fuels Reduction Project	Active	5.5	Handline; mastication	FP	September 2025
2023 MRCA Hazardous Fuels Reduction	Active	372.5	Mastication	WPG	March to December 2024
Los Angeles County Motorway Maintenance	Active	2	Mastication	WPG	September to December2023
Helispot Fuel Break	Active	28.6	Chipping; thinning	FP	June 2021 to June 2025
69B Community Risk Reduction	Active	18.1	Grazing	FP	July to August 2024
Home Ignition Zone Evaluation Program (HIZEP)	Active	—	Project admin.	WPG	June 2023 to March 2025
Malibu System	Active	91.3	Thinning	FP	April 2019 to August 2025
Mount Saint Mary's University-Los Angeles Wildfire Prevention	Complete	21.6	Mastication	WPG	January 2023 to March 2025
Defensible Space Virtual Learning Center	Complete	—	Project admin.	WPG	December 2021 to March 2024
Malibu Wildfire Prevention Education	Complete	—	Project admin.	WPG	Jan 2022 to Mar 2024

Figure 2.5: CAL FIRE fuel reduction prcjects



2.1.5. Wildfire Protection Regulatory Framework in Pacific Palisades

The City and County have implemented programs and building code standards that mandate proactive vegetation management and infrastructure upgrades. The programs are consistent with CGC §§ 51175–51189, which establishes the legal framework for identifying and managing areas identified as VHFHSZs.

2.1.5.1. Brush Clearance Program

The City's Brush Clearance Program requires that property owners in VHFHSZ areas clear hazardous vegetation and maintain defensible space within 200 feet of any structures/buildings and within 10 feet of any combustible fence or roadway used for vehicular travel (LAFD, 2017). Specific requirements include removing lower branches up to 6 feet off the ground on trees over 18 feet tall, pruning smaller trees and shrubs to one-third of their height, clearing vegetation around chimneys and roofs, and legally disposing of debris. Chipped vegetation may be redistributed onsite if it is not more than 3 inches deep or within 30 feet of any structure and not more than 6 inches deep beyond 30 feet.

2.1.5.2. Baseline Hillside Ordinance

The Baseline Hillside Ordinance (Los Angeles Building Code § 7006.8.3) is a zoning regulation designed to limit development in hillside areas. The ordinance applies to single-family homes in hillside areas, which include many homes in the Pacific Palisades, and limits building height to 36 feet on 0% to 66% slopes. LACP published guidance on implementing the ordinance in City of Los Angeles (2011). To reduce the risk of fire damage, the ordinance requires that existing and new buildings install approved automatic fire sprinkler systems in compliance with the Los Angeles Plumbing Code (Los Angeles Municipal Code §§ 94.100.0 to 94.400.0), which covers the entire building or dwelling. The ordinance also sets minimum street widths and driveway gradients and requires fire department access for new development.

2.1.5.3. California Defensible Space Requirements

California's defensible space requirements apply to properties in the SRA or VHFHSZs in the LRA, as designated by CAL FIRE.

Defensible space requirements apply to the area within 100 feet of a structure, currently categorized into two "zones":

- **Zone 1:** 0-30 feet from the structure
- **Zone 2:** 30-100 feet from the structure

Zones 1 and 2 are already subject to enforceable vegetation management requirements under California Government Code § 51182 and Los Angeles Fire County Code § 325.2.1. Zone 1 requirements apply within 30 feet of all structures (or to the property line) and include the removal of dead vegetation, pruning overhanging branches to maintain at least 10 feet of clearance from chimneys, and maintaining healthy tree spacing to minimize flammable materials and slow the spread of fire. Zone 2 covers the area from 30 to 100 feet and includes actions such as trimming grass, removing fallen leaves, and spacing trees to reduce potential fuel sources.

Zone 0, the most recently defined, covers the area within 5 feet of a structure and is intended to eliminate combustible materials and reduce ignition from wind-driven embers. This zone was introduced through Assembly Bill (AB) 3074, passed in 2020, but its requirements are not yet in effect. The State Board of Forestry and Fire Protection is currently developing implementing regulations, which must be finalized no later than December 31, 2025, per Governor Newsom's Executive Order N-18-25. As of November 2025, the regulations for Zone 0 are still under discussion (Haggerty, 2025). In the meantime, County guidance encourages the use of hardscape, removal of dead and dying plants, and pruning branches within 10 feet of chimneys to make this area ember resistant.

In Los Angeles County, California's defensible space requirements are enforced through the Defensible Space Inspection Program, which is a joint effort of LACoFD and the County of Los Angeles Agricultural Commissioner's Weights and Measures Department, Weed Hazard and Integrated Pest Management Bureau (LAFD, 2025b).

2.1.5.4. Wildland-Urban Interface (WUI) Regulations

The 2025 California WUI Code, adopted as Title 24 of the California Code of Regulations (CCR) Part 7 in 2025, establishes minimum statewide requirements for wildfire risk mitigation in designated WUI areas and FHSZs (State of California, 2025). These requirements apply to the Pacific Palisades, which is in an LRA that is designated as a VHFHSZ. Specifically, the WUI code applies to new construction and major rebuilds. Existing development is not subject to the new building standards unless it is undergoing substantial renovation or reconstruction. Chapter 6, Fire Protection Requirements, of Title 24 CCR Part 7 mandates the following critical strategies for structures in the FHSZ across the state:

- New construction in designated FHSZ or WUI areas must comply with fire protection design and performance criteria (in projects subject to that requirement), including Class A fire-rated roofing materials, non-combustible or ignition-resistant exterior walls, and fire-resistant doors, windows and vents.
- Submission of a landscape or vegetation management plan when triggered by the code (with ongoing fuel-modification obligations)
- Establishment and ongoing maintenance of defensible space zones (30 to 100 feet) around structures and subdivisions to reduce ignition risk and promote fire suppression access.

Until the 2025 code cycle, regulations specific to WUI areas were scattered across parts of the California Building Code (Chapter 7A) (State of California, 2023) but were consolidated into a new, stand-alone code (California WUI Code) in Part 7 of Title 24 CCR Part 7 to clarify regulations for buildings in FHSZs.

2.1.5.5. Statewide Fuels Reduction Environmental Protection Plan

The California Natural Resources Agency (CNRA) and California Environmental Protection Agency (CalEPA) have developed a Statewide Fuels Reduction Environmental Protection Plan (EPP) (CalEPA et al., 2024) to fulfill Governor Newsom's State of Emergency Proclamation signed on March 1, 2025, seeking to expedite fuels reduction projects that protect communities and reduce severe risks of catastrophic wildfires. The EPP facilitates the timely implementation of essential wildfire safety initiatives while ensuring the protection of public health and the environment. It outlines protective measures for projects exempted from state permitting requirements under the proclamation. Additionally, the EPP includes Best Management Practices (BMPs), designed jointly by CNRA, CalEPA, and several partner agencies, to minimize environmental impacts during fuels reduction efforts. These BMPs focus on preserving air and water quality, safeguarding Tribal cultural resources, protecting special-status species and their habitats, and conserving other critical habitat resources (CalEPA et al., 2024).

2.2. Vulnerability Assessment

Wildfire risk is influenced by a range of vulnerabilities that span natural and built environments, community assets, and social elements. Areas like Pacific Palisades that experience prolonged drought, dry air, dense vegetation, and poor vegetation and land management are more susceptible to ignition and rapid fire spread. Social vulnerabilities, such as limited access to emergency services, lack of physical mobility, language barriers, and lack of economic resources, can reduce community preparedness and response. Aging infrastructure, lax vegetation maintenance standards, and buildings with flammable materials compound risks.

The vulnerability assessment in this section provides an overview of the elements of the natural and built environments and the underlying socioeconomic characteristics that contributed to the damage, destruction, and displacement from the Palisades Fire. Note that further analysis of vulnerabilities related to water supply, energy, and transportation facilities are contained in the respective sections of this report (Alternative Wildfire Water Supply, Electrical Energy System, and Evacuation Capabilities).

This section describes the following types of vulnerability:

- **Natural environment:** Susceptibility of natural resources, such as vegetation and wildlife, to wildfire and other hazards
- **Built environment:** Ability of infrastructure, housing, and urban systems to withstand physical risks
- **Social:** How demographic, economic, and cultural factors influence a community's ability to prepare for, respond to, and recover from adverse events

2.2.1. Natural Environment Vulnerability

The vulnerability of the natural environment before and after the Palisades Fire was assessed using a wildland fire fuel model. Understanding the vegetation conditions that led to the rapid growth of the Palisades Fire and the post-fire conditions can inform fuels management and maintenance decisions. Vegetation levels were significantly altered due to the fire; comparing the pre-fire vegetation environment with USGS analysis of Palisades Fire burn severity provides insight into the likely state of the post-fire vegetation environment. Vegetation type and humidity are the core drivers of wildfire behavior in the chaparral- and shrub-dominated ecosystems of the Santa Monica Mountains.

The analysis used fuel types from the USGS Landscape Fire and Resource Management Planning Tools (LANDFIRE) Fire Behavior Fuel Model (FBFM40), developed in 2022, to map surface fuel components. The components are described by the most common fuel types: grass, brush, timber, or slash. Weather variables such as wind, temperature, and precipitation were evaluated during model design but were not included to intentionally maintain a stable, non-seasonal framework that focused on long-term structural wildfire potential rather than on short-term weather variability. Fuel type, continuity, and structure exert primary control over fire intensity, flame length, and rate of spread.

The fuels assessment was performed on an area larger than the PPCC area and Palisades Fire burn area to capture the broader vegetation environment surrounding Pacific Palisades. This area, referred to as the Fuels Assessment Area, contains the Palisades Fire burn area and PPCC area, along with surroundings bounded by Malibu Canyon Road to the west, Highway 101 to the north, Interstate 405 and the Brentwood-Pacific Palisades CPA boundary to the east, and PCH to the south. Due to a slight margin of error in geospatial data, the burn area total acreage in this analysis captures a total area approximately 400 acres greater than the official fire acreage from CAL FIRE referenced earlier in this report. The pre-fire fuel environment in the Fuels Assessment Area was characterized using FBFM40, which provides high-resolution geospatial data to support wildland fire and natural resource management across the United States. FBFM40 describes 40 types of surface fuels used to simulate fire behavior, such as fuel loading, size classes, and moisture.

2.2.1.1. Pre-Fire Fuel Environment

The pre-fire Fuels Assessment Area environment was dominated by a combination of non-burnable surfaces, grass and grass-shrub fuels, and extensive chaparral shrublands, reflecting the mosaic of urban development, open space, and native vegetation typical of the Santa Monica Mountains. Table 2.4, Figure 2.6, and Figure 2.7 show the pre-fire fuel types in the Fuels Assessment Area, burn area boundary, and PPCC area.

Table 2.4: Pre-fire LANDFIRE Fuel Types for the Fuels Assessment Area, Burn Area Boundary, and PPCC Area

Fuel Type	Fuels Assessment Area		Burn Area Boundary		PPCC Area	
	Acres	Coverage (%)	Acres	Coverage (%)	Acres	Coverage (%)
Short Grass, Sparse, Dry	1,228.7	1%	67.7	0%	144.6	3%
Grass, Low Load, Dry	1,061.9	1%	142.6	1%	46.6	1%
Grass, Low Load, Very Coarse, Humid	12.0	0%	1.6	0%	3.1	0%
Grass-Shrub, Low Load, Dry	2,351.1	2%	411.6	2%	248.8	5%
Grass-Shrub, Moderate Load, Dry	9,884.3	10%	2,586.1	11%	363.3	7%
Grass-Shrub, Moderate Load, Dry	3,247.6	3%	1,455.6	6%	150.7	3%
Urban	32,992.4	34%	3,998.9	17%	3,311.1	64%
Agricultural	2.2	0%	—	0%	—	0%
Water	13,476.7	14%	4.7	0%	4.8	0%
Barren	139.2	0%	39.6	0%	34.9	1%
Shrub, Low Load, Dry	1,006.8	1%	364.1	2%	—	0%
Shrub, Moderate Load, Dry	1,207.4	1%	101.3	0%	16.4	0%
Shrub, Low Load, Humid	3.3	0%	—	0%	—	0%
Shrub, High Load, Humid	24,084.8	25%	12,381.9	51%	407.3	8%
Shrub, Very High Load, Dry	24.4	0%	19.3	0%	—	0%
Low Load, Compact Conifer Litter	38.5	0%	18.8	0%	—	0%
Broadleaf Conifer Litter, Low Load	10.9	0%	1.1	0%	—	0%
Low Load, Compact Conifer Litter	1,929.5	2%	277.2	1%	202.0	4%
Broadleaf Litter, Low Load	9.8	0%	2.4	0%	0.7	0%
Conifer Litter, High Load	704.8	1%	103.2	0%	71.6	1%
Broadleaf Litter, Moderate Load	1,564.8	2%	660.1	3%	72.4	1%
Long Needle Litter	178.4	0%	36.5	0%	36.9	1%
Broadleaf Litter, Very High Load	27.6	0%	6.8	0%	14.5	0%
Timber Grass Shrub, Low Load, Dry	49.6	0%	15.0	0%	—	0%
Timber-Shrub, Moderate Load, Humid	10.9	0%	3.9	0%	—	0%
Timber-Shrub, Moderate Load, Humid	79.2	0%	18.2	0%	7.3	0%
Timber Shrub, Very High Load, Dry	2,625.8	3%	1,332.2	6%	49.5	1%
Total	**97,952.6**	**100%**	**24,050.4**	**100%**	**5,186.5**	**100 %**

Source: LANDFIRE (2024)

Figure 2.6: Pre-fire fuel types and models (LANDFIRE, 2024)

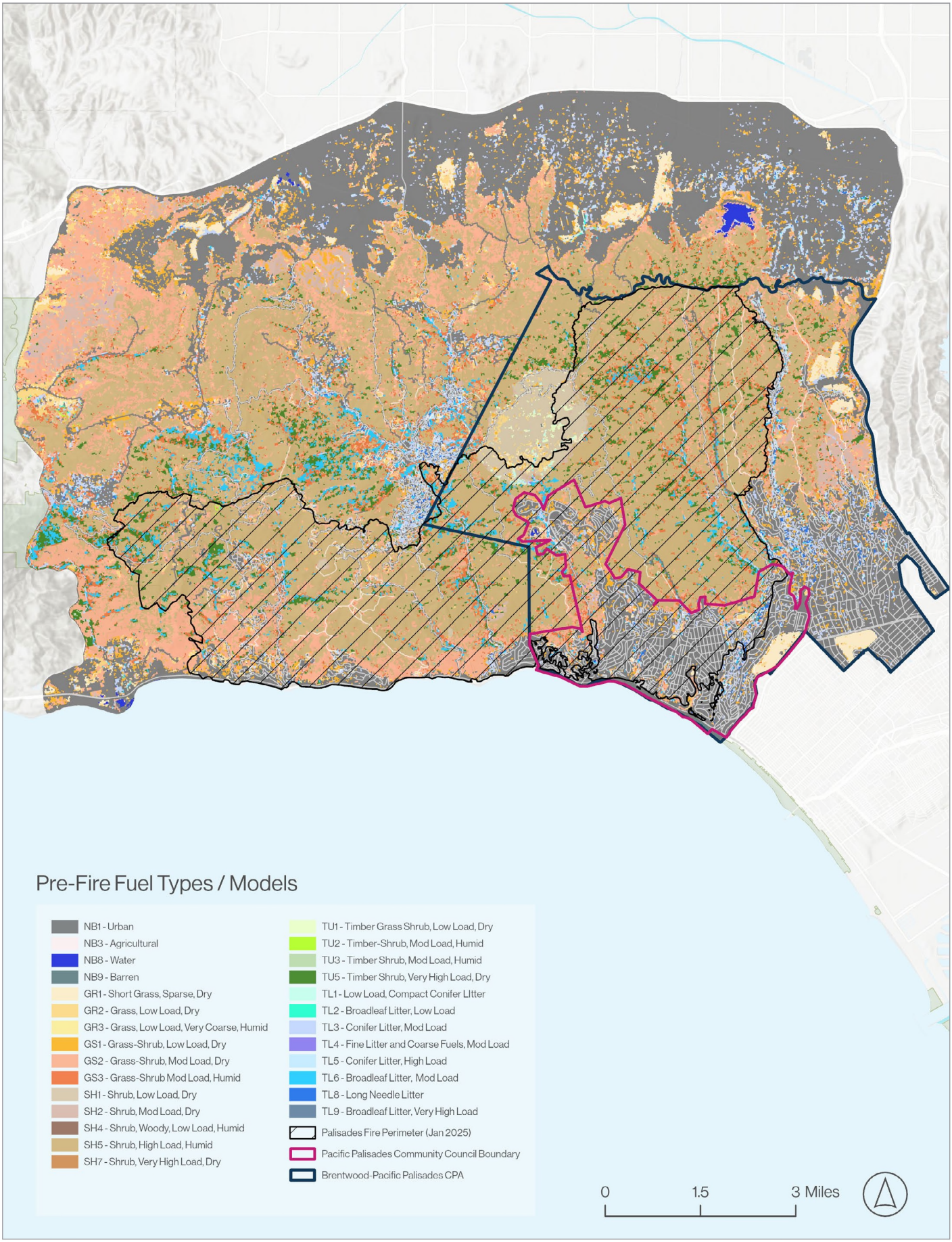
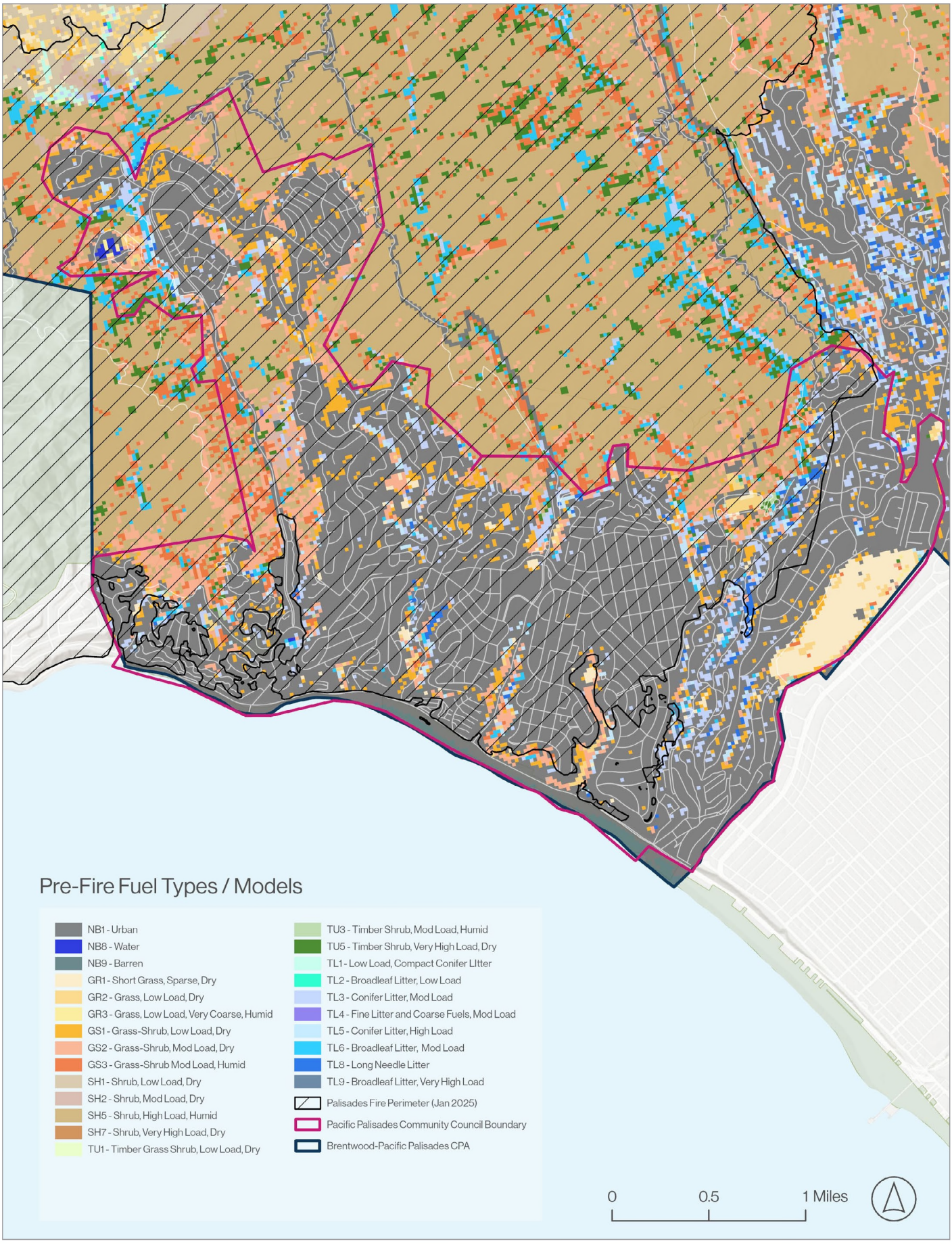


Figure 2.7: Pre-fire fuel types and models – PPCC (LANDFIRE, 2024)



Non-burnable fuel models (NB1, NB8) accounted for 47.4% of the total landscape; NB1 represented 33.7%, and NB8 represented 13.8% of the total landscape. Non-burnable fuels include developed parcels, rock outcrops, open water, and other non-fuel surfaces that act as discontinuities within the fuel bed.

Shrub fuels (e.g., SH5, SH1, SH2, SH4, SH7) comprised 26.9% of the study area; SH5 alone represented 24.6%. The dominance of mature chaparral aligns with the known ecology of the Santa Monica Mountains, where these vegetation types are capable of sustaining high flame lengths and rapid spread, particularly under Santa Ana wind conditions. Shrubs produce high intensity fires with long flame lengths and are difficult to suppress.

Grass and grass-shrub fuels (GR and GS series) are also well-represented. GS2 was the largest contributor at 10.09%, followed by GS1, GS3, and scattered GR models. These fine, flashy fuels are highly responsive to curing and seasonal drying, creating fast-spreading surface fire potential during critical fire weather. Grass fires are short and intense and relatively easy to put out.

Timber litter and timber-understory fuel models (TL and TU series) occurred in smaller, patchier distributions, together comprising approximately 7.1% of the landscape. These areas are associated primarily with scattered tree cover and mixed chaparral–woodland edges and produce slow-moving fires with low flame lengths that can burn for long periods.

In total, approximately 52.6% of the landscape consisted of burnable fuels, in which shrub fuels represent the dominant burnable type. This pre-fire fuel structure is consistent with historical fire regimes in the region, where mature chaparral and mixed grass–shrub communities produce high-intensity, wind-driven fires that are difficult to control once ignited.

To characterize expected fire behavior under pre-fire conditions, the Behave model was run. Behave uses mathematical models to estimate the rate of spread, flame length, fire intensity, probability of ignition, spotting distance, and brown fire potential. The model was run with the fuel types from LANDFIRE and representative Santa Monica Mountains fire weather and terrain inputs, including:

- **Fuel moistures** (a measure of how much moisture is in different fuels and how quickly they burn, measured in percent):
  - 1-hour fuel moisture (grass and leaves): 3 to 12%
  - 10-hour fuel moisture (small twigs and branches): 4%
  - 100-hour fuel moisture (larger branches): 6%
  - Live herbaceous fuel moisture: 30%
  - Live woody fuel moisture: 60%
- **Wind speed** (stronger wind speeds will accelerate the head fire and increase flame length and promote spotting): 18 mph at 20 feet
- **Slope** (fires move faster uphill on steeper slopes): 40%
- **Spotting source** (are embers able to be carried by wind and ignite new fires): Ridgetop

Under these conditions, modeled surface fire rates of spread for grass-shrub fuels (GS), which covered 15% of the PPCC area and 19% of the burned area, ranged from 62.5 to 98.6 chains per hour (ch/h), or 4,125 to 6,508 feet per hour, while mature chaparral fuels (SH5) produced 136.3 to 198.0 ch/h, or 9,005 to 13,068 feet/hour, depending on fine fuel moisture. Corresponding flame lengths were approximately 7.4 to 10.8 feet for grass shrubs and 19.0 to 26.1 feet for shrubs.

The modeled outputs reflect high-intensity, wind-driven fire potential, consistent with historical fire behavior observed in the Santa Monica Mountains during Santa Ana events. SH5 chaparral fuels can support flame lengths exceeding 20 feet, making direct suppression extremely difficult. Even grass–shrub fuels under these conditions exhibit rapid rates of spread, contributing to fast-moving head fires and ember transport from ridgetops into adjacent urban areas. This combination of fuel model composition and expected fire behavior under typical critical weather conditions provides a clear picture of pre-fire wildfire potential in Pacific Palisades and establishes the baseline conditions against which post-fire fuel changes and treatment strategies can be evaluated.

Table 2.5 shows the rate of spread for GS2 and SH5 fuel types under varying 1-hour fuel moisture levels. Lower fuel moisture means fuels ignite and burn easily; higher moisture means fuels resist ignition and slow fire spread.

Table 2.5: Pre-Fire Surface Fire Rate of Spread (ch/h)

Fuel Model	1-h Fuel Moisture									
	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%
GS2 (Grass-Shrub, Moderate Load, Dry)	98.6	92.6	88.1	84.6	81.8	79.1	76.3	73	69	62.5
SH5 (Shrub, High Load, Humid)	198	187.4	179.4	173.3	168.3	163.7	158.8	152.9	145.7	136.3

Source: Fire Research and Management Exchange System (Frames) BehavePlus v6.0.0 fire modeling system

Table 2.6 shows the pre-fire flame length for GS2 and SH5 fuel types under varying 1-hour fuel moisture levels. Lower fuel moisture is correlated with longer flame lengths and faster rates of spread.

Table 2.6: Pre-Fire Surface Fire Flame Length (feet)

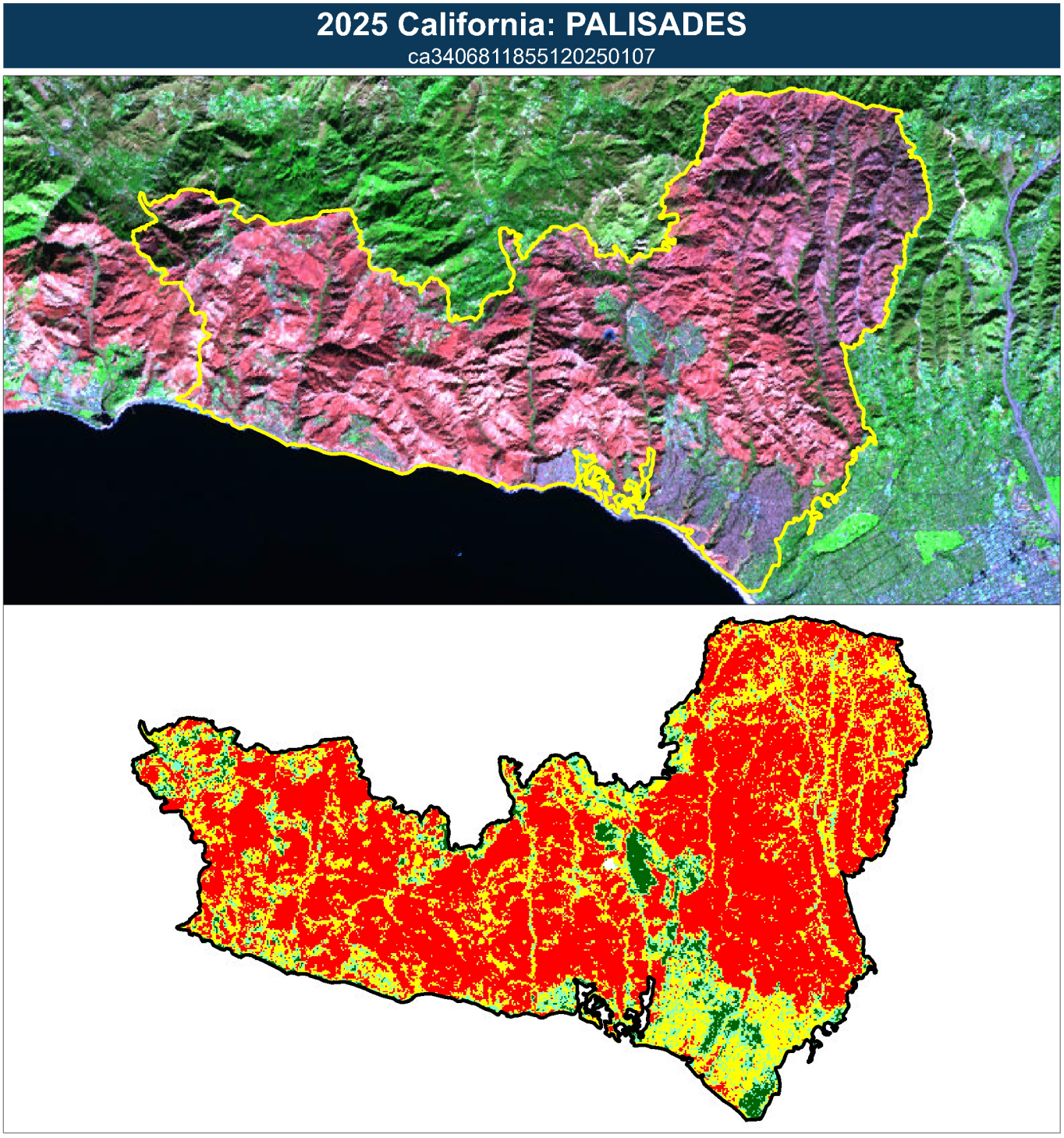
Fuel Model	1-h Fuel Moisture									
	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%
GS2 (Grass-Shrub, Moderate Load, Dry)	10.8	10.3	9.9	9.6	9.3	9.1	8.8	8.5	8.1	7.4
SH5 (Shrub, High Load, Humid)	26.1	24.9	24	23.3	22.7	22.2	21.7	21	20.1	19

Source: Frames BehavePlus v6.0.0 fire modeling system

2.2.1.2. Post-Fire Fuel Environment

As post-fire fuel data is not yet available, and field verification and advanced modeling were not feasible within the scope of this analysis, the post-fire analysis relies on the USGS burn severity map, shown in Figure 2.8, to make assumptions about changes in the vegetation environment. In areas of high burn severity, much of the mature shrub-dominated chaparral (previously represented by SH5, or tall, dense shrubs with high fuel loads) is expected to be replaced with lower intensity fuel models consisting of sparse, short-stature shrub (SH1, SH2), grass–shrub (GS1, GS2), and grass fuels (GR1, GR2), which have less fire potential due to lower canopy heights, more gaps between fuel sources, and less biomass. The shift reflects the immediate post-disturbance condition, characterized by decreased canopy height, reduced fuel continuity, and lower bulk fuel loading.

Figure 2.8: Palisades fire burn severity





Latitude: 34° 04' 48.0"
Longitude: -118° 35' 38.4"
Fire Ignition Date: January 07, 2025
Assessment Type: Initial
Pre-Fire Image Date: January 12, 2024 (L9)
Post-Fire Image Date: January 14, 2025 (L9)

USGS

This map portrays fire severity for the fire specified in the map title and summarizes proportions of fire severity classes. These data are produced under the Provisional Initial Assessment (PIA) mapping project jointly implemented by the USGS EROS and the USFS GTAC. The PIA mapping project ascertains the locations of fires based on available fire occurrence information provided by federal and state agencies, and other reliable sources. The PIA mapping project reserves the right to correct, update or modify geospatial inputs to this map without notification.

0 2 4 Miles

Acreage of Burn Severity

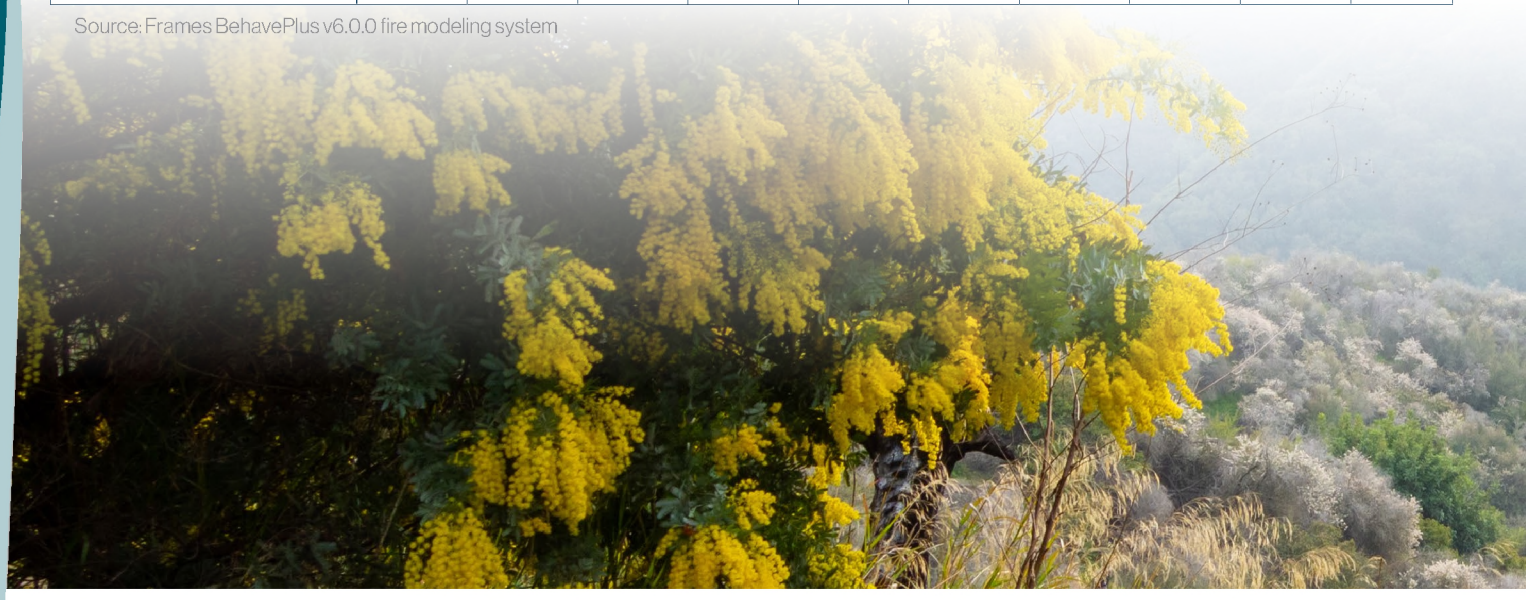
Burn Severity	Acres
Unburned to Low	1,083
Low	1,750
Moderate	6,980
High	14,173
Increased Greenness	1
Non-Processing Area Mask*	14
Total	**24,001**

To understand how these changes to the vegetation environment may affect fire behavior in the Fuels Assessment Area, the same environmental parameters used in the pre-fire analysis were applied in the Behave model to isolate the effects of reduced fuel loading and structural change. For the fuel types assumed present in the post-fire environment, modeled fire behavior was substantially reduced compared to pre-fire conditions. Table 2.7 shows the predicted rate of spread for different fuel models under varying 1-hour fuel moisture levels. Surface fire rates of spread declined sharply; grass fuel models (GR1 and GR2) produced values between approximately 5.8 and 165.9 ch/h, with the large spread accounting for a high dependence on fine fuel moisture. Grass fuel models generated rates between 57.2 and 98.6 ch/h, which represented moderate spread potential associated with residual fine fuel continuity. The regenerating shrub (SH1 and SH2) fuels produced the lowest rates and ranged from roughly 1.6 to 27 ch/h, which reflected sparse and discontinuous regrowth.

Table 2.7: Post-Fire Surface Fire Rate of Spread (ch/h)

Fuel Model	1-h Fuel Moisture									
	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%
Short Grass, Dry (GR1)	27.3	21.4	18	16.1	14.9	13.8	12.6	10.9	8.6	5.8
Grass, Dry (GR2)	165.9	147	134.1	125.4	119	113.3	107.1	98.7	77.9	52.5
Grass-Shrub, Low Load, Dry (GS1)	71.5	66.9	63.6	61	59	57.2	55.3	52.8	45.8	8.7
Grass-Shrub, Moderate Load, Dry (GS2)	98.6	92.6	88.1	84.6	81.8	79.1	76.3	73	69	62.5
Shrub, Low Load, Dry (SH1)	38	33.5	26.2	6.2	3	2.9	2.7	2.5	2.1	1.6
Shrub, Moderate Load, Dry (SH2)	27	26.1	25.5	24.9	24.3	23.4	21.6	18.1	10.8	5.5

Source: Frames BehavePlus v6.0.0 fire modeling system



Flame lengths followed a similar pattern. GR1 and GR2 models generated flames between 1.0 and 9.7 feet, GS1 and GS2 between 6.1 and 10.8 feet, and SH1 and SH2 between 0.6 and 9.3 feet. These values contrast sharply with the 20-foot-plus flame lengths generated under pre-fire SH5 conditions, demonstrating a temporary reduction in fire intensity and crown ignition potential.

While these results suggest a notable decline in modeled fire behavior, the expected increase in fine grass and mixed grass–shrub fuels introduce a different fire regime characterized by lower intensity but potentially higher frequency fires due to the rapid curing and high ignitability of fine fuels. With vegetation already substantially reduced, this transitional post-fire state is critical for planning targeted fuel treatments, green space buffers, and monitoring strategies to prevent reburning during early vegetation recovery. Table 2.8 shows the estimated flame length for fuel types at different 1-hr fuel moistures.

Table 2.8: Post-Fire Surface Fire Flame Length (feet)

Fuel Model	1-h Fuel Moisture									
	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%
Short Grass, Dry (GR1)	2.6	2.2	2	1.9	1.8	1.7	1.6	1.5	1.3	1
Grass, Dry (GR2)	9.7	8.8	8.3	7.9	7.6	7.4	7.1	6.7	5.8	4.5
Grass-Shrub, Low Load, Dry (GS1)	7.5	7.1	6.8	6.5	6.4	6.2	6.1	5.8	5.1	1.7
Grass-Shrub, Moderate Load, Dry (GS2)	10.8	10.3	9.9	9.6	9.3	9.1	8.8	8.5	8.1	7.4
Shrub, Low Load, Dry (SH1)	5.9	5.2	4.2	1.5	1	0.9	0.9	0.8	0.8	0.6
Shrub, Moderate Load, Dry (SH2)	9.3	9	8.9	8.7	8.5	8.2	7.7	6.5	4.1	2.2

Source: Frames BehavePlus v6.0.0 fire modeling system



Based on the pre-fire LANDFIRE fuels data and the USGS Burn Severity map, the Palisades Fire transformed the vegetation environment from dense, flammable vegetation to a more open space with lower fuel loads. The assumed post-fire fuel types are expected to generate shorter flame lengths, slower fire spread, and reduced likelihood of crown and ladder fires. The assumed changes in vegetation and fuel characteristics, and short-term effects on fire behavior are summarized in Table 2.9.

Table 2.9: Change in Vegetation and Fuel Characteristics Before and After the Palisades Fire

Variable	Pre-Fire Condition	Assumed Post-Fire Condition	Assumed Short-term Effect on Fire Behavior
Fuel	High-chaparral/shrub fuels with high flame length and rate-of-spread potential	Sparse or non-burnable surface fuels	Large reduction in modeled flame length and rate of spread potential
Canopy Bulk Density	Dense canopy fuels supporting potential for crown fire behavior	Severely reduced canopy density	Minimal likelihood of sustained crown fire
Canopy Base Height	Low crown base heights facilitating ladder fire	Increased height or removal of canopy fuels	Reduced ladder fire potential and crown ignition likelihood
Canopy Cover	Dense canopy structure	Open structure with minimal canopy closure	Less vertical continuity, lower crown ignition potential
Canopy Height	Tall, continuous canopy structure	Reduced canopy height or canopy loss	More open vertical structure, limiting ladder and crown fire dynamics
Vegetation Cover	Dense shrub cover providing continuous surface fuels	Significantly reduced surface fuel coverage	Decreased surface fire spread potential
Vegetation Height	High shrub and understory height	Low vegetation height	Decreased ladder fuel connectivity and flame length
Vegetation Type	Flammable chaparral and shrub communities	Temporary post-burn, low-flammability condition	Lower overall flammability and reduced ignition/spread probability

While this reduction in fuels is expected to temporarily reduce immediate wildfire potential, exposure and suppression factors related to roads, WUI, infrastructure, and terrain have not changed. These results illustrate how post-fire landscapes exhibit temporarily lower modeled fire intensity and spread potential but also highlight that vulnerability is not eliminated. Without active fuel management or greenspace restoration, chaparral landscapes in this region typically re-accumulate hazardous fuels within 5 to 10 years, returning FBFM and canopy structure values to pre-fire levels. The return to pre-fire level underscores the importance of using post-fire periods strategically to implement targeted fuel treatments, firebreak construction, and vegetation management measures to prevent rapid re-establishment of high hazard conditions.

2.2.2. Built Environment and Community Assets

2.2.2.1. Built Environment

Prior to the fire, homes in the PPCC area were an average of 60 years old and pre-date fire resilient construction approaches. The median construction year for homes in Pacific Palisades is 1962; approximately 21% of homes were built prior to 1950, 67% were constructed between 1950 and 2000, and just 14% were constructed in the last 25 years (CAL FIRE, 2025c). Newer construction integrated more fire-resistant materials, but many homes retain legacy elements such as wooden frames, decks, fences, and balconies, which were more likely to connect with flammable landscaping (LAFD, 2025c). The International Building Code (IBC) (ICC, 2024) uses a classification system for building construction types that indicates fire resistance and the safety of occupants during a fire. Type I buildings, the most fire resistive, are made of high-quality noncombustible materials such as concrete and steel framing rated to withstand fires for 2 to 3 hours. The most common category for single-family homes (70% of homes in Pacific Palisades) is the least fire resistive, Type V, which is characterized by buildings constructed largely wood without a fire-resistance rating. Large commercial properties in the fire boundary have predominantly concrete exterior walls with wood interiors.

6,837 structures in Pacific Palisades, Malibu, and Topanga were destroyed, including 5,421 single-family homes, 135 multi-unit homes, 158 commercial buildings, and several community assets and critical infrastructure facilities (CAL FIRE Damage Inspection Data, 2025). See Table 2.10 .

Standard fire damage procedures categorize damage into five categories:

- **No Damage:** Structure with damage affecting less than 1% of the total square footage
- **Affected:** Minimal damage; no impact on habitability
- **Minor:** Cosmetic or partial damage; still habitable
- **Major:** Significant structural compromise; unsafe to occupy
- **Destroyed:** Total loss

Table 2.10: Destruction by Building Type and Damage Category in Pacific Palisades, Malibu, and Topanga

Building Type	Total No. of Buildings	Damage Category									
		No Damage		Affected		Minor		Major		Destroyed	
		No.	%	No.	%	No.	%	No.	%	No.	%
Infrastructure	**30**	24	80%	5	17%	0	0%	0	0%	1	3%
Mixed Commercial/ Residential	**11**	6	55%	1	9%	1	9%	0	0%	3	27%
Multiple Residence	**391**	204	52%	37	9%	8	2%	7	2%	135	35%
Nonresidential Commercial	**340**	143	42%	27	8%	7	2%	5	1%	158	46%
Other Minor Structure	**1,764**	536	30%	81	5%	21	1%	9	1%	1,117	63%
Single Residence	**9,417**	3,232	34%	579	6%	134	1%	51	1%	5,421	58%
Total	**11,953**	**4,145**	**35%**	**730**	**6%**	**171**	**1%**	**72**	**1%**	**6,835**	**57%**

Over half (57%) of all structures were destroyed, leaving the Pacific Palisades neighborhood with houses reduced to rubble and ash, as shown in Figure 2.9.

Figure 2.9: Home in Pacific Palisades before and after the fire; left photo (Google Maps); right photo (County of Los Angeles, n.d.)



2.2.2.2. Community Assets

Community assets provide essential services to the community and are priority locations for restoration efforts and future wildfire hardening and protection projects. Community assets are places that strengthen and support a community by improving quality of life and resilience. Community assets are shown in Figure 2.10. Public properties with buildings that were damaged or destroyed include the Palisades Recreation Center, Palisades Branch Library, recreational areas, and schools. The damage they sustained in the Palisades Fire is listed in Table 2.11.

Figure 2.10: Community Assets in Pacific Palisades

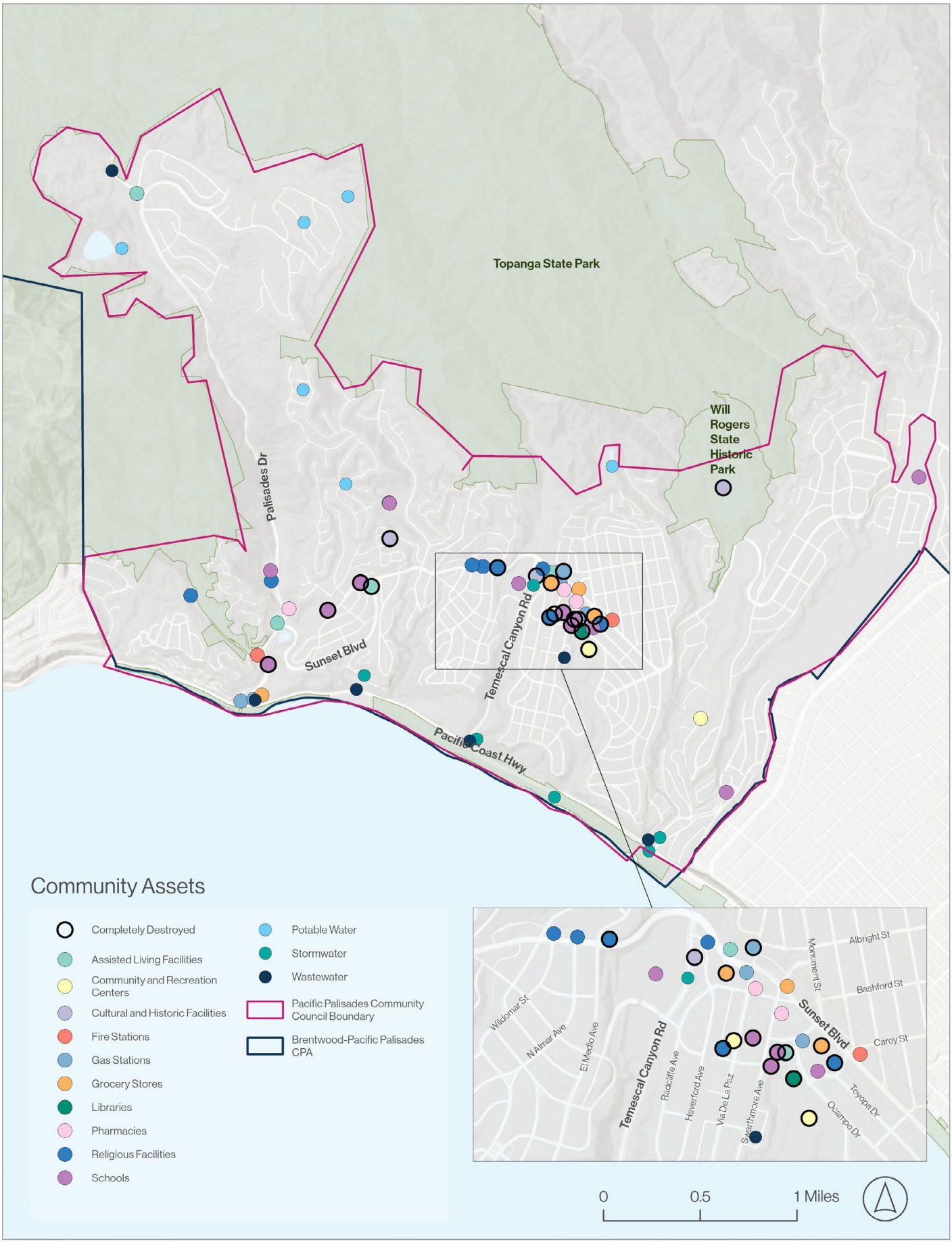


Table 2.11: Community Asset Damage Sustained in the Palisades Fire

Type of Facility	Damage Category					
	NO Physical Damage	MINOR Structural Damage	MODERATE Structural Damage	MAJOR Structural Damage	DESTROYED	Total
Assisted Living Facilities	1	1	1	–	2	**5**
Community and Recreation Centers	–	–	–	1	–	**1**
Fire Stations	1	–	1	–	–	**2**
Gas Stations	4	–	–	–	1	**5**
Grocery Stores	–	2	–	–	2	**4**
Libraries	–	–	–	–	1	**1**
Pharmacies	2	1	–	–	–	**3**
Religious Facilities	3	–	–	2	4	**9**
Schools	4	–	2	4	4	**14**
Total	**15**	**4**	**4**	**7**	**18**	**48**

2.2.3. Social Vulnerability

The older individuals and households with disabilities in Pacific Palisades were more vulnerable to the fire (i.e., most impacted during and after the fire). Disabilities and age can impair an individual's ability to evacuate, and underlying health conditions make individuals more susceptible to health risks from unhealthy air and wildfire smoke.

Age and Disability

Within the area burned by the Palisades fire, 21% of the population was 65 years or older, increasing to 28% within the Brentwood-Pacific Palisades CPA, as shown in Table 2.12. Both are much higher than the County average of 15.7% (Los Angeles County Aging and Disabilities Department, 2025).

Table 2.12: Age

Area	Total Population	Median Age	Population Over 65 (Years)
Palisades Fire boundary	83,622 (2018-2022)	43	17,294 (21%)
Brentwood-Pacific Palisades CPA	57,064 (2019-2023)	44	15,756 (28)

Sources: U.S. Census (2023b) and CAL FIRE (2025)

The median age in the CPA prior to the fire was 44 years, which is notably higher than both the County median age of approximately 38 years and the national median age of 38.9 years. The much higher than median age suggests a relatively older population, which may have implications for emergency preparedness, evacuation strategies, and post-disaster recovery needs (U.S. Census, 2023b). Age distribution of the PPCC shows that:

- 21% of residents under the age of 15, indicating a significant presence of young children and families
- 8% aged 15 to 24, representing teenagers and young adults
- 18% aged 25 to 44, typically considered the core working-age population
- 27% aged 45 to 65, a group often associated with higher homeownership and community involvement
- 26% aged 65 or older, highlighting a substantial senior population that may require additional support during and after emergencies

Figure 2.11 shows the percentage of the population 65 or older in the PPCC area. Over 32% of the population in Riveria and Rustic Canyon is age 65 or over, and approximately 30% of the population in the Highlands is aged 65 or over, according to 2023 census data. Marquez, Las Casas, and Bienveneda have a lower proportion of residents aged 65 or over.

The proportion of residents with a disability ranges from less than 2% to just over 6%, with Huntington and Lower Marquez having slightly higher proportions of residents with disabilities than the rest of the PPCC, as shown in Figure 2.12.

Figure 2.11: Percent of the population 65 and over in the Brentwood-Pacific Palisades CFA (U.S. Census, 2023b)

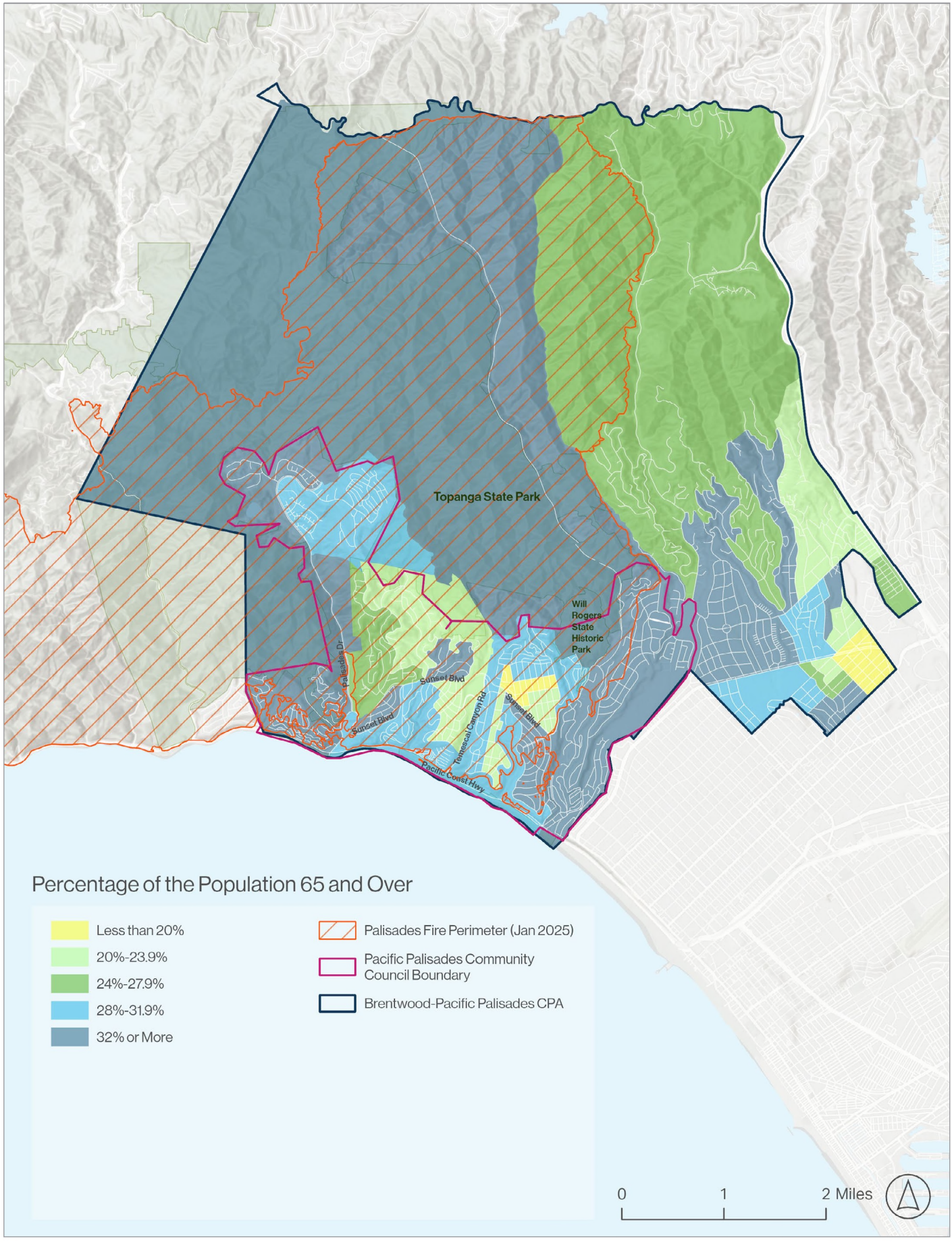
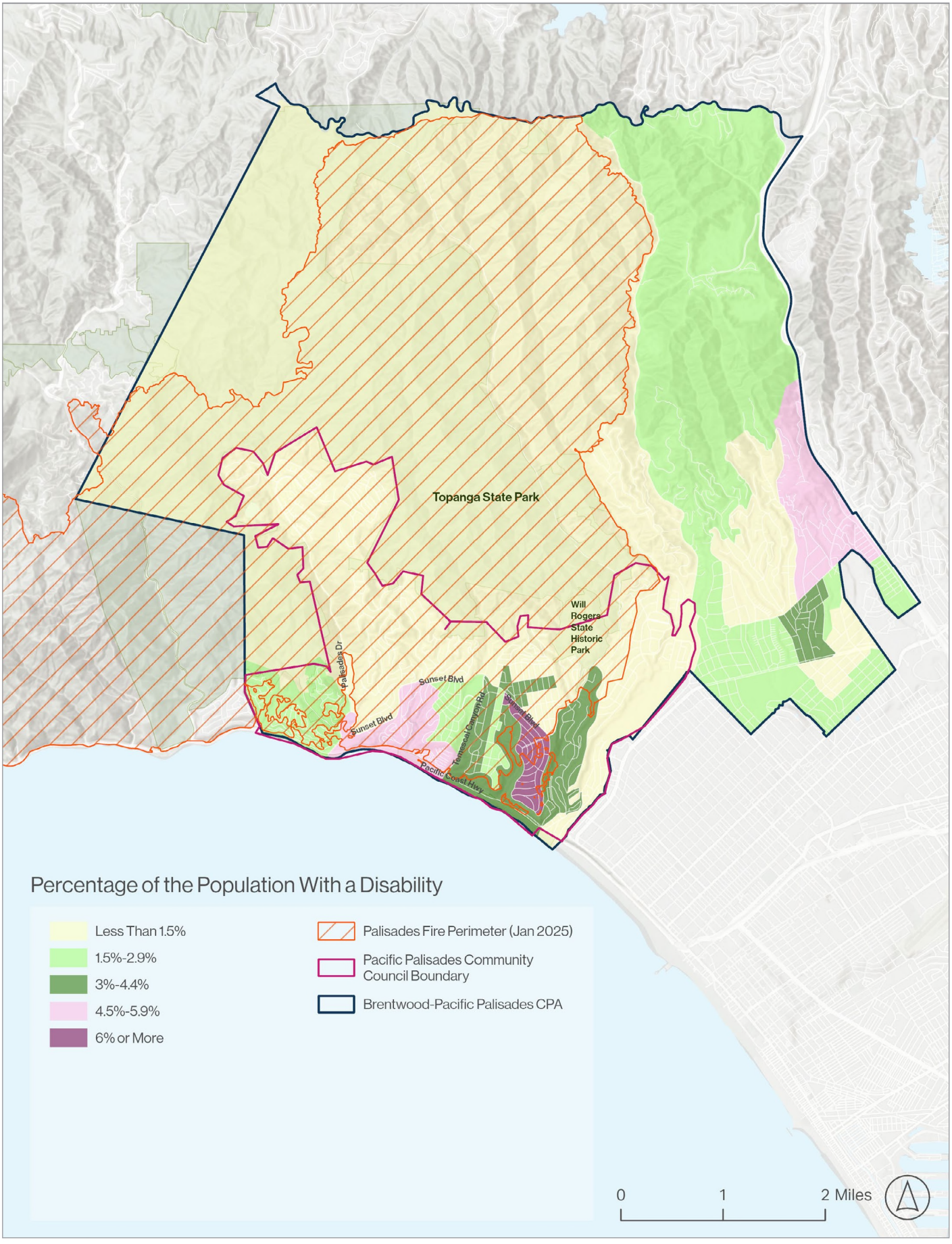


Figure 2.12: Percent of the population with a disability in the Brentwood-Pacific Palisades CFA (U.S. Census, 2023b)





2.2.3.1. Race and Income

The PPCC area is characterized by a predominantly White population (82% of residents). The remaining population is 7% Asian, 9.4% two or more races, and 0.9% Black or African American. In general, predominantly White communities experience lower social vulnerability, as racial composition intersects with larger systemic disparities in income and access to opportunities and resources (Turner and Greene, 2023).

In 2023, the Pacific Palisades (within zip code 90272) reported an average annual household income of $374,808, which is more than three times the City average of $122,610. The median household income stood at $200,985, approximately 1.5 times the City median of $80,366 and 1.3 times the County median of $87,760. In 2023, only 3% of the population in the Brentwood-Palisades CPA (about 1,800 individuals) lived below the poverty line (U.S. Census, n.d.). Elevated income levels are a critical factor in reducing the overall community's vulnerability to wildfires, but (Income By Zipcode, n.d.). Households with higher incomes are better suited to mitigate wildfire risk by investing in fire-resistant building materials, landscaping practices to reduce fuel loads, and home-hardening upgrades. Financial stability provides greater evacuation flexibility because residents can afford temporary housing and transportation. High income households have better access to comprehensive insurance coverage and professional services like lawyers and contractors; however, residents with lower income levels were displaced by the Palisades Fire.



3. Vegetation Management

Pacific Palisades is one of the most fire-prone communities in Los Angeles. Steep terrain, canyon topography, and dense chaparral create hazardous fire conditions at the WUI. Effective fuels treatment in this landscape requires a multi-pronged strategy that combines defensible space measures with new community-scale treatments, strategically placed fuel breaks, roadside clearance, and targeted programs for private landowners. In addition, long-term resilience depends on invasive species control, and restoration practices that prevent species type conversion to fire-prone annual grasslands. The following sections describe the current status of fuel treatments, approaches for expansion of fuel treatment activities, and prioritization considerations for implementation.

The approaches listed in Table 3.1 are industry standard practices that may be applicable to areas within and surrounding Pacific Palisades, with potential to reduce the likelihood of wildfire ignition, the rate of wildfire spread, and the level of wildfire impact to communities, natural resources, buildings, and critical infrastructure. Table 3.1 also includes considerations related to the benefits, challenges, and next steps of these potential approaches.

Most of the vegetated public land surrounding Pacific Palisades, both within and outside of the City of Los Angeles' boundaries, is owned and managed by non-City agencies including the State, the County, or other utility and recreation districts. Therefore, the planning and implementation of the approaches discussed in this section will require close coordination between City, State, County, and other agencies based on jurisdictional authority.

A preliminary analysis of vegetation, fuel, and topographic data derived from LANDFIRE was conducted to identify initial treatment areas within the High Severity Burn Area (USGS, 2025). Assumed post-fire fuel conditions in these areas align with lower-intensity fire behavior models, offering an opportunity to sustain reduced hazard levels through targeted maintenance, fuel management, and restoration activities rather than extensive vegetation removal. Current defensible space standards and a case study from the Contra Costa County Fire Protection District (CCCFPD) also informed these recommendations.

Table 3.1: Potential Wildfire Fuel Mitigation Approaches

Approach	Description	Benefits	Challenges	Next Steps for Consideration by the City
Community Defensible Space	Coordinate vegetation management to create community defensible space; Create community fuel break area; Create community chipping program for disposal of cut vegetation; Create Fire Protection District; Perform home hardening.	Reduces ignition risk and fire intensity at parcel and neighborhood scale; Increases structure survivability and firefighter safety; Creates unified fuel management zones across multiple parcels.	Requires landowner cooperation across property lines; Enforcement and funding coordination.	A medium- to long-term strategy that requires the development of outreach, cost share, and improvements for compliance/ educational programs; City and State coordination to promote wildfire resiliency is a cornerstone of Urban Forest Management in Very High and High Fire Hazard Severity Zones; Secure funding to assist homeowners with Zones 2 and extended Zones where necessary.
Fuel Modification Practices	Create fuel breaks ; Treat roadside fuels; Create Vegetated; Greenspace Buffers.	Provides operational anchor lines for suppression; Reduces flame length and rate of spread at landscape scale; Connects WUI areas to roads, ridges, and critical infrastructure; Requires continuous maintenance to remain effective.	High implementation and maintenance costs; Environmental permitting (California Environmental Quality Act [CEQA], Coastal Commission).	Conduct advanced fire modeling to refine fuel break placement; Gather post-fire data / conduct field verification of site conditions; A medium- to long-term strategy that requires securing funding and environmental clearances; CAL FIRE Wildfire Prevention Grants for Hazardous Fuel Reduction.
Restoration and Maintenance	Remove highly flammable nonnative vegetation and re-establish native species with lower fire susceptibility; Treat compacted soils to improve infiltration and seed-to-soil contact; Stabilize slopes.	Sustains effectiveness of existing treatments over time; Reduces regrowth of hazardous fuels; Stabilizes soils and restores native vegetation.	Recurring costs and long-term maintenance obligations; Potential environmental constraints.	A short- to -medium strategy that requires gathering post-fire data / conduct field verification of site conditions; Develop integrated erosion control and native restoration plans; Establish maintenance cycles (annual/ biannual); Identify opportunities for short-term action within City-owned land in the Palisades, such as land maintained by Rec and Parks, surrounding infrastructure assets, and hillside areas along streets.
Integration with Critical Infrastructure	Prioritize fuel reduction immediately adjacent to critical infrastructure, such as reservoirs, sub stations, community resilience centers, and others.	Protects water, power, and transportation systems during wildfire events; Increases community resilience; Provides access for suppression operations.	Multi-agency coordination required; Site access and utility coordination issues.	Identify infrastructure co-location opportunities (e.g., fuel breaks near utility corridors); Coordinate with LADWP and other infrastructure operators. Identify opportunities for short-term action surrounding City-owned infrastructure assets; Identify opportunities for short-term action surrounding City-owned infrastructure assets

Many projects and strategies identified in this document are currently in preliminary stages of the development process, and may still be pending funding, final approvals, and/or permitting. All projects are subject to change in scope, schedule, and cost until they are fully approved. Some of the projects, strategies, and efforts described in this report may not be possible for the City to complete without additional funding from the Federal and State governments as well as philanthropy, which may or may not be forthcoming.

3.1. Community Defensible Space

3.1.1. Community Defensible Space (Neighborhood Scale)

Community Defensible Space refers to coordinated vegetation management among adjacent landowners to create continuous zones of defensible space that protect groups of homes rather than isolated structures. Treatments are designed to account for how topography, vegetation continuity, and wind alignment influence fire behavior, independent of parcel boundaries. When paired with structural hardening measures, this approach represents the best practice for reducing structure loss in high-risk WUI areas.

Standard 100-foot clearance may be insufficient in many locations within Pacific Palisades due to steep slopes, canyon winds, chaparral fuel conditions, and density of housing. In alignment with Los Angeles County Fire Code Title 32, defensible space may extend up to 200 feet or more where site conditions warrant. The expanded buffer helps reduce flame lengths, ember exposure, and radiant heat impacts on structures.

Implementation of Community Defensible Space must be neighborhood-driven and supported by public agencies, leveraging education, site visits, and funding opportunities. The approach can be demonstrated through targeted pilot projects such as the Contra Costa County Fire Protection District initiative where residents worked collaboratively with fire agencies to create neighborhood-scale defensible zones. For private landowners, Table 3.2 provides local resources for plant selection, creation of defensible space, defensible space inspection information, and home hardening guidance. Defensible space zones serve as the first line of defense, reducing the probability of structure-to-structure ignition and increasing firefighter safety and tactical options during wildfire events.

Table 3.2: Local Resources for Private Landowners

Resource	Guidance	Issuing Agency	Link
Plant Selection Guidelines	Recommended fire-resistant landscaping for WUI areas; species selection for defensible space and VGB zones.	LACoFD	https://fire.lacounty.gov/wp-content/uploads/2020/05/Plant-Selection-Guidelines.pdf
Home Hardening	Structure hardening measures including ember-resistant construction, vent screening, and roofing upgrades.	LACoFD	https://lafd.org/home-hardening
Brush Clearance Regulations	Parcel-level brush clearance standards and enforcement for WUI properties.	LACoFD	https://www.lafd.org/fire-prevention/brush/clearance-requirements
Defensible Space Resources	Defensible space requirements and compliance guidance for property owners.	LACoFD	https://fire.lacounty.gov/fire-hazard-reduction-programs/

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3.1.2. Community Fuel Break Area (Landscape Scale)

Community fuel break areas are defined in 14 CCR § 895.1 as "shaded fuel breaks approved by a public fire agency as part of a fire prevention plan for fire protection, ignition management, pre-fire management, or other fire defense improvements." Shaded fuel breaks are planned thinning of tree cover and brush removal to reduce fire risk by reducing fire speed and severity. Unlike parcel-based defensible space, these fuel breaks are strategically placed across the landscape often along ridges, canyon rims, and WUI perimeters to reduce wildfire intensity and support suppression operations.

A community fuel break area may include:

- Defensible space zones within 200 feet of structures (per 14 CCR §§ 895.1 and 1271)
- Systems of fuel breaks designed or approved by a public fire agency as part of a fire prevention plan
- Strategically connected corridors that link neighborhoods, greenspace buffers, fire roads, and critical infrastructure

Fuel breaks are typically implemented through public agency coordination, for example through the California Department of Forestry and Fire Protection, or local fire mitigation initiatives. Treatments emphasize shaded fuel break design, retaining overstory canopy while removing ladder fuels and surface vegetation to reduce flame lengths and slow rates of spread.

Community Chipping Program

One persistent challenge in fuels reduction is the disposal of cut vegetation. Without affordable or accessible disposal options, homeowners often leave cut material in place, creating hazardous piles of dead fuels. Pacific Palisades would benefit from a dedicated community chipping program, operated by LAFD or through Homeowners Associations (HOAs) in coordination with City agencies. The program could include curbside pickup during peak clearance season, mobile chipping units stationed at fire stations or parks, and centralized drop-off points for residents. Biomass generated from chipping could be reused as mulch for erosion control or processed into biochar, adding ecological benefits to the program. Such programs have been established in other fire-prone California communities, such as Yolo, Ventura, and San Mateo counties, where treatments have strong potential to stifle wildfire spread within and surrounding the community. In addition to chipping services, the program could explore collaboration with local urban lumber yards for reuse of vegetation. Currently, Angel City Lumber recovers downed trees in residential neighborhoods and forested areas around Los Angeles to manufacture lumber and carpentry products.



Fire Protection Districts: Contra Costa County Case Study

Fire protection districts are local government entities established to provide fire protection and emergency response services within a defined geographic area, defined as "special" districts under the Fire Protection District Law of 1987. Approximately 700 fire districts have been established in California, each with localized funding sources to support their ongoing activities.

As an example, the Contra Costa County Fire Protection District (CCCFPD) manages the Contra Costa County Wildfire Mitigation Program (CCCWMP), which has been successful in generating community involvement, implementing protective measures such as fuel breaks along community edges, and providing homeowners with assistance for hazard removal and maintenance. Keys to CCCFPD's success include conducting educational (rather than punitive) property inspections, transitioning seasonal fire staff into full time roles for fire prevention and reduction activities in the off-season, and providing an accessible portal for community members to request fuel reduction activities.

CCCWMP is funded through Contra Costa's Measure X, a countywide sales tax approved by voters in 2020. Since its inception, Measure X has been a successful and stable funding mechanism supporting expanded fire response capacity and proactive wildfire mitigation across the nineteen cities and numerous unincorporated areas that are part of Contra Costa County.

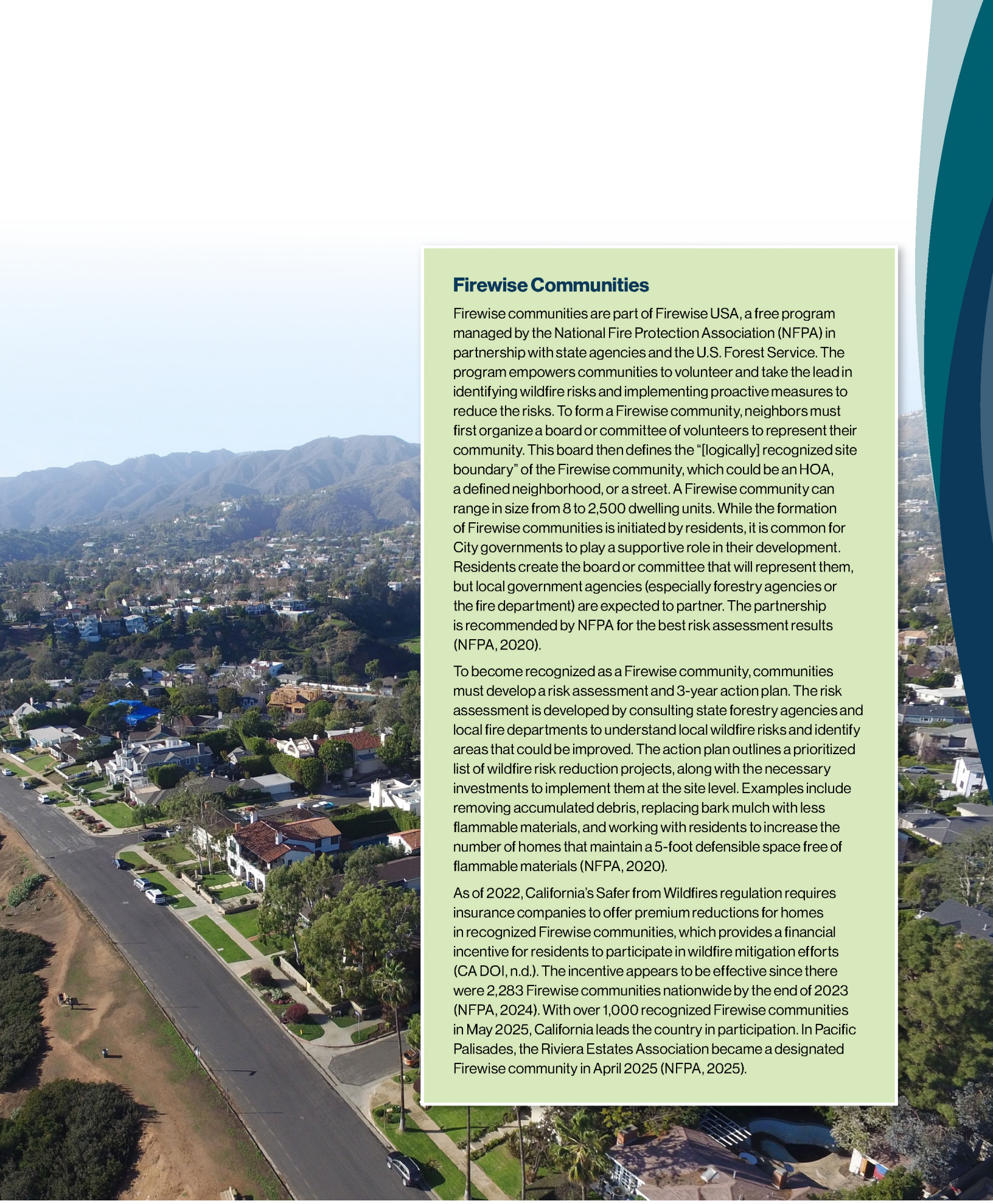
Benefits of a fire protection district include the following:

- **Localized decision-making:** A fire protection district allows residents to directly influence wildfire prevention and response strategies tailored to the area's unique topography, vegetation, and community needs.
- **Dedicated funding stream:** A fire protection district can establish its own funding mechanisms (e.g., parcel taxes, assessments, sales taxes) to ensure consistent investment in fire mitigation and preparedness.
- **Tailored mitigation strategies:** The district can design and implement fire prevention measures specific to Pacific Palisades, such as fuel reduction in high-risk zones, evacuation planning, and defensible space initiatives.

Considerations for a fire protection district include the following:

- **Administrative setup:** Establishing an FPD requires significant planning, including legal formation, stakeholder engagement, and coordination with local and state agencies.
- **Voter approval:** Funding mechanisms, such as parcel taxes and sales taxes, typically require approval from local voters, which involves outreach and consensus-building.





Firewise Communities

Firewise communities are part of Firewise USA, a free program managed by the National Fire Protection Association (NFPA) in partnership with state agencies and the U.S. Forest Service. The program empowers communities to volunteer and take the lead in identifying wildfire risks and implementing proactive measures to reduce the risks. To form a Firewise community, neighbors must first organize a board or committee of volunteers to represent their community. This board then defines the "[logically] recognized site boundary" of the Firewise community, which could be an HOA, a defined neighborhood, or a street. A Firewise community can range in size from 8 to 2,500 dwelling units. While the formation of Firewise communities is initiated by residents, it is common for City governments to play a supportive role in their development. Residents create the board or committee that will represent them, but local government agencies (especially forestry agencies or the fire department) are expected to partner. The partnership is recommended by NFPA for the best risk assessment results (NFPA, 2020).

To become recognized as a Firewise community, communities must develop a risk assessment and 3-year action plan. The risk assessment is developed by consulting state forestry agencies and local fire departments to understand local wildfire risks and identify areas that could be improved. The action plan outlines a prioritized list of wildfire risk reduction projects, along with the necessary investments to implement them at the site level. Examples include removing accumulated debris, replacing bark mulch with less flammable materials, and working with residents to increase the number of homes that maintain a 5-foot defensible space free of flammable materials (NFPA, 2020).

As of 2022, California's Safer from Wildfires regulation requires insurance companies to offer premium reductions for homes in recognized Firewise communities, which provides a financial incentive for residents to participate in wildfire mitigation efforts (CA DOI, n.d.). The incentive appears to be effective since there were 2,283 Firewise communities nationwide by the end of 2023 (NFPA, 2024). With over 1,000 recognized Firewise communities in May 2025, California leads the country in participation. In Pacific Palisades, the Riviera Estates Association became a designated Firewise community in April 2025 (NFPA, 2025).

3.2. Fuel Modification Practices

Fuel modification practices refer to the suite of vegetation management methods designed to alter fuel characteristics such as type, continuity, loading, or arrangement to reduce fire intensity and improve control effectiveness. According to Green (1977), fuel modification is a cornerstone of the fuel break concept and encompasses both temporary and permanent treatments aimed at influencing fire behavior across strategic portions of the landscape.

These treatments can be applied at varying scales depending on terrain, vegetation type, and management objectives. The most common objectives include: reduction of fine-fuel continuity, elimination of ladder fuels that contribute to crown fire development, and establishment of stable, low-flammability vegetation covers on critical control features such as ridgetops and access corridors.

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Green (1977) identified three fundamental categories of fuel modification within wildland fire management:

1. **Cleanup of localized fuel hazards** — Removal or treatment of hazardous debris generated by natural events or human activity (e.g., blowdown, logging slash, or storm damage).

2. **Periodic fuel reduction** — Area-wide treatments such as prescribed burning or mowing that temporarily reduce accumulated fuel loading, requiring recurring maintenance cycles to sustain low hazard levels.

3. **Permanent fuel reduction or type conversion** — Long-term replacement of high-hazard vegetation types (e.g., dense chaparral or mixed brush) with low-growing, low-fuel-volume species such as perennial grasses or semishrubs. This practice forms the basis of fuel break establishment, generally occupying 5 to 10% of the landscape in strategic configurations.

An example of successful fuel modification treatment is the 69 Bravo Helispot on Saddle Peak, managed by LACoFD.. Across an 18-acre footprint, annual goat grazing, thinning, and chipping have created a maintained low-fuel zone. During the 2025 Palisades Fire, this treatment proved highly effective: the fire burned into the site, lost intensity, and self-extinguished without suppression efforts (CAL FIRE, 2025b). This strategy demonstrates the role of well-maintained fuel treatment zones in protecting critical infrastructure and allowing firefighting resources to be allocated elsewhere.

Overall, fuel modification practices are most effective when integrated within a landscape-scale system of fuel breaks, roads, and defensible corridors. When properly maintained, these treated areas provide critical anchor points for suppression forces, break up continuous expanses of flammable vegetation, and contribute to the long-term resilience and manageability of fire-prone landscapes (Green 1977).

3.2.1. Fuel Breaks

Fuel breaks are strategically located strips or blocks of modified vegetation designed to reduce fire intensity and improve suppression effectiveness. Historical guidance emphasizes that effective fuel breaks require permanent vegetation modification with low-growing cover and spaced trees or shrubs to reduce ladder fuels (Green, 1963). Modern studies indicate that fuel breaks alone stop fires only about 22 to 47% of the time; their effectiveness depends on strategic placement and accessibility for firefighting operations (Syphard and Keeley, 2011).

Fuel breaks typically range from 150 to 300 feet in width depending on the vegetation type, slope, and other site specific factors (CNRA and CAL FIRE, 2019). In Southern California, the recommended minimum width of 200 feet is based on empirical research showing that this distance limits radiant heat exposure to below 0.3 cal cm^{-2} s^{-1} (calories per square centimeter per second) the threshold for firefighter safety during head-fire attack. Wider breaks, up to 300 feet or more, are favored on flat or wind-exposed ridges to provide additional buffer and maneuvering space (Green, 1977).

Table 3.3 lists Best Management Practices for southern chaparral fuel treatments and fuel breaks for CAL FIRE emergency projects.

Table 3.3: Best Management practices for Southern Chaparral Fuel Treatments and Fuel Breaks for CAL FIRE Emergency Prcjects

Topic	Summary / Key Practices
Fuel break	Typically 150-300 ft; dependent on site-specific conditions including vegetation type and slope.
Standard Fuel Treatments	Techniques include mowing, grazing, pruning, vegetation removal, chipping, prescribed burning, and mastication. Focus on removing dead, diseased, or dense trees and chaparral. Maintain canopy spacing to reduce fire spread. Retain large or unique chaparral specimens on edges for wildlife habitat.
Vegetation Treatment	Remove downed dead trees and shrubs if not embedded in soil. Embedded material left to prevent soil disturbance. Use chipping or mastication to reduce fuel continuity and maintain slope stability. Mimics natural stand-replacing fire regimes where chaparral regenerates from root systems.
Fuel Break Edges	Feather fuel break edges into surrounding vegetation for aesthetic integration and gradual transition. Treat outer fuels to prepare for future maintenance.
Chaparral Overstory Canopy Retention	Maintain sparse canopy depending on fuel break width: ■ **0–150 ft:** retain 0% canopy ■ **150–250 ft:** retain ≥5% canopy ■ **>250 ft:** retain ≥10% canopy. Retention estimated in field; more large specimens preserved in wider breaks.
Equipment Use	Use ground-based equipment suitable for soil conditions; avoid compaction, rutting, or surface damage. Operate on contour when feasible. Avoid slopes >50% for safety and soil protection.
Maintenance	Control regrowth through pruning, mowing, or removal to maintain reduced fuel loads. Periodic maintenance required to sustain effectiveness.
Vegetation Type Conversion Prevention	Design treatments to avoid converting native chaparral or coastal sage-scrub into non-native or altered vegetation types.
Equipment Slope Restriction	Do not conduct tractor or heavy equipment operations on slopes >50%.
Unstable Area Restriction	Avoid tractor or heavy equipment use on known landslides or unstable terrain.

Source: CNRA and CAL FIRE (2019)

Preferred locations for strategic placement fuel breaks include ridgelines and fire roads (Green 1977). Fire roads exist within the canyons connecting to ridgelines and optimal treatment locations surrounding the Pacific Palisades, as follows: Trailer Canyon, Rustic Canyon, Temescal Canyon, Topanga Canyon, Santa Ynez Canyon, Sulivan Canyon, and Los Liones Canyon.

3.2.2. Contingency Firelines

A fireline is a break in fuel, made by cutting, scraping, or digging with a bulldozer or hand tools. Contingency firelines constructed during the 2025 Palisades Fire remain a valuable component of the operational wildfire defense network and should be formally incorporated into the long-term fuels management strategy. Firelines were established under emergency conditions to slow or redirect fire spread in critical terrain. To maintain their functional value, these lines should be mapped, stabilized, and maintained as strategic fuel breaks where appropriate.

Where permanent retention of these lines is not needed, erosion control and stabilization measures such as mulching, water bars, or revegetation with low-flammability native species should be implemented to prevent post-fire soil degradation. Because many contingency lines traverse or border private lands, long-term effectiveness will depend on landowner coordination, formal easement agreements where needed, and integration with local brush clearance and defensible space standards. Priority should be given to contingency lines along key ridge and canyon corridors that were actively engaged during the 2025 Palisades Fire and align with operational suppression strategies.

3.2.3. Green (Vegetated) Buffers

Green (vegetated) space buffers are strategically managed low-flammability zones at the interface between residential development and adjacent wildland areas. Their primary function is to reduce ember transmission, radiant heat exposure, and direct flame contact to structures during a wildfire event. Unlike fuel breaks, which are designed primarily for operational suppression, green space buffers are intended to soften the transition between built environments and wildland fuels through the use of fire-resistant landscape design and vegetation management.

Vegetation in green space buffers is selectively modified to maintain low, discontinuous fuel profiles, typically consisting of native, drought-tolerant, and fire-resilient species. Combustible plant species with high resin and oil content, such as eucalyptus, acacia, juniper, palms, and pampas grass, are reduced or removed. Non-combustible hardscape elements—such as decomposed granite, gravel, or other ignition-resistant surfaces—are incorporated to limit fire spread and create ember-resistant zones adjacent to structures.



3.2.4. Roadside Fuel Treatments

3.2.4.1. Urban Roads

Roadside treatments protect evacuees and firefighters while reducing the likelihood that fires will jump across narrow canyon roads into adjacent neighborhoods (Allen et al., 2018). Fires in steep canyon terrain often funnel toward roads, creating choke points that threaten lives and hinder suppression efforts. Table 3.4 presents current City roadside brush clearance requirements for roadways within the VHFHSZ. Caltrans is responsible for brush clearance along state highways, including in the right-of-way. The City of LA Urban Forestry Division is responsible for managing and maintaining all trees and plants contained in the public right-of-way, and certain native tree species on private property that are protected by the City. Property owners are responsible for roadside brush clearance within their properties and for vegetation maintenance in parkways —areas with vegetation between the sidewalk and the curb — adjacent to their property. To fund public roadside brush clearance projects, jurisdictions can apply for funding through CAL FIRE's Wildfire Prevention Grants program, which has helped fund similar efforts such as the Yuba Roadside Fuel Treatment Project.

Table 3.4: Roadside Brush Clearance Requirements

Requirement Category	LAFD Requirement	Distance / Zone
Grass and Brush Height	Grass and native brush must be cut or reduced to a maximum height of **3 inches**. Individual native shrubs may remain if **spaced at least 18 feet apart,** trimmed up to 1/3 of their height, and free of dead material.	Within **10 feet of roadside**
Tree Clearance (≥18 feet)	Lower branches must be trimmed so no foliage is within **6 feet of the ground**, and all dead material must be removed.	Within **10 feet of roadside**
Tree Clearance (<18 feet)	Lower branches must be removed to **1/3 of tree height**, and all dead material must be removed.	Within **10 feet of roadside**
Debris and Chipped Material	All cut vegetation and debris must be legally removed. Chipped material may not be placed within **10 feet of any roadside**.	Within **10 feet of roadside**
Landscape Vegetation	Landscape vegetation must be maintained to the same clearance standards as native vegetation.	Within **10 feet of roadside**
Year-Round Compliance	Roadside vegetation clearance must be maintained **year-round**, not just during declared fire season.	VHFHSZ designated areas

3.2.4.2. Fire Roads

Existing fire roads serve as critical access corridors and operational fuel breaks for wildfire suppression in the Pacific Palisades landscape. Regular maintenance of these routes is essential to ensure safe ingress and egress for emergency personnel and to provide pre-established control lines during wildfire events. A 30- to 100-foot vegetation modification zone on each side of fire roads should be maintained, including the removal of downed or dead material, reduction of ladder fuels, pruning of overhanging limbs, and management of surface fuels.

Sullivan Fire Road, Rogers Fire Road, Trailer Canyon Fire Road, Temescal Fire Road, and East Topanga Fire Road are corridors that occupy strategic ridgelines and connect directly to high-risk WUI zones, evacuation routes, and staging areas. Maintaining fire roads as part of the permanent fuel treatment network enhances landscape connectivity, improves suppression efficiency, and provides additional anchor points for both planned and emergency fireline operations.

3.3. Restoration and Maintenance

The Palisades Fire burned large portions of coastal sage scrub and chaparral, leaving bare soil and openings now susceptible to nonnative and invasive annual grasses and forbs. The loss of native vegetation has increased erosion hazards on steep slopes, weakened ecological resilience, and elevated future wildfire risk through the accumulation of flashy fuels. The following habitat restoration approach, discussed in greater detail in WS2 Infrastructure Restoration Plan (AECOM, in progress) aims to reduce wildfire risk by removing highly flammable invasive vegetation and re-establishing native species with lower fire susceptibility. The approach is modeled on the standards used by the Mountains Restoration Trust (MRT) for restoration in the Santa Monica Mountains (LACDPW,2009) and it incorporates ecological science on chaparral restoration and resilience as summarized in Allen et al. (2018). The restoration and maintenance approaches in Sections 3.3.1 through 3.3.6 apply primarily to vegetated open spaces in the WUI and wildland areas surrounding Pacific Palisades.

Many projects and strategies identified in this document are currently in preliminary stages of the project development process, and may still be pending funding, final approvals, and/or permitting. All projects are subject to change in scope, schedule, and cost until they are fully approved. Some of the projects, strategies, and efforts described in this report may not be possible for the City to complete without additional funding from the Federal and State governments as well as philanthropy, which may or may not be forthcoming.

3.3.1. Weed Removal

Restoration should begin with the targeted removal of nonnative species because non-native grasses are known to outcompete native shrub seedlings and create a grass–fire cycle that perpetuates ecosystem degradation.

3.3.2. Site and Soil Preparation

Site preparation should include light scarification of compacted soils to improve infiltration and seed-to-soil contact. Erosion control measures, including biodegradable jute netting and fiber rolls, should be installed on steep slopes to reduce runoff velocity and protect germinating seeds. Soil amendments should not be introduced in order to maintain the nutrient-poor conditions favored by native chaparral species and to avoid giving an advantage to invasive grasses, which thrive in high-nitrogen conditions.

3.3.3. Slope Stabilization

Vegetation loss from wildfire and subsequent disturbance has left large expanses of bare soil vulnerable to erosion and slope failure. Restoration should employ a combination of structural slope stabilization with vegetative reinforcement while vegetation is reestablishing.

3.3.4. Irrigation

Temporary supplemental irrigation should be provided during the first 2 to 3 years of establishment, tapering down with the goal of transitioning to fully self-sustaining dryland vegetation by the third year.

3.3.5. Planting

A Seed Zone 995-certified native seed mix should be employed to support ecological integrity and adaptation to local conditions. The seed mix is structured into functional groups: grasses (30 to 40%), shrubs and subshrubs (30 to 40%), forbs and wildflowers (20 to 25%), and early nurse species (5 to 10%). Container plantings of shrubs and oaks should be planted along canyons and riparian drainages to complement the seed mix and accelerate restoration of chaparral structure.

3.3.6. Maintenance and Monitoring

Maintenance should focus on irrigation, weed control, and soil/slope care to ensure the success of planted natives and prevent reinvasion of non-native species. Monitoring should occur through an initial post-installation assessment followed by annual monitoring to measure survival, native cover, species richness, and invasive suppression.

3.4. Integration with Critical Infrastructure

Fuel reduction treatments near critical infrastructure and facilities are essential to safeguarding vital systems that communities depend on during wildfire events. Treatments adjacent to reservoirs, schools, substations, community resilience centers, and other key facilities can support fire response and community protection efforts by improving access for suppression operations, preserving water supplies, maintaining power delivery to homes and emergency facilities, and mitigating cascading effects of wildfire damage on essential services.

Implementing fuel reduction near critical infrastructure often requires multi-agency coordination, as these projects intersect with the jurisdictions of utility operators, local governments, and environmental agencies. Site access and utility coordination issues can further complicate efforts, particularly in remote or heavily regulated areas. Integration of fuel treatments and critical infrastructure protection will require proactive coordination between LAFD and LACoFD with LADWP and other infrastructure managers to identify co-location opportunities and implement treatments.



3.5. Fuel Treatment Prioritization Considerations

Given the scale of the challenge and the limited resources available, prioritization is an important first step in the planning and implementation of fuel treatments. Prioritization criteria should consider the immediate benefits to life safety, levels of hazard risk, levels of neighborhood vulnerability, and feasibility of treatment.

Many projects and strategies identified in this document are currently in preliminary stages of the project development process, and may still be pending funding, final approvals, and/or permitting. All projects are subject to change in scope, schedule, and cost until they are fully approved. Some of the projects, strategies, and efforts described in this report may not be possible for the City to complete without additional funding from the Federal and State governments as well as philanthropy, which may or may not be forthcoming.

Life Safety. Consider which treatments most directly impact life safety, such as fuels reduction along evacuation corridors and buffer zones around schools, fire stations, and critical water infrastructure. These sites not only protect residents during emergencies but also support firefighting operations during major fire events.

Hazard Risk. Consider which treatments reduce fire behavior potential in areas of greatest hazard, such as ridgelines and canyon rims where chaparral fuels drive high flame lengths and embers are lofted into neighborhoods. Fuel breaks in these locations can significantly alter fire spread and improve suppression effectiveness (Green, 1963; Syphard and Keeley, 2011).

Vulnerability. Consider which treatments target high vulnerability neighborhoods where housing density and direct exposure to wildland fuels create compounded risk, or where there is a concentration of seniors, schools, or persons with disabilities.

Feasibility. Consider which treatments are most feasible, addressing areas accessible to mechanical thinning, grazing, or prescribed fire first. More complex or constrained zones may require phased approaches.

3.6. Implementation Tools and Funding Sources

Effective wildfire risk reduction depends on strategic planning and the availability of tools and funding mechanisms that are being advanced by CAL FIRE programs. These initiatives provide financial support, streamline environmental review processes, and facilitate collaborative fuel reduction efforts across public and private lands. These resources help local agencies and private landowners scale and implement wildfire mitigation projects.

3.6.1. California Vegetation Treatment Program

The California Vegetation Treatment Program (CalVTP), developed by CAL FIRE, is a statewide CEQA streamlining tool that accelerates the approval of wildfire prevention and vegetation management projects. By tiering from a pre-approved Programmatic Environmental Impact Report, agencies can implement fuel breaks, roadside treatments, defensible space work, and ecological restoration more efficiently while meeting environmental protection standards. CalVTP reduces permitting timelines, supports grant competitiveness, and enables faster implementation of high-priority wildfire mitigation projects.

3.6.2. Wildfire Prevention Grants

The CAL FIRE WPG Program provides state funding to reduce wildfire risk to people, structures, and communities in fire-prone areas. Eligible activities include hazardous fuels reduction, strategic fuel breaks, roadside vegetation management, community defensible space, planning, and education. The program is funded through California Climate Investments and prioritizes projects in the WUI that protect life and property. The grants help local agencies, tribes, and nonprofits implement mitigation projects more quickly, often pairing effectively with permitting tools such as CalVTP.

3.6.3. Vegetation Management Program

The Vegetation Management Program (VMP) is one of CAL FIRE's key tools for reducing wildfire risk and promoting the natural role of fire in undeveloped areas. Through prescribed burns, fuel breaks, and targeted vegetation treatments, the VMP reduces the risk of wildfires and improves long-term forest health across SRAs. The program operates primarily in SRAs where the state has the primary financial responsibility for wildfire prevention and suppression, which include rural or lightly developed lands with high wildfire risk. CAL FIRE may support vegetation management efforts in LRAs through technical assistance or grant funding, but the primary responsibility for wildfire mitigation in these areas lies with local entities. LRAs are also subject to defensible space laws and fire hazard severity zone classifications, which guide property owners in maintaining fire-safe landscapes.

The VMP is a cost-sharing program between private landowners and CAL FIRE. Private landowners can choose to apply to the VMP and if approved, CAL FIRE covers liability costs for conducting prescribed burns (CAL FIRE, n.d.a) Creating a cost-sharing program with private landowners allows for a coordinated, multi-parcel fuel treatment approach, which is crucial in Pacific Palisades where much of the land is privately owned. The VMP would apply to SRAs in the Pacific Palisades which are more rural that are also more susceptible to fire risk, such as the areas around the Santa Monica Mountains. The program has benefits that extend beyond property owners to the broader community, such as reduced fire risk and improved air quality (a controlled release of smoke is better than increased smoke intensity during a wildfire). CAL FIRE also provides cost-share funding of up to 60%, which reduces the financial burden for individual landowners (State of California, 2021).

The current VMP is a continuation of California's Range Improvement Program, which ran from 1950 to the 1970s and brought together ranchers to conduct prescribed burns without fire agency involvement. However, the program ended because of more stringent air quality regulations and increasing liability issues. In 1980, Governor Jerry Brown signed SB 1640 authorizing CAL FIRE to conduct prescribed burns on private property. Since then, VMPs have been leveraged in several SRA lands. For example, prescribed burns were leveraged in 2023 on the Tulloch Ranch In the unincorporated areas of San Diego County as part of the VMP (Oakley, 2023).





4. Alternative Wildfire Water Supply

The objective of this section is to provide an overview of the existing water supply system and sources of water in Pacific Palisades used for firefighting and provide the City with potential approaches for future system modifications, including concepts for alternative water supply sources.



4.1. Pacific Palisades Water Supply System

4.1.1. Water Supply Sources

The primary water supply sources for Los Angeles are shown in Figure 4.1. Although LADWP's water system relies on multiple water supplies, the water supply to Pacific Palisades comes from the Stone Canyon Reservoir, which stores mostly imported water from the Los Angeles Aqueduct (LAA) and purchased water from the Metropolitan Water District (MWD) (LADWP, 2011; 2012; 2025c). The LAA extends 340 miles and delivers water from the Mono Basin and Owens Valley to the City of Los Angeles.

MWD is the largest water wholesaler for domestic and municipal users in California. MWD manages its own infrastructure and has a vast water network that delivers water to Ventura, Los Angeles, Riverside, Orange, San Bernardino, and San Diego Counties. MWD delivers water from multiple sources to its customers, but most of its water supply comes from the Colorado River, via the Colorado River Aqueduct and from the California Department of Water Resources (DWR) State Water Project (SWP). Water delivered to LADWP from MWD is solely supplied from the SWP (MWD, 2022a). The SWP system originates in Northern California at Lake Oroville on the Feather River, travels downstream to the confluence with the Sacramento River, then goes into the Sacramento-San Joaquin River Delta and San Francisco Bay (Bay-Delta). From there, water is pumped to the north and south of the San Francisco Bay and south of the Bay-Delta via the California Aqueduct.

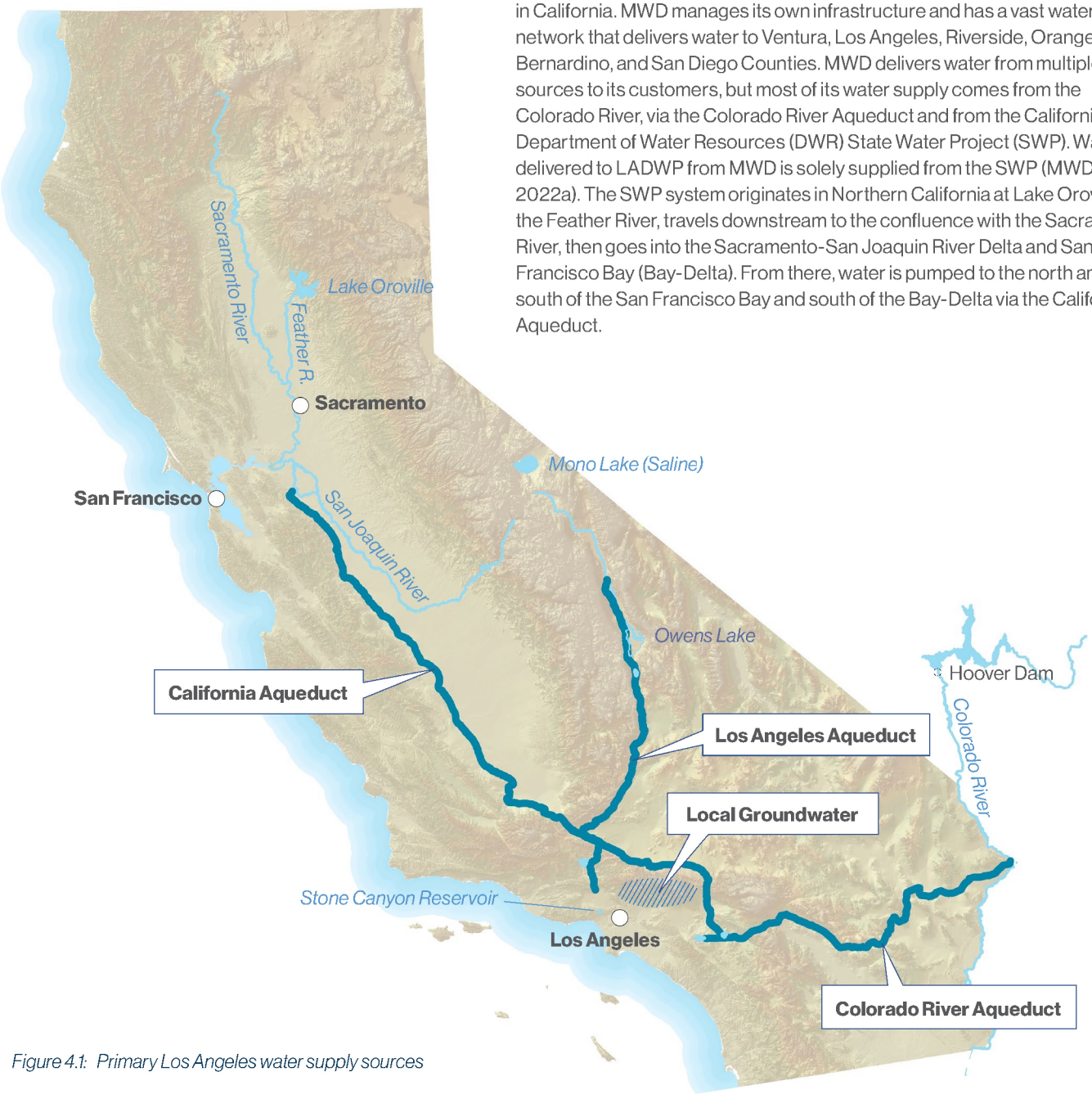
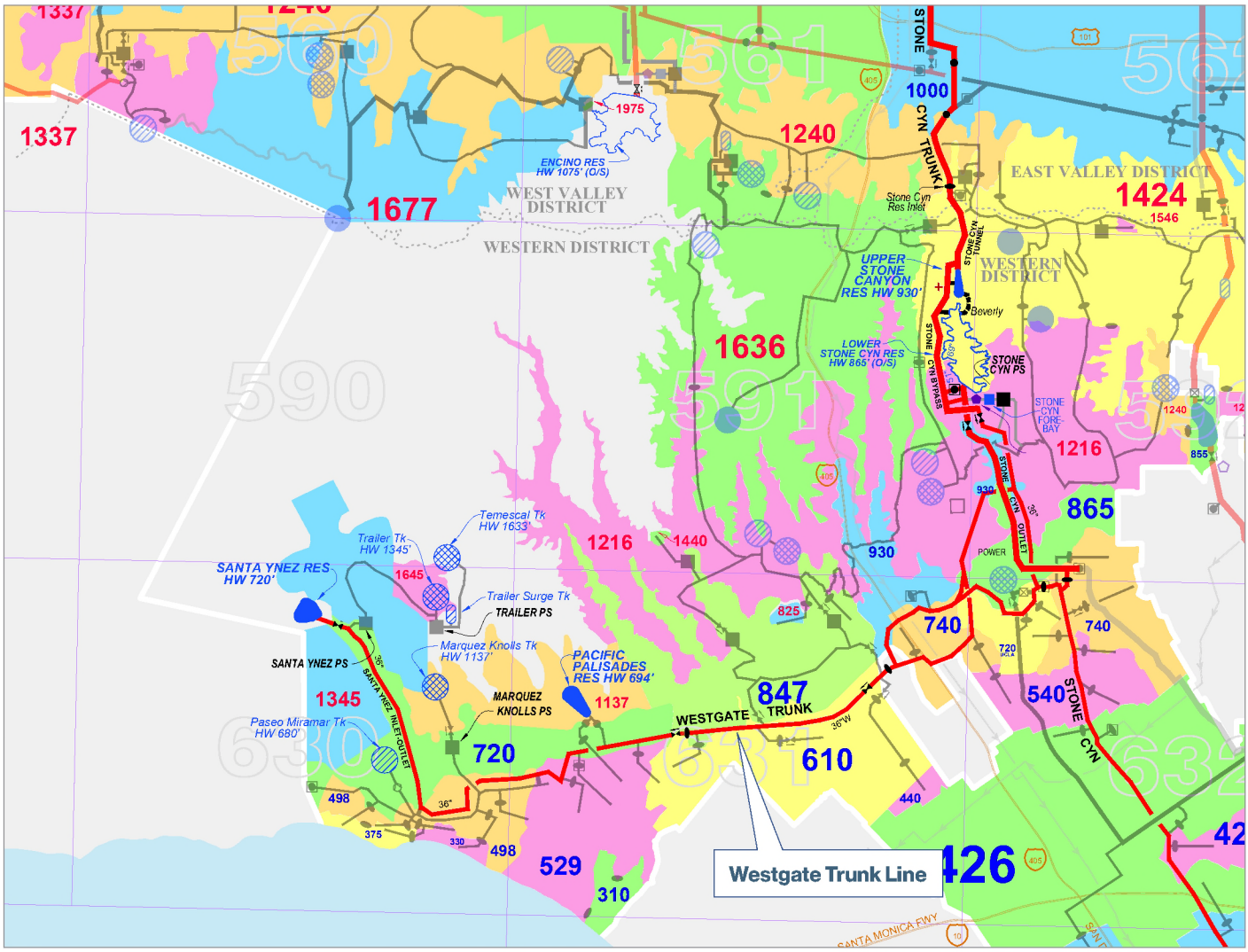


Figure 4.1: Primary Los Angeles water supply sources

4.1.2. Water Supply Distribution System

As shown in Figure 4.2, the Westgate Trunk Line, which measures up to 36 inches in diameter in most sections, is the main drinking water supply for Pacific Palisades (LADWP, 2025d). Water flows via gravity from east to west through low elevation zones through pressure-regulating valves before reaching the pump stations (LADWP, 2025a). LADWP's pump stations are typically equipped with internal combustion engine-driven pumps that activate automatically to ensure that at least one pump remains operational during a power outage. Additionally, in a loss of utility power, portable generators can be connected to a transfer switch at the pump stations to provide backup power (LADWP, 2025b).

Figure 4.2: Pacific Palisades water supply network (LADWP, 2025e)



Water from the trunk line is pumped via three pump stations to higher elevations and stored in three water tanks that serve different water pressure service zones in the Pacific Palisades community: Marquez Knolls Tank, Trailer Tank, and Temescal Tank. Each tank has a capacity of about 1 million gallons and exceeds requirements for firefighting flow storage under City of Los Angeles Fire Code § 507.3.1 and for supplying regulatory storage and total emergency storage as shown in Table 4.1 (LADWP, 2025a). Even with excess capacity, urban water systems are not designed to fight wildfires (LADWP, 2025d; and Pierce et al., 2025).

The Santa Ynez Reservoir is located at the western end of the Westgate Trunk Line and provides a backup supply of water for the Pacific Palisades community (LADWP, 2025d). However, as part of LADWP's drinking water system, it is not an open-air reservoir and must be covered to protect treated water from contamination per state and federal regulations (LADWP, 2025d).

Santa Ynez Reservoir was undergoing repairs of its floating cover from early 2024 through June 2025, and it was not utilized as a resource at the time of the Palisades Fire (LADWP, 2025a; 2025d). The Pacific Palisades water system still complies with all fire codes and state standards and is built to meet regular and emergency demands even when the Santa Ynez Reservoir is offline (LADWP, 2025d).

The stated capacity of Santa Ynez Reservoir is 117 million gallons (MG), but the reservoir can only operate between certain elevations, referred to as the operational band (LADWP, 2025d). The reservoir cannot be filled higher than 705 feet above sea level due to the risk of nitrification and water quality issues, and it cannot drop below 670 feet because there would not be sufficient pressure to push water into the distribution system. Between these elevations, the operational capacity of the reservoir is 22 MG (LADWP, 2025d). Figure 4.3 demonstrates this concept.

Table 4.1: Storage Capacity of the Three Pacific Palisades Water Storage Tanks

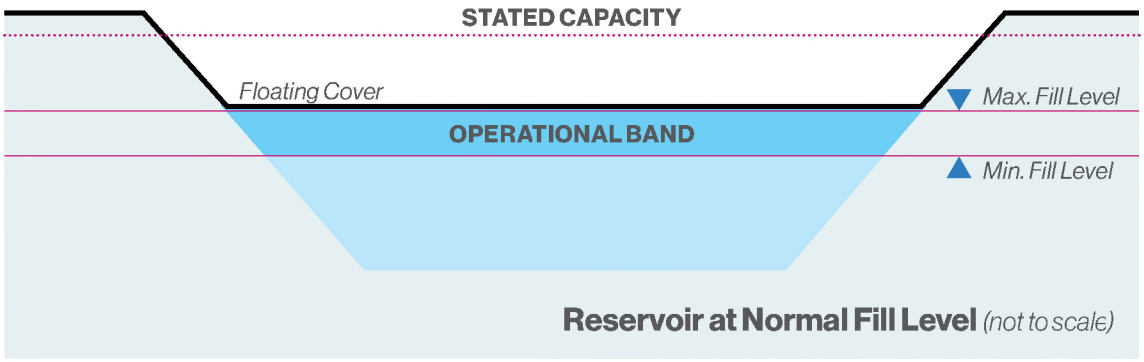
Tank	Actual Capacity (gallons)	Required Storage Capacity (gallons)				Excess Capacity (gallons)
		Regulatory[1]	Fire Flow (per Fire Code)[2]	Excess for Emergency[3]	Total	
Marquez Knolls	1,018,502	78,000	480,000	60,000	618,000	400,502
Trailer	972,118	163,000	480,000	60,000	703,000	269,118
Temescal	972,118	63,000	480,000	60,000	703,000	369,118

Source: LADWP (2025a)

1. Regulatory storage is the amount needed for regular use by customers, for everyday activities such as drinking, cooking, bathing, laundry, toilet flushing, cleaning, and outdoor irrigation
2. Fire flow storage is the amount needed for use in an urban fire, which is set by the Fire Code. For low-density residential areas such as Pacific Palisades, there must be sufficient water to sustain three adjacent fire hydrants simultaneously at a combined flow of 2,000 gallons per minute for four hours.
3 Emergency storage is the amount of water needed for fire flow plus sufficient excess to account for other emergencies.

The Pacific Palisades Reservoir, is located on the hill of the northernmost end of Chautauqua Boulevard. The stated capacity of Pacific Palisades Reservoir is 6 million gallons, but the operational band was only 1.75 million gallons when it was in use (LADWP, 2025a). Because Pacific Palisades Reservoir is not needed to satisfy system demands and due to water quality concerns and leaks, the reservoir was taken out of service in 2013 (LADWP, 2025a). Restoration of this reservoir imposed structural and safety risks, eliminating the option of having it as a back-up during the Santa Ynez Restoration period (Baker, 2025).

Figure 4.3: Stated capacity versus operational capacity of a reservoir (LADWP, 2025a)



4.1.3. Hydrant Coverage

The fire hydrant coverage in Pacific Palisades is designed for typical urban fire suppression such as house fires. This coverage follows national and global trends because "urban water supply systems are not designed to fight large wildfires or large-scale fires that start in wildland areas and spread to urban areas (Pierce, Roquemore, and Kearns, 2021)."

Fire hydrants in Pacific Palisades are supplied by gravity pipes with water from the three storage tanks. All issues reported to LADWP about fire hydrants in the Pacific Palisades before the fire had been addressed (LADWP, 2025d). LADWP works with the LAFD, which oversees the inspection of fire hydrants across the City (LADWP, 2025d).

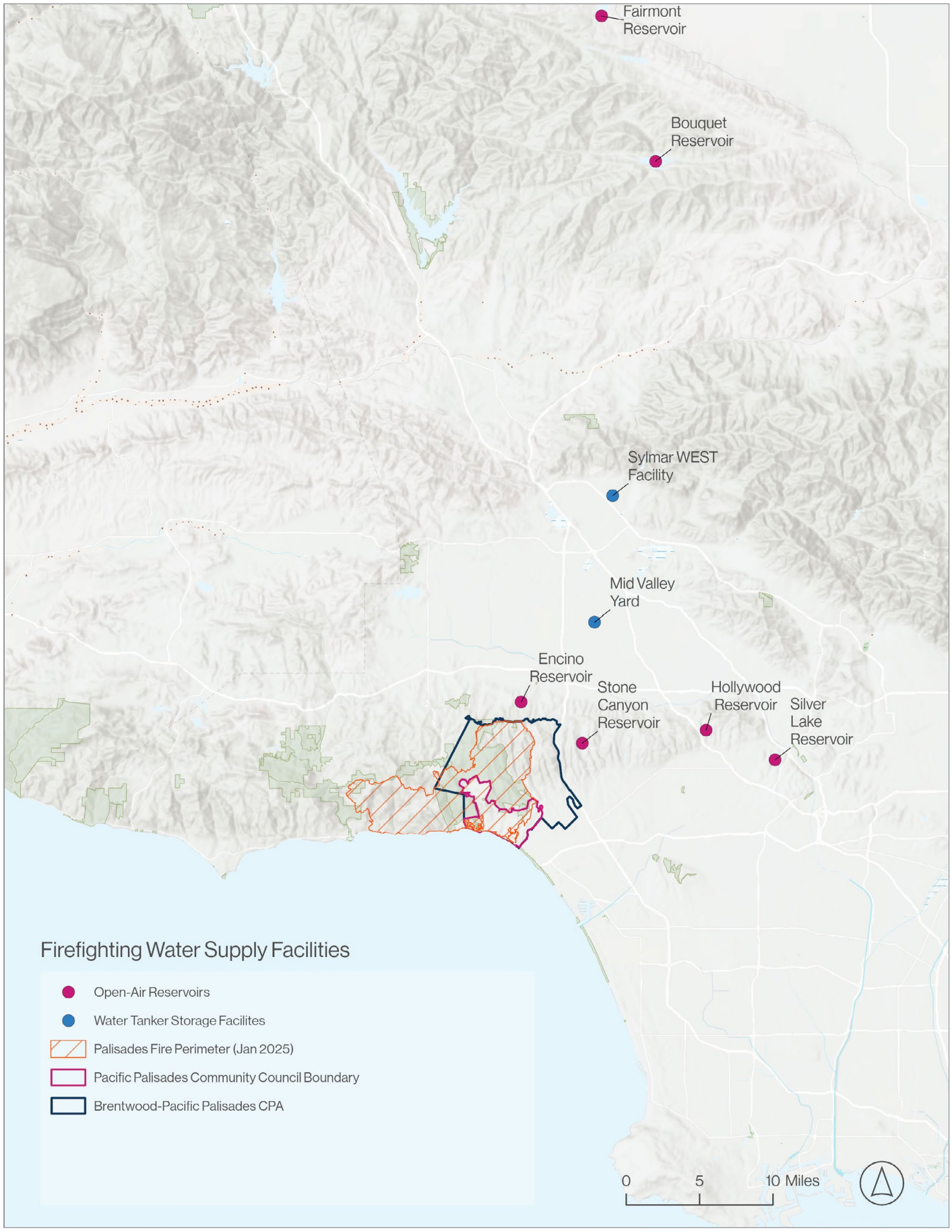
Additionally, the LADWP water system has over 61,000 hydrants available for use (LADWP, 2025f). As soon as LADWP identified the risk of losing water in the tanks and water pressure in the system, LADWP deployed potable water tankers to sustain support for firefighting efforts (LADWP, 2025d). Water tankers are initially filled at a hydrant located near their storage locations (currently the Mid Valley Yard and Sylmar WEST Facility) (Figure 4.4). Subsequent refilling would be done at hydrant locations near the incident but typically outside the impacted area based on safety, ease of access, and traffic implications (LADWP, 2025f).

4.1.4. Reservoirs Available for Aerial Firefighting Efforts

LADWP operates several open-air reservoirs that provide over 8.5 billion gallons for aerial firefighting and emergency water supplies (LADWP, 2025d). These non-potable water reservoirs are isolated from the potable water systems and do not have dedicated distribution systems or hydrants (LADWP, 2025f). Designed for aerial access, the LAFD, the County, and other state and federal agencies withdraw water from the non-potable reservoirs using helicopters for fire emergencies when conditions allow. Figure 4.4 shows the open-air reservoirs that LADWP made available within and outside the LA Metro Area to support aerial firefighting efforts during the Palisades Fire.

Because the Santa Ynez Reservoir is covered to protect treated drinking water, it is not accessible to helicopters for aerial firefighting efforts (LADWP, 2025d). However, using a helipad and a fire hydrant adjacent to Santa Ynez Reservoir, a helicopter can fill up with water from the LADWP water system (supplied via the Westgate Trunk) (LADWP, 2025d). This fire hydrant is not supplied by water from the Santa Ynez Reservoir and the hydrant's functionality therefore does not depend on Santa Ynez Reservoir being in service (LADWP, 2025d). LAFD helicopters used the helipad and hydrant at the Santa Ynez Reservoir on January 7, 2025, the first day of the Palisades Fire, until air operations ended at about 7:45 p.m. that evening due to the dangerous high winds (LADWP, 2025d).

Figure 4.4: Open-air reservoirs and water tanker storage facilities within and outside the LA Metro Area that LADWP used to support firefighting during the Palisades Fire



4.1.5. Other Firefighting Water Supply Resources

Several additional resources for combatting wildfires exist and were used during the Palisades fires. This section summarizes the resources to illustrate the regionality of available resources, but the list of the resources and entities that were available or that provided support during the Palisades fires is not exhaustive.

4.1.5.1. Mutual Aid

The Standardized Emergency Management System (SEMS) is used in California to manage emergencies involving multiple jurisdictions and agencies. SEMS unifies all elements of California's emergency management community into a single integrated system and standardized key elements including mutual aid, fire, police, medical and health, communications, transportation, and utilities. Mutual aid is intended to provide adequate resources, facilities, and other support to jurisdictions whenever their own resources are inadequate for the given situation (State of California, 2025b) .

A common mutual aid agreement governs Water and Wastewater Agency Response Networks (WARNs) comprised of utilities helping utilities. The WARN agreement allows utilities to share resources in a more expedited way rather than requiring a formal disaster declaration (EPA, 2025a). The LADWP is a member of Southern Region 1 in the California WARN. During an emergency fire situation, LADWP can easily request water supply assistance from other agencies in the WARN (ACS, 2025).

The Emergency Management Assistance Compact (EMAC) is a nationwide mutual aid system that offers assistance during governor-declared states of emergency or disaster. The system allows states to send personnel, equipment, and commodities to assist with response and recovery efforts in other states. EMAC creates a legal foundation that solves the problem of liability and responsibility of cost and assists in creating a fast and straightforward plan for providing disaster relief. For firefighting specifically, EMAC can provide personnel, fire trucks, and other equipment from nearby states to assist in wildfire response (NEMA, 2025).

4.1.5.2. State and Federal Firefighting Resources

CAL FIRE is responsible for responding to wildfires in SRAs. CAL FIRE's firefighting emergency response resources include a large fleet of mobile equipment, an aviation program for aerial firefighting, and law enforcement personnel to enforce forest and fire laws. The program allows for quick and effective emergency response across California (State of California, 2025a).

Federal firefighting resources are managed together under the National Interagency Fire Center (NIFC). NIFC pools resources, cuts costs, and coordinates national fire suppression and planning efforts. Federal agencies that are currently represented at NIFC include the Bureau of Indian Affairs, Bureau of Land Management, U.S. Fire Administration, U.S. Fish and Wildlife Service, U.S. Department of Agriculture-Forest Service, National Weather Service, and National Park Service, as well as the National Association of State Foresters. Together, these agencies provide support to on-the-ground wildland firefighting efforts, develop wildland fire policy, and serve as the decision support center for wildland fire emergency incidents (NIFC, 2025).

CAL FIRE moved several firefighting resources, including both aerial and ground support teams, to Southern California at the start of the 2025 fires (Fox, 2025). Additional support was provided by the California National Guard's Joint Forces Training Base in Los Alamitos, the Forest Service, and other federal agencies (Fox, 2025).

4.2. Firefighting Water Supply System Review

This report is not making any assessments as to whether if any of these potential approaches had been available during the fire, that they would have had any effect on the availability of water to firefighters during the event.

The objective of this section is to review the existing water supply sources and the water supply system that are used for firefighting in the Pacific Palisades community in order to identify areas where potential future modifications and alternative firefighting water supply approaches could increase the resilience of the firefighting water supply system in the community.

4.2.1. LADWP Water Supply Sources

LADWP has been addressing the challenge of providing a reliable water supply for a growing population in a semi-arid climate since the 1970s as droughts have become more frequent and severe (LADWP, 2017). LADWP has several plans in place and has invested heavily in water conservation, recycled water, groundwater recovery, and stormwater capture to build drought resilient local water supplies (LADWP, 2017; 2020; 2024a). The plans listed in Table 4.2 have been reviewed, and the challenges the water supply sources in Pacific Palisades are still facing are described in this section.

Table 4.2: Relevant Pre-Fire Water Supply and Water System Infrastructure Plans

Date	Agency	Plan Title	Relevance to Water Supply Planning
2014	LADWP	The Greater Los Angeles County Integrated Resources Water Management Plan (LADWP, 2014)	LADWP's ongoing operations, including the integrated management of the City's water infrastructure, which was in the early stages of drought
2015	LADWP	Stormwater Capture Master Plan (Geosyntec Consultants, 2015)	Identifies capture projects that can be integrated into recovery and rebuilding efforts
2017-09	LADWP	Water Conservation Potential Study (LADWP, 2017)	Identified significant potential for further water savings beyond what had already been achieved
2018-04	City of Los Angeles	One Water LA 2040 Plan (Vol. 1) (LASAN and LADWP, 2018)	Long-term integrated water management; provides foundation for coordinated stormwater, wastewater, and reuse projects
2020	LADWP	Urban Water Management Plan (UWMP) (LADWP, 2020)	Long-term water supply reliability strategy; critical for resilience in post-fire recovery
2021-06	MWD	2020 Urban Water Management Plan (UWMP) (MWD, 2021)	Long-term water supply reliability strategy
2021-06	City of Santa Monica	2020 Urban Water Management Plan (UWMP) (City of Santa Monica, 2021)	Long-term water supply reliability strategy
2022-01	Santa Monica Basin Groundwater Sustainability Agency	Groundwater Sustainability Plan for the Santa Monica Groundwater Subbasin (Dudek, 2022)	The first comprehensive groundwater assessment and management plan specific to the Santa Monica Basin
2022-12	City of Los Angeles	Sustainable City pLAn (Green New Deal Annual Report 2022) (City of Los Angeles, 2022)	Broader sustainability framework; includes water resilience and equity targets
2023-12	State of California	California Water Plan 2023 Update (DWR, 2023c)	The State's strategic plan for sustainably and equitably managing and developing water resources
2024	City of Los Angeles	Local Hazard Mitigation Plan (City of Los Angeles, 2024)	Identifies and assesses the hazards to which the City is most vulnerable and provides strategies to be implemented over the next five-years; includes drought and wildfire
2024	LA County	LA County Water Plan (Los Angeles County, 2024)	Countywide water resilience framework; aligns local and regional strategies for recovery
2024-12	LADWP	Pure Water Los Angeles Master Plan (LADWP, 2024a)	Plan to increase and optimize the City's local supplies and support the transition to 70% local water by maximizing the production of purified recycled water as part of a diversified water portfolio
2025-02	LASAN	FY 24-25 Watershed Investment Strategic Plan (LASAN, 2025)	Outlines the cities stormwater management goals and projects. The plan is updated on an annual basis.

4.2.2. Imported Water Supply Challenges

As mentioned previously, the water supply to Pacific Palisades comes from the Stone Canyon Reservoir, which stores mostly imported water from the LAA and purchased water from MWD (LADWP, 2011, 2012, 2020, 2024a, 2025c; MWD, 2021). All of the imported water supplies come with unique challenges that are exacerbated by climate change (LADWP, 2020, 2024a).

One of MWD's primary sources of water in its portfolio is the Colorado River, of which MWD has an annual allocation of 0.9 million acre-feet (MAF) (MWD, 2021). However, MWD does not have enough pipeline connectivity or operational flexibility to provide water from this source to six of their 26 member agencies, including LADWP (MWD, 2022a).

These six agencies (Calleguas Municipal Water District, Inland Empire Utilities Agency (IEUA), Las Virgenes Municipal Water District, the City of Los Angeles, Three Valleys Municipal Water District, and Upper San Gabriel Valley Municipal Water District) receive all of their water purchased from MWD from MWD's other main water supply source, the DWR SWP (LADWP, 2020). MWD has an annual allocation of 1.912 MAF of water from the SWP (MWD, 2021), but water quality and supply reliability challenges have plagued the supply.

The main limitation is the irregularity of California's climate, which affects the water supply. California's water supply experiences extreme variability due to differences in seasonal precipitation and geographic region, and climate change is increasing the variability annually (DWR, 2023b). As a result, actual allocation amounts and deliveries of SWP supplies differ every year, ranging from 5 to 100% of the historical allocation (DWR, 2023c).



Figure 4.5 shows the percentage of water allocations that MWD has received from the SWP compared to the maximum possible contracted amount since 2013. The percentage shown is the projected amount for all contractors, but some contractors can receive more if approved.

The six SWP-dependent agencies have been forced to take mandatory and especially painful water supply cuts from their MWD deliveries during severe droughts (MWD, 2022a). The MWD Board adopted Resolution No. 9318 in August 2022 (MWD, 2022b) affirming that serving any member agency from only one supply source creates a long-term and unacceptable risk. The MWD Board further affirmed that all member agencies must receive equivalent water supply reliability through an interconnected and robust system of supplies, storage, and programs. MWD's integrated planning efforts to resolve this issue are in progress.

The flow from the LAA is also variable from year to year due to the hydrologic extremes that California and the Western U.S. face annually, as well as the ever-growing challenge of climate change and drought (LADWP, 2020). Decreases in flow from LAA currently result in more use of purchased water from MWD, or more use of local groundwater, as shown in Figure 4.6 (LADWP, 2020).

Figure 4.5: Percent of annual State Water Prcject (SWF) water allocations from 2013 to 2023 of the maximum possible contracted amounts (DWR, 2023a)

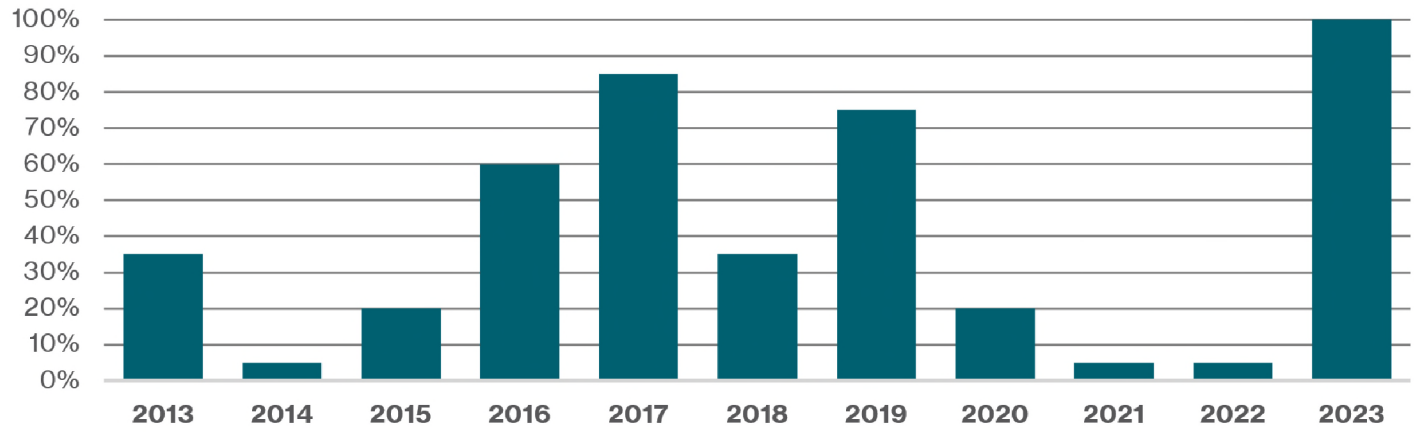
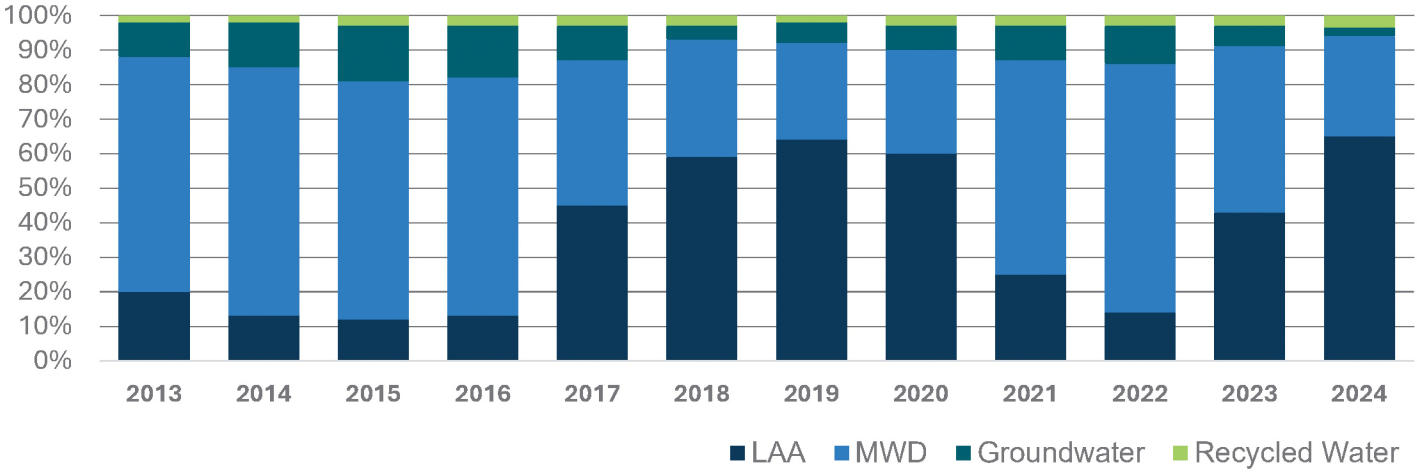


Figure 4.6: Percentage of water source variability from FY 2013/2014 to 2023/2024 (LADWP, 2025)



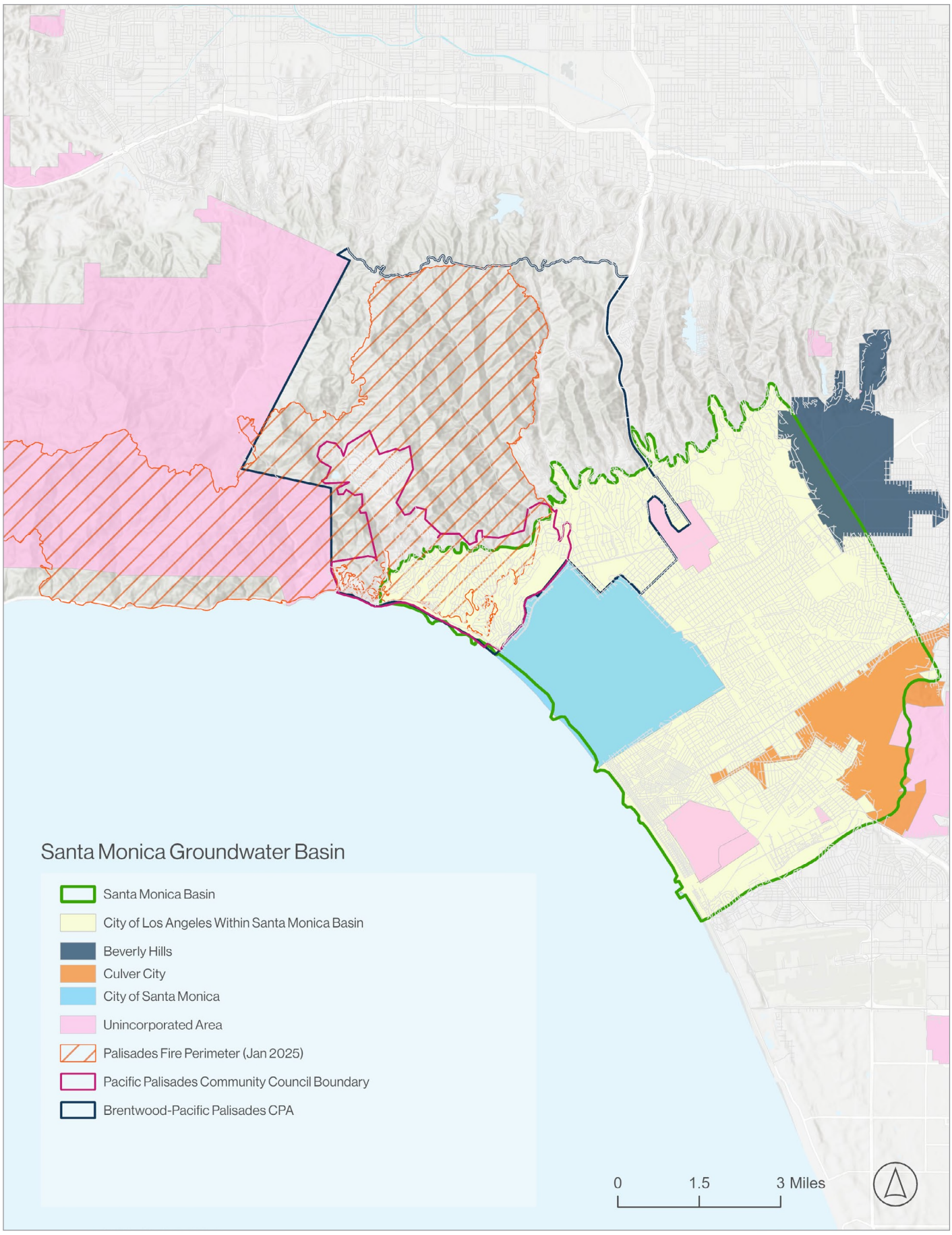
4.2.3. Local Water Supplies

In response to the climate and hydrology challenges and impacts to its imported supplies, LADWP has been making substantial investments for years to further diversify its water supply portfolio by increasing local groundwater, recycled water, stormwater capture, and water conservation and use efficiency (LADWP, 2020). Local water supplies are generally more reliable than imported sources because they are less affected by climatic variability, weather conditions, and environmental constraints (LADWP, 2020).

Pacific Palisades overlays the unadjudicated Santa Monica Groundwater Basin as shown in Figure 4.7. Adjudication is a legal process where a court determines groundwater rights, and LADWP does not currently have any groundwater rights in this basin. The Santa Monica Groundwater Basin is subject to the Sustainable Groundwater Management Act (SGMA) and is managed by a Groundwater Sustainability Agency (GSA), which includes agencies such as LADWP, Beverly Hills, Culver City, and the City of Santa Monica (Dudek, 2022).



Figure 4.7: Santa Monica groundwater basin (LADWP, 2024c)



4.2.4. Non-potable Resources

Outside of the Pacific Palisades community, LADWP operates several open-air reservoirs that provide over 8.5 billion gallons of non-potable water for aerial firefighting and emergency water supplies (LADWP, 2025d). Aerial firefighters can also deploy specialized water-bombing planes to scoop saltwater from the ocean and drop it on wildfires. Within the Pacific Palisades community, non-potable resources are limited based on a GIS review. The largest is a lake owned and managed by the Self-Realization Fellowship (SRF) and located at a lower elevation near the coast at the intersection of Sunset Boulevard and Palisades Drive. The lake has an estimated capacity of about 12 million gallons (its surface is approximately 2.5 acres, and the average depth is approximately 15 feet).

4.2.5. Interconnections to Neighboring Water Systems

Interconnections between water systems allow for the transfer or sharing of water supplies during shortages or emergencies. The Pacific Palisades area is connected to Los Angeles County Water Works District No. 29, Malibu, to the northwest via a 6-inch connection identified as "Sandy Cape Drive & Surfview Drive Connection to LA County Water Works District No. 29 (MWD-29)." Similarly, Pacific Palisades is connected to the Santa Monica water system through LA07, a 12-/20-inch connection located at Santa Monica Boulevard and South Manning Avenue. However, LADWP has greater pressure than these smaller system connections, so if LADWP connects to take water from either Santa Monica or Los Angeles County, the supplies of these two systems would be quickly depleted (LADWP, 2025f).



4.2.6. Water Supply Distribution System

All water supplied to Pacific Palisades is potable and delivered through a single distribution system serving all uses (LADWP, 2025a; 2025c). It is not possible to distinguish between firefighting and other demands or to restrict water use for a specific purpose (LADWP, 2025f).

During the Palisades Fire, the Westgate Trunk Line remained fully operational (LADWP, 2025a; 2025c). However, the fire's rapid spread and strong winds placed extreme demand on the trunk line. Unable to fight the fire from the air, firefighters relied entirely on water from the trunk line. Residents also drew from the line by leaving sprinklers on during evacuation, using hoses on their homes, and leaving hoses running. Additionally, as buildings burned, damaged or broken pipes on the premises caused further water loss (LADWP, 2025a; 2025c).

As water from the Westgate Trunk Line was used at extraordinary rates, water pressure rapidly decreased (LADWP, 2025d). The geographical organization of the water distribution system in Pacific Palisades requires the water to flow through low elevation zones via gravity through pressure-regulating valves before reaching the pump stations (LADWP, 2025a). When water is in high demand in the low elevation zones, as it was during the January 2025 fires, water moves too quickly through the pipes, resulting in pressure loss in the system due to friction loss. If the system loses too much pressure, there could be insufficient pressure to create the necessary suctions for the pumps. This can then affect the pump stations' ability to supply water and pressure to the high elevation zones (LADWP, 2025a).

By early morning on January 8, the three pumping stations had shut down because the water that was reaching the pumping stations lacked sufficient pressure to create the necessary suction, causing the stations to automatically shut down (LADWP, 2025c). With the pumps offline, water was drawn from the three Pacific Palisades tanks without replenishment from the Westgate Trunk Line, eventually depleting the tanks (LADWP, 2025c).

As pumping stations lost pressure and the tanks were emptied, there were reports that some hydrants in Pacific Palisades, especially those in high-elevation zones that are serviced by the tanks, lost pressure and water flow (LADWP, 2025a).

4.3. Alternative Firefighting Water Supply Approaches

The Pacific Palisades water supply system faces combined threats from wildfire, seismic activity, drought, and aging infrastructure. In response to these risks, City of Los Angeles Emergency Executive Order No. 5, Return and Rebuild, directed LADWP to evaluate distribution, storage capacity, and pumping infrastructure to improve system resilience. The order also emphasized supporting aerial and ground-based firefighting operations, minimizing service disruptions during emergencies, and assessing potential upgrades to enhance the resilience of the water system within the limitations inherent to urban water systems).

Building on this directive and on knowledge shared from other communities, future enhancements to the Pacific Palisades water supply system could include the following types of approaches:

- Existing system enhancements
- Enhancement of water system reliability
- System enhancement for emergency responders
- Enhancement of water supply
- Coordination measures

These potential approaches could enhance future resiliency. No studies have been conducted to measure the impact that these potential approaches could have made during the January 2025 Palisades Fire or any other event. These potential approaches are grounded in case study evidence and knowledge sharing from recent wildfire disasters in California, Colorado, Hawaii, and abroad. By connecting external knowledge with LADWP's and other existing state and local planning programs (Table 4.2), the approaches highlight not only what can be done but also how proven methods can be adapted to the Pacific Palisades.

Several of these approaches are in alignment with the recovery measures for the water utilities from the Pacific Palisades Infrastructure Restoration Plan (AECOM, in progress). The Infrastructure Restoration Plan provides a coordinated, multi-agency roadmap for restoring critical infrastructure systems damaged by the January 2025 Palisades Fire. Additional details about the approaches specific to infrastructure restoration, including the implementation strategy and schedule, can also be found in the Infrastructure Restoration Plan.

This section provides a brief description of each of the potential approaches. The following section describes the feasibility of these potential approaches and summarizes the benefits, challenges, and steps that would need to be taken by LADWP in order to advance these measures further. It is important to note that not all of the suggested approaches are feasible in this particular region. LADWP has studied many of these alternative options in greater detail and may have already eliminated an approach due to feasibility. All of these potential approaches will require further study and information in order to determine if it is applicable and feasible.

Many projects and strategies identified in this document are currently in preliminary stages of the project development process, and may still be pending funding, final approvals, and/or permitting. All projects are subject to change in scope, schedule, and cost until they are fully approved. Some of the projects, strategies, and efforts described in this report may not be possible for the City to complete without additional funding from the Federal and State governments as well as philanthropy, which may or may not be forthcoming.

4.3.1. Existing System Enhancements

System enhancements include any opportunities in the existing conveyance and distribution system for upsizing, looping, or modernizing that could strengthen fire defense capabilities.

4.3.1.1. Replace Vulnerable Assets

The Iron Mountain Mine project (2022) showed that fire-resistant pipe materials reduced risk in fire corridors. For the Pacific Palisades, deeply buried water pipelines fared well during the Palisades fire, but replacing any vulnerable assets with fire-resistant pipe materials could mitigate future failures and align with existing sewer replacement tiers.

4.3.1.2. Augment System Conveyance Capacity

High firefighting demands and leakage from the system can result in increased flow and associated high head losses in the water system, which reduces the pressure available for firefighting. One means of improving water pressure under high demand conditions is to augment the system capacity by increasing the size of pipelines or the number of pipelines in the water system. A hydraulic model of the system will need to be created in order to test the impacts of any capacity or sizing improvements and to balance any potential of water quality issues from stagnant water if pipes are oversized.

4.3.1.3. Installation of a Permanent Regulation Station

The three high-pressure service zones (SZs) (1137 feet, 1345 feet, and 1645 feet) in the Pacific Palisades currently have adequate pressure to supply the system demands and adequate fire flow demand in accordance with the LAFD fire code (LADWP, 2025f). However, the main supply for the three SZs is provided by the

720-foot SZ, and therefore, any issues (such as increased velocity and pressure decreases) in the 720-foot SZ will impact the three high pressure SZs (1137 feet, 1345 feet, and 1645 feet). If a valve were installed and used when all SZs were drained simultaneously, higher elevations (1345-foot SZ) would drain faster to send it to lower zones (1137-foot SZ).

During the Palisades Fire, an attempt was made to install a regulating valve to regulate water from the 1345-foot SZ to the 1137-foot SZ to increase water pressure in the higher elevations in Pacific Palisades (LADWP, 2025a; 2025f). The valve was not installed because LADWP crews were directed to evacuate due to the fire (LADWP, 2025a; 2025f).

4.3.2. Enhancement of Water System Reliability

Potential approaches to enhance water system reliability focus on design and construction measures that improve the ability of water facilities (e.g., tanks, pump stations, pipelines) to withstand wildfire and other potential hazardous impacts.

4.3.2.1. Upgrade Reservoirs to Fire-Resistant Designs

Geomembrane-lined reservoirs can fail under wildfire heat and embers. Following a wildfire in 2023, the El Dorado Irrigation District managed a project to replace aging reservoirs that provided critical water supply for firefighting and domestic use and that replaced linings with concrete tanks, ensuring storage integrity (El Dorado Irrigation District, 2023). Pacific Palisades could strengthen long-term capacity by converting lined reservoirs to fire-resistant designs.

4.3.2.2. Implement Backflow Prevention and Zoning

Post-fire backflow contamination is common, as confirmed by the Water Research Foundation (WRF, 2025). Installing backflow devices and using network zoning would allow Pacific Palisades to confine risks and speed potable water restoration.

4.3.2.3. Adopt Seismic-Resilient Piping

Earthquake-resilient ductile iron pipe (ERDIP) uses ductile iron designed to flex and maintain integrity during seismic movement, making it ideal for fault crossings. LADWP has an existing ERDIP pilot program (LADWP, 2019a) that could be expanded to the Pacific Palisades as warranted to address both seismic and wildfire-related ground stresses and extend asset life and system reliability. LADWP considers several factors such as leak history, age of pipe, operating pressure, soil conditions, risk of service interruption and community disruption, and other projects for replacing water mains. ERDIPs should only be installed in areas with known ground movement activities. Additional details about how this strategy could be implemented are provided in the Infrastructure Restoration Plan (AECOM, in progress).

4.3.3. System Enhancement for Emergency Responders

These are potential system enhancements that support the ability of emergency personnel, and in particular firefighters, to respond effectively during a wildfire event and gain or maintain access to wildfire water supplies during a wildfire event.

4.3.3.1. Deploy Pressure Monitoring Systems

As pumping stations lost pressure and the tanks were emptied, there were reports that some hydrants in Pacific Palisades, especially those in high-elevation zones that are serviced by the tanks, lost pressure and water flow (LADWP, 2025a). The fact that hydrants have no sensors impacted LADWP's traceability of which hydrants lost pressure or when.

Real-time pressure tracking, as used in San Francisco's Emergency Firefighting Water System (EFWS) (SFPUC, 2021), could ensure water availability and prevent dry hydrants by streaming live data to fire crews throughout the network during emergencies.

4.3.3.2. Provide Remote-Controlled Isolation for Fire Support

During the Palisades Fire, LADWP manually shut off water access to 4,800 points where water was unnecessarily running, which had caused an increase in the water velocity and led to a decrease in pressure within the system (LADWP, 2025a). Research following the Marshall Fire in Colorado (2021) found that remote isolation valves can preserve pressure and limit contamination by quickly sectioning off damaged areas (Whelton et al., 2023). The City could adopt similar remote-controlled valves at key points to preserve pressure and maintain firefighting supply.

4.3.4. Enhancement of Water Supply

The enhancement of the water supply may include developing additional water supplies such as wells, interties, or alternative storage facilities. These approaches would help improve system redundancy and provide a more reliable supply for firefighting and emergency needs.

4.3.4.1. Explore Long-term Improvements for Santa Ynez Reservoir

As described in Section 4.1.2, the Santa Ynez Reservoir has a maximum capacity of 117 MG, but the operational band of the reservoir is only 22 MG. Increasing the operational capacity of the reservoir or replacing it with an alternative operational configuration could improve access to additional water supplies during an emergency event.

In the short term, LADWP plans to replace the existing Santa Ynez Reservoir floating cover with a new floating cover. Replacing the existing floating cover is needed due to repeated tears and repairs. The new floating cover should be in place by August 2027 or sooner. LADWP is currently studying the following four alternatives for a long-term solution (LADWP, 2025g):

- Replace Santa Ynez Reservoir floating cover with a fixed cover that could be an aluminum roof or concrete slab
- Replace Santa Ynez Reservoir with a tank(s)
- Construct a new tank(s) in an area adjacent to the Santa Ynez Reservoir
- Convert Santa Ynez Reservoir to an open-air reservoir and construct a new water treatment plant downstream of the Santa Ynez Reservoir

4.3.4.2. Add a Sea Water Pump Station

Seawater pump stations are used for wildfires, typically as a last resort in coastal areas when freshwater sources are exhausted. Seawater pump stations work by using powerful pumps, which can be portable units, fireboats, or fixed systems, to draw seawater from the ocean and transport it via hoses to the fire. While seawater can extinguish fires, it poses risks such as equipment corrosion and potential harm to coastal ecosystems due to salinity.

Similar to San Francisco's EFWS (SFPUC, 2021), a seawater pump station could provide an emergency source to refill Santa Ynez Reservoir (or another storage location or emergency fill point) during extended wildfires, providing firefighting capacity when local supplies run low (SFPUC, 2025).

4.3.4.3. Explore Resources for Emergency Supply

Reliable access to substantial water supplies is critical for effective fire control and suppression, particularly in fire-prone areas and during dry seasons (Almar Water Solutions, 2024). Identification of potential resources and securing agreements for access to any and all available resources that could be used to support firefighting or emergency response operations should be explored in advance of the next emergency. Exploration should include the evaluation of privately owned water assets and assets in neighboring communities such as wells, storage tanks, and ponds.

4.3.4.4. Provide Interconnections from Neighboring Communities

Interconnections between water systems allow for the transfer or sharing of water supplies during shortages or emergencies. As described in Section 4.2.5, the Pacific Palisades area has existing interconnections to neighboring water systems in Los Angeles County and the City of Santa Monica. LADWP considers these interconnections to be one-directional because LADWP's system has greater water pressure than these smaller systems; if LADWP connects to take water from either of the systems, their supplies would be quickly depleted (LADWP, 2025f). Options for new interconnections for Pacific Palisades or the Westside Region of LADWP's system could be explored to see if additional interconnections to provide redundancy exist.

4.3.4.5. Provide Non-Potable Water Access

Firefighting operations for the Palisades Fire included the use of seawater scooped by aircraft and dropped on the wildfires (Allyn, 2025). The use of non-potable water, such as treated wastewater and collected storm or greywater, to fight wildfires is becoming more common, especially in drought-prone or arid regions, to conserve drinking water and provide a continuous supply during emergencies (Fox, 2019). This can be accomplished through direct use of treated wastewater or by identifying opportunities to combine non-potable water storage opportunities with environmental enhancement (nature-based solutions) or recreational opportunities (EPA, 2025c).

The City of Naples, Florida, has attached street fire hydrants directly to reclaimed water systems (Fox, 2019), and firefighters in Wales in the United Kingdom have used treated sewage water to tackle fires as droughts threaten their responses to emergencies (Dafydd and Hale, 2023). However, the addition of nature-based solutions for storage can make it easier to implement a water reuse project because they can lower the cost of the project and enhance multiple benefits of a water reuse project (EPA, 2025c). Examples of these solutions include constructing multi-use reservoirs or ponds to store reclaimed wastewater or captured stormwater that also provide a permanent water source for local wildlife and accommodate recreational activities (e.g., fishing, kayaking, canoeing).

Other sources of non-potable water could be considered. Opportunities to expand stormwater capture capacity citywide were extensively reviewed in the Stormwater Capture Master Plan (Geosyntec Consultants, 2015), and the most feasible projects from that plan have already been implemented or are currently in-progress.

4.3.4.6. Construct New Potable Tanks

The 2023 Lahaina, Hawaii, wildfire demonstrated the danger of relying on a limited water supply during a major disaster. Firefighters struggled to find adequate water pressure and residents were unable to access water (Sowby and Porter, 2024). The incident highlighted a critical failure in water infrastructure that left communities vulnerable, as seen by weakened water pressure in Lahaina and the difficulty of getting water to combat the flames. Construction of new potable tanks, placed outside fire-prone zones, would add redundancy and help maintain water service during and after wildfires. However due to the grade requirements for storage, this may not be achievable in the Pacific Palisades area.

4.3.4.7. Add a Well in the Santa Monica Basin

Groundwater, such as from a well, can be used for firefighting by pumping it through hoses or filling tanker trucks. The Pacific Palisades area overlays the unadjudicated Santa Monica Groundwater Basin, which could potentially offer a backup water supply source. The City currently has no water rights in the Santa Monica Basin, but the potential for groundwater to be used in Pacific Palisades to maintain water supply or pressure during emergencies should be explored as local water supplies tend to be more reliable than imported water because they have less variability due to climate, weather, and environmental restrictions (LADWP, 2020).

LADWP has already made substantial investments in local groundwater as part of its plans to further diversify its water supply portfolio, and by being an active stakeholder in the Santa Monica GSA, the City can safeguard its future interests in the Santa Monica Basin should it pursue additional groundwater extractions as a supplemental supply source.

4.3.5. Coordination Measures

Coordination measures focus on assessing any potential risks, aligning efforts, setting clear priorities, and using plans and communication tools to ensure smooth execution in advance of and preparation for the next potential wildfire event.

4.3.5.1. Review Emergency Fill Points

Emergency fill points, such as designated hydrants and standpipes, provide fire agencies and water haulers with a reliable, high-pressure water source during emergencies like fires, droughts, or other events in which water is scarce. The primary benefits are rapid response, enhanced fire suppression, and resilience in emergencies by ensuring that water is available when and where it is needed most, even in areas that lack municipal water. LADWP noted the existence of several of these that were used during the Palisades Fires. A potential plan would be to discuss with LAFD the number and locations of the fill points to determine if additional emergency fill points would be beneficial to LAFD.

4.3.5.2. Pre-Plan Use of Limited Water Supply

Research from the Lahaina Fire (2023) found that the availability of water does not guarantee that structures will be saved (Sowby and Porter, 2024). Research concluded that "...sources agree that the most excessive fire flows are likely associated with situations where the buildings would have been lost anyway, regardless of how much water was available" (Sowby and Porter, 2024). Therefore, prioritizing in advance of the next wildfire how limited water resources should be used could help make a significant difference in firefighting efforts. It is recommended that firefighters and water utility staff coordinate and make these decisions together in joint planning exercises.



4.4. Feasibility of Approaches

The benefits, challenges, and general feasibility of each approach are discussed in the following sections, but the actual feasibility (including costs, measured impact, and timing) of a specific approach is not the subject of this plan and will require further evaluation.

4.4.1. Existing Water System Enhancements

Opportunities in the existing conveyance and distribution system for upsizing, looping, or modernizing could strengthen fire defense capabilities. Older pipelines and shallow or exposed infrastructure are highly vulnerable to fire-related contamination and failure, and upgrading or making improvements to the existing system at the same time as any damaged infrastructure is being restored following the fire could save time and resources, as well as leverage potential funding opportunities following a disaster. Table 4.3 lists the potential approaches for existing system improvements and summarizes the benefits, challenges, and next steps needed to move these approaches forward.

All of the system updates and improvements would require significant capital expenditures, and in addition to system design and scheduling concerns, they would need to be integrated into any future capital plans. The Infrastructure Restoration Plan (AECOM, in progress) explores these concepts in further detail.

Table 4.3: Potential Approaches for Existing Water System Enhancements

Potential Approach	Benefits	Challenges	Next Steps for Consideration by the City
Replace Vulnerable Assets	Mitigate failures; Align with existing sewer replacement tiers; Increases resilience	Cost; Timing with emergency repairs	Identify if there are any potentially vulnerable assets; Can be actioned in the medium- to long-term; medium if expedited planning process identifies asset as critical and vulnerable; requires coordination with other city departments and additional planning to prioritize projects with other rebuild efforts.
Augment System Conveyance Capacity	Improves water pressure; Provides additional capacity; Increases resilience	Cost; Potential impacts to distribution water quality during normal operating conditions	Create hydraulic model to test design and operation; Requires additional feasibility analysis and in-depth evaluation of potential options.
Install a permanent regulation station	Increased ability to regulate pressure without endangering staff	Faster drainage from higher to lower pressure zones in some cases	Currently planned by LADWP

See document disclaimer. All approaches require detailed feasibility analysis by LADWP.

4.4.2. Enhancement of Water System Reliability

Enhancing water system resilience for firefighting is crucial for protecting communities, especially in areas prone to wildfires. Resilient water systems ensure that firefighters have a reliable water supply to suppress fires, but the process involves complex technical, financial, and logistical challenges. General benefits of increasing water system resilience include improved public and firefighter safety, reduced fire damage and costs, greater continuity of water service, and increased disaster preparedness. However, upgrading water systems is expensive, and water system planners face competing priorities to address numerous pressing needs beyond firefighting, including climate adaptation for drought and floods, replacing aging infrastructure, and managing contaminants. Table 4.4 lists the potential approaches for enhancing water system reliability and summarizes the benefits, challenges, and next steps needed to move these approaches forward.

Similar to the existing system enhancement approaches, almost all these approaches to enhance water system reliability will require significant capital expenditures, and they will need to be integrated in any future capital plans. The Infrastructure Restoration Plan (AECOM, in progress) also explores most of these concepts in further detail.

Table 4.4: Potential Approaches for Enhancing Water System Reliability

Potential Approach	Benefits	Challenges	Next Steps for Consideration by the City
Upgrade Reservoirs to Fire-Resistant Designs	Strengthen long-term capacity	Cost	Requires additional feasibility analysis and in-depth evaluation of potential options.
Implement Backflow Prevention and Zoning	Confine risks; Speed potable water restoration	Cost	Requires additional feasibility analysis and in-depth evaluation of potential options.
Adopt Seismic-Resilient Piping	Extends asset life and system reliability	Cost	Requires additional feasibility analysis and in-depth evaluation of potential options.

See document disclaimer. All approaches require detailed feasibility analysis by LADWP.

4.4.3. System Enhancement for Emergency Responders

Approaches that enhance the ability of emergency personnel, and in particular firefighters, to respond effectively during a wildfire event and gain or maintain access to wildfire water supplies during a wildfire event enhances efficiency while minimizing risks to firefighters. This group of measures highlights the benefits of advanced planning for new types of emergencies and touches on some of the recent enhancements in monitoring and real-time data that can help guide fire force deployment and optimize limited resources. Table 4.5 lists the potential approaches to support access to wildfire water supplies and summarizes the benefits, challenges, and next steps needed to move these approaches forward.

Table 4.5: Potential Approaches for System Enhancement for Emergency Responders

Potential Approach	Benefits	Challenges	Next Steps for Consideration by the City
Deploy Pressure Monitoring Systems	Real-time pressure tracking ensures water availability throughout the network during emergencies	Cost; Availability of utility power and telecommunication networks being operational during an emergency	Requires additional feasibility analysis and in-depth evaluation of potential options and coordination with LAFD.
Provide Remote-Controlled Isolation for Fire Support	Preserve pressure and limit contamination	Cost; Lack of availability of fire-resistant materials for smart controls at individual services; and potential negative impacts of shutting off supply to entire sections of affected services during emergencies	Requires additional feasibility analysis and in-depth evaluation to identify which valves would benefit from this technology. Coordination with LAFD is required.

See document disclaimer. All approaches require detailed feasibility analysis by LADWP.



4.4.4. Enhancement of Water Supply

Communities in fire-prone areas need to have robust water supply systems to maintain water pressure and storage, even during catastrophic events. Redundant water sources, secondary or backup water supplies, and the addition of community-scale water storage facilities are approaches that can improve system redundancy and provide alternative water supply sources for firefighting or emergency needs.

New sources of alternative water supply sources have already been explored extensively, particularly in an area like Southern California that has been facing water resources challenges such as population growth, climate change, and drought for decades. LADWP has been evaluating how to further diversify its water supply portfolio and expand its use of local water supplies for many years by investing in water conservation, recycled water, groundwater recovery, and stormwater capture (LADWP, 2017; 2020; 2024a). LADWP has also identified opportunities for water transfers, groundwater banking, brackish groundwater recovery, and seawater desalination, as noted in its 2020 UWMP, but review of the available studies did not find any localized water supply alternatives specifically for the Pacific Palisades area.

Table 4.6: Potential Approaches to Enhance Water Supplies

Potential Approach	Benefits	Challenges	Next Steps for Consideration by the City
Explore Long-term Improvements for Santa Ynez Reservoir	Maximizes potential of existing resources; Adds redundancy	Cost	Complete planned Alternatives Evaluation Study
Add a Sea Water Pump Station	Large quantity of nearby water supply	Equipment corrosion and potential harm to coastal ecosystems due to salinity; Cost of installing and maintaining a duplicate piping/hydrant system, and/or feasibility of conveyance "via hoses" to the fire	Requires additional feasibility analysis and in-depth evaluation of potential use.
Explore Resources for Emergency Supply	Maximizes potential of existing resources; Adds redundancy	Requires pre-arranged agreement and potential costs to adapt operations	Requires additional feasibility analysis and in-depth evaluation of potential options.
Provide Interconnections from Neighboring communities	Adds redundancy	LADWP has already explored interconnections- options for new connections may be limited; Cost	Requires additional feasibility analysis and in-depth evaluation of potential options and coordination with neighboring communities.
Provide Non-Potable Water Access	Adds redundancy; Adds local resilient water supplies	Cost- new infrastructure for the storage and transportation needed; Water quality risks to health or the environment during its use	Requires additional feasibility analysis and in-depth evaluation of potential options.
Construct New Potable Tanks	Adds redundancy; Increases resiliency	Cost; Operational constraints to locate potential new storage at appropriate grade	Requires additional feasibility analysis and in-depth evaluation of potential options.
Add a Well in the Santa Monica Basin	Adds redundancy; Adds local resilient water supplies	Potentially unavailable resource; Water quality; Cost	Requires coordination with the Santa Monica Groundwater Sustainability Agency and member agencies of this GSA.

See document disclaimer. All approaches require detailed feasibility analysis by LADWP.

Review of the available studies also found that watershed management efforts in the region have focused mainly on stormwater capture for groundwater recharge for drinking water supplies (Geosyntec Consultants, 2015), and water supply planning efforts have focused on reclaimed water for drinking water purposes (LADWP, 2024a). There has not been a large focus on increasing non-potable water supplies for emergency supplies. Additional studies could help identify opportunities that were not beneficial for drinking water supplies but could be beneficial for emergency purposes.

Table 4.6 lists the potential approaches to enhance water supplies and summarizes the benefits, challenges, and next steps needed to move these approaches forward.

Collaborative partnerships between agencies on local supply development and regional conveyance can expand the total volume of local water available region-wide, improve cost-effectiveness, and enhance opportunities for external funding (Los Angeles County, 2023). Recognizing and managing the Pacific Palisades existing water infrastructure as an interconnected system with other local municipal, County, and State resources can create opportunities to better link water supplies with demand and storage where appropriate (Los Angeles County, 2023).

4.4.5. Coordination Measures

The coordination measures focus on approaches and actions that can be taken to recover from the Palisades wildfires efficiently and effectively and on how to coordinate the data-driven decision-making process by supporting faster and efficient response for future disasters. Studies have shown that it is easier to prepare to provide emergency water supplies after public water systems fail, particularly for the critical needs of potable water use, firefighting, hospitals, and sanitation (Welter, 2010; Lindovsky and Krocova, 2015; Sowby and Porter, 2024). Table 4.7 lists the potential coordination approaches and summarizes the benefits, challenges, and next steps needed to move these measures forward.

4.4.6. Potential Implementation

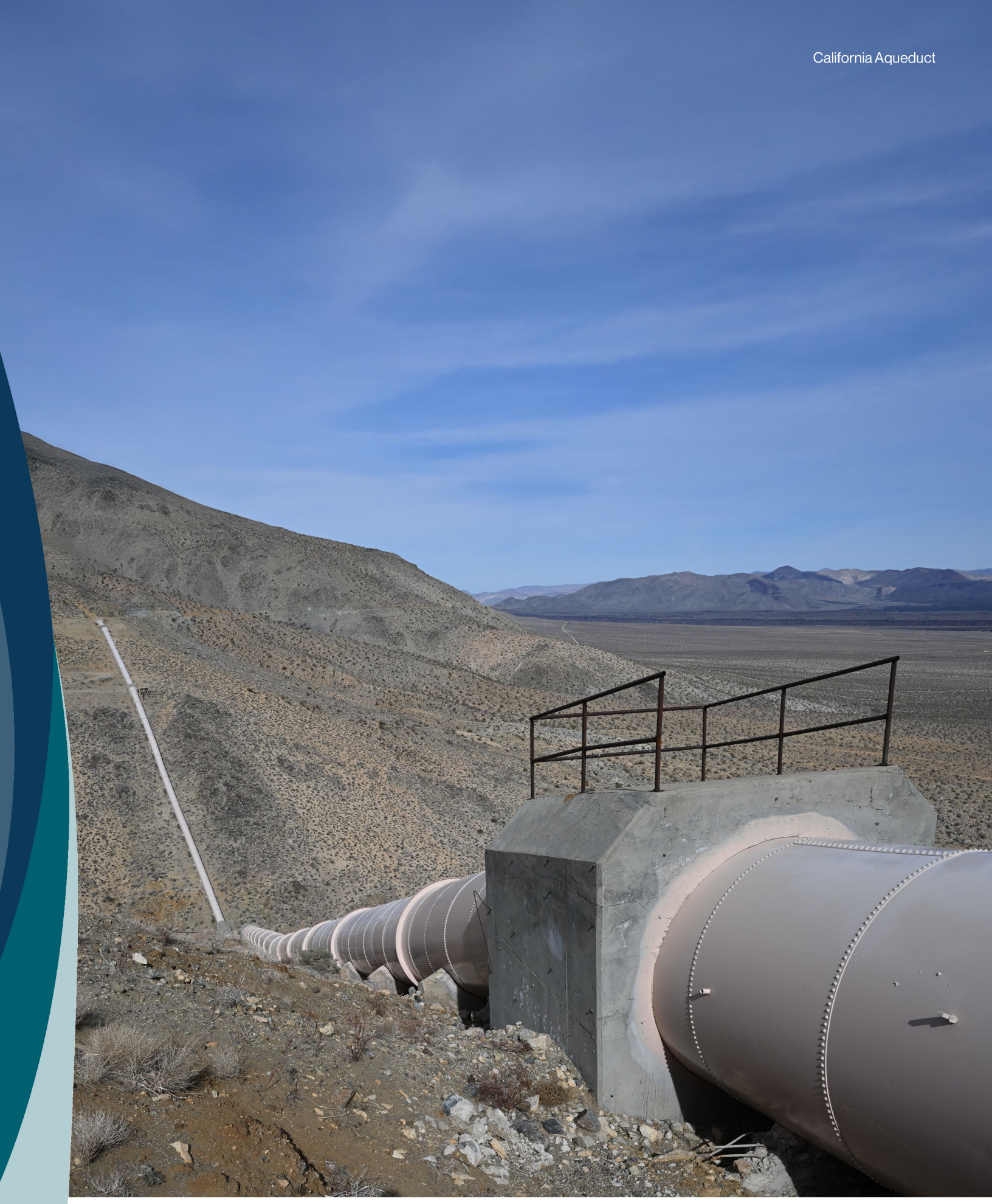
While this report presents the approaches as discrete options, the Infrastructure Restoration Plan (AECOM, in progress) summarizes potential combinations of measures that can create more robust resilience packages for the Pacific Palisades. These combinations, drawn from case study evidence in Paradise, Lahaina, San Francisco, and international examples, form a menu of resilience packages that the Pacific Palisades can adopt and scale. By linking each package to proven solutions, this menu ensures that implementation is both credible and context-specific.

The Infrastructure Restoration Plan also sequences many of these potential approaches into a roadmap as part of a broader resilience framework. Coordination measures establish priorities and direct resources; system enhancements provide the durable backbone; and alternative water supply packages ensure redundancy and firefighting readiness. Integrated in this way, the strategies not only accelerate recovery but have the potential to transform the Pacific Palisades into a model of long-term adaptation to wildfire, seismic, drought and climate risks.

Table 4.7: Potential Coordination Measures

Potential Approach	Benefits	Challenges	Next Steps for Consideration by the City
Provide Additional Emergency Fill points	Rapid response, enhanced fire suppression, and resilience in emergencies	LADWP and LAFD already utilize this as a strategy-additional access points may be limited	Review existing plans in the lens of the January 2025 fires to determine additional needs or areas for improvement; requires additional analysis and coordination with LAFD.
Pre-plan Use of Limited Water Supply	Making decisions in advance allows for more streamlined responses	Coordination; Making tough decisions that will need to be defensible	Coordination with key partners and develop strategy; requires additional analysis and coordination with LAFD.

See document disclaimer. All approaches require detailed feasibility analysis by LADWP.



California Aqueduct



5. Electrical Energy System

A resilient energy system is important to mitigate future wildfires and in the event of a wildfire, back up power sources would be available if needed. The objective of this section is to outline key approaches to support and advance resilience for the future system.

Many projects and strategies identified in this document are currently in preliminary stages of the project development process, and may still be pending funding, final approvals, and/or permitting. All projects are subject to change in scope, schedule, and cost until they are fully approved. Some of the projects, strategies, and efforts described in this report may not be possible for the City to complete without additional funding from the Federal and State governments as well as philanthropy, which may or may not be forthcoming.

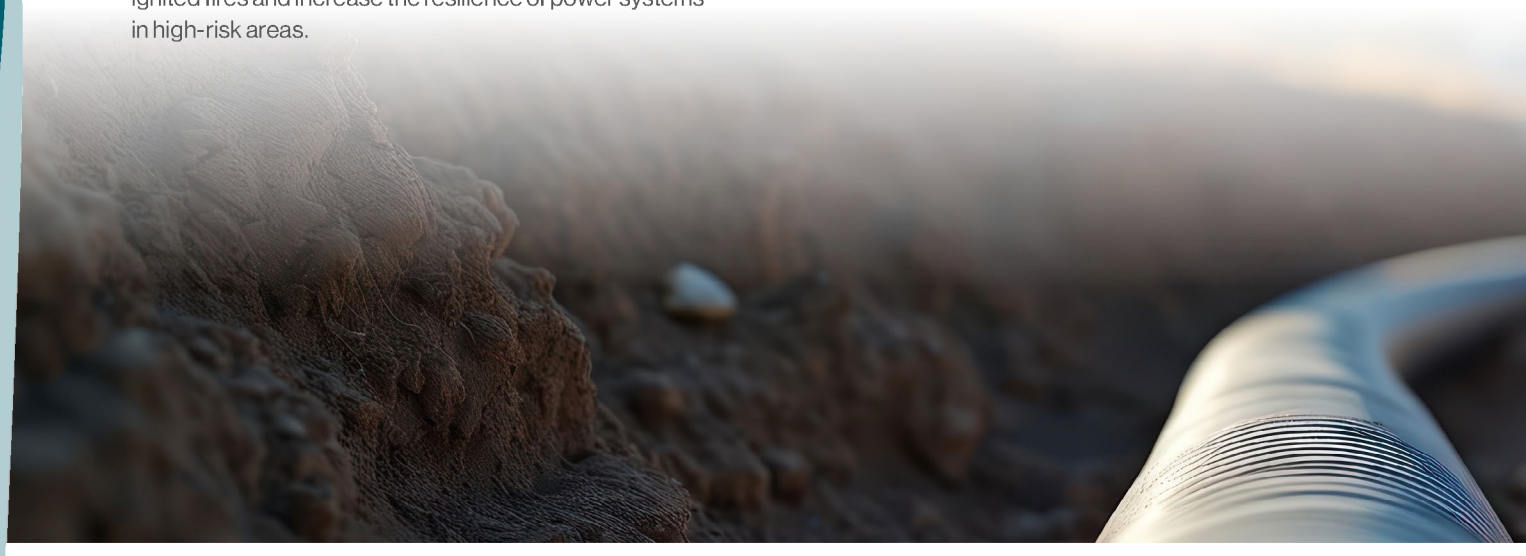
Approaches have been identified referencing the Blue Ribbon Commission on Climate Action and Fire-Safe Recovery alongside best or innovative practices implemented by other electric utilities (Blue Ribbon Commission, 2025). These approaches were compared to existing planning documents such as LADWP's 2025 Wildfire Mitigation Plan (LADWP, 2025b) (see sidebar). The ambition is to determine approaches for integration into utility practices and buildout plans to mitigate the potential for wildfire ignition and reduce the spread of wildfire in the future. Further details these strategies is provided in the Infrastructure Restoration Plan (AECOM, in progress).

LADWP is seeking approval to increase the voltage of the distribution system, which would provide key wildfire mitigation benefits including:

- Grounded neutral and fault isolation: A four-wire WYE system has a grounded neutral, unlike the old ungrounded three-wire delta. The grounded neutral provides a stable reference and allows single-phase faults to clear via fuses or relays. In a WYE system, line-to-neutral faults generate currents that trip breakers/fuses quickly, improving fault isolation and allowing sections of the grid to quickly de-energize.
- Arc-flash and safety: At higher system voltages, delivering a given power draw requires lower current, which generally reduces fault current magnitude and potential arc energy at any point. Although not easily cited quantitatively, engineering guidelines recognize that moving from 4.8 to 12 kV typically lowers arc-flash incident energy which can reduce the risk of utility infrastructure-ignited fires and increase the resilience of power systems in high-risk areas.

LADWP Wildfire Mitigation Plan

As part of a broader wildfire mitigation strategy, LADWP developed its Wildfire Mitigation Plan to help safeguard and improve public safety. The plan details roles and responsibilities of LADWP staff to manage wildfire risk, key drivers of wildfire, and preventative strategies. Strategies included in the plan are assigning threat districts, developing design standards, vegetation management tactics, inspection procedures, reliability programs, workforce training, and operational protocols.



5.1. Undergrounding

Undergrounding power lines may reduce the risk of ignition by protecting energized lines from extreme weather and vegetation contact. The U.S. Department of Energy (DOE) emphasizes that underground lines greatly reduce vulnerability to extreme weather and wildfires, by preventing initial ignition and avoiding storm damage (DOE, 2024). In effect, buried feeders reduce potential contact between energized lines and vegetation or debris and reduce the susceptibility to windstorms.

Compared to their overhead counterparts, underground systems have shown to be more effective in fire mitigation but at a steeper cost (see Table 5.1). Although enhanced reliability comes at a higher initial cost, most utilities throughout the United States that have been challenged by extreme weather and wildfire risks have either been undergrounding power lines in the past few years or considering it as a potential solution, especially by targeting the most vulnerable and outage-prone segments of the network. Examples are Pacific Gas and Electric (PG&E), Southern California Edison (SCE), San Diego Gas & Electric (SDG&E), and Hawaiian Electric.

Table 5.1: Southern California Edison Fire Mitigation Technology Comparison

Mitigation Option	Relative Mitigation Effectiveness Factor[1]	Cost per Mile	Mitigation Effectiveness-to-Cost Ratio
Re-conductor-Conventional poles and conductors	0.15	$300,000	0.5
Covered Conductors and Fire-Resistant Metal Poles	0.6	$480,000	1.4
Underground Conversion	1	$3,000,000	0.33

[1] *Undergrounding serves as the baseline for measuring mitigation effectiveness.*



5.2. Covered Conductor

In some areas, undergrounding overhead powerlines may not be feasible due to technical or operational constraints. In these cases, the remaining overhead lines need to be hardened using alternative methods. One option is a covered conductor, an overhead wire with added insulation. Covered conductors directly reduce wildfire ignition risk by preventing common fault arcs. If a tree limb or balloon contacts a covered phase, the insulating jacket stops a dead short – any flashover is far less likely. Utility studies quantify installing covered conductors in high-fire zones can cut ignition drivers by roughly 60% to 90% compared to bare wire. LADWP has installed over 20 miles of covered conductors (LADWP, 2025b). While the covered conductor strategy improves protection from vegetation management it has been found to reduce the useful like due to an increase in corrosion rate of the metallic conductor (PG&E, n.d.).

5.3. Ground Level Distribution System

A Ground Level Distribution System (GLDS) is an innovative solution that is ideal for areas where traditional underground conversions present challenges, including rocky terrain, environmentally sensitive regions, or difficult field conditions. The Electric Power Research Institute is actively conducting technical evaluations of this technology. PG&E has recently deployed GLDS technology in selected parts of its service territory with positive results (P&E, 2023). GLDS is currently not a strategy included in LADWP's Wildfire Mitigation Plan (LADWP, 2025b).



5.4. Replacement of Wood Poles

High temperatures can compromise the structural integrity of wood poles, exacerbating fires when they fail. For remaining overhead lines, LADWP may consider alternatives to wood poles, such as the following materials:

- Galvanized Steel, which is 100% recyclable, and has 50 to 80 years of service life.
- Spun Concrete, which is durable and long lasting, and has around 75 years of service life.
- Composite, which is lightweight, rot-proof, and has more than 80 years of service life.
- Fire-retardant Wraps or Coatings can be applied to existing wooden utility poles. When exposed to extreme heat, these wraps use an intumescent process to swell and form a protective, heat-insulating barrier around the pole.

While these alternatives provide superior durability and resistance, they face similar structural integrity issues at high temperatures as wooden poles. For example, steel poles lose 50% of their strength as temperatures reach 932°F, well within wildfire temperatures that can reach up to 2,200°F (T&D World, 2024). Fire-retardant wraps have shown the most promise they have successfully protected wooden structures during wildfires, resulting in minimal damage (BPA, 2024). LADWP has replaced wooden poles with steel poles historically. This is a strategy proposed in the Wildfire Mitigation Plan (LADWP, 2025b).

5.5. Advanced Conductors

Traditional overhead cables have operational limits determined by the thermal properties of their steel core. High electrical loads or high ambient temperatures results in line sag, which reduces the clearance between the lines and the ground, and increases the risk of sparks. Advanced conductors address this issue by replacing the steel core with lighter, stronger composite materials like carbon fiber. This innovation known as advanced reconductoring reduces thermal sag by up to 50% and is included in LADWP's Wildfire Mitigation Plan (CTC Global, 2025). It is particularly impactful for overhead transmission lines, as demonstrated in LADWP's upgrade of the Rinaldi Tarzana Transmission line. The upgrades cost $4.5 billion to replace aging conductors and tower foundations along the 10.3 mile line (LADWP, 2024b).



5.6. Advanced Vegetation Management

Vegetation remains a leading cause of outages and an ignition source for utility-related wildfires. LADWP meets the industry standard practices outlined by the North American Reliability Corporation and the California Public Utility Commission. As detailed in the Wildfire Mitigation Plan, LADWP patrols the clearances between conductors and vegetation of 100% of their transmission and distribution lines at least once per calendar year to help ensure no vegetation encroachments occur within the conductor's respective clearance distance.

Advanced vegetation management in wildfire-prone areas involves strategic methods for reducing flammable vegetation, creating defensible spaces, and mitigating the intensity and spread of fires. This new approach integrates multiple data sources and advanced analytical tools such as Light Detection and Ranging (LiDAR) and satellite imagery to monitor entire service territories. LADWP has indicated that this is currently under evaluation as part of its Wildfire Mitigation Plan (LADWP, 2025b). Artificial Intelligence is used to analyze the data generated by LiDAR and satellite imagery to classify vegetation types and predict future growth patterns, so the utility can create comprehensive and targeted plans to manage the vegetation.

5.7. Technological and Operational Modernization

The deployment of advanced line sensors that monitor voltage and current flow on distribution circuits and high-speed Phasor Measurement Units on the transmission system can provide synchronized, system-wide snapshots of grid stability. Newer technologies such as Distributed Fiber Optic Sensing can use fiber optic cables to continuously monitor temperature, physical strain, and acoustic vibrations along a power line, detecting hotspots, mechanical stress, or third-party intrusion. These sensors collect vast amounts of data on everything from power quality and equipment health to fault locations. The sensors enable real-time system visibility and wide area situational awareness that allow rapid response systems and operators to quickly disconnect live sections of the grid to mitigate possible wildfire risks.



5.8. Leveraging Artificial Intelligence and Digital Tools

Modernization extends beyond automated response to proactive prediction. Digital technologies such as Artificial Intelligence (AI), machine learning (ML), and digital twin technologies can be considered in the future to conduct wildfire mitigation tasks including:

- **Predictive Analytics for Asset Management:** AI and ML algorithms analyze vast datasets including data from sensors, smart meters, historical failure records, weather data, and equipment specifications to identify subtle patterns that precede a failure. This allows the system to forecast the probability of failure for individual assets like transformers or circuit breakers in advance. This not only reduces unplanned outages and maintenance costs but also helps mitigate wildfire risk by preventing failures that could lead to electrical faults in high fire-threat areas.
- **Digital Twin Technology:** A digital twin is a detailed, dynamic virtual model of a physical grid asset, a substation, or even an entire distribution network. This virtual replica is not static; it is continuously updated with real-time data from the physical grid's sensors, creating a faithful mirror of the system's current state. This technology provides a powerful "sandbox" for operators and planners to simulate the impact of various events and test different response strategies without posing any risk to the live grid. Digital twins enable utilities to model fire-prone scenarios, assess grid vulnerabilities, and optimize preventive actions like de-energization or rerouting power flows to reduce ignition risk.

5.9. Resiliency through Distributed Energy Resources

One of the many benefits of distributed energy resources (DERs) is providing back-up generation in the event of a power outage through technologies such as rooftop solar and battery energy storage systems. DERs serving as back-up generators are encouraged for critical facilities such as fire stations, police stations, and water pumping stations. LADWP has installed back-up diesel generators at pump stations, such as the Garvanza Pump Station (LADWP, 2025h). In Riverside County, California, the Soboba Band of Luiseno Indians upgraded a Fire Station utilizing vanadium flow batteries alongside solar photovoltaics to provide 10 hours of continuous back up power during times of outages (Invinity, n.d.). By reducing reliance on the centralized grid during high-risk periods, DERs can play a vital role in wildfire mitigation by maintaining critical services and minimizing the need for emergency grid operations that could spark ignitions.

5.10. Public Safety Power Shutoff Protocol

Public Safety Power Shutoff (PSPS) is a last-resort proactive approach to de-energize electrical lines in circumstances where high heat, wind, or vegetation interaction increases the potential of fire. While PSPS events may reduce the circumstances that have the potential to cause wildfires, PSPS events can leave communities and essential facilities without power, which brings its own risks and hardships, especially for vulnerable communities and individuals. The Environmental Protection Agency (EPA) provides PSPS Standard Operating Procedures and CPUC guidelines (EPA. 2025b; CPUC, 2020). California utilities that perform PSPS include PG&E, SCE, and SDG&E, as well as smaller utilities like Liberty Utilities. LADWP currently does not have a PSPS protocol but is actively working to evaluate options.

5.11. Feasibility of Electrical Energy System Approaches

A summary of the potential benefits, challenges, and next steps needed to move each approach forward is provided in Table 5.2. If undergrounding and voltage conversion was pursued, some overhead lines may not be suitable for undergrounding due to technical and operational limitations. Advanced, covered conductors with fire wrapped poles are encouraged for consideration for remaining overhead conduit. Alternatively, the City could pilot and deploy GLDS instead of overhead lines. The City may benefit from joining and participating in EPRI's evaluation team to stay at the forefront of industry innovation. Additionally, the City is encouraged to engage with PG&E to review the GLDS project and learn from its experience. LADWP would need to develop a design for both options over the next 2 years for implementation.

Table 5.2: Potential Electrical Energy System Approaches

Potential Approach	Benefits	Challenges	Next Steps for Consideration by the City
Voltage Conversion from 4.8 kV to 12 kV	» Grounded neutral and fault isolation » Arc-flash and safety	Cost, upfront costs and transformer supply chain challenges	Design & planning are currently being implemented. Investigating funding opportunities is a near-term action.
Undergrounding	Fire protection and prevention, mitigate energized lines contacting vegetation	Cost, land and right of way availability, rollout difficulty	Design & planning are currently being implemented. Investigating funding opportunities is required to support planning efforts.
Covered Conductor	Mitigate energized lines contact with animals or vegetation	Reduction in useful life due to increased corrosion rate of the metallic conductor	Near-term opportunity to develop a plan to cover remaining permanent overhead conductors in Pacific Palisades.
Ground Level Distribution System	Alternative to undergrounding where technical limitations exist	Technology in the pilot stages, regulatory barriers	This is a long-term strategy to evaluate the feasibility to convert remaining overhead system to GLDS. Coordination efforts can begin in the near term to learn from other utilities on the pilot learnings of the technology.
Replacement of Wood Poles	Increased resilience from corrosion and other weather events	Structural integrity concerns during high-temperature fires	LADWP is currently evaluating the feasibility to wrap permanent overhead poles.
Advanced Conductors	Increase in thermal limits replacing the steel core with lighter, stronger composite materials. Reduced line sag.	Upfront cost	Determine priority transmission lines in wildfire hazard zones for reconducting. LADWP is currently implementing this strategy through their Wildfire Mitigation Plan.
Advanced Vegetation Management	Mitigate energized lines contacting vegetation	Staff training with new technologies	Test and train staff on using LiDAR to monitor vegetation. LADWP is currently implementing this strategy through their Wildfire Mitigation Plan.
Technological and Operational Modernization	Rapid response to monitor grid health and de-energize lines	Data management, upfront costs, security concerns	Determine sensor locations. LADWP is currently implementing this strategy through their Wildfire Mitigation Plan.

Potential Approach	Benefits	Challenges	Next Steps for Consideration by the City
Leveraging AI and Digital Tools	Proactive mitigation assessment	Data management, software capabilities and accuracy	Continue to collaborate with industry leaders on leveraging Artificial Intelligence for wildfire mitigation efforts; Consider pilot to test offering. This is a long term action that will require further coordination with technology partners.
Resiliency through Distributed Energy Resources	Continued operation of critical facilities during outages	Upfront cost, land availability	Deploy Battery Energy Storage System to back-up hydrant pump systems; Investigate funding opportunities. Further coordination with LAFD is needed for short-term action.
Public Safety Power Shutoff (PSPS) Protocol	Fire prevention by de-energizing lines	Health and safety risks of cutting off power for vulnerable populations, communication logistics, difficult protocol decisions	Continue research efforts on PSPS protocols; Gain feedback from stakeholders on PSPS protocols. This strategy is currently being investigated. Further collaboration with CPUC and sharing learnings from other utilities is needed.





6. Evacuation Capabilities Strategies

Mass evacuations, especially for a short-notice event such as a wildfire, present distinct and significant challenges to public safety agencies. Even under the best of circumstances, mass evacuations are difficult to conduct, have challenging time constraints, and impose significant demands on available personnel and resources. Pacific Palisades compounds these issues with additional factors, namely the potential for severe hazards that may have limited advance warning; challenges related to topography, road network, and population density; and limited communications networks.

This section presents strategies for consideration, targeted at assisting the City with planning for, and conducting, future mass evacuations in Pacific Palisades. The strategies are grouped into two broad categories: Section 6.2 addresses the physical transportation infrastructure of the road network and the signaling systems, to promote greater throughput of evacuation traffic; Section 6.3 focuses on operational considerations. for enhancing the implementation of evacuation planning and response protocols. The strategies are subdivided into the following subcategories:

Physical Infrastructure Strategies

- Roadway widths and turnarounds
- Intersection designs
- Traffic signals and signage systems
- Street network

Operational Strategies

- Evacuation management framework
- Pacific Palisades-specific traffic management tactics
- Public alert and warning
- Public education

The strategies in this section are not intended to mitigate or reduce the hazard of wildfire for Pacific Palisades, but rather to assist City agencies with planning and conducting response activities once a wildfire occurs. The strategies are applicable to Pacific Palisades, but many may also be relevant to general evacuation planning at the City level.

The strategies are not intended to supersede or replace elements of the the City's existing Emergency Operations Plan (EOP) and EOP applicable annexes, or other existing plans and procedures for mass evacuations. Rather, they are designed to inform future updates or revisions of those materials and to support ancillary preparedness activities. As part of the project scope, this report includes a draft for a proposed Pacific Palisades Evacuation Tactical Guide, as Appendix B. As with the evacuation strategies, the Tactical Guide is designed to complement the City's current plans and procedures, not to replace them. It is intended to be a decision-support tool for use by responding agencies as they implement elements of the City's established emergency response plans.

Many projects and strategies identified in this document are currently in preliminary stages of the project development process, and may still be pending funding, final approvals, and/or permitting. All projects are subject to change in scope, schedule, and cost until they are fully approved. Some of the projects, strategies, and efforts described in this report may not be possible for the City to complete without additional funding from the Federal and State governments as well as philanthropy, which may or may not be forthcoming.

6.1. Assumptions and Limitations

This section reflects the following factors:

- Pacific Palisades is a geographically diverse area characterized by coastal zones, steep terrain, limited egress routes, and residential neighborhoods with varying population densities. Key vulnerabilities include:
  - Limited evacuation routes (e.g., narrow roads, single access points)
  - High wildfire and landslide risk due to terrain and vegetation
  - Tourist and commuter populations unfamiliar with local hazards
  - At-risk groups, including elderly residents and individuals with limited mobility
  - High volume of street parking
- The City provided the following evacuation and emergency-preparedness plans and documents, which were reviewed as a basis for the development of evacuation strategies:
  - City of Los Angeles Base Emergency Operations Plan (EOP), dated September 14, 2023
  - EOP Adverse Weather Annex, dated January 2023
  - EOP Brush Fire Annex, dated March 2018
  - EOP Communications Annex, dated June 2018
  - EOP Emergency Alert and Warning Annex, dated January 2022
  - EOP Emergency Public Information Annex, dated February 2018
  - EOP Evacuation Annex, dated October 2020
  - EOP Local Assistance Center Annex, dated September 2020
  - EOP Logistics Annex, dated July 2018
  - EOP Mass Care and Sheltering Annex, dated January 2020
  - City of Los Angeles Brush Fire Evacuation Plan (LAFD/LAPD), undated
  - LAFD evacuation reference document: Palisades/ Highland Area, dated January 2020
  - City of Los Angeles Hazard Mitigation Plan, dated June 2024
- Interviews were conducted with staff from select City departments including the mayor's office, EMD, LAPD, and LAFD, as well as with Pacific Palisades neighborhood groups and residents.
- The strategies presented here address selected aspects of mass evacuation planning and conduct. They are not intended to encompass a comprehensive, standalone approach to managing an evacuation.
- The strategies vary significantly in their ease of implementation, likely time frames, and required resources. No expectations are stated or implied concerning the likelihood or timeline for implementing any specific strategy or combination of strategies.
- Strategies specific to the transportation network (described primarily in, but not limited to, Sections 6.2 and 6.3.2) were informed by a transportation network analysis conducted by the consultant team, and included for reference as Appendix C. That analysis reflects several factors:
  - Assumptions inherent in the analysis are intended to reasonably capture a wide range of potential situations, but the exact circumstances of any given wildfire event could vary substantially. Tactics and improvements identified through the analysis would thus generally benefit (or be applicable to) a wide range of potential scenarios.
  - Land-use inputs in the analysis are based on parcel data from the County Assessor, so the analysis reflects the assumption that rebuilding within Pacific Palisades will reflect December 2024 land use patterns and density.
  - All households are assumed to evacuate; there is no credit or reduction taken for evacuation traffic due to residents being away (e.g., on vacation) or otherwise unable to return home prior to the area being completely closed to entry.
  - Evacuees are assumed to obey traffic signals and other controls and instructions from traffic control staff in the field. Erratic or illegal driving behavior is not assumed.
  - Any traffic operations analysis reflects the data and assumptions feeding into the analysis. To the extent that wildfire events are frequently unpredictable and fast-changing, it is unlikely that any one wildfire event is represented by any of the scenarios assumed in the analysis. In fact, some, if not many, events may differ substantially from the scenarios assumed in the analysis.

6.2. Physical Infrastructure Strategies

The Pacific Palisades road network presents significant challenges for conducting an emergency evacuation easily and effectively. The area's topography and historical development patterns have led to a dense network of narrow streets connecting to a few larger-capacity streets. The number of homes and residents relative to the street network's capacity means that congestion and delays are almost certain during a short-notice, time-critical evacuation effort such as in response to a wildfire. Strategies for modifications to Pacific Palisades' physical transportation infrastructure to improve evacuation capabilities involve roadway widths and turnarounds, intersection designs, traffic signals and signage systems, and street network.

The strategies for physical modifications to the road network are consistent with, and complement, the operational evacuation strategies presented in Section 6.3. The collective set of evacuation strategies was informed by an in-depth assessment of the existing transportation network. The effort analyzed several facets of the network, including carrying capacity, projected levels of service, likely congestion points and bottlenecks, and redundancy. The results of the assessment are provided in Appendix C.

6.2.1. Roadway Widths and Turnarounds

Table 6.1 lists the potential strategies for roadway widths and turnarounds. More detailed information on each strategy is provided following the table.

To assist in infrastructure planning, a high-level review of Fire Code compliance was conducted for the Pacific Palisades street network using satellite imagery, focusing on roadway width and turnaround standards for public streets and major private streets in the study area. For this exercise, standards were referenced from the 2023 City of Los Angeles Fire Code, which consists of the 2022 California Fire Code modified with Los Angeles-specific amendments.

As the analysis is a planning-level review based on dimensions measured from satellite imagery, it is not intended to replace a formal compliance check based on as-built drawings, field surveys and measurements, and other information. The analysis evaluates all streets and does not make a determination or interpretation as to whether or not a street qualifies as a "fire apparatus access road". A detailed needs analysis using more complete and accurate information would need to be conducted to determine which streets qualify as "fire apparatus access roads" and whether or not those streets are code-compliant.

6.2.1.1. Strategy 1: Increase Roadway Width and On-Street Parking Prohibition

The 2023 City of Los Angeles Fire Code states the following:

> *503.2.1 Dimensions.*
>
> *Fire apparatus access roads shall have an unobstructed width of not less than 20 feet, exclusive of shoulders, except for approved security gates in accordance with Section 503.6, and an unobstructed vertical clearance of not less than 13 feet 6 inches.* (LADWP, 2019b)

The compliance check indicates that a significant share of the local streets within the area do not appear to comply with the Fire Code requirements for unobstructed roadway width. These streets are shown in **blue** in Figure 6.1. The base map for Figure 6.1 includes some driveways, trails, fire roads, and other special roads that were generally excluded from the code compliance check.

The compliance check also accounted for the presence of on-street parking. Fire Code provisions typically require a minimum curb-to-curb width of approximately 35 feet for a typical street with parking on both sides. While on-street parking is already prohibited along certain street segments and block faces within the area, a review of Google Earth satellite imagery and Google Street View imagery indicates that the level of compliance is poor in many areas. As a result, most streets less than 35 feet wide curb-to-curb have been included among the identified streets, even in cases where parking is already prohibited on one or both sides.

Regardless, almost all of the local streets within the Pacific Palisades area are identified as potentially non-compliant, with the exception of the Highlands and Huntington subareas and selected portions of the Sunset Mesa and Marquez Knolls (Lachman–Bienveneda). In particular, virtually all of the streets in the Alphabet Streets, Via Bluffs, El Medio North, El Medio South, Riviera, Rustic Canyon, and Castellammare subareas are potentially non-compliant.

Figure 6.1: Fire code non-compliance: Roadway width

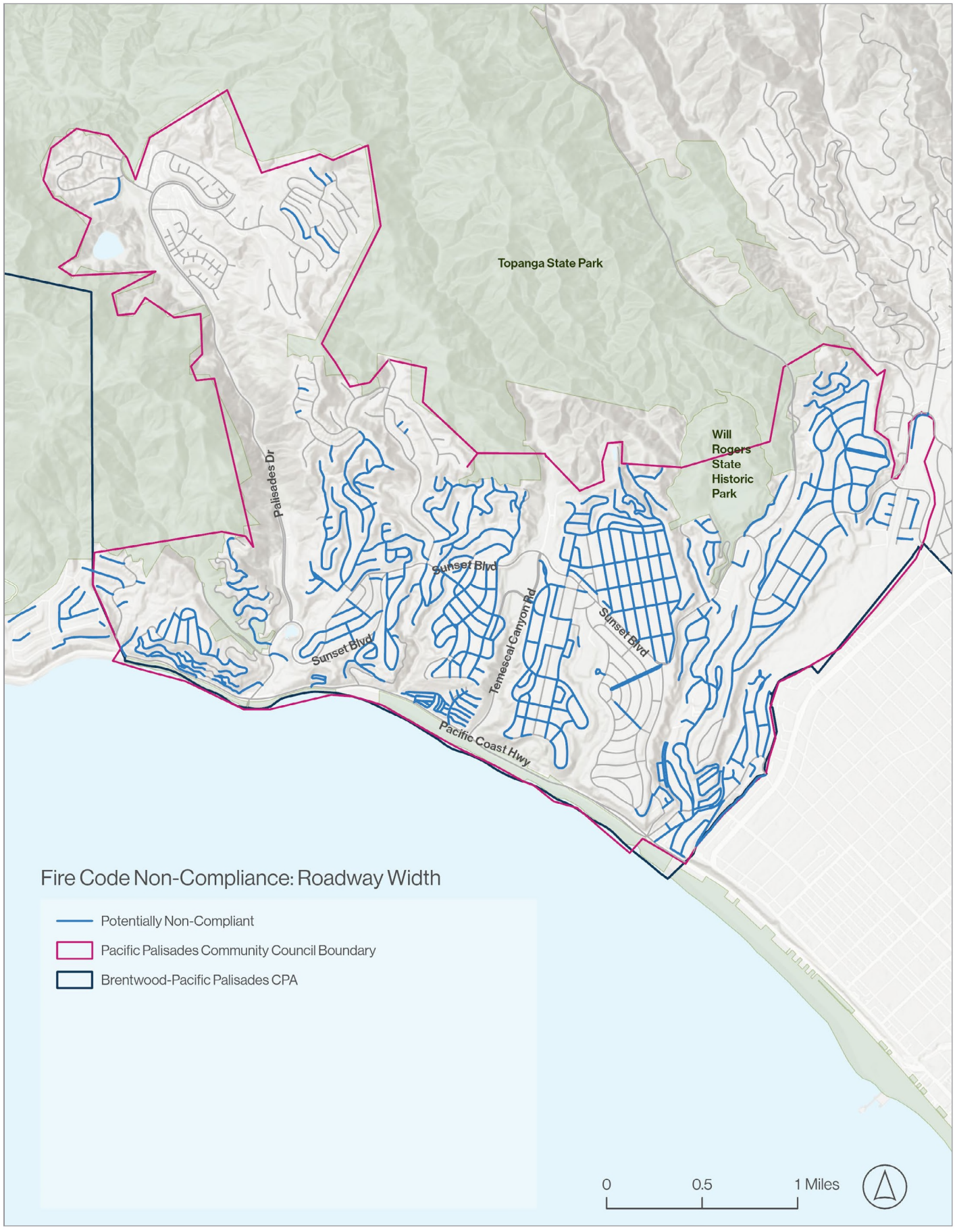


Table 6.1: Potential Strategies for Roadway Widths and Turnarounds

Potential Strategy	Benefits	Challenges	Next Steps for Consideration by the City
Strategy 1: Increase Roadway Width and On-Street Parking Prohibition	Keeps streets unobstructed to facilitate fire response and evacuation	Public support; Enforcement and compliance	Detailed needs analysis to identify specific streets or areas for implementation; Can be actioned in the short-term for parking restrictions; long-term for roadway widths, where possible.
Strategy 2: Turnarounds and On-Street Parking Prohibition	Facilitates egress for fire apparatus along dead-end streets	Public support; Enforcement and compliance	Detailed needs analysis to identify specific streets or areas for implementation.

In most of these cases, roadway widening to satisfy Fire Code requirements would likely be challenging and require significant right-of-way acquisition from private property owners. A more tenable and immediate solution would be to prohibit on-street parking along the identified streets. Where restrictions are already in place but the level of compliance is low, additional enforcement may be needed to increase compliance. Reinforcement through signage, curb and pavement markings, and other means could be expanded.

On-street parking restrictions could be implemented on a permanent basis, which would likely ensure the highest level of compliance. Temporary restrictions, such as when Red Flag Warnings are in effect, may be easier to implement in terms of public support, but would likely involve accepting some inherent level of non-compliance due to considerations such as motorists being unaware of the restrictions and residents not being present to move their vehicles.

Another potential consideration for implementation would be limiting or prioritizing the geographical scope of on-street parking restrictions to a subset of the identified roadways. Potential criteria could include whether a street is designated as an evacuation route or the proximity of the street segment to a Tier 1 evacuation route (the Tier 1 network covers the main routes to get into and out of the larger Pacific Palisades area; see Section 6.3.2.1).

Where prohibition of on-street parking is implemented permanently, traffic-calming measures (e.g., speed humps) can be installed to discourage speeding and mitigate safety impacts in day-to-day (non-emergency) conditions.

An alternative to on-street parking restrictions could involve converting streets to one-way traffic. This option would be most suitable for areas where there are clear couplets (pairs) of streets that can be converted to one-way traffic; this option would not be feasible in areas where the street network is limited (e.g., few or no parallel streets, many cul-de-sacs or other dead-end streets). Additional study would be needed to determine the most appropriate locations for one-way conversions because some streets that are officially two-way would still be too narrow, even if formally converted to one-way traffic, to meet Fire Code standards without the removal of one or both sides of on-street parking. Examples of such streets are Temecula Street (El Medio South), Haverford Avenue (Via Bluffs), and many of the Alphabet Streets.

6.2.1.2. Strategy 2: Turnarounds and On-Street Parking Prohibition

The 2023 City of Los Angeles Fire Code states the following:

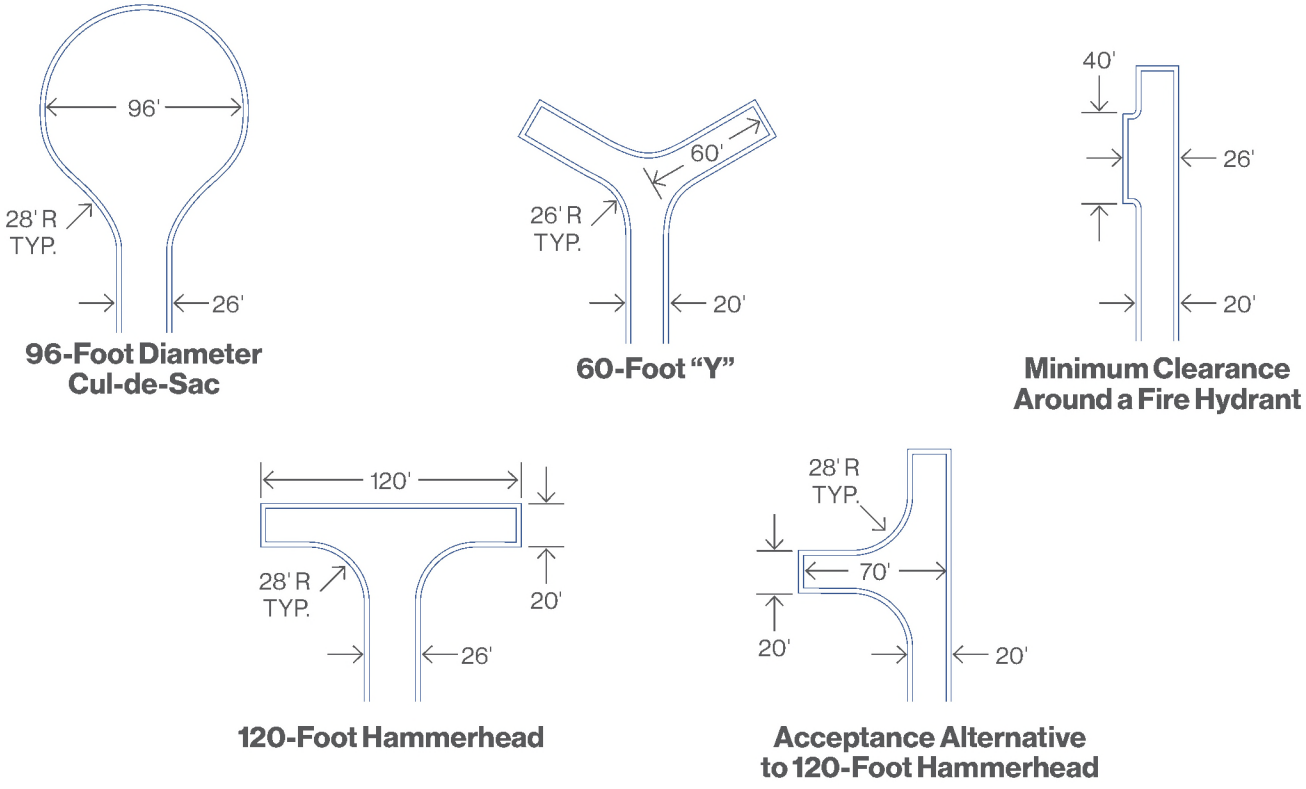
> *D103.4 Dead ends.*
>
> *Dead-end fire apparatus access roads in excess of 150 feet shall be provided with width and turnaround provisions in accordance with Table D103.4.* (LADWP, 2019)

Table D103.4 and Figure D103.1 from the Fire Code are reproduced here for reference as Table 6.2 and Figure 6.2, respectively.

Table 6.2: Requirements for Dead-End Fire Apparatus Access Roads

Length (feet)	Width (feet)	Required Turnarounds
0–150	20	None required
151–500	20	120-foot hammerhead, 60-foot "Y," or 96-foot-diameter cul-de-sac in accordance with Figure D103.1
501–750	26	120-foot hammerhead, 60-foot "Y," or 96-foot-diameter cul-de-sac in accordance with Figure D103.1
Over 750		Special approval required

Figure 6.2: Turnaround standards for dead-end fire apparatus access roads



The compliance check indicates that the majority of such streets in excess of 150 feet in length do not fully comply with current Fire Code turnaround requirements. These streets are illustrated in Figure 6.3.

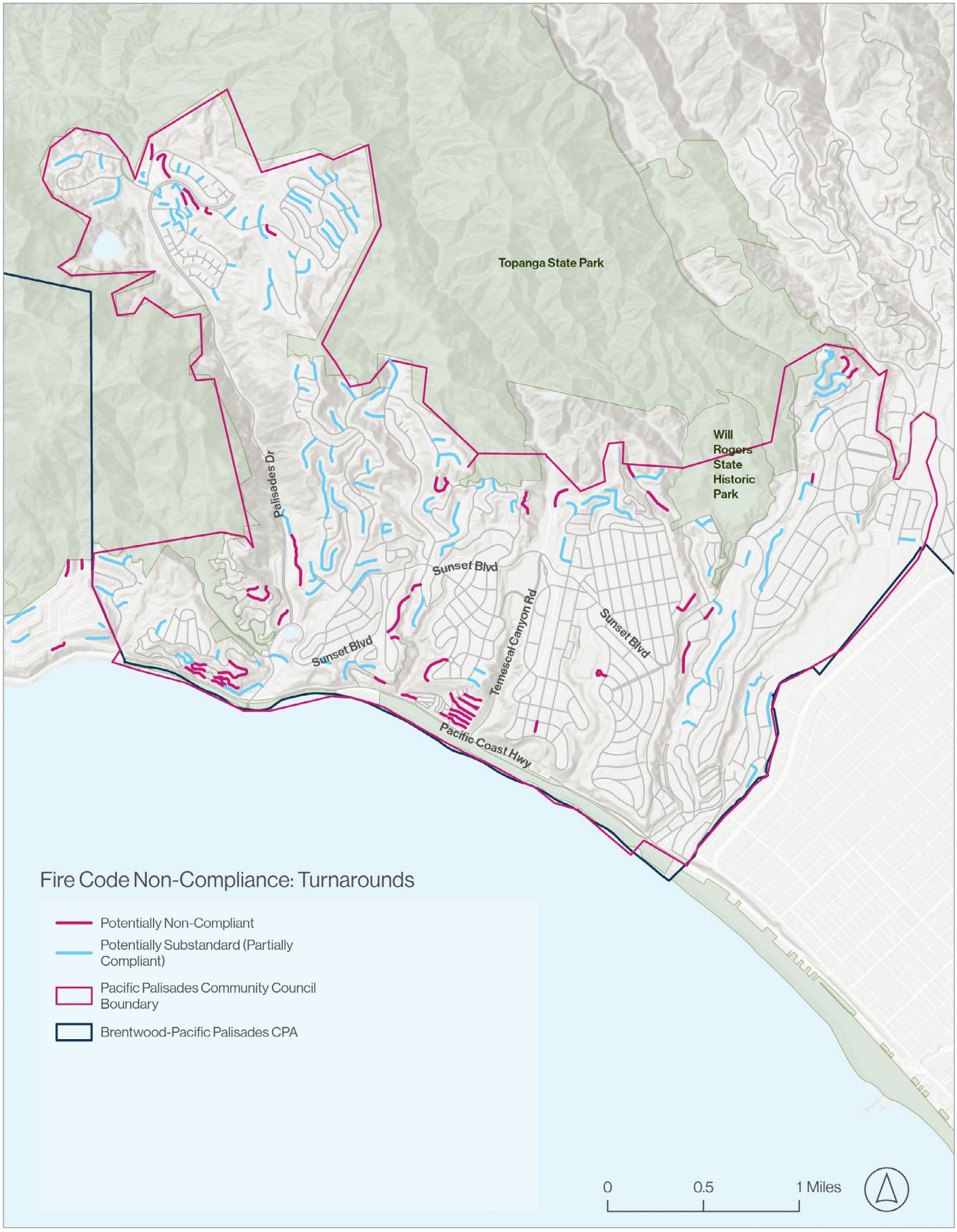
- Most of the identified streets are substandard (i.e., partially compliant) (shown in **blue**) because they were built with cul-de-sac or hammerhead turnarounds at dimensions smaller than required under the current Fire Code. It is assumed that most of these developments were compliant with Fire Code requirements in effect at the time of construction but that the Fire Code has become more stringent over time.
- A small number of dead-end streets (in **magenta**) are not compliant because they do not have any turnarounds. These streets are generally scattered throughout the area although there are notable concentrations in the Castellammare subarea and the Tahitian Terrace mobile home park. It appears that some of these instances may arise from streets that were mapped during planning but never fully completed or other special cases.

Where feasible, new or modified turnarounds could be installed at these locations to facilitate ingress and egress for fire trucks and other fire apparatus. In most cases, however, existing turnarounds are surrounded by homes and other private property, which would complicate such improvements.

Regardless of whether improvements are implemented, one policy recommendation could involve restricting on-street parking within existing turnarounds either permanently or under certain conditions. Many turnarounds are currently used as de-facto on-street parking by residents, which further constrains their usability for fire apparatus. Any private vehicles abandoned during an evacuation would likely make it very difficult or impossible to turn around fire apparatus, slowing down fire response.

The City of Los Angeles Standard Plan S-470-1 (Standard Street Dimensions) has slightly different specifications for some dimensions such as curb return radii. Any proposed modifications or new construction would therefore generally need to satisfy both Fire Code standards and any other applicable local standards.

Figure 6.3: Turnaround standards for dead-end fire apparatus access roads fire code non-compliance: Turnarounds



6.2.2. Intersection Designs

The network assessment identified intersections that have a higher likelihood of creating significant bottlenecks for traffic during an evacuation. Intersection design strategies address feasible design modifications for several intersections within and adjacent to Pacific Palisades, which could improve throughput during an evacuation.

Table 6.3 lists the potential strategies for intersection designs. More detailed information on each strategy is provided following the table.

Table 6.3: Potential Strategies for Intersection Designs

Potential Strategy	Benefits	Challenges	Next Steps for Consideration by the City
Strategy 3: Additional Southbound Right Turn Lane at Sunset Boulevard and Palisades Drive	Increases egress capacity from the Highlands	Lead time and staff availability to set up temporary traffic controls during evacuation	Identify staffing and traffic controls needs; Can be actioned in the medium- to long-term; requires coordination with LADOT.
Strategy 4: Additional Southbound Left Turn Lane at Sunset Boulevard and Baylor Street / Marquez Avenue	Increases egress capacity from Marquez Knolls	Lead time and staff availability to set up temporary traffic controls during evacuation	Identify staffing and traffic controls needs
Strategy 5: Extended Southbound Left Turn Lane Storage at PCH and Temescal Canyon Road	Increases storage capacity of left-turn pocket	Lead time and staff availability to set up temporary traffic controls during evacuation	Identify staffing and traffic controls needs
Strategy 6: Overlap Phasing and Additional Southbound Left Turn Lane at PCH and Temescal Canyon Road	Increases egress capacity onto PCH	Signal modifications; Pedestrian and bicyclist safety; Lead time and staff availability to set up temporary traffic controls during evacuation	Coordinate with California Department of Transportation (Caltrans) on design and implementation of necessary signal modifications; Identify staffing and traffic controls needs
Strategy 7: Traffic Flow Simplification at PCH and Chautauqua Boulevard / W. Channel Road	Reduces potential traffic conflicts and potentially increases intersection capacity	Cost; Property and right-of-way acquisition; Pedestrian and bicyclist safety; Lead time and staff availability to set up temporary traffic controls during evacuation	Identify staffing and traffic controls needs; Coordinate with Caltrans on potential short-term improvements; Begin planning and outreach for longer-term permanent improvements
Strategy 8: Left-turn Prohibition at Selected Locations	Removes potential traffic conflicts and increases intersection and evacuation route capacity	Lead time and staff availability to set up temporary traffic controls during evacuation; Public support and compliance (if permanent)	Identify staffing and traffic controls needs; Design and install signage and other permanent infrastructure
Strategy 9: "KEEP CLEAR" Zones at Selected Locations	Prevents blockage of key driveways and side streets	Potential design and compliance challenges for some locations	Design and implement necessary pavement markings
Strategy 10: Replacement of Deteriorated Lane Striping at Selected Locations	Ensures efficient use of existing roadway capacity	Periodic maintenance and repair	Install replacement striping; Establish inspection and repair regimen

6.2.2.1. Strategy 3: Additional Southbound Right Turn Lane at Sunset Boulevard and Palisades Drive

A temporary additional southbound right (SBR) turn lane to facilitate evacuation from the Highlands subareas could be created by splitting the existing SBR turn lane with cones.

6.2.2.2. Strategy 4: Additional Southbound Left Turn Lane at Sunset Boulevard and Baylor Street / Marquez Avenue

A temporary additional southbound left (SBL) turn lane to facilitate evacuation from the Marquez Knolls subareas could be created through conversion of the northbound departure lane and prohibition of the eastbound left (EBL) and northbound through (NBT) movements.

6.2.2.3. Strategy 5: Extended Southbound Left Turn Lane Storage at PCH and Temescal Canyon Road

Temporary additional stacking capacity for the SBL movement at PCH could be created by coning off the center two-way left-turn lane (TWLTL) along Temescal Canyon Road to prevent use by northbound traffic.

6.2.2.4. Strategy 6: Overlap Phasing and Additional Southbound Left Turn Lane at PCH and Temescal Canyon Road

Overlap phasing could be added for the westbound right (WBR) movement (with the SBL movement) and the SBR movement (with the EBL movement). A temporary additional SBL turn lane could also be created by closing the northbound approach and directing SBL traffic to the existing southbound through (SBT) lane. Northbound traffic departing the Will Rogers State Beach parking lot would be diverted to the remaining parking lot egress driveways along PCH.

6.2.2.5. Strategy 7: Traffic Flow Simplification at PCH and Chautauqua Boulevard / W. Channel Road

The intersection of PCH and Chautauqua Boulevard /W. Channel Road is located at an important juncture in the roadway network. Together with the adjacent intersection at PCH and Entrada Drive, which operates on the same signal controller, the intersection is likely to be a major bottleneck during evacuation. Simplifying the traffic flows and removing turn conflicts could improve throughput.

One temporary measure that could be considered during an evacuation is to close off the W. Channel Road approach and make it departure-only, removing conflicts for the permitted "hard left" from southbound PCH to Chautauqua Boulevard Traffic originally on the W. Channel Road approach could be diverted to Entrada Drive via Short Street, continuing from there to either northbound or southbound PCH. This could be expanded to a closure of both the W. Channel Road and Entrada Drive approaches to PCH, forcing traffic to divert through Santa Monica via eastbound Entrada Drive and other local streets to avoid oversaturation of PCH.

More permanent improvements for these two intersections should be evaluated and considered for the long term in coordination with Caltrans, Los Angeles Department of Transportation (LADOT) and other agencies. This strategy could include a complete redesign of the two intersections, such as construction of a new slip-lane connection from Chautauqua Boulevard to northbound PCH (see Strategy 16: Expanded Redundancy in the Street Network).

6.2.2.6. Strategy 8: Left-turn Prohibition at Selected Locations

Prohibition of left turns at selected intersections along Sunset Boulevard on a temporary (evacuation-only) or permanent basis would help minimize disruptions to through traffic. Potential locations for consideration (due to the availability of easy alternative routes and/or the lack of turn pockets along Sunset Boulevard) include the following:

- Sunset Boulevard and Marquez Avenue / Baylor Street: EBL
- Sunset Boulevard and Bienveneda Avenue: EBL
- Sunset Boulevard and Muskingum Avenue: EBL
- Sunset Boulevard and Wildomar Street: WBL
- Sunset Boulevard and Almar Avenue: WBL
- Sunset Boulevard and Fiske Street: EBL
- Sunset Boulevard and Spezia Place: WBL
- Sunset Boulevard and Minorca Drive: EBL and WBL
- Sunset Boulevard and Napoli Drive: EBL and WBL

6.2.2.7. Strategy 9: "KEEP CLEAR" Zones at Selected Locations

Adding new "KEEP CLEAR" zones (or repainting existing ones) would help facilitate egress from specific sites or side streets. Two potential locations for consideration are Sunset Boulevard at the Edgewater Towers and Temescal Canyon Road at Haverford Avenue.

6.2.2.8. Strategy 10: Replacement of Deteriorated Lane Striping at Selected Locations

Lane striping and pavement markings for the southbound Sunset Boulevard approach to PCH, the eastbound right (EBR) movement at Sunset Boulevard and Temescal Canyon Road, and the Porto Marina Way approach to PCH have deteriorated significantly. Replacing the striping and stencils at these locations would improve lane visibility and ensure that motorists make efficient use of the available roadway capacity.

6.2.3. Traffic Signals and Signage Systems

Traffic signal and signage system strategies include potential modifications and expansions to the existing traffic-signal systems affecting Pacific Palisades. These changes, which are focused on priority intersections more prone to congestion, could help improve traffic flow, both during an evacuation and everyday conditions.

Table 6.4 lists the potential strategies for traffic signals and signage systems. More detailed information on each strategy is provided following the table.

Table 6.4: Potential Strategies for Traffic Signals and Signage Systems

Potential Strategy	Benefits	Challenges	Next Steps for Consideration by the City
Strategy 11: Signalization of Unsignalized Intersections	Improves side-street access	Cost; Regular maintenance needs	Detailed needs analysis to identify specific locations for implementation; Can be actioned in the medium- to long-term; requires coordination with LADOT.
Strategy 12: Coordination between City- and Caltrans-maintained Signal Systems	Improves evacuation efficiency and reduces delays and congestion; Potentially improves fire response	Cost; Technological compatibility; Interagency coordination and communication	Coordinate with Caltrans on identifying appropriate solutions and establishing appropriate protocols
Strategy 13: Remote Override and Control	Improves evacuation efficiency and reduces delays and congestion; Potentially improves fire response	Cost; Technological capability; Staff availability	Detailed feasibility and implementation study
Strategy 14: Evacuation-Specific Signal Timing Plans	Improves evacuation efficiency and reduces delays and congestion	Technological capability	Detailed feasibility and implementation study
Strategy 15: Dynamic Message Signs	Disseminates critical information concerning evacuation routes	Cost; Public support; Regular maintenance needs (if permanent); Property or right-of-way acquisition or easements (if permanent); Staging areas (if temporary); Lead time and staff availability to set up signage during evacuation (if temporary)	Detailed needs analysis to identify specific locations for implementation

6.2.3.1. Strategy 11: Signalization of Unsignalized Intersections

Installation of new traffic signals could provide regular benefits in day-to-day operations (e.g., improved traffic safety, facilitating pedestrian crossings). In general, a new signal at an intersection would make egress out of (and potentially ingress into) the side street much easier by allocating dedicated green time to make these movements while traffic on the major street is stopped. This strategy could prove particularly important during a mass evacuation event because it may be difficult to find large enough gaps in traffic to exit safely onto major arterials such as Sunset Boulevard or Chautauqua Boulevard Implementing signal coordination on the major arterials, if not currently available, would minimize the delay impacts associated with the new signals.

Higher priority locations that could be considered for signalization include the following intersections:

- Sunset Boulevard and Las Casas Avenue
- Sunset Boulevard and Las Lomas Avenue
- Sunset Boulevard and Fiske Street
- Chautauqua Boulevard and Almoloya Drive
- Chautauqua Boulevard and La Cumbre Drive

6.2.3.2. Strategy 12: Coordination between City- and Caltrans-maintained Signal Systems

With the exception of PCH, traffic signals in Pacific Palisades are owned and maintained by the City. Like most signals on the State Highway System, the signals on PCH are operated by Caltrans. A significant share of the evacuating traffic is expected to use PCH as an evacuation route, and the PCH boundary intersections (at Sunset Boulevard and Chautauqua Boulevard), as well as the PCH intersection at Temescal Canyon Road, are expected to be major potential bottlenecks during an evacuation. An ideal potential solution would be to allow for direct coordination between the two signal systems to prioritize green time and minimize delays for the evacuating traffic.

If direct coordination between the two signal systems is not possible, LADOT and Caltrans could jointly review the compatibilities of their respective signal patterns. Particularly for an evacuation, the two systems' patterns should have complementary timing and flow-direction priorities.

6.2.3.3. Strategy 13: Remote Override and Control

As a general principle, relying on technology (i.e., signal controller) is typically more efficient than manual direction of traffic by LAPD and California Highway Patrol (CHP) staff or traffic control officers (TCOs), except when traffic cannot be handled by the signal. In addition, dispatching enough LAPD and CHP staff or TCOs to all of the desired intersections is likely to prove difficult, even under non-emergency conditions. Similar situations for major staged events (e.g., July 4th, New Year's Eve fireworks shows) typically require additional staff on overtime.

Where possible, allowing or expanding manual override or control of traffic signals remotely (e.g., at a traffic control center) would leverage technology to reduce staffing needs and improve efficiency. Live cameras could be installed at signalized intersections to allow TCO staff to remotely monitor traffic conditions and adjust the traffic signal timing appropriately. A single TCO could monitor multiple intersections at once, which is significantly more efficient than if they were individually dispatched to the field where they would typically be stationed at a single intersection.

6.2.3.4. Strategy 14: Evacuation-Specific Signal Timing Plans

Traffic signals are typically programmed with different timing plans to address regular variations in day-to-day traffic patterns, such as heavier traffic during the morning and evening commute periods. Flexibility could also be applied to a mass evacuation event by programming signals with one or more additional timing plans tailored to an evacuation event. At the Sunset Boulevard / Palisades Drive intersection, for example, programming signals might involve increasing the minimum and/or maximum greens, increasing the cycle length to improve signal efficiency, or other modifications. A remote override and control system for Pacific Palisades-area traffic signals (see Strategy 13: Remote Override and Control) would make it possible to activate the evacuation-specific signal timing plans immediately from the traffic control center as soon as the evacuation order is issued. If not already present, the traffic signal system can also be augmented with emergency vehicle pre-emption to facilitate fire and emergency response into, out of, and within the area.

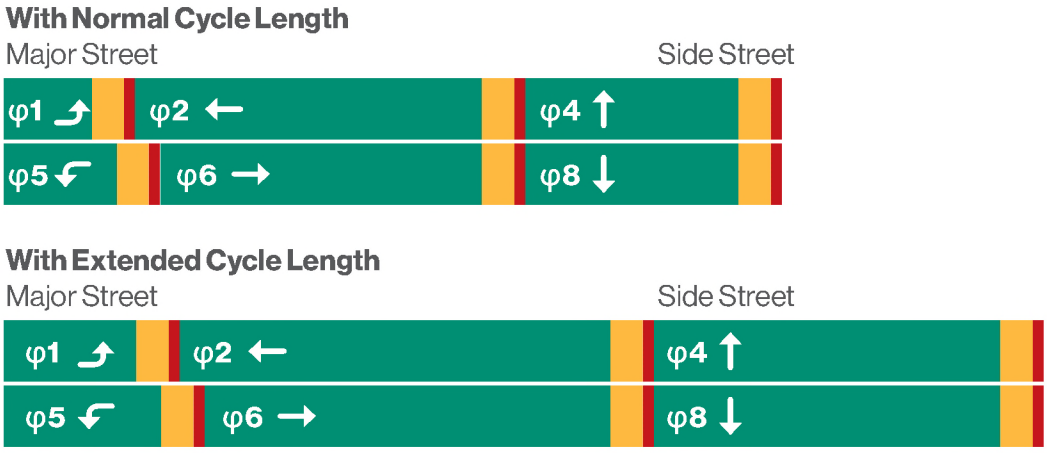
Figure 6.4 illustrates how extending cycle lengths could improve overall signal efficiency. For a given cycle length, the total of all yellow + all-red intervals (for φ1 + φ2 + φ4 or φ5 + φ6 + φ8) remains the same under both the upper and lower plans. The extended cycle length in the lower plan, however, increases the total green time. Assuming a normal cycle length of 90 seconds, an extended cycle length of 120 seconds, and a uniform yellow + all-red interval of 5 seconds, the green per cycle (g/c) ratio would increase from 75 seconds ÷ 90 seconds = 0.833 under the normal cycle to 105 seconds ÷ 120 seconds = 0.875 under the extended cycle. This is equivalent to a 5% increase in g/c ratio.

6.2.3.5. Strategy 15: Dynamic Message Signs

Installation of dynamic message signs would substantially simplify the process of directing traffic to desired routes during an evacuation. Signs placed at strategic locations (e.g., along southbound Palisades Drive upstream of Sunset Boulevard) would help inform evacuees of open evacuation routes, roadway closures, and other important information. The signs' messaging could be changed quickly and easily to provide updated guidance to evacuees.

The signs could be permanent installations (e.g., overhead masts) in high-priority locations, temporary installations such as portable signs running on solar panels or batteries, or a combination. Temporary, mobile units could be staged nearby for rapid deployment during higher-risk periods (e.g., wildfire season).

Figure 6.4: Protected left-turn movements and signal efficiency



6.2.4. Street Network

Street network strategies include street network design and operational principles to facilitate evacuation and fire response. Table 6.5 lists the potential street network strategies. More detailed information on each strategy is provided after the table.

Table 6.5: Potential Street Network Strategies

Potential Strategy	Benefits	Challenges	Next Steps for Consideration by the City
Strategy 16: Expanded Redundancy in the Street Network	Improves fire response and evacuation by increasing the capacity and redundancy of the street network	Cost; Property and right-of-way acquisition; Public support; Potential environmental challenges; Pedestrian and bicyclist safety	Detailed feasibility and implementation study; Can be actioned in the medium- to long-term, where feasible; requires coordination with LADOT.
Strategy 17: Side Streets as Alternative Evacuation Routes	Improves fire response and evacuation by increasing the capacity and redundancy of the street network	Lead time and staff availability to set up temporary traffic controls during evacuation	Identify staffing and traffic controls needs
Strategy 18: Bel-Air Bay Club Through Access	Formalizes an additional evacuation route onto PCH	Potential concerns from property ownership team; Liability; Public support	Coordination with Caltrans on potential concerns; Planning and negotiation with property ownership team
Strategy 19: Turning Movement Restrictions at Intersections	Removes potential traffic conflicts and increases intersection and evacuation route capacity	Lead time and staff availability to set up temporary traffic controls during evacuation; Public support and compliance (if permanent)	Identify staffing and traffic controls needs; Design and install signage and other permanent infrastructure
Strategy 20: Evacuation Route Assignment	Segregates traffic flows to reduce conflicts and minimize delays	Lead time and staff availability to set up temporary traffic controls during evacuation; Public notification and awareness; Coordination with third-party GIS navigation platforms; Compliance	Detailed feasibility and implementation study

6.2.4.1. Strategy 16: Expanded Redundancy in the Street Network

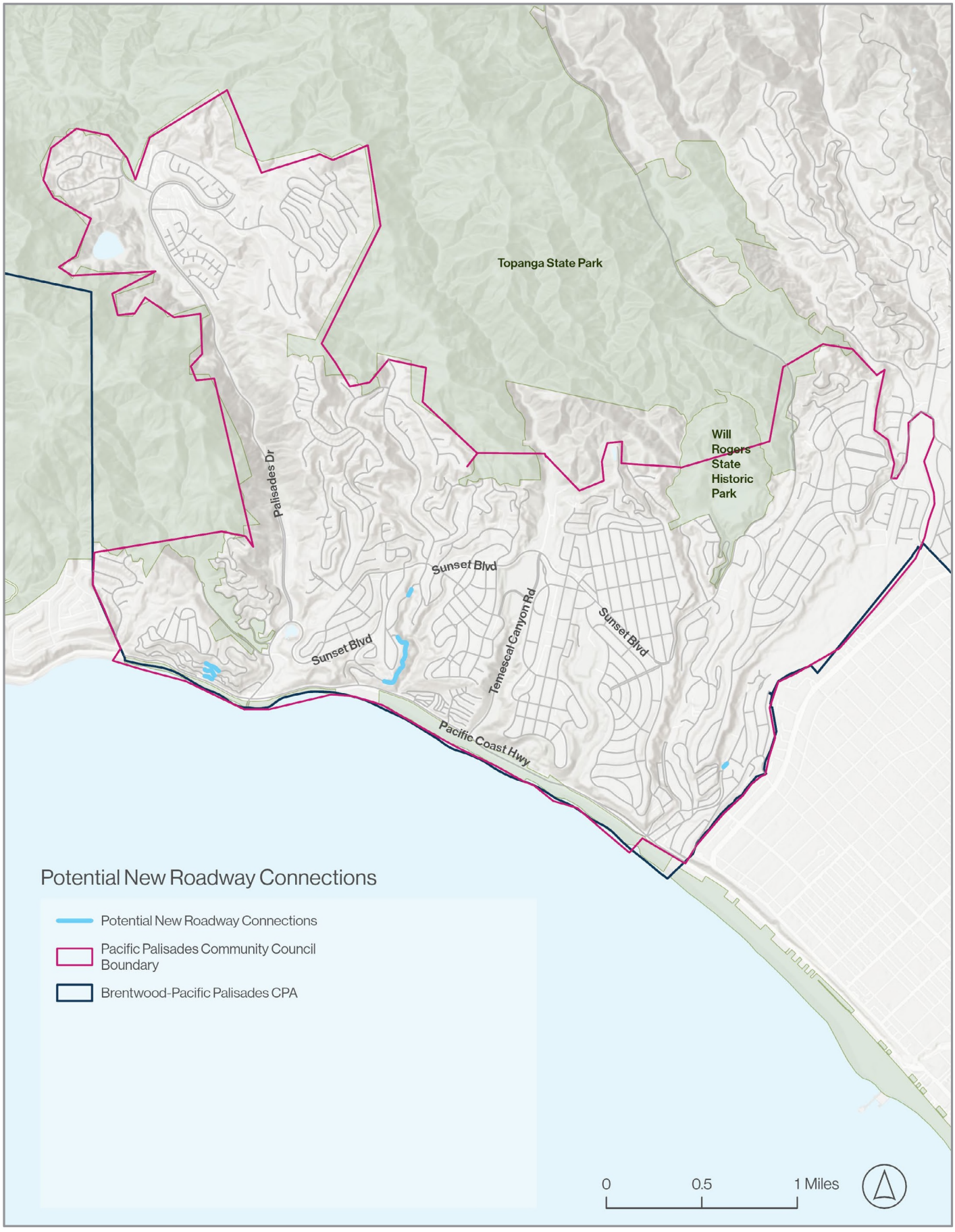
Some streets and rights-of-way within Pacific Palisades were mapped but have not been fully built out, while others have been partially closed (e.g., as part of traffic calming) or are otherwise currently unused. Opening or reopening these streets as new connections could be considered as a means of providing an added level of redundancy in the street network. Potential new roadway connections are illustrated in Figure 6.5 and summarized below.

- Bowdoin Street ingress into Via Bluffs at Temescal Canyon Road
- Bowdoin Street between Haverford Avenue and Via de la Paz
- E. Channel Road between Attilla Road and Amalfi Drive
- Chautauqua Boulevard slip-lane connection into northbound PCH
- Castellammare Drive, Posetano Road, and Revello Drive between Breve Way and Stretto Way
- Pintoresca Drive between Grenola Street and Arno Way
- Marquette Street between Grenola Street and Bienveneda Avenue

In some cases, these connections would create additional ingress/egress options for the affected areas (for both evacuation traffic and for fire or other emergency response). Connections include the Castellammare subarea connections and the E. Channel Road connection. If temporary evacuation-related use of the Bay Club property were formalized (see Figure 6.5), the Marquette Street and Pintoresca Drive connections would provide valuable links to this evacuation route.

In other cases, the suggested connections would allow traffic to bypass major bottleneck intersections, relieving pressure at those locations. These connections include the Bowdoin Street connections and the Chautauqua Boulevard slip-lane connection.

Figure 6.5: Potential new roadway connections



6.2.4.2. Strategy 17: Side Streets as Alternative Evacuation Routes

Typical suburban street hierarchies are designed to direct all traffic to the arterial roadway and discourage or prevent through-traffic within neighborhoods. This objective is usually accomplished through the use of cul-de-sacs and circuitous or non-intuitive street alignments and by limiting access points into or out of the neighborhood to selected streets and intersections. Unfortunately, this design philosophy is usually at odds with the goals of evacuation.

However, portions of Pacific Palisades south of Sunset Boulevard between Las Lomas Avenue and Chautauqua Boulevard were built with some level of redundancy that could be useful during a mass evacuation event. Specific streets and routes to consider are illustrated in Figure 6.6 and might include the following:

- **Northfield Street + Bowdoin Street** (bypass of Sunset Boulevard and Temescal Canyon Road intersection), potentially combined with reversing the direction of Northfield Street either permanently or during an evacuation.
- **Bowdoin Street + Swarthmore Avenue + La Cruz Drive** (bypass of Sunset Boulevard and Temescal Canyon Road intersection), which would require construction of an unbuilt section of Bowdoin Street between Haverford Avenue and Via de la Paz (see Section 6.2.4.1).
- **Alma Real Drive / Ocampo Drive or Toyopa Drive** in the Huntington subarea (bypass of Sunset Boulevard and Chautauqua Boulevard intersection) could be combined with installation of new signals (see Section 6.2.3.1) to facilitate side-street ingress and egress.

6.2.4.3. Strategy 18: Bel-Air Bay Club Through Access

Working with the Bel-Air Bay Club owner to formalize an agreement allowing for public access through the Bay Club property on a temporary basis during evacuations could be considered. This strategy would relieve pressure on Sunset Boulevard and Temescal Canyon Road by providing a third option to access PCH via Arno Way

6.2.4.4. Strategy 19: Turning Movement Restrictions at Intersections

Turning movements, particularly left-turn movements, are markedly less efficient than through-movements due to right-of-way conflicts. Streamlining traffic flows by prohibiting turns eliminates these conflicts and the associated disruptions to traffic flow. In the case of signalized intersections, for example, the green time that would normally be allotted to a protected left-turn phase could be redistributed to the opposing through-movement or the side-street phases. With actuated signal control, this process is automated, meaning that the green time could be reallocated directly by the signal without the need for manual intervention as long as the associated lanes are coned off to prevent vehicle entry.

Meanwhile, turning traffic could be diverted to alternative locations upstream or downstream of the intersection that are less congested or better equipped to handle these movements. Closure of a street or road due to an active wildfire could also provide the impetus to close specific intersection approaches or turning movements during the evacuation.

This tactic could be applied to both signalized and unsignalized intersections, but the benefits would generally be more significant for more complex or congested intersections.

Some potential high-priority or "easy-fix" left-turn prohibitions have been identified along Sunset Boulevard through the Marquez–Bienveneda–El Medio and Riviera subareas (see Strategy 8: Left-turn Prohibition at Selected Locations). These locations were identified because there are other intersections nearby where left turns would be possible and/or there is no dedicated left-turn pocket provided, meaning that through traffic could be disrupted by permitted left-turn movements. However, many more additional locations for left- and right-turn prohibitions within Pacific Palisades could be considered on a permanent or temporary basis.

Figure 6.6: Potential alternative evacuation routes

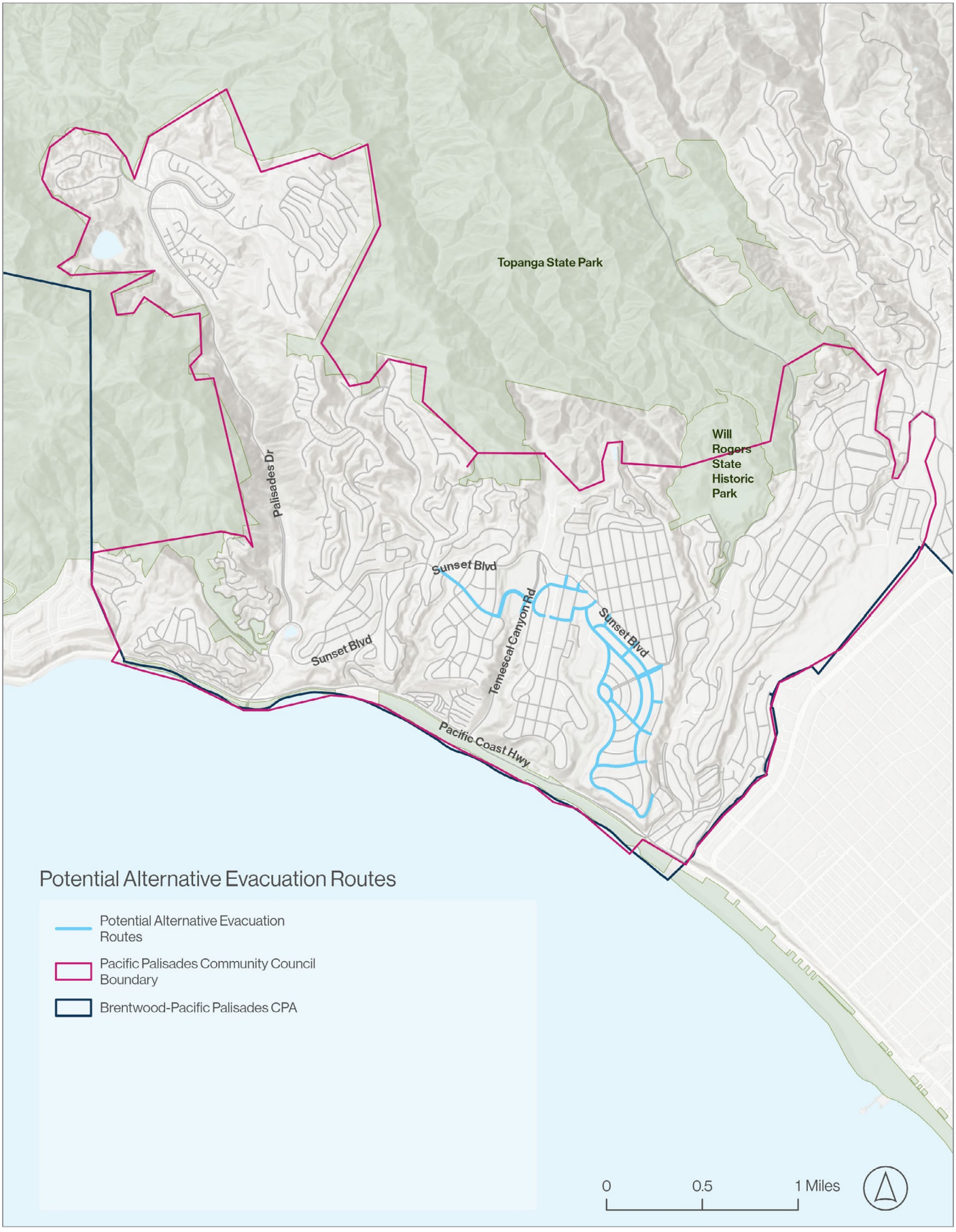
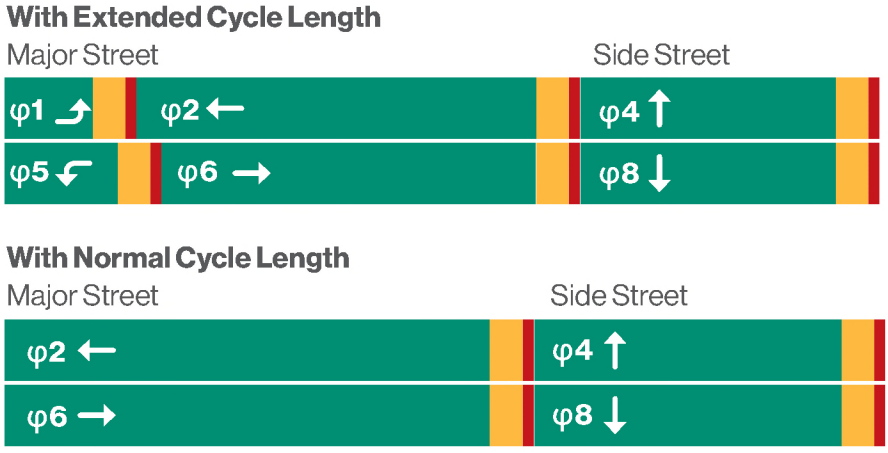


Figure 6.7 illustrates how prohibition of left-turn movements could improve signal efficiency and intersection throughput. The signal phasing diagram in the upper half illustrates a typical signalized intersection along an arterial street with protected left-turn movements (φ1 and φ5) from the arterial to the side street. The diagram in the lower half illustrates the signal phasing at the same location when the protected left-turn movements are prohibited or deactivated, allowing the associated time originally allotted to φ1 and φ5 to be reallocated to other movements at the intersection.

In typical cases where the protected left-turn phases are actuated and not set on recall, implementation of this change would be relatively simple and only require placing cones or other barriers to prevent vehicles from entering the left-turn pockets. This change would prevent the left-turn phases from being called and activated, and the signal would continue to run without these phases, reallocating the associated time based on the other parameters of the timing plan.

Figure 6.7: Protected left-turn movements and signal efficiency



6.2.4.5. Strategy 20: Evacuation Route Assignment

The primary goal during an evacuation should be to vacate the entire area as quickly as possible. Under ideal conditions, evacuees would have all evacuation routes open to them, as their immediate destination would likely vary from one household to the next and could include the homes of family or friends or temporary lodging at a hotel or motel. However, as alluded to in Section 6.2.4.4, it is generally desirable to simplify traffic flows to avoid conflicts and maximize efficient use of the available roadway capacity. In the same vein, directing evacuees from specific subareas to specific evacuation routes could also help achieve those goals.

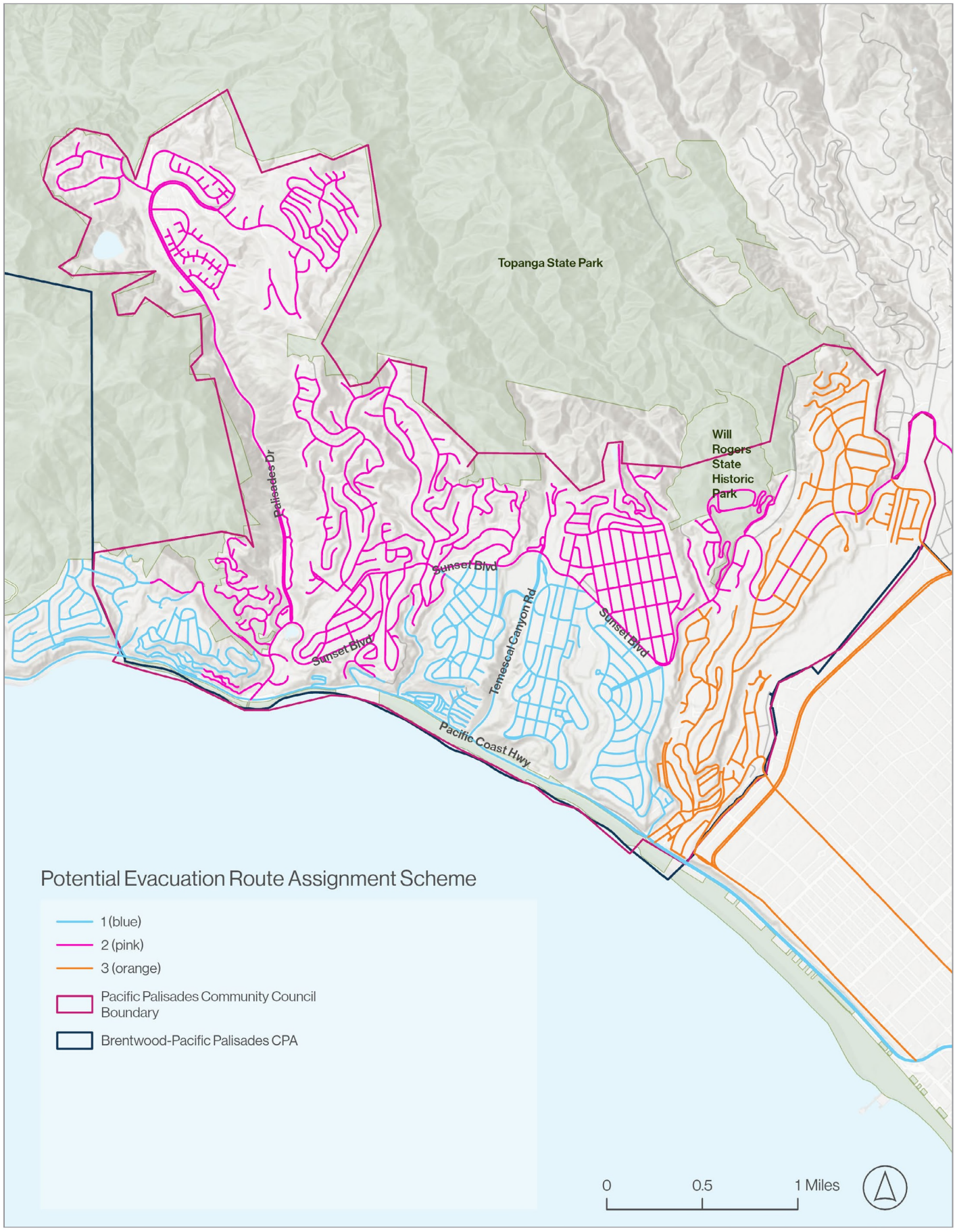
As mentioned in Section 6.2.4.4 portions of Pacific Palisades south of Sunset Boulevard such as Via Bluffs and Huntington could be funneled to PCH via Chautauqua Boulevard and Temescal Canyon Road, which would leave Sunset Boulevard more open for the Alphabet Streets and other subareas to the north of Sunset Boulevard. Prohibiting turns into Chautauqua Boulevard from Sunset Boulevard would reinforce the segregation of traffic flows. This approach would help avoid oversubscribing critical intersections such as Sunset Boulevard / Temescal Canyon Road and Sunset Boulevard / Chautauqua Boulevard and remove a significant portion of short-distance through traffic along Sunset Boulevard. Once out of the immediate Pacific Palisades area, evacuees would disperse to the larger local and regional roadway network to reach their destination.

Figure 6.8 shows one potential assignment scheme for an evacuation of the entire Pacific Palisades area with no roadway closures assumed, but the final scheme for any given evacuation event would depend on the specifics of the situation. Alignment of the City's evacuation zone delineation in the County's Genasys platform with Figure 6.8 (or a similar scheme that reflects the logical evacuation routes for specific subareas based on the local street network) may help facilitate implementation of this strategy by allowing targeted direction of residents to specific evacuation routes.

This tactic would require significant staging and deployment of staff and other resources into the field to implement and enforce the associated temporary traffic controls. Thus, this tactic is most effective when there is sufficient lead time and resources for planning and execution prior to the evacuation. This could be reinforced through coordination with GPS-based navigation platforms such as Google Maps, Apple Maps, and Waze to promote the appropriate designated route for trip planning queries starting in the affected subareas. This may, however, require lead time, as well as agreements or protocols in place with each of the platforms to allow government staff to make or suggest updates.

This tactic may also be less practical in more severe scenarios where the wildfire is unpredictable or forces the closure of certain evacuation routes or other streets. Evacuees could end up stalled or trapped if their designated route becomes gridlocked or is closed.

Figure 6.8: Potential evacuation route assignment scheme



6.3. Operational Evacuation Strategies

A mass evacuation effort in Pacific Palisades potentially involves numerous City, County, and State agencies. Mass evacuations require coordination across jurisdictional boundaries and encompass a wide range of response activities, likely all within a demanding timeframe. Mass evacuations also present the City and other participating agencies with significant operational challenges. Strategies for operational planning and activities related to a mass evacuation are an evacuation management framework, Pacific Palisades-specific traffic management tactics, public alert and warning, and public education.

The strategies presented here are consistent with the infrastructure strategies presented in Section 6.2, and with the City's existing plans, policies and procedures related to mass evacuations.

6.3.1. Evacuation Management Framework

The following strategies may help to support evacuation planning for the City generally and Pacific Palisades specifically. Strategies were identified based on an analysis of existing City emergency planning documents related to evacuation, and could be incorporated, as desired, into future updates of those plans and procedures to strengthen coordination, operational clarity, and community resilience during a wildfire evacuation.

The first few strategies in this section are applicable to the City's evacuation framework, including guidance, plans, and procedures, and are identified as such. The remainder of the strategies are specific to Pacific Palisades.

6.3.1.1. Strategy 21: Volunteer Management (Citywide)

Currently the City has a Volunteer Management Appendix within its Local Assistance Center Annex, which focuses on the management of volunteers during the recovery phase of an emergency. LAFD also manages a Community Emergency Response Team (CERT) program that provides a preparedness and response structure for volunteers. While these provide a framework for organizing and managing emergency volunteers, the City would benefit from a comprehensive volunteer management strategy that spans preparedness, response, and recovery. Community engagement and volunteer coordination are important components of effective disaster response and recovery, and integrating a formal volunteer management strategy into the City's emergency plans would therefore ensure the ability to organize, train, and deploy both affiliated and spontaneous volunteers safely and efficiently. Structured volunteer management reduces convergence and duplication of effort at disaster sites, maximizes the use of local resources and community capabilities, and improves safety and operational efficiency of volunteers during emergencies.

An effective volunteer management strategy includes:

- Roles and responsibilities
- Volunteer coordination activation procedures
- Credentialing and tracking protocols for volunteers
- Identification of Voluntary Organizations Active in Disaster and Community Emergency Response Team (CERT) programs

For an evacuation effort, organized volunteer activity can provide multiple benefits, including:

- Communicating and encouraging compliance with on-street parking restrictions (permanent or temporary), during high-hazard periods
- Assisting with initial notification of residents of an evacuation order through existing social connections and in-neighborhood activities (e.g., door-to-door)
- Supporting movement of evacuees in their personal vehicles, particularly people needing transportation assistance

6.3.1.2. Strategy 22: Evacuation Decision-Making Authority and Triggers of Flowchart (Citywide)

Timely and coordinated decision-making is necessary during emergencies, particularly when determining activation levels, resource needs, emergency declarations, and evacuation determinations. A visual flowchart depicting authority and operational triggers can improve understanding and consistency across involved City departments, enhance operational clarity and coordination, and reduce confusion during high-pressure decision-making circumstances.

A proposed evacuation decision-making flowchart is illustrated in Figure 6.9.

6.3.1.3. Strategy 23: Family Reunification (Citywide)

Following a large-scale evacuation, reuniting families—especially those separated during displacement or sheltering operations—is an important component of recovery and community trust. During the 2025 Palisades Fire, LAFD set up a Family Assistance Center to assist with family reunification, which was a best practice, though no formal documentation outlined the process for its establishment. Establishing a formal family reunification strategy would more clearly define the procedures and partnerships necessary to coordinate this process, strengthen public confidence and emotional recovery post-disaster, and reduce duplication of effort among agencies managing displaced populations.

A family reunification strategy would incorporate the following elements:

- Identification of information-sharing and registration systems for displaced persons using existing platforms
- Coordination roles between shelters, hospitals, schools, law enforcement, and other relevant stakeholders
- Communication protocols for public information and privacy protection

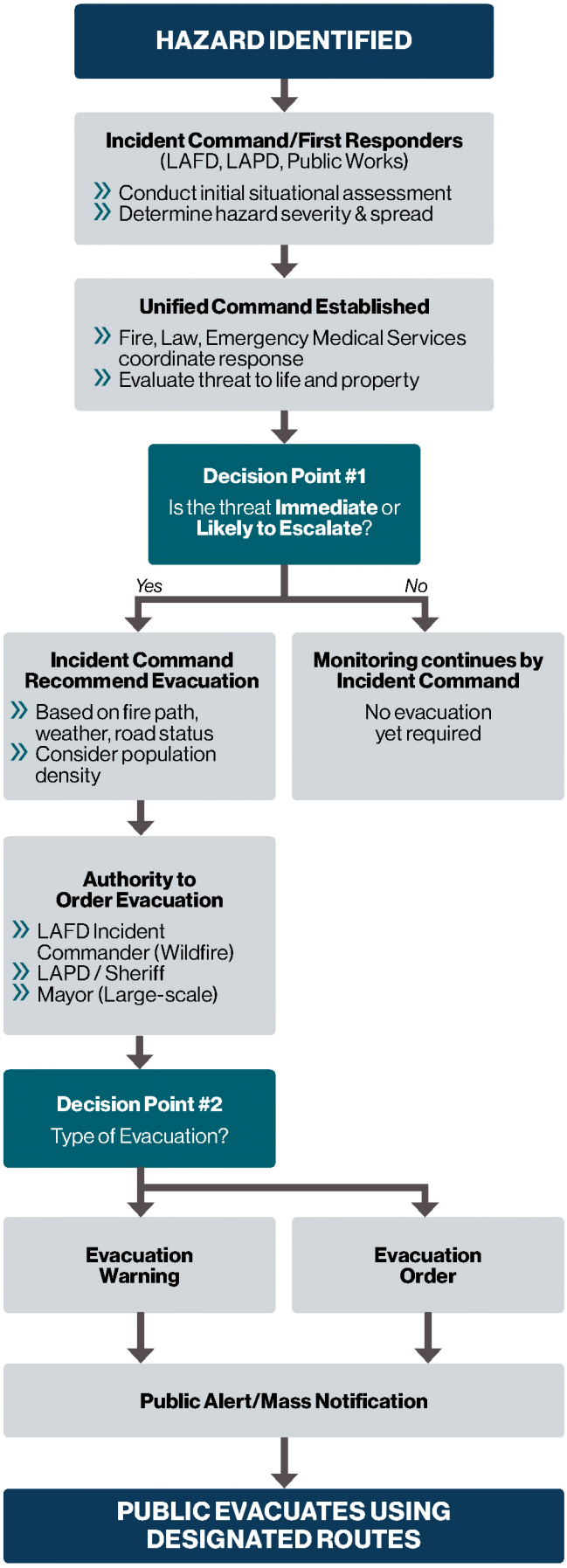
6.3.1.4. Strategy 24: Geographic Scope and Population Served

Prepare a concise summary of the Pacific Palisades' geographic details and population numbers/characteristics, for inclusion in any Pacific Palisades-specific response plan. A summary reflecting current demographics (and updated demographics upon repopulation of the Pacific Palisades) should encompass all neighborhoods within the community, including adjacent canyons, coastal zones, and hillside areas. It should also identify major evacuation routes such as Sunset Boulevard, PCH, and Chautauqua Boulevard and key access points to adjoining jurisdictions to ensure coordinated operations and route management during an emergency.

Population characteristics information should include current demographics (and updated demographics upon repopulation of the Pacific Palisades) such as age distribution, mobility levels, household size, and access to personal or public transportation. This will enable planners to develop an evacuation strategy that is realistic, equitable, and effective. These data inform critical planning decisions, including:

- Estimating evacuation clearance times
- Identifying the number of residents who may require transportation assistance
- Determining appropriate locations for pick-up points and temporary shelters
- Selecting the most effective communication channels for public warnings and notifications

Figure 6.9: Proposed evacuation decision-making flowchart



Comprehensive demographic analysis also helps identify residents who may need additional assistance during evacuations, such as older adults, individuals with disabilities, families with young children, and those with limited English proficiency. Integrating this information into evacuation planning will aid responders in meeting the diverse needs of the residents and support a more inclusive and coordinated community response.

6.3.1.5. Strategy 25: Weather Factors Relative to Evacuation Timing

Integrating weather and fire-behavior forecasting into wildfire evacuation planning is essential for Pacific Palisades where local topography and coastal wind patterns can cause fire conditions to change rapidly. Accurate, real-time forecasts enable emergency managers to anticipate when and where fire threats may escalate, allowing for earlier decision-making and more effective resource deployment.

Such forecasting can be used to develop weather thresholds for evacuation triggers (e.g., Red Flag conditions). Information about wind speed, direction, humidity, and temperature provides critical data to determine the likelihood of rapid fire spread and can be used to identify trigger points for evacuation warnings and orders. Forecasts also assist in predicting which neighborhoods or evacuation routes may be affected first, improving the precision of evacuation zone activation and traffic management.

Predictive fire spread modeling can be conducted in coordination with the National Weather Service and LAFD Fire Weather Officers. Information obtained through modeling will allow decision-makers to issue timely public notifications, position response resources strategically, and protect both residents and first responders.

Ultimately, integrating weather and fire-behavior forecasting ensures that evacuation decisions in Pacific Palisades are informed, data-driven, and adaptive to rapidly changing wildfire conditions.

6.3.1.6. Strategy 26: Interjurisdictional Coordination

Pacific Palisades borders the City of Malibu, City of Santa Monica, and unincorporated areas of Los Angeles County. Because wildfires in this region will likely span jurisdictional boundaries, a coordinated response among these partners as well as Caltrans and CHP will be essential for effective traffic management, maximizing traffic flow, and conducting a unified evacuation process.

The agencies or departments that may be involved in an evacuation of Pacific Palisades, along with their corresponding roles, are listed below. Proposed actions and agency responsibilities are identified in Table 6.6.

- LAPD West Bureau / West LA Division (Lead): Issue evacuation orders, establish zones, direct traffic management, and enforce access restrictions.
- LAFD: Initiate evacuations in fire-related events, provide life safety support, canvass neighborhoods, and assist with notifications.
- LADOT: Provide traffic support at intersections and perimeters.
- Los Angeles Animal Services: Provide pet sheltering and evacuation support.
- Los Angeles Department of Recreation and Parks: Support evacuations within City parks.
- EMD: Assist with resource coordination, mutual aid requests, and communication with the City Emergency Operations Center (EOC).
- Caltrans: Provide traffic management and road infrastructure support on state highways (including PCH).
- CHP: Manage traffic flow and enforce laws on state highways (including PCH) during evacuations.
- Los Angeles County Sheriff's Department (LASD): Support mutual aid and unincorporated Pacific Palisades-adjacent areas (e.g., Topanga, Malibu, County zones).
- LACoFD: Provide fire suppression, rescue, and life safety coordination; also lead the Incident Command for wildfires that cross into County areas.

Table 6.6: Proposed Multijurisdictional Evacuation Actions and Responsible Agencies

Action	Responsible Agency
Establish Incident Command Post (ICP)	LAFD (Lead) with LAPD
Assign Evacuation Group Supervisor	LAFD
Develop and Disseminate Evacuation Plan	LAFD with LAPD, coordination through EMD
Implement Traffic Control Points	LAPD/LADOT/Caltrans/ CHP/LASD (for County areas)
Communicate Evacuation Orders	LAFD PIO/LAPD (Lead) with EMD for City wide coordination
Shelter Coordination	Department of Recreation and Parks (Lead), supported by Red Cross
Animal Evacuation	LA Animal Services (Lead), supported by Red Cross for co-located shelters
Fire Spread Projections	LAFD (Air Recon and Operations), coordinate with LACoFD if multi-jurisdictional
Reentry and Recovery Plan	LAFD/LAPD/LADOT/EMD (coordination Lead)

To fully implement an interjurisdictional coordination strategy, the following are suggested:

- Establish Memorandums of Understanding (MOUs) for mutual aid, resource sharing, and coordinated evacuation operations.
- Participate in joint exercises to align communication protocols and evacuation zone boundaries.
- Integrate regional evacuation and sheltering plans to ensure consistent public messaging and route management.
- Maintain liaison officers from neighboring jurisdictions within the Unified Command structure during major incidents.
- Include unified command coordination procedures for cross-boundary incidents.

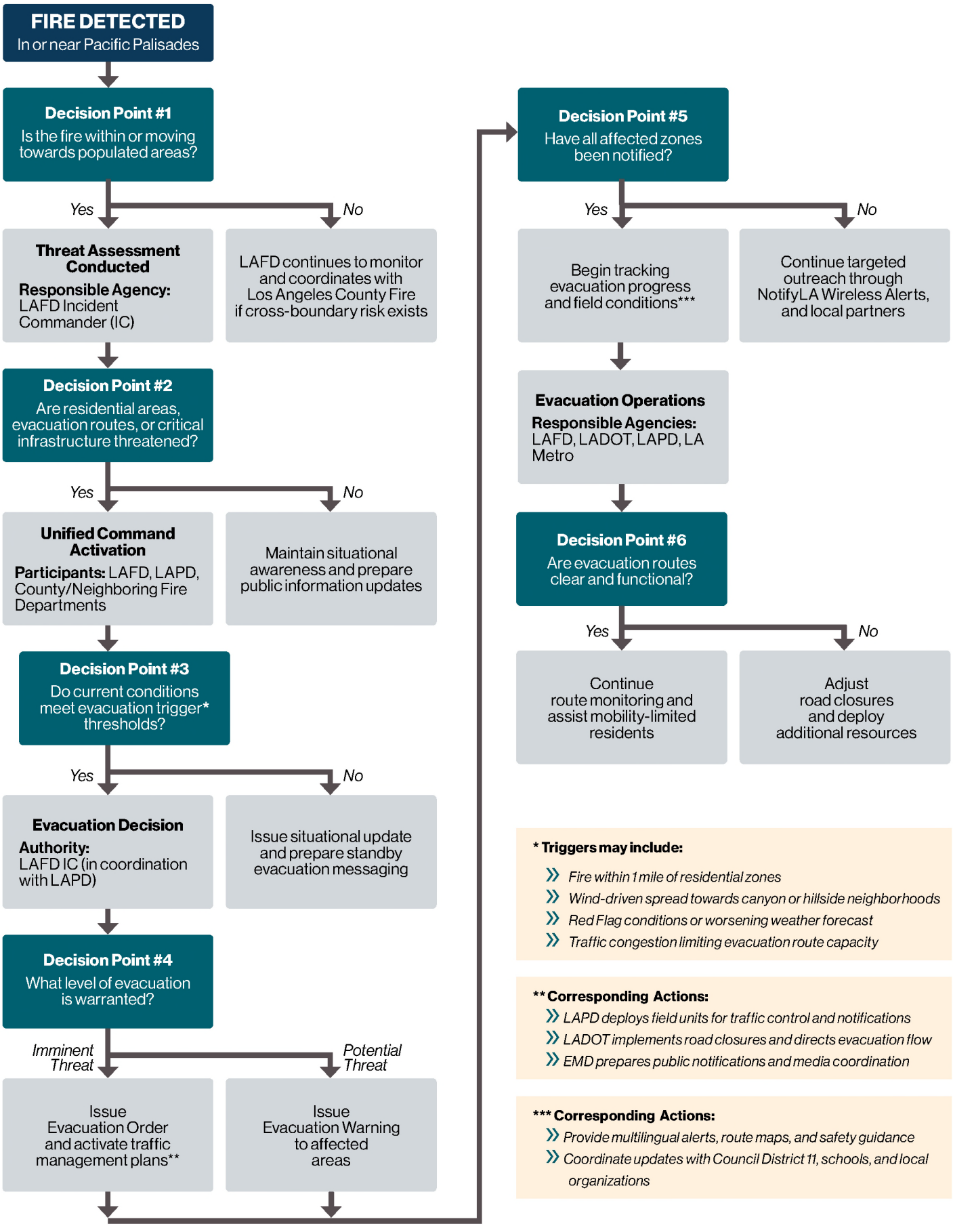
6.3.1.7. Strategy 27: Decision-Making Authority and Triggers

Developing a visual evacuation flowchart for Pacific Palisades would help clarify decision-making authority and outline pre-defined triggers for evacuation warnings and orders. The flowchart can identify the agencies authorized to issue evacuation orders and define operational thresholds based on fire location, direction of spread, and weather conditions. Incorporating this tool into the planning framework could enhance coordination, improve situational awareness, and support timely, consistent decision-making during wildfire events.

A proposed evacuation decision-making flowchart specific to Pacific Palisades is shown in Figure 6.10.



Figure 6.10: Proposed Pacific Palisades evacuation decision-making flowchart



*** Triggers may include:**

- *Fire within 1 mile of residential zones*
- *Wind-driven spread towards canyon or hillside neighborhoods*
- *Red Flag conditions or worsening weather forecast*
- *Traffic congestion limiting evacuation route capacity*

**** Corresponding Actions:**

- *LAPD deploys field units for traffic control and notifications*
- *LADOT implements road closures and directs evacuation flow*
- *EMD prepares public notifications and media coordination*

***** Corresponding Actions:**

- *Provide multilingual alerts, route maps, and safety guidance*
- *Coordinate updates with Council District 11, schools, and local organizations*

6.3.1.8. Strategy 28: Populations with Transportation Needs

Evacuation planning for Pacific Palisades must reflect the unique challenges posed by its geography, limited road network, and diverse community demographics. To support the safe evacuation of residents and visitors, particularly those who rely on public transportation or mobility assistance, targeted response strategies can be developed for populations with transportation needs.

Populations that need additional considerations for evacuation planning include:

- **Elderly residents:** Many Pacific Palisades residents are older adults who may have limited mobility or health concerns. Through the DAFN Coalition, maintain partnerships with trusted community organizations, such as the RYLAN program and the Palisades Senior Alliance, to ensure that distribution of emergency information is sent to the people their organizations serve on a daily basis.
- **People with disabilities:** Coordinate with local service providers and caregivers to pre-identify residents needing accessible transportation or on-site support. Plan for evacuation staging areas and shelters meet Americans with Disabilities accessibility standards.
- **Non-English speakers:** Although English is the predominant language, outreach materials should include Spanish and other languages spoken in the community. Multilingual communication through local schools, houses of worship, and community organizations will help ensure broader understanding of evacuation procedures.
- **Tourists and short-term visitors:** Pacific Palisades includes vacation rentals, coastal lodging, and recreational sites such as Will Rogers State Beach and Temescal Gateway Park. Coordination with the Department of Recreation and Parks, Airbnb hosts, and local businesses can ensure visitors receive timely evacuation alerts and transportation information.
- **Transit-Dependent residents:** While the area has limited public transit options, coordination with LADOT, Metro, and Los Angeles Unified School District (LAUSD) (for use of school buses) could provide essential evacuation transport for residents without personal vehicles. Pre-designated pick-up points along Sunset Boulevard, Temescal Canyon Road, and PCH can be identified and publicized in advance.
- **Other Disability, Access, and Functional Needs (DAFN) populations:** Work with local emergency volunteer groups, such as CERT and Community Council emergency committees, to ensure that at-risk populations are included in notification systems and transportation planning.

6.3.1.9. Strategy 29: Tactical Evacuation Guide

The City's guidance elements for conducting an evacuation are distributed across multiple plans and supporting documents. By necessity, these documents collectively span multiple levels of information, policies, and response procedures on a citywide basis and for multiple geographies and incident scenarios.

Upon revision and adoption of updated evacuation plans, procedures, and protocols, the City can prepare a targeted tactical evacuation guidance document specific to Pacific Palisades. The document would distill key information about response activities from the various citywide and Pacific Palisades-specific documents into a single easy-to-use document for responding agencies and personnel. Appendix B, Pacific Palisades Evacuation Tactical Guide, presents a draft version of such a document for consideration by City personnel.



6.3.2. Palisades-Specific Traffic Management Tactics

The geography, topography and streets network of Pacific Palisades present significant challenges to conducting a safe and rapid evacuation under time-critical circumstances. This section presents tactical strategies for the consideration, selection and management of evacuation routes, and traffic-management measures during an evacuation.

6.3.2.1. Strategy 30: Identification of Appropriate Evacuation Routes

Once an evacuation order is issued, City staff should select appropriate evacuation routes based on the specifics of the wildfire event. Routes are the roadways and intersections emergency responders should prioritize for clearance, supplemental traffic-control activities, and communication to the evacuating public.

For this set of evacuation strategies, a two-tiered system of potential evacuation routes for Pacific Palisades was identified based on the capacity and connectivity of the roadway network to help City staff in selecting appropriate routes for a given wildfire situation.

The Tier 1 evacuation routes include primary, secondary, and tertiary routes.

- **Primary routes.** Regional access routes into and out of the area and include PCH and Sunset Boulevard
- **Secondary routes.** Major feeder routes to the primary routes and include Palisades Drive, Temescal Canyon Road, and Chautauqua Boulevard
- **Tertiary routes.** Other important connectors and through routes, concentrated in the Riviera and Rustic Canyon subareas of Pacific Palisades. These tertiary routes connect with the street network in the adjacent portions of Santa Monica and provide an important alternative to the primary routes. Tertiary routes include the following:
  - Allenford Avenue + S. 26th Street
  - Amalfi Drive + E. Channel Road
  - Brooktree Road + Latimer Road + Upper Mesa Road + Mesa Road
  - W. Channel Road + Entrada Drive + 7th Street
  - Ocean Way + Mabery Road
  - Ocean Avenue Ext.
  - Ocean Avenue + San Vicente Boulevard
  - Montana Avenue
  - Lincoln Boulevard
  - Wilshire Boulevard
  - Santa Monica Boulevard

Together, the Tier 1 network covers the main routes to get into and out of the larger Pacific Palisades area. All evacuation traffic is expected to use at least one of these routes. These routes are illustrated in Figure 6.11.

Figure 6.11: Evacuation routes: Tier 1



Tier 2 routes are a lower-level network of routes for evacuation of specific communities *within* the larger Pacific Palisades area.

- **Neighborhood routes.** Primary local egress from specific neighborhoods (subareas) within Pacific Palisades such as the Highlands, Alphabet Streets, and Via Bluffs.
- **Special routes.** Important private streets or other restricted-access roadways associated with specific sites:
  - Visitor uses (The Getty Villa, Bel-Air Bay Club, Riviera Country Club, Will Rogers State Park)
  - Gated communities (Ridgeview Country Estates, Palisades Country Estates)
  - Mobile home parks (Malibu Village, Pacific Palisades Bowl, Tahitian Terrace)
  - Palisades Charter High School
  - Las Pulgas Canyon

Also included is the fully paved fire road linking The Summit area (Monte Hermoso Drive) with Lachman Lane, which could (if permitted by fire officials) provide an evacuation route alternative to Palisades Drive depending on the specifics of the wildfire event.

Figure 6.12 shows the Tier 1 and Tier 2 routes.



Figure 6.12: Evacuation routes: Tier 1 and Tier 2



6.3.2.2. Strategy 31: Dispatch Plan for Traffic Control Staff

Once an evacuation order is issued, LAPD / CHP personnel and TCOs should be dispatched immediately to implement the necessary upstream roadway closures (e.g., PCH, Sunset Boulevard) to prevent through-traffic from entering the evacuation zone. If sufficient time and staffing resources are available, additional police and TCOs can be dispatched to locations within the Pacific Palisades area to facilitate evacuation and reinforce any localized roadway closures specific to the evacuation event. The exact dispatch plan would depend on the specifics of the evacuation event, but potential locations are illustrated in Figure 6.13 and summarized in Table 6.7.

The two PCH boundary intersections (at Sunset Boulevard and Chautauqua Boulevard / W. Channel Road) and the two key juncture intersections along Sunset Boulevard (at Temescal Canyon Road and Chautauqua Boulevard) are expected to be high-priority locations for manual traffic control in the field; the volume and complexity of traffic flows at these four locations are likely to warrant field staff under most evacuation scenarios. Lower priority locations include most of the remaining signalized intersections in the area, primarily along Sunset Boulevard, PCH, and W. Channel Road; deployment of staff to these locations would be dependent on staffing availability and the specifics of the evacuation event.

The primary purpose of staff deployment would be to facilitate efficient and orderly evacuation and emergency response through manual control or override of traffic signals, coning, and other means. Staff would also be available to assist in answering questions or directing traffic away from downstream roadway closures. At many of the larger intersections, multiple staff may be needed and some differentiation in work duties may be necessary. Police officers, for example, are not typically trained in field use of signal controller equipment, so these duties would likely be handled primarily by TCOs.

Table 6.7: Police and TCO Dispatch Locations

High- Priority Intersections	Low-Priority Intersections	
PCH and Sunset Boulevard	PCH and Coastline Drive	Sunset Boulevard and Drummond Street
Sunset Boulevard and Temescal Canyon Road	Sunset Boulevard and Palisades Drive	Sunset Boulevard and Brooktree Road
Sunset Boulevard and Chautauqua Boulevard	Marquez Avenue and Jacon Way	Sunset Boulevard and Will Rogers State Park Road
PCH and Chautauqua Boulevard / W. Channel Road	Sunset Boulevard and Baylor Street / Marquez Avenue	Sunset Boulevard and Amalfi Drive
	Sunset Boulevard and Bienveneda Avenue	Sunset Boulevard and Capri Drive
	Sunset Boulevard and El Medio Avenue	Sunset Boulevard and Allenford Avenue
	Sunset Boulevard and Via de la Paz	Temescal Canyon Road and Bowdoin Street
	Sunset Boulevard and Swarthmore Avenue	PCH and Temescal Canyon Road
	Sunset Boulevard and Antioch Street	W. Channel Road / Entrada Drive and Mesa Road
	Sunset Boulevard and La Cruz Drive / Monument Street	Entrada Drive and E. Channel Road / Ocean Avenue Ext.
	Sunset Boulevard and Carey Street	

Figure 6.13: Police and TCO dispatch locations



6.3.3. Public Alert and Warning

Clear and timely communication with the public is an essential element of conducting an evacuation safely and effectively. Communication includes initial notifications of evacuation warnings and orders, ongoing situational updates, and directions for how to leave the area in the safest manner.

The scenario of a wildfire in Pacific Palisades presents distinct challenges to City personnel. The wildfire's speed of progression may limit, or even outpace, the ideal time frame for notifications. The area's topography and current telecommunications infrastructure may impede the effectiveness of emergency notification and communications systems. This section presents strategies for helping to mitigate those challenges.

The City's response plans identify multiple systems for public notifications of emergency alerts:

- **Primary Alert Systems**
  - **Wireless Emergency Alerts (WEAs):** Geo-targeted alerts to mobile devices for immediate evacuation orders or critical updates.
  - **Emergency Alert System (EAS):** Broadcast alerts via TV and radio for widespread emergency communications.
  - **National Oceanic and Atmospheric Administration (NOAA) Weather Radio:** Used for weather-related emergencies, including severe storms or tsunamis.
  - **Integrated Public Alert and Warning System (IPAWS):** Ensures coordinated alerting across all systems.
  - **Mass Notification Systems (NotifyLA):** Targeted calls, texts, and emails to registered residents.
- **Supplemental Notification Tools**
  - **City/County Social Media Accounts:** Facebook, X (Twitter), and Instagram used for rapid updates.
  - **Website Updates:** Real-time updates posted on City and County emergency management websites.
  - **PA Systems:** Mobile or vehicle-based PA systems are occasionally used on an ad hoc basis for areas with limited cell reception and/or to provide outdoor warning.

These systems provide a strong base for notification capabilities, which can be supplemented through the following strategies.

6.3.3.1. Strategy 32: Current Systems

The City's plans and procedures should be updated to reflect currently available systems and detail how they are to be used. Chief among these are the Genasys System (in conjunction with Los Angeles County) and NotifyLA. These systems represent significant improvements in communication capabilities and can be leveraged to enhance emergency communications to the public.

6.3.3.2. Strategy 33: Cellular Infrastructure

Many of the current emergency communications systems in place rely on cellular technology. Given the Pacific Palisades topography and telecommunications infrastructure, cellular transmissions are susceptible to disruption by poor signal strength (e.g., in canyons) and by the loss of key cellular infrastructure due to power outages, fire damage, and other issues. Achieving the objectives listed below is possible by deploying additional hardware in coordination with cellular-service providers.

- Reduce or eliminate dead spots with poor signal reception
- Harden existing infrastructure and cabling with features such as fire protection measures and backup power supplies
- Provide backup transmission capabilities in key areas with redundant towers/hardware

6.3.3.3. Strategy 34: Additional Systems (Hardwired)

Consider the deployment of additional, hardwired systems to improve notification capabilities. Options include alert sirens, public-address speakers, and digital message signs. The infrastructure for these systems can be integrated into routing for existing systems in the area, with cabling and hardware leveraging existing conduits and utility poles for lighting, traffic signals, etc. These are likely feasible for Pacific Palisades but would require extensive locations for comprehensive coverage.

6.3.3.4. Strategy 35: Additional Systems (Wireless)

Consider implementing additional wireless systems to supplement the existing cellular-based systems. Satellite-based transmission systems are promising, and the City should complete its feasibility study for this option. The City could also consider a localized, AM radio-based transmitter (like those used at national parks and similar sites) for ongoing updates and directions. This would have the twofold benefit of (1) not being subject to

bandwidth constraints on cellular or satellite networks and (2) being readily accessible to residents evacuating in their vehicles, through their vehicles' radios.

6.3.3.5. Strategy 36: Timing

The timeliness of notifications to the public is one of the most critical—and most challenging—aspects of an evacuation. Providing additional time for the public to prepare and respond in advance of an evacuation order is one of the most effective ways to increase an evacuation's safety and effectiveness. A wildfire, however, may not allow much time for the various steps of the notification decision and activation process before the area is directly impacted. To help mitigate this issue, the City can consider certain steps to improve the timeliness of notifications:

- Incorporate lower hazard thresholds for initial notifications to the public. Issue evacuation warnings earlier than under previous standards to make the public aware of the potential threat and provide additional time to prepare. These actions also enable pre-emptive evacuations for those with mobility issues and is likely to reduce congestion at the time of a later evacuation order.
- Provide tiered information through multiple systems. Initial alerts can be issued through all available alert systems for the greatest public awareness. These actions can include reference to specific systems that provide greater information and directions. When possible, pre-scripted and/or pre-recorded messages can be used to reduce preparation times.

6.3.3.6. Strategy 37: Consistency of Messaging

Use a clear, consistent pattern of notification during emergencies to improve the public's receipt and understanding of the messaging content. When people (the public) interact with certain systems infrequently – such as emergency alerts – keeping the process the same every time, builds familiarity and helps to reduce confusion. The City can establish protocols for which specific systems are used at each step of the notification process, and what the structure and content of each message will be. This applies to initial alerts and to subsequent status updates and evacuation instructions.

The need for consistency extends beyond City agencies. For a wildfire that affects Pacific Palisades, impacted populations will likely receive messages from the City, the County, and even nearby cities. These jurisdictions' agencies can align to establish shared, or at least consistent, protocols for the timing, structure, and content of public messaging.

6.3.3.7. Strategy 38: Public Adoption of Opt-In Systems

Interviews with City agencies and Pacific Palisades residents indicate varying levels of awareness and adoption for the available emergency notification systems. The City can target improved registration and familiarity with the opt-in systems available to the public. Promoting enrollment increases the number of recipients who receive important, time-critical information and shortens the time frame in which they receive it. Such systems (e.g., NotifyLA) should be designed for ease of understanding and streamlined use by the public.

Strategies to help with public adoption are addressed in Section 6.3.4.

6.3.3.8. Strategy 39: On-the-Ground Tactics

The City's notification protocols already include provisions for having emergency responders (primarily LAFD and LAPD personnel) provide on-the-ground notifications to residents in areas to be evacuated. These notifications comprise primarily announcements through the public-address systems of circulating emergency vehicles and going door-to-door through the neighborhood. While effective, these methods are typically considered a last resort after the aforementioned mass-notification processes because they are time intensive and can require significant staff resources that may not be available due to competing response needs. To help address this issue, the City can consider means to supplement on-the-ground capabilities, including:

- Identify additional City staff from departments other than LAFD and LAPD to deploy rapidly and conduct alerts in the neighborhood. These staff would receive specialized training to address issues regarding safety, coordination with emergency responders, and interaction with the public.
- Leverage new and established community groups to assist with house-by-house notifications. Early in the hazard period while it is safer to do so, residents who are already on site can notify their neighbors quickly. They will likely already have a sense of individuals' sense of awareness and any specialized needs. The City can provide specialized training to these groups and pre-register individuals for specialized notifications and guidance on information to disseminate. The City's existing Ready Your LA Neighborhood (RYLAN) program, which provides residents a framework to create neighborhood-level emergency plans and share contact information, is a good example of an existing program.

Both of these options can provide a force-multiplier effect for LAFD and LAPD staff, reducing the notification workload on these two agencies and enabling them to channel limited staff resources to support other aspects of the evacuation.

6.3.4. Public Education

When a mass evacuation scenario arises, an informed and prepared public is a key element that helps the evacuation proceed as safely, effectively, and efficiently as possible. The process of preparing the public, however, starts well before the need to declare an evacuation.

The City and other resources already have extensive advice readily available to the public to prepare for a variety of emergency situations including evacuations. In the case of Pacific Palisades, though, the higher levels of risk and complicating factors for an evacuation can justify a more focused effort at public education. While a comprehensive public-education campaign is beyond the scope of this document, the following are strategies to consider when developing a targeted campaign.

6.3.4.1. Strategy 40: Public Disregard

The earlier an impacted population begins evacuating, the faster and smoother the evacuation will be. Conversely, in working groups, residents cited an evacuation warning fatigue in association with previous false alarms that contribute to some initial hesitation to evacuating. Preparedness materials should emphasize that warnings are not issued by the City lightly and that every alert deserves careful and intentional consideration. Consistent application of this message can help foster a stronger mentality of "better safe than sorry," leading to a better response to evacuation alerts.

6.3.4.2. Strategy 41: Regular Reinforcement

Public education campaigns should be viewed as a long-term strategy, not one-time activities. The City can improve levels of household and individual preparedness by communicating evacuation-preparedness guidance on a consistent, ongoing basis. Repetition will breed familiarity, and familiarity will lead to better understanding. The more often someone receives the guidance, the more likely they are eventually to act on it. Education materials ideally will be distributed on a regular cadence (e.g., quarterly) for an extended period if not indefinitely.

Annual reminders immediately preceding high-risk periods such as wildfire season also help keep preparedness top of mind with the public at the times they may need it the most. Activities such as town hall meetings, media campaigns, and drills are timely and useful reminders.

6.3.4.3. Strategy 42: Multiple Communications Channels

Preparedness guidance can be provided in multiple forms across numerous media and channels. The more methods that are used, the greater the absorption rate by the public. Different people pay attention to different channels, and process information in different ways. Some people prioritize social media, while others prefer printed materials. An ideal public-education campaign covers as many of these options as possible. Using different methods at different times also provides a way to achieve regular reinforcement of the campaign without direct repetition of specific channels.

Residents should be made aware of the various materials and channels available to them. They can be encouraged to enroll for opt-in channels to be kept aware of upcoming activities and updated preparedness guidance.

While using multiple channels is helpful, it is critical that the information be consistent across all channels. Failing to do this can foster confusion over preparedness approaches and ultimately reduce adoption rates.

6.3.4.4. Strategy 43: Grassroots Approach

Local and community organizations provide an effective opportunity to push preparedness guidance directly to the populations who need it. Preparedness guidance typically proves more effective than making the information available in ways that require the public to seek it out (on a web site, for example).

Pacific Palisades benefits from an extensive and engaged network of community advocates. In addition to existing HOAs and neighborhood groups, the City can encourage and support the formation of groups such as CERTs that focus on emergency preparedness. All of these groups can partner with City staff to conduct community seminars and disseminate guidance on personal emergency preparedness. Trained members of the public can also work one-on-one with their neighbors to identify particular concerns and develop personalized response plans.



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Appendix A

Fuel Treatment Locations for Further Analysis

This appendix lists potential fuel treatment locations in the Pacific Palisades and surrounding area recommended for further analysis. Sites are included based on a general assessment of their slope suitability and typology (e.g., ridgelines, canyon mouths and rims, corridors, critical infrastructure), which are applied to suggest appropriate treatment types. Site conditions and details of treatment options must be further analyzed by the City and/or State using post-fire data as it becomes available, along with advanced fire modeling and ground truthing.



Table A.1: Fuel Treatment Locations for Further Analysis

Area / Location	Treatment Type(s)	Slope Suitability
Mulholland Drive Ridgeline	Fuel break	Feasible (≤30–40%)
Temescal Ridge Rd	Fuel break	Mixed slopes, feasible on ridge
Castellammare Ridge	Fuel break + greenspace	Rim flats allow VGB; steep faces fuelbreak only
Topanga Canyon Ridgeline	Fuel break	Feasible on ridge tops
Paseo Miramar / Los Liones Ridge	Fuel break	Feasible (ridge crest)
Rivas Canyon Ridge	Fuel break	Feasible (mixed slopes)
Sullivan Canyon Upper Ridge	Fuel break	Ridge tops feasible
Temescal Canyon Mouth (current MRCA operations)	Vegetated Green Buffer	≤30% slopes suitable
Bienveneda Canyon Mouth	Vegetated Green Buffer	≤30% slopes suitable
Tuna Canyon Mouth	Vegetated Green Buffer	≤30% slopes suitable
Santa Ynez Canyon Mouth	Vegetated Green Buffer	Flat canyon mouth feasible
Los Liones Canyon Mouth	Vegetated Green Buffer	≤30% slope feasible at trailhead
Trailer Canyon Mouth	Vegetated Green Buffer	Flat base feasible
Rustic Canyon Mouth	Vegetated Green Buffer + restoration	Flat base suitable
Potrero Canyon Mouth	Vegetated Green Buffer + restoration	Flat park base suitable
Temescal Canyon Rim	Canyon-rim buffer	Mixed
Rustic Canyon Rim	Canyon-rim buffer	Mixed
Bienveneda Canyon Rim	Canyon-rim buffer	Mixed
Tuna Canyon Rim(current/planned treatments)	Canyon-rim buffer	Mixed
Potrero Canyon Rim	Canyon-rim buffer	Mixed
Santa Ynez Canyon Rim	Canyon-rim buffer	Mixed
Sullivan Canyon Rim	Canyon-rim buffer	Mixed
Mandeville / Kenter Canyon Rims	Canyon-rim buffer	Mixed
Sunset Boulevard Corridor	Vegetated Green Buffer (linear)	≤30%
Chautauqua Boulevard Corridor	Vegetated Green Buffer (linear)	≤30% lower, >40% upper
Palisades Drive Corridor	Roadside fuel treatment + slope-stabilizing natives	>40% (greenspaces not feasible)
Pacific Coast Highway Coastal Bluffs	Roadside fuel treatment	>40%
Ocean Avenue / Santa Monica Canyon Mouth	Roadside + pocket buffers	≤30%
Marquez Knolls Rim	Community defensible space / Vegetated Green Buffer	Feasible (≤30%)
Upper Riviera Rim	Community defensible space / Vegetated Green Buffer	Feasible (≤30%)
Castellammare Neighborhood Rim	Community defensible space / Vegetated Green Buffer	Feasible on terraces
Rustic Canyon Park	Regional Vegetated Green Buffer	≤30%
Potrero Canyon Park	Regional Vegetated Green Buffer	≤30%
Topanga State Park Interface (treatments observed around boundary/some roads)	Regional greenspace + fuelbreaks	Variable
Will Rogers State Historic Park Perimeter	Vegetated Green Buffer (formalized)	≤30%
Temescal Gateway Park (nodes) (current MRCA operations – mastication)	Pocket greenspaces	≤30%
Getty Villa Perimeter	Irrigated Vegetated Green Buffer	≤30%
Schools (Palisades High, Marquez Charter, etc.)	Critical infrastructure greenspace	≤30%
Water Tanks / Pump Stations (Highlands, Castellammare)	Critical infrastructure greenspace	Feasible
Utility Easements (SCE/LADWP on Sullivan Ridge, Temescal spurs)	Shaded fuelbreak corridors	Feasible





Appendix B

Pacific Palisades Evacuation Tactical Guide

Purpose

The purpose of this document is to draft procedures to be considered by the City of Los Angeles. It provides guidance for local agencies, first responders, and supporting organizations to conduct coordinated, and orderly evacuation of residents during wildfires, earthquakes, tsunamis, or other life-safety emergencies.

This document applies to area-wide evacuations within the boundaries of Pacific Palisades and supports the broader City of Los Angeles Emergency Operations Plan. It distills and references key elements from relevant City documents, including the following:

- City of Los Angeles Emergency Operations Plan Evacuation Annex
- City of Los Angeles Brush Fire Evacuation Plan
- Los Angeles Fire Department Palisades/Highland Area Thomas Guide Page 630-G-5 (Wildland Operational Pages 23-A, 23-B, Areas 23-1 through 23-4, 23-8, and 23-9

This is not a stand-alone evacuation plan; rather, it serves as a quick reference guide containing Palisades-specific evacuation tactics to support rapid decision-making during an emergency.

Pacific Palisades Area Overview

Boundaries

- **North:** Santa Ynez Canyon Park
- **South:** Sunset Blvd
- **East:** Santa Ynez Park
- **West:** Topanga State Park

Key Features

- **Brush coverage:** 2.2 square miles (medium to heavy)
- **Population:** ~26,500 residents
- **Number of homes:** ~10,000-11,000
- **Terrain:** Steep ridges, narrow streets, long private driveways
- **Wildland-Urban Interface (WUI) area:** High fire risk zone

Threats and Hazards

- **Wildfire –** most likely hazard; fast-moving, fueled by Santa Ana winds
- **Earthquake –** infrastructure collapse, road blockage, gas leaks
- **Mudslides/debris flows –** post-fire or heavy rains
- **Tsunami –** low-probability but possible for coastal areas

Evacuation Objectives

These objectives guide tactical and strategic decision-making throughout the evacuation process. Prioritize safety, access, accountability, and coordination at all times.

- Safely evacuate all threatened civilians, including vulnerable populations and pets/livestock
- Ensure clear access and egress for emergency services
- Prevent traffic bottlenecks by establishing traffic control and direction
- Implement Incident Command System (ICS)-structured coordination
- Provide shelter, refuge, and essential services during evacuation and recovery
- Maintain accountability of resources, situation status, and communications
- Facilitate safe re-entry post-incident

Authority

- California Penal Code §409.5 authorizes law enforcement to close areas where a menace to health or safety exists.
- Los Angeles Police Department (LAPD) is the lead agency for area evacuations in Palisades.
- Los Angeles Fire Department (LAFD) may initiate evacuations during wildfire or other fire-related incidents.
- Residents cannot be forcibly removed from private property, but law enforcement may remove minors if adults refuse to act in the child's best interest (California Welfare and Institutions Code).

Categories of Evacuation

- **Evacuation Warning –** Issued when there is a potential threat to life or property. Residents should prepare to leave. People with disabilities, access and functional needs, or who require more time should evacuate immediately.
- **Evacuation Order –** Issued when there is an imminent threat to life safety. Residents should leave immediately. Refusal to evacuate may put lives at risk and hinder emergency operations.
- **Shelter in Place –** Issued when residents should stay indoors due to hazardous conditions outside.

Roles and Responsibilities

- **LAPD West Bureau / West LA Division (Lead):** Issue evacuation orders, establish zones, direct traffic management, enforcement of access restrictions.
- **LAFD:** Initiates evacuations in fire-related events, provides life safety support, canvasses neighborhoods, assists with notifications.
- **Los Angeles Department of Transportation (LADOT):** Traffic support at intersections and perimeters.
- **Los Angeles Animal Services:** Pet sheltering and evacuation support.
- **Los Angeles Department of Parks and Recreation:** Evacuations within city parks.
- **Emergency Management Department (EMD):** Resource coordination, mutual aid requests, and communication with the City Emergency Operations Center (EOC).
- **Caltrans:** Traffic management and road infrastructure support on state highways.
- **California Highway Patrol (CHP):** Manage traffic flow and enforce laws on state highways during evacuations.
- **Los Angeles County Sheriff's Department (LASD):** Supports mutual aid and unincorporated Palisades-adjacent areas (e.g., Topanga, Malibu, County zones).
- **Los Angeles County Fire Department (LACoFD):** Fire suppression, rescue, and life safety coordination; also leads the Incident Command for wildfires that cross into County areas.

Table B.1: Summary of Key Actions and Responsible Agencies

Action	Responsible Agency
Establish Incident Command Post (ICP)	LAFD (Lead) w/LAPD
Assign Evacuation Group Supervisor	LAFD
Develop & Disseminate Evacuation Plan	LAFD w/ LAPD, coordination through EMD
Implement Traffic Control Points	LAPD/LADOT/Caltrans/CHP/LASD (for County areas)
Communicate Evacuation Orders	LAFD PIO/LAPD (Lead) with EMD for city wide coordination
Shelter Coordination	Department of Recreation and Parks (Lead), supported by Red Cross
Animal Evacuation	LA Animal Services (Lead), supported by Red Cross for co-located shelters
Fire Spread Projections	LAFD (Air Recon and Operations), coordinate with LACoFD if multi-jurisdictional
Reentry & Recovery Plan	LAFD/LAPD/LADOT /EMD (coordination Lead)

Public Warning

Notify the public clearly and promptly during emergencies. Use multiple platforms to ensure all populations—especially vulnerable groups—receive accurate and timely alerts. Messages should clearly specify:

- Shelter-in-Place (stay inside for safety).
- Evacuation Warning (prepare to leave).
- Evacuation Order (leave immediately).

Primary Alert Systems

- **Wireless Emergency Alerts (WEA):** Geo-targeted alerts to mobile devices for immediate evacuation orders or critical updates.
- **Emergency Alert System (EAS):** Broadcast alerts via TV and radio for widespread emergency communications.
- **National Oceanic and Atmospheric Administration (NOAA) Weather Radio:** Used for weather-related emergencies, including severe storms or tsunamis.
- **Integrated Public Alert and Warning System (IPAWS):** Ensures coordinated alerting across all systems.
- **Los Angeles County's Genasys:** Geotargeted alerts and warnings by zone.

Supplemental Notification Tools

- **Reverse 911 Calls / Mass Notification Systems** (e.g., NotifyLA, Alert LA County, SMAlerts)**:** Targeted calls, texts, and emails to registered residents.
- **City/County Social Media Accounts:** Facebook, X (Twitter), Nextdoor, Nixle and Instagram used for rapid updates.
- **Website Updates:** Real-time updates posted on City and County emergency management websites.
- **Community Sirens / Public Address Systems:** For areas with limited cell reception or to provide outdoor warning, sirens could be used if the City installed them.
- **Mobile Public Address Units:** Loudspeakers mounted on law enforcement or fire vehicles used during active evacuations.

Evacuation Operations

Evacuation Zones

Pacific Palisades is divided into neighborhoods (Alphabet Streets, Marquez Knolls, Highlands, Castellammare, Riviera, etc.). However, Pacific Palisades will be evacuated in a single zone due to the small size of the area and the likelihood that an incident that impacts any portion of the Palisades is likely to impact the entire area.

Evacuation Routes and Traffic Plan

Once an evacuation order is issued, select appropriate evacuation routes based on the specifics of the wildfire event. A two-tiered system may be utilized to move residents out of Pacific Palisades efficiently. Adjust as needed based on incident conditions and traffic flow. See Annex B1 for evacuation maps.

Traffic Flow Objectives

- Prevent non-resident access into evacuation zone
- Control intersections to avoid bottlenecks
- Stagger releases of vehicles from canyon streets if congestion occurs
- Pre-deploy law enforcement officers and LADOT staff at key junctions for real-time traffic management

Tier 1 Evacuation Routes

The **Tier 1** Palisades evacuation routes include *primary, secondary,* and *tertiary* routes. Together, the Tier 1 network covers the main routes to get in and out of the larger Palisades area. All evacuation traffic is expected to use at least one of these routes. These routes are illustrated in Annex B1, Figure B1.1.

Table B.2: Proposed Tier 1 Evacuation Routes

Class	Description	Street Names
Primary Routes	Comprise the regional access routes into and out of the area	■ Pacific Coast Highway (PCH) ■ Sunset Blvd
Secondary Routes	Major feeder routes to the primary routes	■ Palisades Drive ■ Temescal Canyon Road ■ Chautauqua Boulevard
Tertiary Routes	Other important connectors and through routes, concentrated in the Riviera and Rustic Canyon subareas of Pacific Palisades. These routes connect with the street network in the adjacent portions of Santa Monica and provide an important alternative to the primary routes.	■ Allenford Avenue + S. 26th Street ■ Amalfi Drive + E. Channel Road ■ Brooktree Road + Latimer Road + Upper Mesa Road + Mesa Road ■ W. Channel Road + Entrada Drive + 7th Street ■ Ocean Way + Mabery Road ■ Ocean Avenue Extension ■ Ocean Avenue + San Vicente Boulevard ■ Montana Avenue ■ Lincoln Boulevard ■ Wilshire Boulevard ■ Santa Monica Boulevard

Tier 2 Evacuation Routes

Tier 2 routes are a lower-level network of routes for evacuation of specific communities within the larger Palisades area. These routes are illustrated in Annex B1, Figure B1.2.

Table B.3: Proposed Tier 2 Evacuation Routes

Class	Description	Area/Street Names
Neighborhood Routes	Primary local egress from specific neighborhoods (subareas) within Pacific Palisades	■ Highlands ■ Alphabet Streets ■ Via Bluffs
Special Routes	Important private streets or other restricted-access roadways associated with specific sites	■ Visitor uses (The Getty Villa, Bel-Air Bay Club, Riviera Country Club, Will Rogers State Park) ■ Gated communities (Ridgeview Country Estates, Palisades Country Estates) ■ Mobile home parks (Malibu Village, Pacific Palisades Bowl, Tahitian Terrace) ■ Palisades Charter High School ■ Las Pulgas Canyon
Fire Road	The fully-paved fire road linking The Summit area (Monte Hermoso Drive) with Lachman Ln., which could (if permitted by fire officials) provide an evacuation route alternative to Palisades Drive depending on the specifics of the wildfire event.	■ Fire Road linking Monte Hermoso Drive with Lachman Lane

Conducting the Evacuation

Immediate Actions

1. Immediate Deployment
   - Dispatch LAPD, CHP, and Traffic Control Officers (TCOs) to establish upstream roadway closures to prevent through traffic from entering the evacuation zone.
   - Priority closure points include:
   - PCH
   - Sunset Boulevard
2. Staffing and Coverage
   - If time and staffing permit, assign additional officers and TCOs to critical intersections within Pacific Palisades to support evacuation traffic and reinforce localized closures.
   - Deployment locations are listed in Annex B1, Table B1.1
3. High-Priority Intersections for Manual Control
   - PCH at Sunset Boulevard
   - PCH at Chautauqua Boulevard / W. Channel Road
   - Sunset Boulevard at Temescal Canyon Road
   - Sunset Boulevard at Chautauqua Boulevard
   - These four intersections are expected to require field staffing under most evacuation scenarios due to high volumes and complex traffic movements.
4. Lower-Priority Intersections
   - Secondary intersections along Sunset Boulevard, PCH, and W. Channel Road may receive staff as resources allow and as dictated by event conditions.
5. Primary Field Tasks
   - Manually control or override traffic signals to maintain outbound flow.
   - Cone and direct traffic to designated evacuation routes.
   - Provide public direction and information at key choke points.
   - Redirect vehicles away from downstream closures or hazards.

Resource Management

Resources should be managed and scaled effectively. If local assets are overwhelmed, request mutual aid and escalate to the City EOC as needed.

- Field-Level Operations – Tactical evacuation is managed by LAPD and LAFD.
- If resources are exhausted:
  - Law enforcement mutual aid is requested via LAPD Department Operations Center (DOC).
  - Firefighting resources are requested via LAFD DOC.
  - Other resources are requested through the EMD Duty Officer.
- In large-scale events, the City EOC will activate to coordinate additional resources.

Inter-Agency Communications

Activate communication protocols to ensure continuous coordination across agencies. Assign a liaison officer and maintain situational updates using common channels and ICS tools. Establish:

- Common radio frequencies coordinated among LAFD, LAPD, LADOT, Caltrans, CHP, Animal Control, Red Cross, etc.
- Dedicated liaison officer at the Incident Command Post (ICP) for interagency communications
- Use of ICS-205 for frequency management

Transportation and Access Needs

Identify and support residents without transportation by activating pick-up points and mobility assistance resources. Coordinate closely with EMD and Access Services.

- Pick-Up Points will be established at schools, recreation centers, or large parking lots (locations determined by Evacuation Branch at the Unified Command Post at the time of event).
- Residents without cars should pre-arrange with neighbors or contact 911 for assisted evacuation.
- Paratransit services (Access Services) available for seniors and disabled residents.
- School buses may be mobilized for community transport.

Evacuation Centers and Shelters

Ensure residents are directed to the appropriate location based on the incident type and shelter availability.

Shelter info will be broadcast on news, LA City Alerts, and social media (@LAFD, @ReadyLA).

Access Control

Enforce security in evacuated areas. Restrict access to authorized personnel only and maintain patrols to deter looting or premature re-entry.

- Once an area is evacuated, LAPD will patrol to deter looting and prevent re-entry until the area is declared safe.
- LADOT TCOs will support by manning perimeter intersections.
- Residents attempting re-entry before clearance will be denied access.

Tool Distribution

Distribute this tool to all listed partners to ensure consistent response coordination. Verify that all agencies maintain current versions and are familiar with their responsibilities.

- LAFD Divisions
- LAPD Command Staff
- LADOT
- Red Cross
- EMD
- Los Angeles Animal Services
- Caltrans
- CHP
- LASD
- LACoFD



Annex B1

Evacuation Routes and Traffic Management

Figures B1.1, B1.2, and B1.3 show suggested evacuation routes for Pacific Palisades.

Figure B1.1: Proposed Evacuation Routes: Tier 1

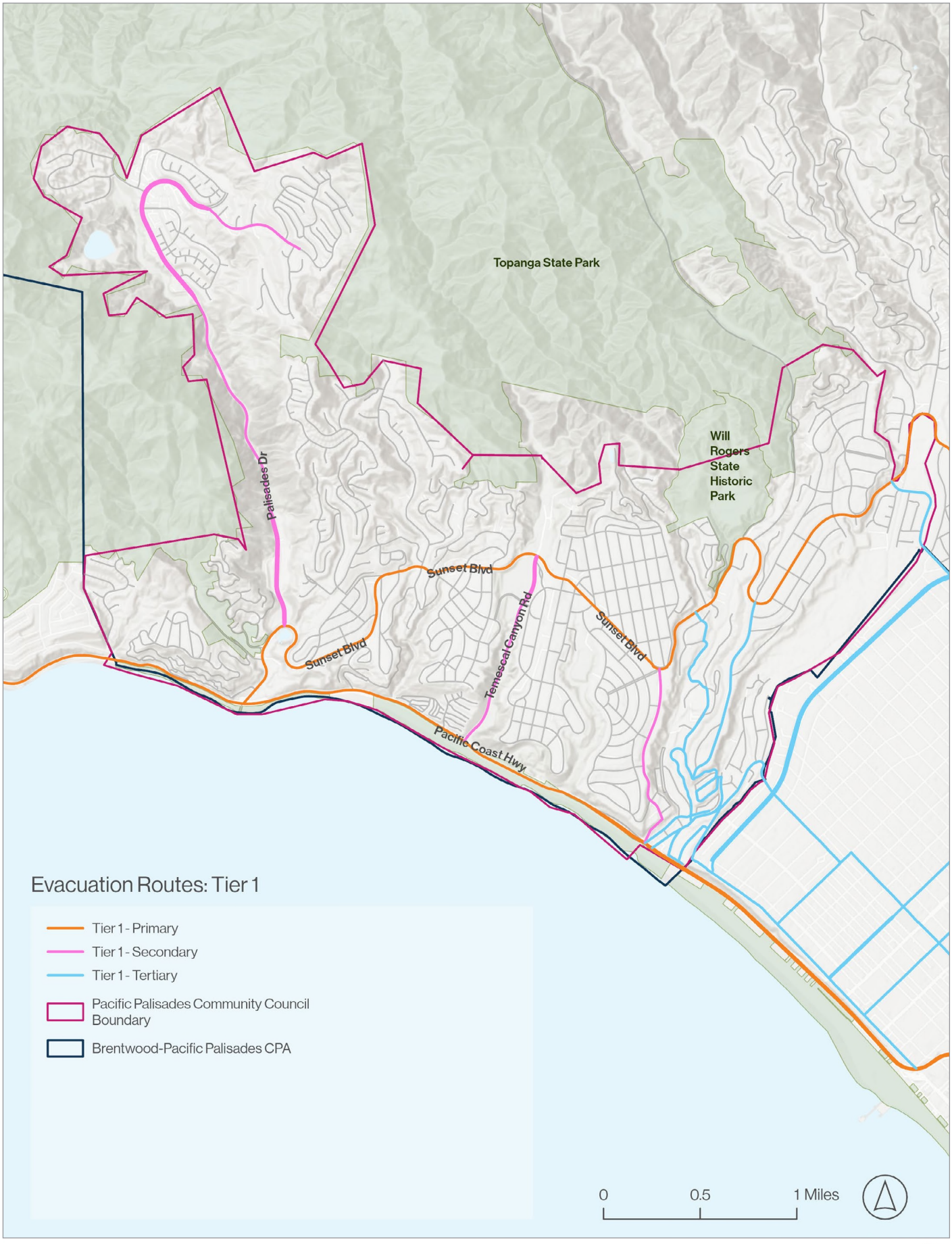


Figure B1.2: Proposed Evacuation Routes: Tier 1 and Tier 2

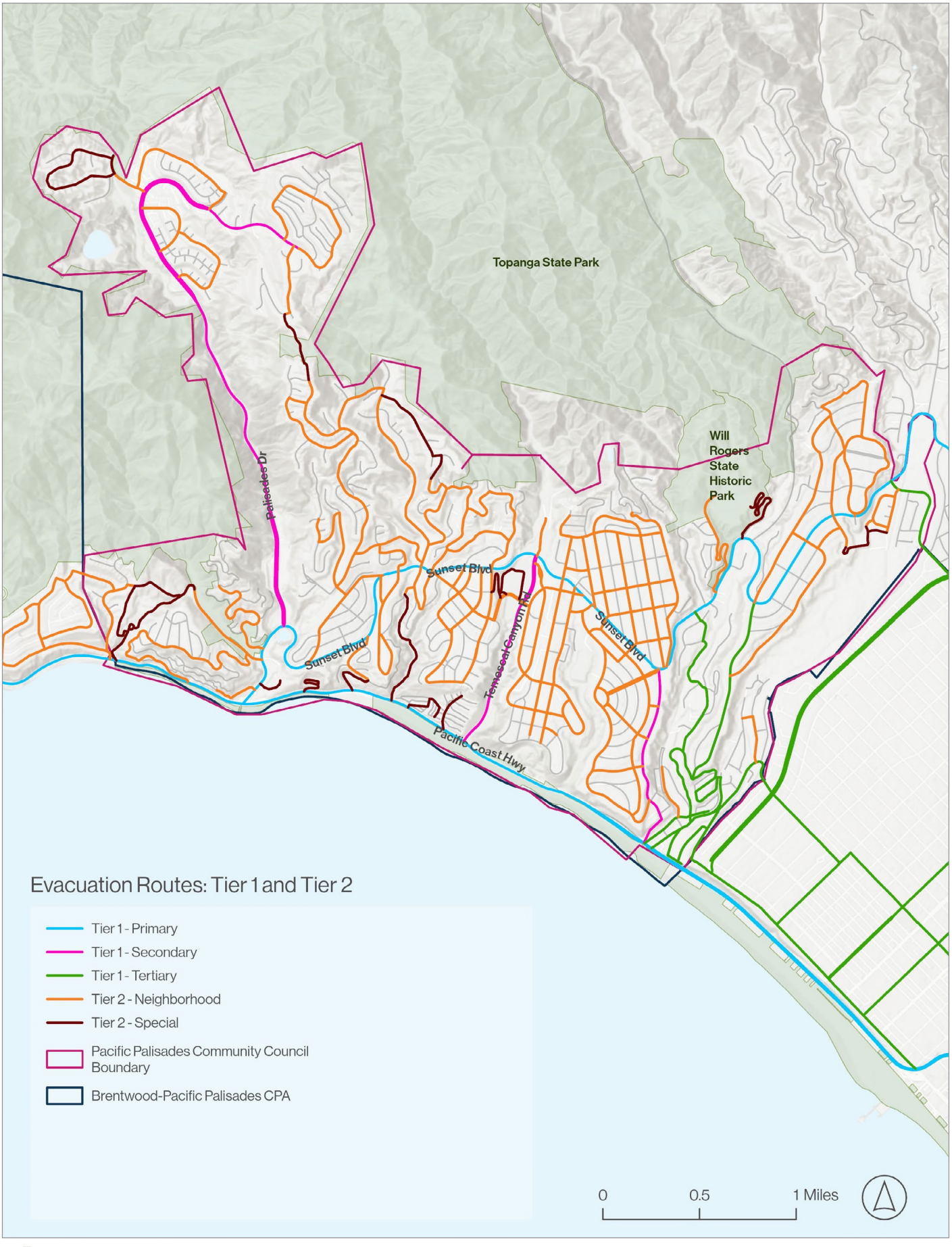


Figure B1.3: Proposed Police and TCO Dispatch Locations



Table B1.1: Police and TCO Dispatch Locations

High- Priority Intersections	Low-Priority Intersections	
PCH and Sunset Boulevard	PCH and Coastline Drive	Sunset Boulevard and Drummond Street
Sunset Boulevard and Temescal Canyon Road	Sunset Boulevard and Palisades Drive	Sunset Boulevard and Brooktree Road
Sunset Boulevard and Chautauqua Boulevard	Marquez Avenue and Jacon Way	Sunset Boulevard and Will Rogers State Park Road
PCH and Chautauqua Boulevard / W. Channel Road	Sunset Boulevard and Baylor Street / Marquez Avenue	Sunset Boulevard and Amalfi Drive
	Sunset Boulevard and Bienveneda Avenue	Sunset Boulevard and Capri Drive
	Sunset Boulevard and El Medio Avenue	Sunset Boulevard and Allenford Avenue
	Sunset Boulevard and Via de la Paz	Temescal Canyon Road and Bowdoin Street
	Sunset Boulevard and Swarthmore Avenue	PCH and Temescal Canyon Road
	Sunset Boulevard and Antioch Street	W. Channel Road / Entrada Drive and Mesa Road
	Sunset Boulevard and La Cruz Drive / Monument Street	Entrada Drive and E. Channel Road / Ocean Avenue Ext.
	Sunset Boulevard and Carey Street	





Annex B2

Wildland Fire Tactical Checklist: Immediate Tactical Missions

For LAPD Supervisors, First Responders, and Incident Liaisons

To be used in coordination with LAFD during wildland fire evacuations

Initial Response (First On-Scene Officer)

- ☐ Assume initial command and begin directing LAPD operations.
- ☐ Notify Communications Division and request additional resources (10 officers per 1,000 population).
- ☐ Determine and communicate:
  - ■ Safest approach direction
  - ■ Command Post and Briefing Area locations
  - ■ Initial situation status report from LAFD
- ☐ Gather and relay Situation Status to Communications Division:
  - ■ Location (street names, canyons, hillsides)
  - ■ Direction/speed of fire spread (wind conditions)
  - ■ Size of area (actual and potential)
  - ■ Type of terrain and assets threatened (structures, vegetation, critical facilities)
  - ■ Ingress/egress routes for emergency vehicles
  - ■ Estimated personnel and staging needs
  - ■ Radio designation for LAPD Operations

Command Post and ICS Coordination

- ☐ Assign an Agency Representative (Supervisor) to the LAFD ICP
- ☐ If not co-located with LAFD, assign liaison with authority to commit LAPD resources
- ☐ Confirm incident is organized under ICS and obtain:
  - ■ Incident objectives
  - ■ Organization chart
  - ■ Areas under Evacuation Warning/Order
  - ■ Fire behavior projections (800' map / Air Recon updates)
  - ■ Potential shelter/refuge sites
- ☐ Declare a Tactical Alert (if necessary) – Provide:
  - ■ Location and nature of incident
  - ■ Anticipated resource needs
  - ■ Anticipated duration
  - ■ Potential escalation risk

Traffic and Perimeter Control

- ☐ Establish Perimeter – Prevent unauthorized ingress, maintain emergency egress.
- ☐ Control key intersections per LAFD direction
- ☐ Protect emergency ingress/egress routes from civilian congestion
- ☐ Initiate towing/impound of vehicles blocking emergency access (VC 22651(b))
- ☐ Move parked vehicles (if safe) and document locations for owner notification

Evacuation Operations

Public Notification:

- ☐ Communicate evacuation information (Warning/Order) using:
  - ■ Door-to-door notifications
  - ■ Public address systems from patrol vehicles
- ☐ Direct evacuees to initial evacuation centers or pickup points
- ☐ If Evacuation Warning:
  - ■ Complete Field Interview Cards (Form 70-15.43.0) for all residents remaining
  - ■ Submit to Police Operations

Interior Patrol:

- ☐ Conduct interior patrols only if practicable and safe
- ☐ Avoid entering Hot Zone (within 30 mins of fire head)
- ☐ Maintain situational awareness from LAFD (hot spots, wind shifts, embers)

Mass Evacuation:

- ☐ Coordinate with LAFD DOC (if activated) for:
  - MTA buses – Transit Bus Division
  - Los Angeles Unified School District (LAUSD) buses – LAUSD Police
- ☐ Provide:
  - Estimated evacuees
  - Pick-up/drop-off points
  - Ingress/egress route
  - Need for police escort

Support Operations

- ☐ Coordinate with:
  - LAFD
  - Los Angeles Emergency Management Department (EMD)
  - Animal Services
  - Red Cross
  - Los Angeles Department of Water and Power
  - Los Angeles Department of Recreation and Parks
  - Caltrans
  - Los Angeles Department of Public Works, Bureau of Street Services (Streets LA)
- ☐ Address sheltering needs with Recreation and Parks, LAUSD, American Red Cross
- ☐ Ensure Animal Control is deployed to assist evacuees with pets or livestock

Media / Press Access

- ☐ Allow media with valid passes into closed areas if access does not interfere with emergency operations.

Reentry / Demobilization Planning

- ☐ Assist in development of:
- ☐ Re-entry Plan with LAFD
- ☐ Staging areas for return
- ☐ Transportation support for returnees
  - Maintain security and patrol evacuated areas until cleared
  - Begin documentation and debriefing once incident winds down





Annex B3

Traffic Control and Law Enforcement Field Checklist

Trigger: Evacuation Order Issued — Initiate immediate deployment

1. Immediate Actions

- [ ] Dispatch LAPD / CHP / TCO units to implement upstream roadway closures:
  - PCH
  - Sunset Boulevard
- [ ] Prevent through traffic from entering the evacuation zone.
- [ ] Confirm closure points are established and communicated to the EOC and field command.

2. Intersection Staffing Priorities

High-Priority Locations (Staff Immediately)

- [ ] PCH @ Sunset Boulevard
- [ ] PCH @ Chautauqua Boulevard / W. Channel Road
- [ ] Sunset Boulevard @ Temescal Canyon Road
- [ ] Sunset Boulevard @ Chautauqua Boulevard

These intersections typically require manual control under all evacuation scenarios.

Secondary Locations (As Resources Allow or Conditions Dictate)

- [ ] Additional signalized intersections along:
  - Sunset Boulevard
  - PCH
  - W. Channel Road

3. Field Tasks

- [ ] Manually operate or override traffic signals to maintain outbound flow.
- [ ] Cone and direct lanes to maximize egress capacity.
- [ ] Divert vehicles away from downstream closures or hazards.
- [ ] Assist public with directions and updates.
- [ ] Maintain communication with field command and EOC for status updates.

4. Staffing and Role Assignments

- [ ] Police Officers:
  - Ensure intersection safety and enforcement.
  - Manage overall traffic flow and public control.
- [ ] TCOs:
  - Operate traffic signal controllers.
  - Support setup and adjustment of traffic control equipment.
- [ ] Assign multiple personnel at major intersections as needed.
- [ ] Clearly define roles and responsibilities to prevent overlap.

5. Coordination Notes

- [ ] See Annex B1, Table B1.1, for detailed deployment locations.
- [ ] Maintain radio contact with Incident Command / Unified Command
- [ ] Report any obstructions or infrastructure issues to Caltrans or Streets LA



Appendix C
Transportation Network Assessment

To assist in the identification of potential traffic-related tactics and other improvements to facilitate evacuation and fire response during a wildfire event, a traffic operations analysis was conducted for a hypothetical large-scale evacuation of the entire Palisades area. This appendix summarizes the methodology and key results of that analysis.



Preface

A typical traffic operations analysis involves calculating average delays (for intersections) or average vehicle densities (for freeways) and assigning an associated level of service (LOS), represented as a letter grade from A through F, to each study location. LOS A indicates free-flow conditions with little to no delay and congestion, while LOS F indicates conditions at or above capacity.

For an evacuation at this scale, however, it is expected that there will be substantial delays and congestion, with most, if not all, intersections operating at LOS F. For a signalized intersection, for example, LOS F corresponds to an average delay of 80.0 seconds or more across all vehicles at the intersection. Anywhere between 80.0 seconds and 120.0 seconds is typically considered the "meaningful" range of an LOS analysis, but under extreme conditions such as a mass evacuation, average delays on the order of 10 minutes or more—and, in some cases, substantially more—could be expected. In these situations, the limitations of a standard intersection LOS analysis also come into play, as queues can exceed available storage capacity and extend well beyond upstream intersections.

In a typical traffic operations analysis, mitigations or improvements might be recommended to attempt to restore an LOS F intersection to "acceptable" conditions (typically. LOS D or LOS E). Under extreme conditions like evacuation, however, improvement to LOS D or LOS E would generally be unrealistic and cost-prohibitive, as the amount of capacity needed is likely impossible to attain without drastic roadway widening and construction of new roadways. This additional roadway capacity would also have other unintended effects, such as induced demand in day-to-day operations, that would conflict with other important community goals related to traffic safety, alternative transportation, greenhouse gas emissions, air quality, noise, and public health.

In addition, any traffic operations analysis reflects the data and assumptions feeding into the analysis. To the extent that wildfire events are frequently unpredictable and fast-changing, it is unlikely that any one wildfire event will be represented by any of the scenarios assumed in the analysis. In fact, some, if not many, events may differ substantially from the scenarios assumed in this analysis.

Given these considerations, the value of the operations analysis therefore lies not in quantified delay values and associated LOS grades but in helping to identify bottlenecks and recommend potential tactics or improvements.

Scenario Definition

The analysis assumes a worst-case scenario that requires evacuation of the entire Palisades (plus Sunset Mesa). It is assumed that the evacuation takes place during the afternoon / evening (PM) peak period on a weekday, when schools are in session and the share of area residents outside of the area due to work obligations is highest. In this scenario, area residents who are not present within the evacuation zone at the time the evacuation order is issued are conservatively assumed to drive back to the area to pick up children or other relatives or friends and / or briefly pack belongings before leaving. Thus, the analysis assumes evacuation by all households—there is no credit or reduction taken for evacuation traffic due to residents being away (e.g., on vacation) or otherwise unable to return home prior to the area being completely closed to entry.

Since LOS analyses are typically conducted for 60-minute periods, it is conservatively assumed that all evacuation-related movement within the study area takes place within the same 60-minute period. In reality, there is expected to be some variability and uncertainty dependent on when residents become aware of the order, how long it takes them to return and / or get ready, and other factors, and the evacuation is likely to take longer (if not much longer) than one hour.

The 60-minute evacuation period is assumed to begin some time shortly after the issuance of the order (e.g., 30 minutes after), and that background through traffic (e.g., traffic on Pacific Coast Highway (PCH) or Sunset Boulevard passing through the area) will have left the area by that time, with any necessary upstream roadway closures in place to prevent any additional through traffic from entering the evacuation zone.

Evacuation of non-residents (e.g., employees, visitors, or customers in the area) is also conservatively assumed to take place within the same 60-minute period, although it is expected that at least some, if not the majority, of these evacuations could already be completed within 30 minutes of the issuance of the order. As discussed in more detail in the "Trip Generation" section, the activity levels for non-residential uses are generally assumed to reflect weekday PM peak period conditions.

Ultimately, the exact circumstances of any given wildfire event could vary substantially, but the assumptions taken here are intended to reasonably capture a wide range of potential situations. Tactics and improvements identified through the analysis would thus generally benefit (or be applicable to) a wide range of potential scenarios.

The base scenario (Scenario 1) assumes all roadways remain open to evacuating traffic and that the wildfire does not require the closure of evacuation routes or other roadways outside Pacific Palisades for evacuating traffic (although, as stated above, it is assumed that through traffic will be prevented from entering the Pacific Palisades area and will instead be diverted to alternate routes). Beyond the base scenario, the analysis considers two additional scenarios:

- **Scenario 2:** Wildfire-induced closure of PCH north of Topanga Canyon Road
- **Scenario 3:** Wildfire-induced closure of Sunset Boulevard near Will Rogers State Park (i.e., between Chautauqua Boulevard and Amalfi Drive)

These scenarios were selected to provide insight into expected changes in traffic flow and operations.

To simplify the analysis, it is assumed that the roadway closures under Scenarios 2 and 3 begin taking effect at the same time as the issuance of the evacuation order. Evacuees are assumed to become aware of the evacuation order and the closures simultaneously and select an alternative evacuation route accordingly. In reality, many closures would begin taking effect after the issuance of the evacuation order as a wildfire spreads. Evacuees may also not be aware of roadway closures as they take effect, requiring detours or backtracking, but these circumstances require a more detailed scenario definition and a more complex and dynamic simulation-based model that is capable of modeling these changes. Standard intersection LOS analyses are typically based on simplified, static models.

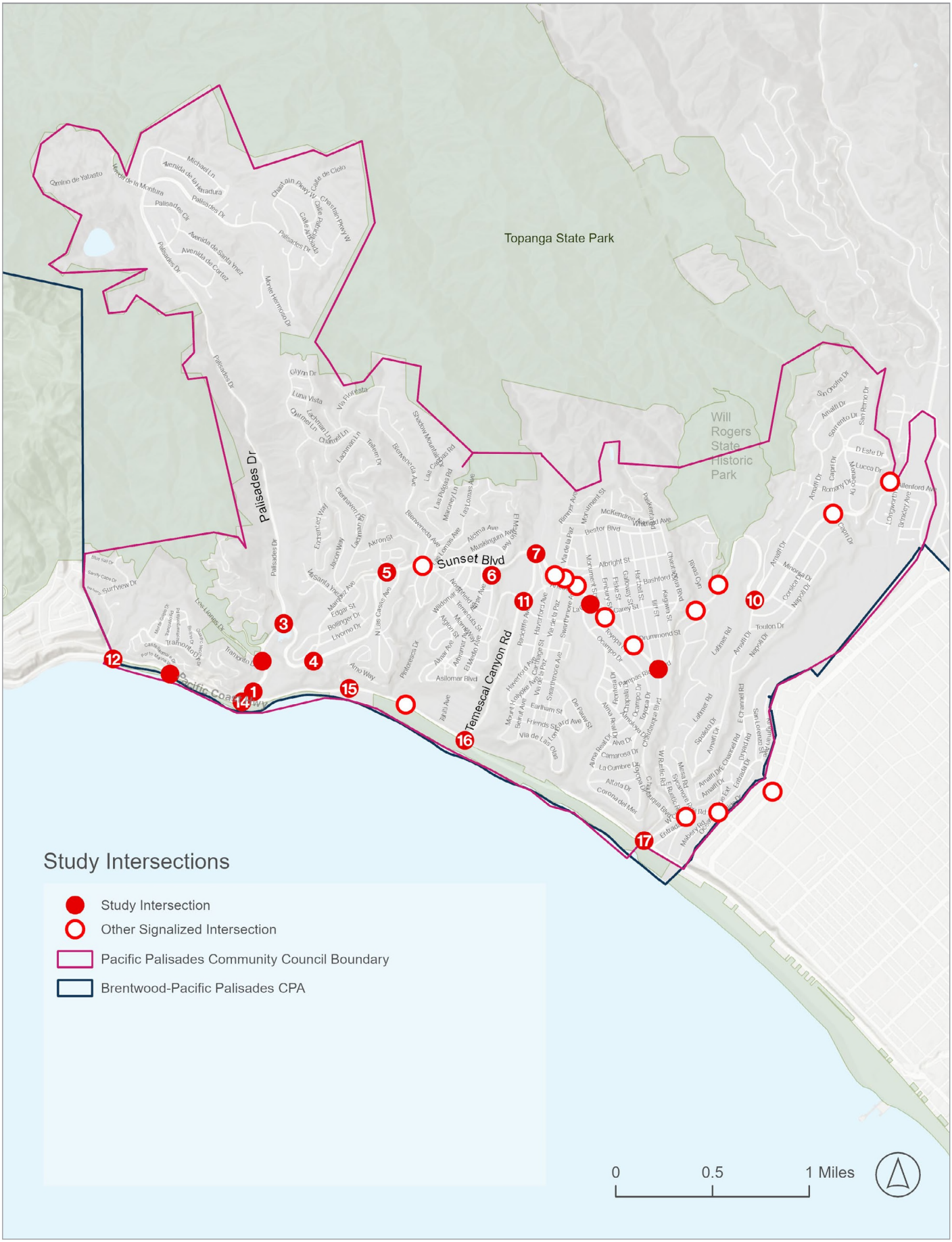
Study Intersections

Based on the geographic scope of the evacuation zone and expected traffic patterns, a total of 17 intersections (illustrated in Figure C.1) were selected for analysis, concentrated along Sunset Boulevard and PCH:

1. Sunset Boulevard and Castellammare Drive
2. Sunset Boulevard and Los Liones Drive
3. Sunset Boulevard and Palisades Drive
4. Sunset Boulevard and Marquez Place / Marquez Avenue
5. Sunset Boulevard and Baylor Street / Marquez Avenue
6. Sunset Boulevard and El Medio Avenue
7. Sunset Boulevard and Temescal Canyon Road
8. Sunset Boulevard and La Cruz Drive / Monument Street
9. Sunset Boulevard and Chautauqua Boulevard
10. Sunset Boulevard and Amalfi Drive
11. Temescal Canyon Road and Bowdoin Street
12. PCH and Coastline Drive
13. PCH and Porto Marina Way
14. PCH and Sunset Boulevard
15. PCH and Bay Club Drive
16. PCH and Temescal Canyon Road
17. PCH and Chautauqua Boulevard / W. Channel Road

The selected locations include the intersections expected to be most impacted by evacuation traffic, as well as intersections that are expected to be potential bottlenecks due to their location at the convergence of conflicting traffic flows or due to capacity constraints relative to other intersections within the study area. All study intersections are signalized.

Figure C.1: Study intersections



Trip Generation

To estimate the volume of evacuation traffic within Pacific Palisades, parcel-level land use data (dwelling units for residential uses and square footage for non-residential uses) were extracted from the parcel geodatabase maintained and published by the Los Angeles County Office of the Assessor (County of Los Angeles, n.d.).

Residential Uses. For residential uses, it is assumed that all residents are required to evacuate. Data on household automobile ownership (i.e., vehicles available per household) were extracted from the U.S. Census Bureau's American Community Survey (ACS) 5-year estimates for 2019–2023, for the relevant census tracts. It should be noted, however, that the number of automobiles *owned by* or *available* to a given household is not necessarily the same as the number of evacuating automobiles for that household, as it is expected that at least some automobiles will be left behind during the evacuation.

An evacuation analysis completed for the City of Berkeley included a survey of residents to determine the expected average number of *evacuating* vehicles per household (1.15) (City of Los Angeles, 2025). Dividing this by the average number of vehicles available for Berkeley residents as reported in that analysis (1.55) results in a ratio of 0.74 evacuating vehicles to every vehicle available. Although similar survey data are not readily available for Pacific Palisades, the Berkeley data provide a usable reference point to derive an appropriate ratio for use in the Pacific Palisades analysis. Recognizing that Berkeley is generally more urban and has significantly better public transportation and a better active transportation network than Pacific Palisades, a higher ratio of 0.85 evacuating vehicles to every 1 vehicle available was deemed appropriate for this analysis. This ratio was then applied to the Pacific Palisades automobile ownership rates to estimate the average number of evacuating vehicles per household. The resulting range of values is generally between 1.6 and 1.9 evacuating vehicles per household, depending on the census tract.

Based on residential parking demand rates from *Shared Parking* (published by the Urban Land Institute), visitor parking demand is approximately 9% of resident parking demand for ownership units (0.15 visitor spaces per unit vs. 1.70 resident spaces per unit). The number of evacuating vehicles per household was therefore increased by an additional 9% to account for residential visitors such as family or friends.

Non-Residential Uses. The predominant land use in the Pacific Palisades area is residential, consisting primarily of single-family homes with a smaller share of multifamily housing. This is complemented by neighborhood-serving retail, concentrated primarily in the Palisades Village area and elsewhere along Sunset Boulevard.

There are also several institutional and visitor uses in the area:

- Notable regional destinations including the Getty Villa, Bel-Air Bay Club, and Riviera Country Club
- Numerous schools (at the preschool / kindergarten, primary, and secondary levels)
- Multiple houses of worship or other religious facilities
- A residential care facility
- Two popular regional or state parks and open spaces (Will Rogers State Park and Temescal Gateway Park)

For typical commercial / retail uses, the evacuation trip generation is based on the parking demand during the defined time period of the analysis (i.e., weekday PM peak period). The parking demand is estimated using Urban Land Institute (ULI) data from Shared Parking, which provides data and guidance on time-of-day and day-of-week variation in parking demand for most standard land uses. For the majority of such uses present in the Pacific Palisades area, the ULI data indicate that weekday parking demand peaks during the 4:00 PM or 5:00 PM hour, consistent with the selection of the weekday PM peak period as part of the scenario definition process.

Most of the institutional and visitor uses identified above, however, are more specialized, with limited or no ULI data available. For these "special generators", evacuation traffic was estimated using other appropriate proxy data such as the number of available parking spaces (for visitor-oriented uses) or the school enrollment and staff counts (from data made available by the California Department of Education). To the extent that parking is frequently overbuilt and underused, the trip generation for some of the visitor uses, such as the Riviera Country Club, can therefore be considered quite conservative, as it is generally unlikely that any one of these uses would be fully "occupied" (i.e., at peak parking capacity) while the evacuation order is issued, much less that all of the uses would be fully occupied.

As the land use inputs into the analysis are based on parcel data from the County Assessor, the analysis reflects the assumption that rebuilding within Pacific Palisades will follow current land use patterns and density.

Inbound / outbound split. Under an evacuation scenario, 100% of the trip generation is assumed to be outbound (leaving the area). As mentioned under the "Scenario Definition" section, however, residents not present in the area at the time the evacuation order is issued are assumed to drive back to the area first to pick up family members or pack up any belongings. Thus, an additional 25% of the resident (i.e., non-visitor) trip generation for residential uses is assumed to also be applied to the inbound direction. The same approach is taken for trips associated with childcare facilities and schools, residential care facilities, and lodging uses.

Internal trip capture. Many of the non-residential uses within the Pacific Palisades area, including retail, schools, and other uses, are neighborhood-serving uses. The majority of the customers, visitors, and other users of these facilities are expected to be residents of the Palisades. As such, a resident patronizing a local business when the evacuation order is issued would likely not leave the area immediately as an "outbound" trip but would instead attempt to return home first. There is therefore some likely duplication in the trip generation estimates, which treat this example as an "outbound" trip from the business and leaving Pacific Palisades, followed by an inbound trip entering Pacific Palisades and destined for the resident's home.

Trip Distribution and Assignment

Traffic analysis zones and special generators. For each of the more than 11,200 parcels within the study area, trip generation was calculated based on the associated land use according to the methodology described previously. To simplify the trip distribution and assignment process, the Pacific Palisades area was divided into approximately 60 different traffic analysis zones (TAZs) based primarily on the local roadway network and the available ingress / egress routes. Parcels within a given TAZ typically share one or more ingress / egress options, allowing them to be aggregated together into a single TAZ for the purposes of distributing and assigning the associated evacuation traffic to the roadway network. This process is similar to the use of TAZs in the traditional travel demand forecasting models used by metropolitan planning organizations (MPOs).

Given the high potential trip density for the special generators (e.g., Getty Villa, schools) and the likelihood of highly localized traffic assignment patterns for these particular uses, a total of approximately 25 special generator zones were added as an overlay on top of the approximately 60 TAZs.

The TAZs and special generators are illustrated in Figure C.2 and summarized in Tables C.1 and C.2.

Figure C.2: Traffic Analysis Zones and Special Generators

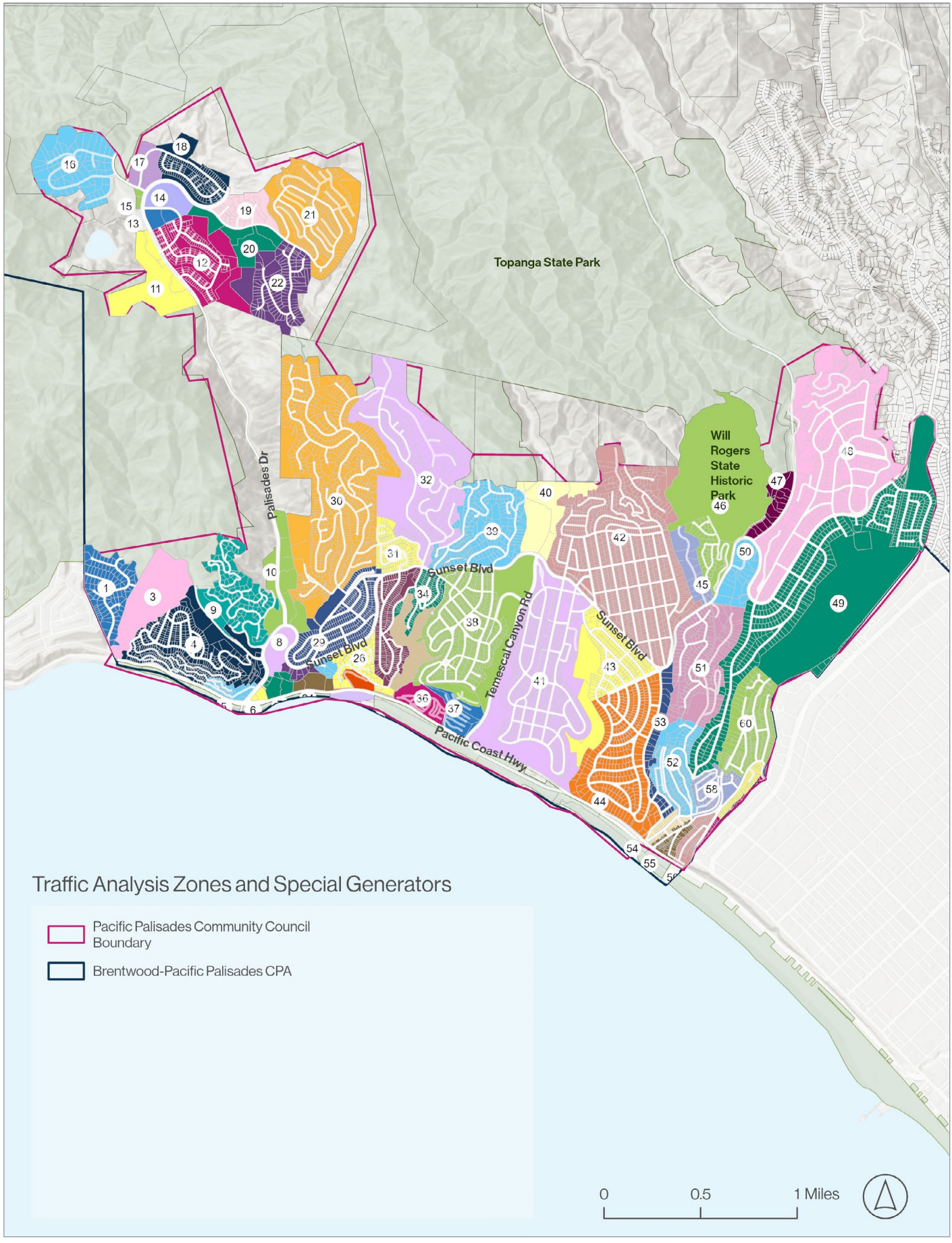


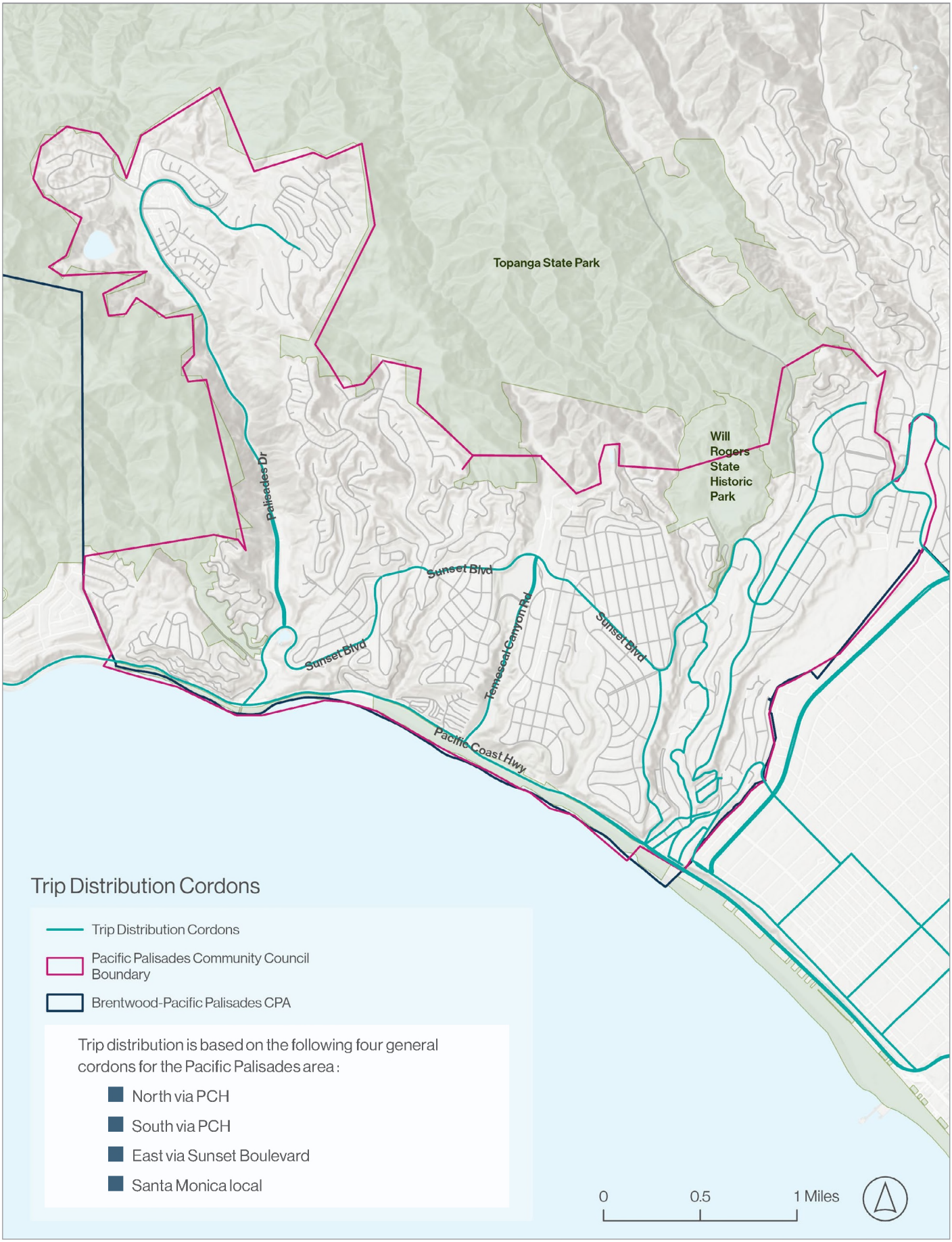
Table C.1: Traffic Analysis Zones

1	Sunset Mesa	16	Country Estates	31	Akron	46	Will Rogers
2	Topanga Beach	17	Highlands Northwest	32	Bienveneda	47	Evans
3	Getty Villa	18	Highlands North	33	Las Casas	48	Riviera North
4	Castellammare	19	Highlands Northeast	34	Las Lomas	49	Riviera South
5	Inceville West	20	Highlands Southeast	35	Las Pulgas Canyon	50	Rustic North
6	Inceville East	21	The Summit North	36	Palisades Bowl	51	Rustic Central
7	Edgewater	22	The Summit South	37	Tahitian Terrace	52	Rustic South
8	Lake Shrine	23	Marquez Southwest	38	El Medio South	53	Chautauqua East
9	Paseo Miramar	24	Malibu Village	39	El Medio North	54	West Channel
10	Sunset–Palisades	25	Marquez Place	40	Temescal Canyon	55	Entrada West
11	Santa Ynez West	26	Arno	41	Via Bluffs	56	Ocean Avenue
12	Santa Ynez East	27	Bay Club North	42	Alphabet Streets	57	Adelaide
13	Palisades Circle South	28	Bay Club South	43	Huntington North	58	East Channel
14	Palisades Circle North	29	Marquez North	44	Huntington South	59	Entrada East
15	Palisades Circle West	30	Lachman	45	Rivas Canyon	60	San Lorenzo

Table C.2: Special Generators (by Traffic Analysis Zone)

3	Getty Villa	• Getty Villa	
4	Castellammare	• Thelma Todd Landmark Building • The Church of Jesus Christ of Latter-day Saints • Chabad Jewish Community Center of Pacific Palisades / Palisades Jewish Early Education Center	
8	Lake Shrine	• Westside Waldorf School • Self-Realization Fellowship Temple / SRF Lake Shrine	
10	Sunset–Palisades	• Calvary Church of Pacific Palisades • Calvary Christian School	
27	Bay Club North	• Bel-Air Bay Club	
28	Bay Club South	• Bel-Air Bay Club	
29	Marquez North	• Marquez Charter Elementary School • Palisades Montessori Center	• Le Lycée Français de Los Angeles: Pacific Palisades Campus • Eclipse School
30	Lachman	• Alicia's Place Childcare	
32	Bienveneda	• The Parish of Street Matthew / Street Matthew's Parish School	
38	El Medio South	• Palisades Charter High School	
39	El Medio North	• Kehillat Israel • Palisades Lutheran Church / STAR Preschool at Palisades Lutheran Church • Pacific Palisades Presbyterian Church / Pali Pres Preschool	
40	Temescal Canyon	• Temescal Gateway Park	
41	Via Bluffs	• Palisades Charter Elementary School • Pacific Palisades Woman's Club • Community United Methodist Church of Pacific Palisades / Methodist Preschool of Pacific Palisades	• Village School • Seven Arrows Elementary School • Roots and Wings Center
42	Alphabet Streets	• Atria Park of Pacific Palisades	
43	Huntington North	• Palisades Park and Recreation Center • Corpus Christi Catholic Church / Corpus Christi School	
46	Will Rogers	• Will Rogers State Historic Park	
49	Riviera South	• Paul Revere Charter Middle School • Riviera Country Club	
51	Rustic Central	• Rustic Canyon Recreation Center	
58	East Channel	• Canyon Charter Elementary School	

Figure C.3: Trip distribution cordons



The assumed trip distribution for evacuation traffic is summarized in Table C.3. The majority of traffic is expected to exit the area heading south via PCH or heading east via Sunset Boulevard, with a slightly smaller share using local streets to get to Santa Monica and beyond.

The area immediately west of Pacific Palisades along the PCH is largely undeveloped and sparsely-populated mountains and coastline. With the exception of Malibu (population of approx. 10,000 residents), there are no major population centers along the PCH until Oxnard in Ventura County. Likewise, Topanga Canyon Road is a rural highway through the Santa Monica Mountains, although it does connect into the southwestern corner of the San Fernando Valley. Given that much of the land surrounding both highways is in a "Very High" FHSZ, any wildfire that results in an evacuation order for Pacific Palisades could easily spread and force a closure of one or both of these roads.

In contrast, the areas to the south and east in Santa Monica and Los Angeles are developed and populated, with lodging, retail and services, and other amenities to handle any immediate, short-term (1–3 days) evacuation needs for Palisades residents. These areas are also better connected to the rest of the metropolitan area and major regional routes including the 10 and 405 freeways for people evacuating to other parts of the Los Angeles Basin or outside of the region.

As indicated in Table C.3, the two closure scenarios are assumed to result in the large-scale diversion of traffic to the remaining open evacuation routes:

- **Scenario 2:** With the closure of PCH to the north of the Pacific Palisades area, affected evacuation traffic is assumed to divert to Sunset Boulevard to the east.
- **Scenario 3:** With the closure of Sunset Boulevard near Will Rogers State Historic Park, the majority of traffic is expected to divert south via PCH and local streets.

For the purposes of this analysis, the trip origins of inbound traffic (e.g., from residents attempting to return home before evacuating) are assumed to follow the trip distribution for outbound traffic shown in Table C.3.

Table C.3: Assumed Trip Distribution

Destination	Scenario 1 All roadways open	Scenario 2 PCH north of Topanga Canyon Road closed	Scenario 3 Sunset Boulevard closed between Chautauqua Boulevard and Amalfi Drive
North via PCH	10.0%	—	12.5%
South via PCH	35.0%	35.0%	47.5%
East via Sunset Boulevard	35.0%	45.0%	—
Santa Monica local	20.0%	20.0%	40.0%
Total	**100.0%**	**100.0%**	**100.0%**

Trip Generation Summary

Table C.4 summarizes the estimated trip generation for a mass evacuation event covering the entirety of Pacific Palisades, reflecting the scenario and analysis assumptions described previously. There would be a total of approximately 35,500 vehicles associated with the evacuation, with the overwhelming majority (84%) exiting the area; a small remainder (16%) would be entering the area to pick up family members and make immediate and final preparations prior to evacuating the area. Residential uses account for approximately 60% of the overall evacuation traffic, followed by special generators (28%) and other non-residential uses (11%).

Table C.4: Trip Summary by Land Use

Land use	Inbound	Outbound	Total
Residential	4,151	17,190	21,340
Non-residential: Standard	114	3,952	4,066
Non-residential: Special generators	1,552	8,518	10,070
Total	**5,817**	**29,660**	**35,477**

Acknowledging that there are some generalizing assumptions at play in the trip generation calculations, one useful way to understand the magnitude of the evacuation need is to compare the total traffic volume against typical roadway lane capacities. Restricted-access facilities (e.g., freeways) operating at free-flow conditions can typically handle approximately 2,000 vehicles per hour (vph) per lane, while local arterial streets might fall somewhere in a typical range of 800–1,200 vph per lane. The outbound (exiting) traffic volume of approximately 29,700 vehicles is therefore the equivalent of approximately 15 lanes of freeway or 25–37 lanes of local arterial streets, assuming that all the traffic must be processed within one hour. It should be noted that, due to the presence of multiple, closely-spaced signalized intersections, PCH would generally be expected to have a capacity somewhere between a local arterial street and a freeway.

Applying the assumed trip distribution percentages to the total evacuation traffic estimates produces the results summarized in Table C.5, which indicates the general directional capacity needs at the "boundaries" of the evacuation zone under each scenario. As shown in the table, there is substantial evacuation flow to / from the south and east of Pacific Palisades. Based on the assumptions in the trip generation and trip distribution analysis, evacuation traffic at the northern / western cordon ("north via PCH") would be lower and closer to the actual capacity of PCH (assuming no background traffic).

Table C.5: Trip Summary by Origin / Destination and Scenario

Origin or destination	Scenario 1			Scenario 2			Scenario 3		
	In	Out	Total	In	Out	Total	In	Out	Total
North via PCH	582	2,966	3,548	—	—	—	727	3,707	4,435
South via PCH	2,036	10,381	12,417	2,036	10,381	12,417	2,763	14,088	16,851
East via Sunset Boulevard	2,036	10,381	12,417	2,618	13,347	15,965	—	—	—
Santa Monica local	1,163	5,932	7,095	1,163	5,932	7,095	2,327	11,864	14,191
Total	**5,817**	**29,660**	**35,477**	**5,817**	**29,660**	**35,477**	**5,817**	**29,660**	**35,477**

Delay and LOS Summary

The results of the traffic operations analysis are summarized in Table C.6. For convenience, delays have been converted to minutes.

Of the 17 study intersections, delays under Scenario 1 (all roadways open) are expected to be highest at locations in the southern portion of the PCH (from Temescal Canyon Road south) and along the central and eastern portions of Sunset Boulevard (from El Medio Avenue east). Delays at most of these locations would be on the order of 10–20 minutes. Delays at other locations would be lower, but most of these would still qualify as LOS F (over capacity), with delays on the order of 2 to 5 minutes.

Scenario 2 (closure of PCH north of Topanga Canyon Road) would see traffic diverted to Sunset Boulevard and to southbound PCH, increasing delays at many of the intersections along these routes. Scenario 3 (closure of Sunset Boulevard near Will Rogers State Park) would result in traffic diverting primarily to southbound PCH, increasing delays at intersections along Temescal Canyon Road and along PCH to the south.

In particular, the analysis shows that the PCH and Chautauqua Boulevard / W. Channel Road is the worst performing of the study intersections on average across all three scenarios. This likely reflects the importance of this intersection at the juncture of multiple evacuation routes out of Pacific Palisades and the complexity of the associated traffic flows. Identifying potential tactics or improvements at this location would therefore be a high priority, as there would be potential benefits under most potential evacuation events.

Table C.6: Intersection Delay and LOS Summary

Intersection		Scenario 1		Scenario 2		Scenario 3	
		All roadways open		Closure of PCH north of Topanga Canyon Road		Closure of Sunset Boulevard near Will Rogers State Park (between Chautauqua Boulevard and Amalfi Drive)	
		Delay (minutes)	LOS	Delay (minutes)	LOS	Delay (minutes)	LOS
1	Sunset Boulevard and Castellammare Drive	1.8	F	0.4	C	5.6	F
2	Sunset Boulevard and Los Liones Drive	1.7	F	0.8	D	4.6	F
3	Sunset Boulevard and Palisades Drive	5.5	F	3.7	F	14.5	F
4	Sunset Boulevard and Marquez Place / Marquez Avenue	0.6	C	0.9	E	0.2	A
5	Sunset Boulevard and Baylor Street / Marquez Avenue	7.3	F	9.6	F	3.5	F
6	Sunset Boulevard and El Medio Avenue	17.3	F	23.2	F	4.9	F
7	Sunset Boulevard and Temescal Canyon Road	15.0	F	17.0	F	24.2	F
8	Sunset Boulevard and La Cruz Drive / Monument Street	19.5	F	27.3	F	2.3	F
9	Sunset Boulevard and Chautauqua Boulevard	21.8	F	29.5	F	3.1	F
10	Sunset Boulevard and Amalfi Drive	13.9	F	19.5	F	0.7	D
11	Temescal Canyon Road and Bowdoin Street	11.8	F	9.2	F	23.7	F
12	PCH and Coastline Drive	3.9	F	0.5	C	5.3	F
13	PCH and Porto Marina Way	1.7	F	0.0	A	3.3	F
14	PCH and Sunset Boulevard	3.4	F	2.3	F	5.6	F
15	PCH and Bay Club Drive	3.4	F	3.5	F	8.9	F
16	PCH and Temescal Canyon Road	17.6	F	17.5	F	32.8	F
17	PCH and Chautauqua Boulevard / W. Channel Road	28.2	F	26.9	F	51.8	F