Sunol is a small community in Alameda County. Nearly half of the population is located along Kilkare Road, a dead-end road that extends almost 4 miles through very dense vegetation, making residents very concerned about what might happen in the event of a fire and evacuation. The road is also very narrow, irregular, and difficult to travel at high speeds.

The evacuation traffic simulations team regularly meets with community partners in Sunol to gather input on evacuation challenges in Sunol and integrate them into the simulations. After discussing with residents their main concerns, such as traffic, the inability to move in both directions simultaneously and thus the possibility of being blocked by emergency vehicles, and the presence of a wedding venue that, especially in summer, could bring about a hundred additional vehicles needing to evacuate at the same time, the concern became clearer.

Figure 1. Sunol site visit with Sunol colleagues

Thanks to the help of our Sunol colleague, Rosemary Chang, the team toured Kilkare Road in Sunol on May 7th and observed the rural village on hillsides with narrow, steep, and windy roads lined with flammable trees. After visiting the road, it was evident that evacuation could indeed be problematic. The houses are not simply situated along the road; there is also a network of private roads that make the residences considerably distant from the main road. Therefore, a more detailed modeling approach became necessary, considering the small size of the area to be evacuated. This approach had to include private roads, bridges, and passages, which could significantly impact evacuation time since these roads are even narrower with tight curves and slopes.

To address this need for detail, the traffic simulator SUMO is used to model each vehicle individually for this case study. In future developments, thanks to the collaboration with residents who provide suggestions and local information for implementing the simulations, some of the more complex nodes within the road network will be modeled in detail to better observe vehicle behavior at specific points. Simulations will also be conducted in certain extreme scenarios that might occur.
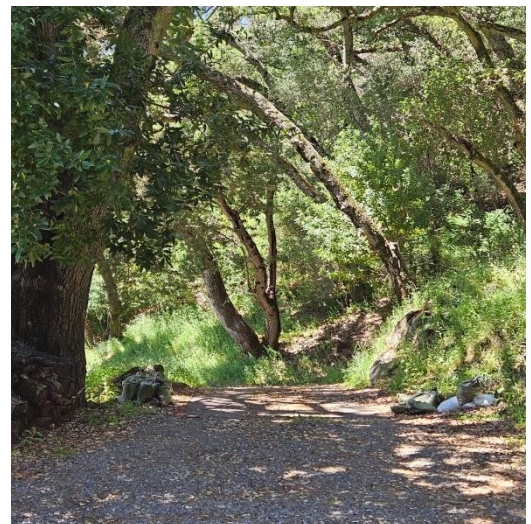

Figure 2. Narrow and winding roads in Sunol

Figure 3. Kilkare Road and all the location of houses distributed along it