

KENSINGTON EVACUATION RESEARCH PROJECT

EXECUTIVE SUMMARY



Stephen Wong

Ian Martin

Jeremy Halpern

University of California, Berkeley

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Overview of Tasks

The community of Kensington, California in Contra Costa County faces multiple risks from natural hazards due to its unique geography, especially from wildfires and earthquakes. Consequently, the Kensington Fire Board and community members requested a research project to begin building a community evacuation plan. The final report details all aspects of the research project and creates a series of recommendations for the community of Kensington to consider when building a wildfire evacuation plan and a transportation response strategy. The report:

- Defines the evacuation problem statement for Kensington;
- Summarizes requests for obtaining official right-of-way maps;
- Reviews local emergency and evacuation preparedness guides and plans;
- Reviews academic literature on wildfire evacuations;
- Documents a data protocol for a field survey of Kensington street conditions;
- Analyzes street condition data from the field survey of Kensington streets;
- Provides methodology and results for a network analysis of Kensington;
- Identifies critical intersections, road links, and gathering points for evacuations;
- Provides recommendations for developing a Kensington evacuation plan.

These tasks provide the starting point for the community of Kensington to develop an actionable evacuation plan in the event of a major disaster. We highlight the two primary data-based tasks from the report in the following sections of this executive summary.

Field Survey of Kensington Streets

In Fall 2019, we conducted a field survey of Kensington street conditions to capture a “worst-case” scenario for a wildfire evacuation. We determined that a “worst-case” scenario would occur at night when most of the population would be home and parking occupancy along streets would be highest. Populations would also be higher during the weekday (as opposed to a weekend) due to weekend travel and vacations. Consequently, we collected data on weekdays (Monday through Thursday) between the hours of 5:00 and 8:00AM or between the hours of 8:00 and 11:00PM. A final day of collection occurred during the daytime to qualitatively assess paths and stairs and gather additional visual evidence of key bottlenecks. The field survey collected the following data:

- Centerline markings
- Minimum lane width
- Percent of street length under 20 feet wide
- Percent of street length containing parked vehicles
- Vegetation (both tree cover and underbrush)

- Roadway grades
- Intersection information
- Walking path conditions

Key results from the field survey of Kensington streets included:

- Minimal centerline markings across the community but some designated through-routes that relied on multiple roads;
- Extremely narrow streets (measured at the narrowest pinch point) of under seven feet on many segments, particularly in the southeast quadrant of Kensington;
- Majority of streets in Kensington with a minimum lane width under ten feet, caused by several issues including: parked vehicles, deep gutters, non-navigable driveways, and narrow rights-of-way, and other obstructions (such as poles);
- Nearly all street segments with at least one pinch-point and a significant number of streets with more than 50% of their length as pinch points (including major through streets);
- Significant portion of Kensington streets with over 25% of the length occupied by parked vehicles, which is an indirect measure of parking demand and potential hazards;
- High vegetation levels in the southwest and southeast part of Kensington and along major routes that could block exits or lead to additional fire danger while evacuating;
- Steep inclines, including along some routes with centerline markings and minimal pinch points, which could slow evacuations;
- Minimal traffic controls at intersections and unconventional intersections that could be hazardous during an evacuation;
- Minimal signage of walking paths and varying conditions of paths with the highest quality ones in the southwest quadrant and the most overgrown or unmaintained in the southeast and northeast quadrants, indicating potential evacuation danger;
- Four additional connections identified - Sunset View Cemetery, a connection from the community center to the school, a connection from Windsor Avenue to the community center, and an East Bay Municipal Utility District access road along Summit Reservoir - that would require removal of gates or bollards for evacuation access.

Network Analysis

We also conducted a network analysis of Kensington streets to uncover highly used routes, problematic links, and busy intersections. A closest facility model was used with the Network Analyst tool in ArcGIS. The model spatially assigns “incidents” to the closest “facilities” via the shortest route. In this scenario, the incidents are the nodes simulating

Kensington's population and the facilities are the designated exit routes. Nodes, including intersections and dead ends, were used as origin points. We conducted nine scenarios with different assumptions:

- Local approach (all exits at Kensington borders);
- Regional approach (four chosen exits in El Cerrito and Berkeley);
- Northern wildfire (no northern exits);
- Southern wildfire (no southern exits);
- Cemetery access; and
- No cemetery access.

We found several key results from the network analysis across the nine scenarios.

- Under shortest-path conditions, evacuees sometimes opted to travel uphill or towards the wildland-urban interface, which would create extensive conflicts and potential fire risks;
- Under shortest-path conditions, evacuees took faster but narrow roads, causing high congestion particularly in the southeast quadrant and on key intersections that do not have any traffic control;
- Under a regional analysis, significant queuing of vehicles along major roads (including those in other jurisdictions) would lead to heavy congestion;
- Under a regional analysis with the cemetery open, a significant amount of evacuees in the middle of Kensington (30% overall) would choose to evacuate through the cemetery;
- For both fire directions with the cemetery open, a significant number of evacuees would route through the cemetery, which would increase with more blocked egress points;
- For both fire directions, smaller roads often experienced a rapid increase in evacuees since their nearest egress was eliminated;
- Consistently across scenarios, Arlington Avenue, Grizzly Peak Boulevard, and Colusa Avenue were key routes for evacuees.

Key Recommendations

Based on the results from the field survey and network analysis, along with review of local evacuation plans and wildfire evacuation literature, we developed a series of recommendations for Kensington.

Literature and Evacuation Plan Review Recommendations

- Kensington should ensure that emergency response plans, evacuation plans, reentry plans, preparedness guides, and fire suppression activity guides are free and easily accessible to the public online and in print.

- Officials should consider developing joint evacuation and emergency plans with neighboring communities, specifically El Cerrito and Berkeley. Plans need to state how evacuees from Kensington may impact those jurisdictions.
- Kensington should develop a campaign that encourages residents to sign up for emergency alerts for both Contra Costa and Alameda counties. This campaign should attempt to reach a critical mass of registered users to ensure that information is widely distributed.
- Kensington officials should be proactive in issuing evacuation orders to ensure that evacuees have time to leave.
- Mandatory evacuation orders and wildfire information should be dispersed consistently across multiple platforms to increase knowledge and reduce confusions and rumors.
- Kensington should consider supplementing official orders with information to Community Emergency Response Teams (CERTs) and neighborhood-based groups to encourage evacuations.

Field Survey Recommendations

- First responders should identify uphill routes for emergency vehicles that minimize conflicts with downhill traffic.
- Kensington should consider reducing vegetation where possible along major evacuation routes.
- Kensington should examine the potential for emergency personnel to remove bollards by Kensington Elementary School.
- Emergency personnel should consider using the EBMUD access road at Summit Reservoir as an alternate route for emergency vehicles. In extreme circumstances, the EBMUD access road could be used to evacuate vehicles.
- Officials should work with Contra Costa county to further establish “clear zones” at intersections to reduce congestion and improve turning ability of vehicles.
- Officials should investigate alternate gutter designs that could enable greater right of way width, particularly for installation in the southeast quadrant along segments of Beloit, Cambridge, Columbia, Trinity, and Willamette Avenues.
- Kensington and/or neighborhood groups should add clearly visible signage at both ends of each segment of the pathway network, and vegetation along the paths should be managed to allow safe passage during an emergency.
- Kensington should improve wayfinding regarding evacuation routes and gathering points.

Network Analysis Recommendations

- Kensington should consider designating identified road combinations as primary evacuation routes for wildfires (see report for recommended routes).
- Fire, police, and/or community officials should have access to the Sunset View Cemetery gate. Officials need to create an arrangement with cemetery personnel to ensure that the gate can be opened at any time.
- Kensington should consider improving Sunset Drive and the nearby area, especially if Kensington intends to use the cemetery for evacuation.
- Kensington should consider deploying traffic coordinators at key intersections to facilitate more efficient traffic flow. They should have a system to communicate with each other and central command.
- Kensington officials should consider instituting one-way directions (either all the time or only red flag warning days) along roads particularly in the southeast quadrant. Parking restrictions at some pinch points may also be necessary, particularly for roads that could be bidirectional.
- In the case of a wildfire (regardless of directionality), Kensington should establish strong coordination with El Cerrito regarding traffic supervision and direction at the intersection of Fairmount Avenue and Colusa Avenue, or work with El Cerrito to define alternate east-west routes.

Conclusion

Overall, Kensington should consider the following transportation changes to improve evacuation outcomes, reduce congestion, and improve flow through the community:

- Removing some on-street parking and/or restricting parking during red flag days, particularly on suggested evacuation routes and roads with enough width for two lanes;
- Designating some very narrow roads as one-way traffic permanently or for red flag days, particularly on highly impacted links;
- Improving intersection signage with yield signs as appropriate to improve flow through the intersection and set precedent to evacuation routes;
- Removing several spaces of parking near tight, unconventional, and/or critical intersections to improve turning radii and set staging areas for first responders;
- Considering some two-way streets as single direction downhill in an evacuation (e.g., Berkeley Park Blvd, Coventry Rd, Moeser Ln, Sunset Dr, all roads within the cemetery); and
- Encouraging residents to park vehicles in driveways or as far off the street as possible before potential emergencies.