TO: Mary Bilse, Senior Planner/Manager, ICF International

FROM: Phuong Nguyen, RE; CR Associates (CRA)

DATE: October 31, 2022

RE: Alpine Community Park Fire Evacuation Analysis – Technical Memorandum

This technical memorandum aims to assess the time required for the site-emergency evacuation from Alpine Community Park ("Project"), under several scenarios, assuming a wind-driven fire that results in a required evacuation affecting the project site and surrounding community. The traffic evacuation simulations and related analysis presented here is to identify the vehicle travel times required under the various simulated evacuation events.

Executive Summary

The evacuation analysis assumes that up to 240 vehicles would evacuate from the proposed Project site. This assumption represents full occupancy of the Project's site. The analysis also assumes up to 4,029 vehicles and 4,432 vehicles would evacuate from the surrounding land uses, under the Existing and Cumulative scenarios, respectively. Key points from the analysis results are provided below, detail results and discussions are provided under the respective sections of this memorandum.

- It would take up to 2 hours and 31 minutes to evacuate the existing land uses via South Grade Road and Alpine Boulevard (Scenario 1). If the TWLTL along Alpine Boulevard is utilized as an evacuation lane, then the evacuation time reduces to 1 hours and 33 minutes (Scenario 2).

- Evacuating the Project Traffic only (Scenario 3) would take up to 31 minutes.

- Evacuating all existing land uses and the Project would take up to 2 hours and 40 minutes to evacuate the existing land uses via South Grade Road and Alpine Boulevard (Scenario 4). If the TWLTL along Alpine Boulevard is utilized as an evacuation lane, then the evacuation time reduces to 1 hours and 41 minutes (Scenario 5). Thus, the Project increases the total evacuation time by 9 Minutes and 8 Minutes, respectively.

- Under the cumulative year scenario, it would take up to 2 hours and 41 minutes to evacuate the cumulative land uses via South Grade Road and Alpine Boulevard (Scenario 6). If the TWLTL along Alpine Boulevard is utilized as an evacuation lane, then the evacuation time reduces to 1 hours and 44 minutes (Scenario 7).

- Evacuating all cumulative land uses and the Project would take up to 2 hours and 53 minutes to evacuate the cumulative land uses via South Grade Road and Alpine Boulevard (Scenario 4). If the TWLTL along Alpine Boulevard is utilized as an evacuation lane, then the evacuation time reduces to 1 hours and 50 minutes (Scenario 5). Thus, the Project's increase the total evacuation time by 12 minutes and 8 minutes, respectively.

The Project provides several features that would enhance evacuation, but which are not reflected in the average evacuation time results above. These features include substantial fuel modification zones within the Project site as well as fuel modification along the Project's frontage, and temporary areas for safe refuge and "shelter-in-place" options. Because the Project would provide a sizable ignition resistant landscape that emulates urbanized areas that have halted wildfire spread, emergency managers may halt evacuations of the Project at any point during an evacuation event to move traffic that is of higher priority. The Project may also serve as a temporary evacuation point for evacuees from other areas due to its design as a fire-resistant zone. Evacuations throughout San Diego County operate on a priority basis, with those populations that are of greatest risk or highest exposure considered the highest priority. Downstream traffic flow is managed to move these populations first and the Project provides an opportunity to protect the park uses and nearby residents (if they evacuate to the Project's site) while prioritizing movement of populations that are at greater risk, reducing the evacuation times for those populations, possibly substantially.

Neither CEQA, nor the County has adopted numerical time standards for determining whether an evacuation timeframe is appropriate. Public safety, not time, is generally the guiding consideration for evaluating impacts related to emergency evacuation. The County considers a project's impact on evacuation significant if the project will significantly impair or physically interfere with implementation of an adopted emergency response or evacuation plan; or if the project will expose people or structures to a significant risk of loss, injury, or death involving wildland fires.

Based on the evacuation simulations above, evacuation traffic generated by Project would not significantly increase the average evacuation travel time or result in unsafe evacuation timeframes. Evacuation flow would be able to be effectively managed.

Background and Purpose

This memorandum provides a summary of the various traffic simulation analyses conducted relative to evacuation of the Project site and surrounding community due to a wildfire. The simulations have been conducted for a variety of evacuation scenarios described below. Modeling potential evacuation traffic impacts requires that numerous assumptions be made to address the many variables that will impact a real-life evacuation scenario, including the number of existing vehicles in the community, the number of project vehicles that will need to evacuate, the roadway capacities and whether enhancements are provided (e.g., extra lanes, lane widening, signaling intersections), the total number of intersections and how they will be operating, the final destination, the targeted evacuation area, the total mobilization time, vegetation communities, weather and wind, fire spread rates, humidity, topography, risk to homes, locations of ignitions and new fire starts, lead time needed, etc. There are thousands of potential model scenarios, and each fire scenario poses variations that regularly change and would be reassessed "real-time" during a wildfire. Agencies involved in implementing an evacuation order may be informed by the project-specific modeling in this memorandum but will also rely on situational awareness and wildfire pre-plans, which act as operational tools to provide high-level fire assessments of assets at risk, preferred evacuation approaches, and safety information to inform evacuation decision-making. Analysis presented herein are consistent with the methodology and guidelines in the County of San Diego Operational Area Emergency Operations Plan (Annex Q) by the Unified San Diego County Emergency Services Organization and County of San Diego (September 2022).

The following analysis is intended to present representative evacuation scenarios using the best available information, conservative assumptions, and the best available modeling technology[1]. In an actual emergency, fire command will take into account numerous factors including fire location and spread rates, wind speeds and direction, humidity, topography, fuel loading, emergency access routes, evacuation routes, shelter-in-place options, time needed to evacuate, and other variables, and will issue specific evacuation or shelter-in-place directives consistent with the process and protocols

[1] This evacuation analysis was conducted using the Vissim microsimulation software, which is one of the leading microsimulation software models available that can accurately replicate human driving behavior during an evacuation, including yielding at a congested location and delay due to stop & go traffic.

outlined in the County of San Diego's Emergency Operations Plans. The evacuation traffic model used herein is appropriate for planning and comparison purposes and would provide useful information to agencies and emergency managers regarding evacuation timeframes for purposes of informing managers' issuance of specific evacuation or shelter-in-place orders. For that reason, it will be provided to agencies and emergency managers. However, during a wildfire, residents and park users should comply with directives from authorities and first responders conducting the evacuation or emergency response, not rely on this evacuation traffic model.

This technical memorandum and associated analyses were performed in accordance with the requirements of the Annex Q for the determination of evacuation times. The roadway network and vehicle input assumptions have been selected to simulate a "worst-case" evacuation scenario that would occur when park usage if the highest. This "worst-case" evaluation is not required by CEQA; indeed, CEQA requires the application of reasonable standards and criteria only. Nonetheless, this preparer imposed a "worst-case" evaluation out of an abundance of caution. In an actual wildfire event, it is likely that fewer park users would be presented on-site and fewer residents/customers would be presented in the evacuation area. While other evacuation scenarios are also possible, such as evacuation during morning or evening peak hours, however, during those hours, residents are likely to be away from their respective homes, and park users are not likely to arrive at the Project, thus they are already in a safe area. Under an evacuation order, first responder and law enforcements would not allow residents to return an endangered area. Therefore, the worst case is when everyone is already at home and attempt to leave all at once with all their vehicles.

The wildfire evacuation scenarios selected for this analysis were based on a comprehensive approach that included review of fire history, including review of the Cedar Fire evacuations in 2003, and West Fire in 2019, fire behavior science, area topography, fuel types, and the evolved approach to evacuations, which has become more targeted and surgical in recent evacuations instead of large, area wide, mass evacuations, which were the normal protocol prior to about 2015. In the highest probability wildfire scenarios that would result in evacuation, the perimeter populations in certain wildland urban interface locations are likely to comprise the priority populations to be targeted for evacuation. The entire Project will include fire hardening construction, which will provide significant additional protection against exposure to wildfire via fuel management zones, fire-resistant landscape, hardscape, and other measures. In certain cases, evacuation authorities may use the Project site as an evacuation site due to the availability of parking and fire-resistant designs.

Project Description

The proposed Project will be located on the west side of South Grade Road, east of Tavern Road, and south of Alpine Boulevard, within the unincorporated community of Alpine, in San Diego County. The Proposed Project will construct 24 acres of community park space including baseball fields, soccer fields, a skate park, equine staging area, corral, amphitheater, dog park, bike park, community garden, playground, shade structure, restrooms, picnic areas, RV Volunteer pad, and a parking lot. Figure 1 displays the proposed Project location and Figure 2 displays the proposed Project site plan.

The proposed Project will also improve South Grade Road, along the Project's frontage to provide wider pavements and buffer bike lanes on both sides. The buffer bike lanes will also act as a by-pass in case of emergency.

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Figure 1
Proposed Project Regional Location

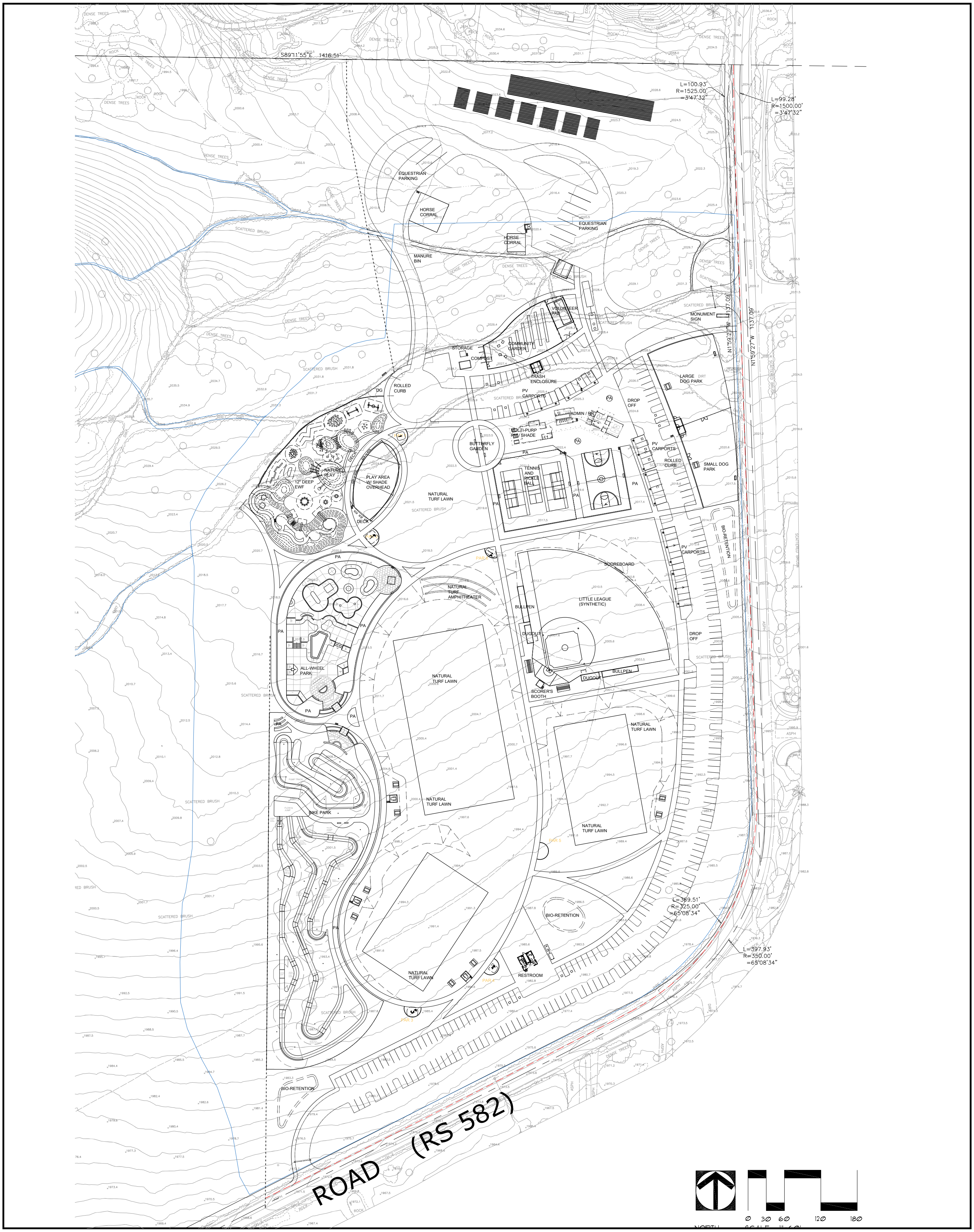

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Figure 2
Project Site Plan

Assumptions

This evacuation analysis was performed for the Project to determine approximately how long it would take for park users from the Project and the surrounding community to evacuate to nearby urban areas in case of a fire emergency. Current evacuation practice typically targets the scope of the evacuation only to the area in immediate danger. This practice allows for better evacuation operations, reduces gridlock, and reserves sufficient travel way for emergency vehicles. It is assumed that first responders or law enforcement will direct traffic at all major intersections during the evacuation process.

During the evacuation process, which can proceed aided by the roadside fuel modification zones and unexposed corridors, wildfire progress may be slowed by fire-fighting efforts that would likely include fixed wing and helicopter fire-fighting assets. Hand crews would also be deployed toward containment. None of the evacuation scenarios presented here assumed counter-flow lanes, as these lanes are reserved for first responders, law enforcement, and fire fighters in case of unforeseen circumstances.

The following is a brief description of each of the nine (9) evacuation scenarios analyzed in this memo. Additional details regarding each scenario are provided below in the section entitled Scenario Description:

- Scenario 1 – *Existing Land Uses*: This scenario estimates the evacuation time for the existing land uses along Alpine Boulevard, between West Victoria Drive and Willows Road, as well as land uses along South Grade Road, between Alpine Boulevard and Via Viejas Oeste. This evacuation area was selected for the analysis due to the tendency for the land use and evacuating vehicles in this area to share the same roadways as the Project. Other evacuation routes such as other mobility element roadways are also available in an evacuation, however, for a conservative analysis, it is assumed that these roadways are reserved for other areas of the Alpine community. This scenario assumed that all evacuating vehicles would utilize the existing lanes to exit the evacuation area. Vehicles are assumed to be in a safe zone once they pass W Victoria Road. Figure 3 displays the area assumed to be evacuated under this scenario. Figure 4 displays the Mobility Element roadways and evacuation routes within the study area.
- Scenario 2 – *Existing Land Uses with Two-Way Left-Turn Lane (TWLTL)*: This scenario is the same as Scenario 1, with one different. The TWLTL along Alpine Boulevard would be use as a emergency evacuation lane. Figure 5 displays the TWLTL segment.
- Scenario 3 – Project Only: This scenario estimates the time for full evacuation of the Project site. Figure 6 displays the area assumed to be evacuated under this scenario.
- Scenario 4 – *Existing with the Project*: This scenario is like Scenario 1, with the addition of all Project traffic.
- Scenario 5 – *Existing Land Uses with the Project with Two-Way Left-Turn Lane*: This scenario is like Scenario 2, with the addition of all Project traffic.
- Scenario 6 – *Cumulative Land Uses:* This scenario is like Scenario 1, with the addition of potential growth in evacuation traffic in the area. Review of the County of San Diego Accela Records only show one additional cumulative project with 19 single family dwelling units. However, for a conservative analysis, a ten percent (10%) growth was applied to all evacuation areas.
- Scenario 7 – *Cumulative Land Uses with Two-Way Left-Turn Lane:* This scenario is the same as Scenario 6, with the utilization of the TWLTL along Alpine Boulevard as an evacuation lane.
- Scenario 8 – *Cumulative Land Uses with Project:* This scenario is similar to Scenario 6, with the addition of all Project traffic.
- Scenario 9 – *Cumulative Land Uses with Project with Two-Way Left-Turn Lane:* This scenario is similar to Scenario 7, with the addition of all Project traffic.

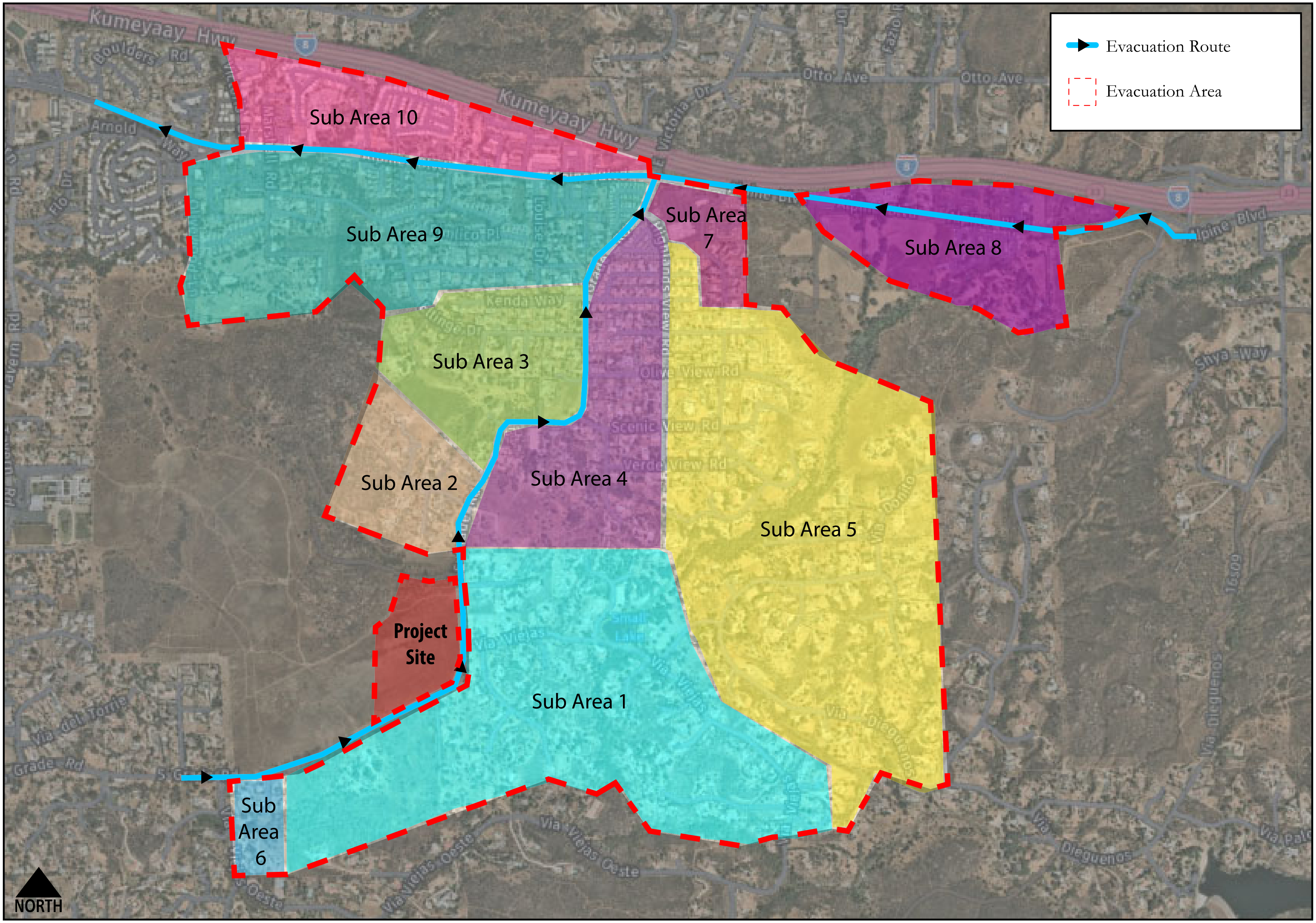

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Figure 3
Existing Land Uses Evacuation Area

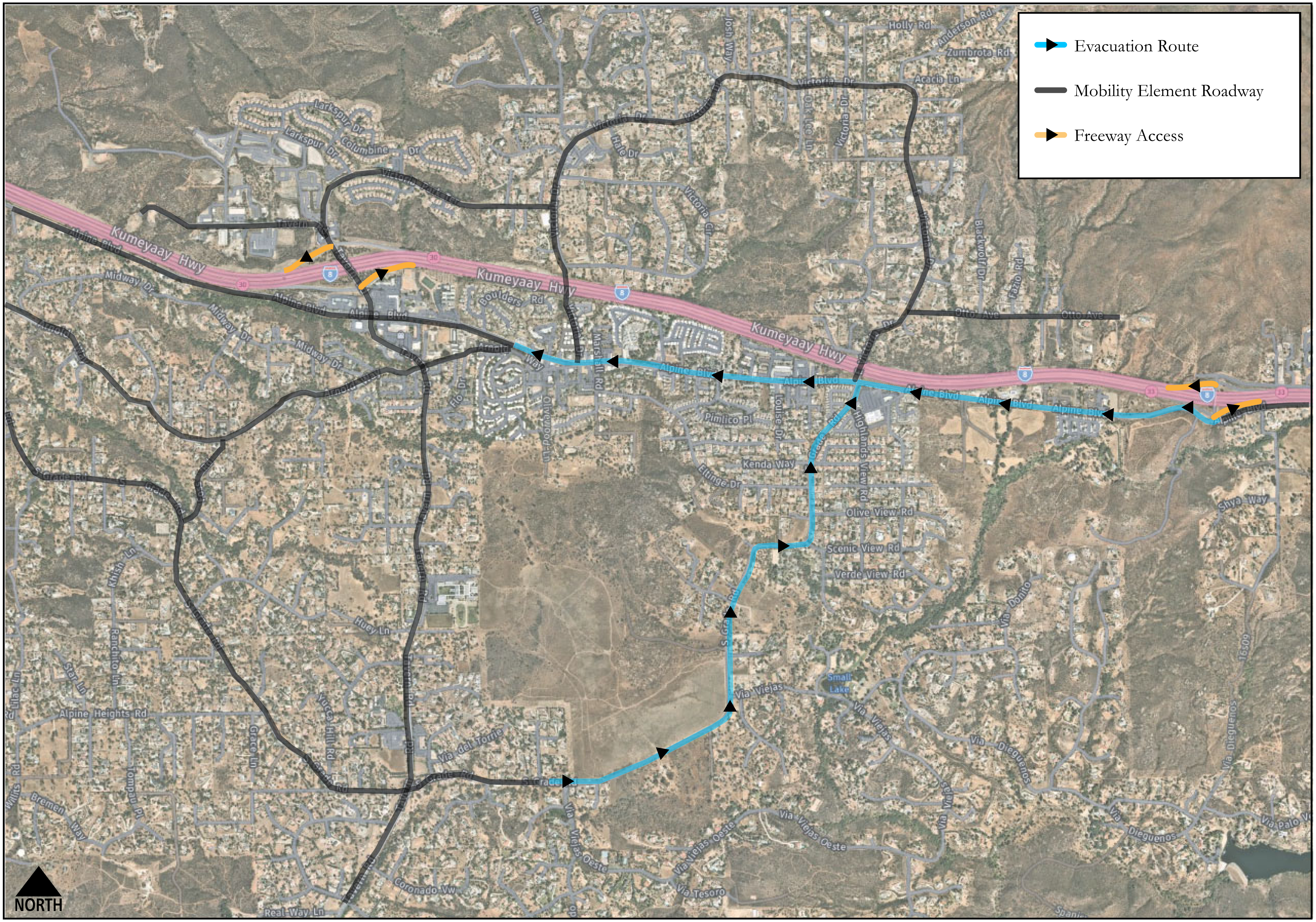

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Figure 4
Mobility Element Roadways and Evacuation Routes

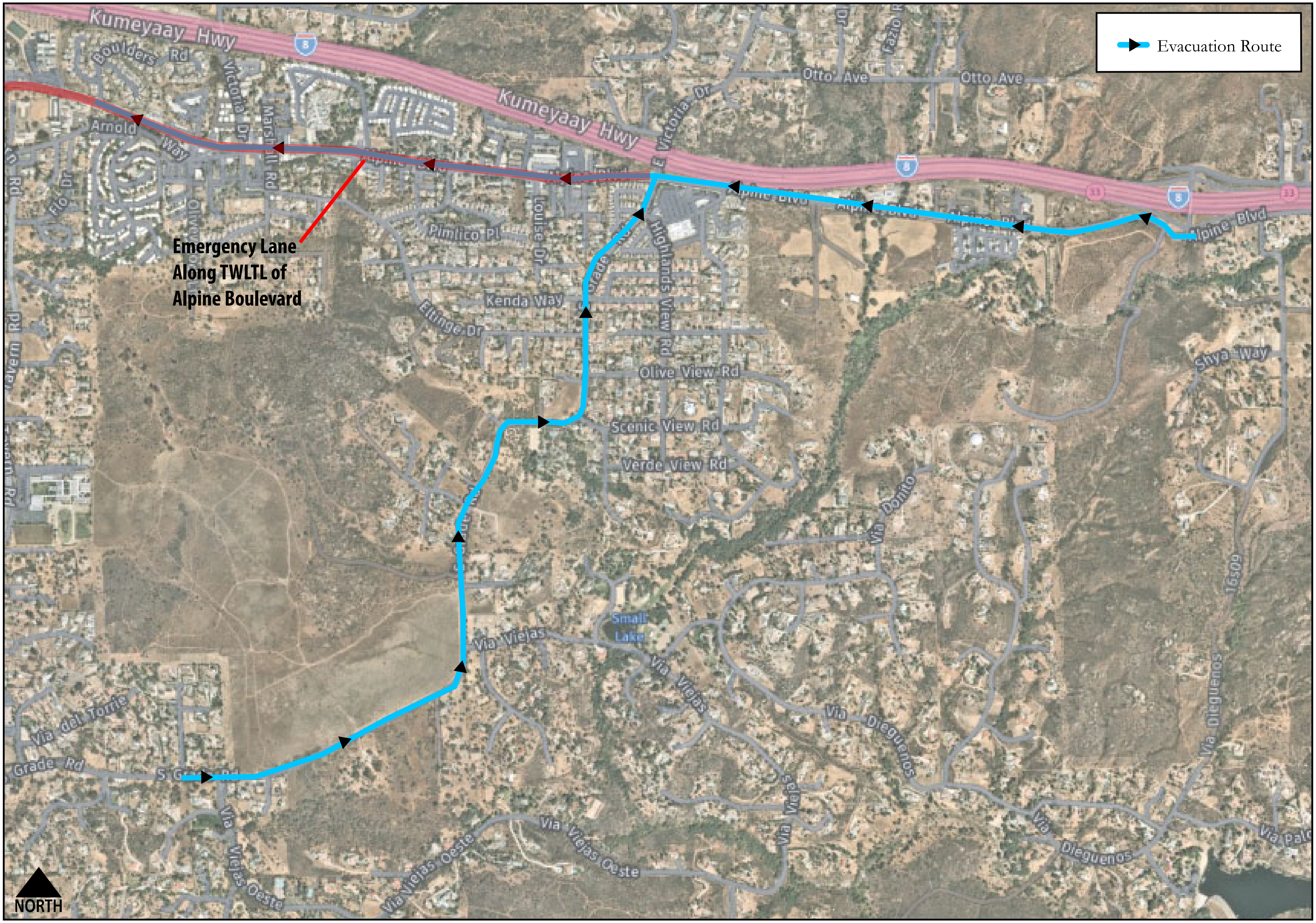

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Figure 5
Evacuation Routes with Two-Way Left-Turn Lane

Evacuation Assumptions

This section provides a description of the different assumptions used to calculate the number of evacuating vehicles and evacuation routes within the study area. Because of uncertainty regarding each household level of readiness to mobilize under an evacuation order, the analysis presented below does not include the time it takes for a household to mobilize once an evacuation order is issued. Note that while some households may leave the area prior to an evacuation order for personal reasons, for a conservative analysis, it is assumed that all the households and vehicles would leave together once an evacuation order is issued.

Evacuating Vehicles

The number of vehicles evacuating under each scenario was calculated for each individual land uses. Assumption for the different land uses within the study area are as follows:

The total number of evacuating vehicles associated with residential land uses was calculated by taking the total number of housing units within the study area and multiplying it by the average vehicle ownership (2.071 vehicles per dwelling unit). The total number of housing units and average vehicle ownership was obtained from the American Community Survey Census. Note that this is a conservative analysis, as the total housing units includes both occupied and unoccupied housing.

The total number of evacuating vehicles associated with office and retail land uses were calculated by taking the square footage each land uses and multiplying them by the average parking generation rate for the respective land uses from the Institute of Transportation Engineer (ITE) Parking Generation Manual or the Alpine Village Core Form-Based Code (AVC Code). It is assumed that all parked vehicles would evacuate in an emergency. Additional field review was conducted to adjusted for land uses that many generate more weekend trips, for example, it is assumed that both Janet's Montana Café and Shadow Mountain Grace Church are fully occupied in the analysis.

Table 1 displays the total evacuating vehicles for the study area. Average vehicle ownership and residential unit calculations are provided in **Attachment A.**

Table 1 – Evacuating Vehicles

Land Uses	Amount	Rate	Source	Total
Residential	1,517	2.071	US Census	3,142
Office	19,900	0.76	ITE	15
General Commercial	147,000	3.5	AVC Code	515
Neighborhood Commercial	70,500	3.64	ITE	257
Industrial	11,000	0.65	ITE	7
Shadow Mountain Grace Church		Assumed fully occupied		61
Janet's Montana Café		Assumed fully occupied		32
			Total Without Project	**4,029**
			Project Assumed fully occupied	240
			Total With Project	**4,269**

For the analysis, it is assumed that two percent (2%) of the evacuating vehicles would be heavy vehicles (trucks with trailers). Two percent is the nationally accepted ratio of heavy vehicles to all vehicles[2].

Mass Evacuation versus Targeted Evacuation

Several mass evacuation scenarios are modeled in which all area residents would evacuate at the same time: Scenarios 1, 2, and 4 through 9. The mass evacuation assumption presents a worst-case scenario as all traffic would be directed to the evacuation roadways at once. Mass evacuation events can overwhelm a roadway's capacity which results, when reaching a threshold traffic density, in decreasing traffic flow.

In an actual "real-life" wildfire event, a phased, or targeted, evacuation would be implemented where orders are given to evacuate based on vulnerability, location, and other factors, which reduces or prevents traffic surges on major roadways and improves traffic flow. The phased evacuation strategy also prioritizes the evacuation of residents in proximity to the immediate danger, giving emergency managers the ability to monitor the fire situation and decide in real time based on changing conditions whether to order additional evacuations as needed, or not. The Federal Emergency Management Agency (FEMA) Planning Considerations: Evacuation and Shelter-in-Place Guidance for State, Local, Tribal, and Territorial Partners (July 2019) guidelines recommend phase or zonal evacuation, as this approach prioritizes endangered populations.

Extreme Wildfire Event

The evacuation analysis presented here assumes a Santa Ana-wind driven fire from the north and/or east of the study area and traveling in a westerly and southerly direction. This fire condition is the one most likely to require a large-scale evacuation, and the one that would create the most risk to property and humans. Traffic evacuating from both the Project site and nearby developments are anticipated to use South Grade Road and Alpine Boulevard under a Santa Ana-wind driven fire scenario. While some of the land uses are located close to Willows Road, due to exposure to the wildland interface, this roadway and interchange was not used in the analysis.

In California, wildfire-related large-scale evacuations are almost exclusively associated with wildfires that occur on extreme fire weather days, also known as "Red Flag Warning" days. These days occur when relative humidity drops to low levels and strong winds from the north/northeast are sustained. With climate change, periods in which such wildfires occur may increase. During Red Flag Warning days, vegetation is more likely to ignite and fire spread is more difficult to control. In San Diego County, these extreme weather days typically occur during limited periods in the late summer, fall and, occasionally, in the spring, but may occur at other times on a less frequent basis. Currently, it is not common to experience more than 15 to 20 Red Flag Warning days in a typical year. Wildfires that occur during these periods of extreme weather are driven by winds –referred to as "Santa Ana" winds – that originate in the north or east and blow toward the south or west. Fires driven by these winds move very quickly, making them difficult to control. In response to such fires, emergency managers typically activate pre-planned evacuation triggers that require down-wind communities to sequentially be notified to evacuate and move to nearby urbanized areas prior to the fire's encroachment.

Wildfires that occur on non-extreme weather days behave in a much less aggressive manner and pose fewer dangers to life and property because they include less aggressive fire behavior and are easier to control. Terrain and fuel are typically the wildfire drivers. During these non-extreme weather days,

[2] https://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_599.pdf (p.5)

vegetation is much more difficult to ignite and does not spread fire as rapidly. In these situations, firefighters have a very high success rate of controlling fires and keeping them under 10 acres. CALFIRE estimates that 90% of all vegetation fires occur during normal, onshore weather conditions and that such fires account for only 10% of the land area burned. Conversely, the 10% of wildfires that occur during extreme fire weather account for 90% of the land area burned. This data highlights that the most dangerous fire conditions are those related to a fire that moves rapidly due to high winds and low humidity, whereas under normal conditions fires are likely to be controlled with no evacuation or possibly limited, focused evacuations.

While it is possible that a fire driven by onshore wind (i.e., wind from the west) could require evacuation of the Project site, such an event would be highly unusual. Moreover, due to the reduced fire behavior during normal weather periods, the evacuation would not be expected to be a large-scale evacuation of large areas. Instead, most of the Project area population would be anticipated to remain at their locations and within their communities, with a more targeted evacuation being ordered, if any.

Primary Evacuation Routes

The analysis presented here assumes that traffic evacuating from both the Project and nearby land uses would use Otay Lakes Road to travel west into the more urbanized areas of Alpine and beyond. This presents a worst-case scenario by assuming more traffic would utilize these roadways despite the other available options that may be employed in an actual evacuation scenario, including use of other roadways or shelter in place.

This assumption selects a reasonable evacuation route for the assumed extreme weather scenario and a fire traveling in a southwesterly direction. Detailed evacuation analysis information is provided in Attachment B.

No contraflow lanes were assumed to provide additional evacuation capacity under the analysis. Contraflow or lane reversal involves reversing the usual flow of one or more lanes to serve additional outbound evacuation traffic, increasing outbound traffic capacity to move people away from the wildfire or other hazard. Such a strategy can be used to eliminate bottlenecks in communities with road geometrics that prevent efficient evacuations or to otherwise hasten and facilitate traffic flow. However, among the considerations in planning emergency contraflow are whether sufficient traffic control officers are available, potential negative impact on responding fire apparatus, access management, merging, exiting, safety concerns, and labor requirements.[3] None of the evacuation scenarios analyzed here assumed contraflow traffic flow would be implemented; instead, two-way travel was assumed, with evacuating vehicles traveling outbound to the Safe Zone, and inbound lanes assumed to be reserved for use by first responders, law enforcement, and fire fighters. It is assumed that first responders or law enforcement will direct traffic at all major intersections during the evacuation process. Should evacuation managers determine that contraflow is preferred or necessary in the context of an actual wildfire event, contraflow remains a tool in the evacuation manager's toolbelt that would increase evacuation capacity and decrease evacuation times.

Safe Zone

Based on review of the County's fire history[4], fires have generally not advanced into newer urbanized areas, including to Alpine Village Core. Densely urbanized, irrigated, and hardscaped areas are highly ignition resistant and interrupt fire spread patterns and provide defensible landscape features for

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[3] Dudek July 2014. "Wildland Fire Evacuation Procedures Analysis" for City of Santa Barbara, California, page 65.

[4] Cedar Fire 2003 After Action Report. San Diego Fire and Rescue Department and CAP Radio History of California Wildfires https://projects.capradio.org/california-fire-history/#14.29/32.8359/-116.75856

firefighter tactical control measures. Thus, it is assumed that evacuees would be directed into the Alpine Village Core, where more evacuation routes are available, including access to I-8 to evacuate toward San Diego. Evacuees are considered to have reached a safe area once they travel past the intersection of W Victoria Road and Alpine Boulevard.

Analysis Methodology

The analysis methodology utilized in this report is consistent with the methodologies provided in the County of San Diego – Operational Area Emergency Operations Plan – Annex Q Evacuation Plan (2018). Annex Q provides the following equation for determining evacuation time:

Evacuation Time = (Evacuation Population / Average Vehicle Occupancy) / Roadway Capacity

Note that the evacuation capacity calculated in this report, including the methodology provided in Annex Q (2018) is for planning purpose only. During real life evacuation scenario, the evacuation authority will determine the appropriate evacuation routes and evacuation areas based on different factors. Factors that could affect the evacuation routes are provided Annex Q, which includes but not limited to the following:

- Shortest route to the designated destination areas
- Maximum capacity
- Ability to increase capacity and traffic flow using traffic control strategies.
- Maximum number of lanes that provide continuous flow through the evacuation area.
- Availability of infrastructure to disseminate real-time conditions and messages to evacuees en route, such as changeable message signs.
- Minimal number of potentially hazardous points and bottlenecks, such as bridges, tunnels, lane reductions, etc.
- Traffic conditions must be monitored along evacuation routes and operational adjustments should be made as necessary to maximize throughput.

Evacuation authority will disseminate the evacuation information to evacuees using the methodology outline in the Annex Q Evacuation Coordination Checklist.

To analyze the evacuation events, CR Associates (CRA) conducted simulations using *Vissim*, a microscopic, multimodal traffic flow modeling software used to simulate different traffic conditions. In *Vissim* simulations, roadway capacity is accounted for and each vehicle in the traffic system is individually tracked through the model, and comprehensive measures of effectiveness, such as average vehicle speed and queueing, are collected on every vehicle during each 0.1-second of the simulation. This software enables drivers' behaviors during an evacuation to be replicated. A total of 20 simulations were conducted to yield a reasonable sample size to determine the performance of the study area roadways and impacts during evacuation scenarios. As previously noted, to be conservative, CRA assumed a worst-case scenario in which all vehicles belonging to the households in the study area would be used in the evacuation, instead of the necessary number of vehicles needed to evacuate the impacted population. Detailed evacuation analysis information is provided in Attachment B.

Evacuation Routes

The evacuation areas under each scenario are anticipated to utilize the following facilities as evacuation routes:

Alpine Boulevard – Alpine Boulevard is a two-lane roadway with TWLTL and bike lanes on both sides and a posted speed limit of 40 miles per hour. Sidewalk facilities and parking are intermittently present along both sides of the roadway.

South Grade Road – Within the project study area, South Grade Road is a two-lane undivided roadway between Alpine Boulevard and Tavern Road with a posted speed limit of 40 miles per hour. Sidewalk facilities are intermittently present along both sides of the roadway. Additionally, there are no bicycle facilities along the roadway and parking is prohibited along both sides of the roadway. The Project will improve South Grade Road, along the Project's frontage to provide buffer bike lanes on both sides, which will also act as emergency bypass area for law enforcement and emergency vehicles during congested condition.

Evacuation Analysis & Results

Based on the analysis methodology described above, **Table 2** reflects the evacuation times for each scenario.

Table 2 – Evacuation Vehicles and Time Summary – All Scenarios

Scenario	Total Vehicles	Evacuation Time
Scenario 1 – Existing Land Uses	4,029	2 hours 31 minutes
Scenario 2 – Existing Land Uses with Two-Way Left-Turn Lane (TWLTL)	4,029	1 hour 33 minutes
Scenario 3 – Project Only	240	31 minutes
Scenario 4 – Existing with the Project	4,269	2 hours 40 minutes
Scenario 5 – Existing Land Uses with the Project with Two-Way Left-Turn Lane	4,269	1 hour 41 minutes
Scenario 6 – Cumulative Land Uses	4,432	2 hours 43 minutes
Scenario 7 – Cumulative Land Uses with Two-Way Left-Turn Lane	4,432	1 hour 50 minutes
Scenario 8 – Cumulative Land Uses with Project	4,672	2 hours 53 minutes
Scenario 9 – Cumulative Land Uses with Project with Two-Way Left-Turn Lane	4,672	1 hour 55 minutes

Source: CR Associates (2022).

The modeling does not depict the evacuation time for *each* population modeled, but rather the time needed to evacuate *all* populations. However, it can be reasonably assumed that those populations located in closer proximity to the safe zone would safely evacuate sooner than the calculated evacuation times shown in Table 2.

As shown in Table 2, it would take up to 2 hours and 31 minutes to evacuate the existing land uses via South Grade Road and Alpine Boulevard (Scenario 1). If the TWLTL along Alpine Boulevard is utilized as an evacuation lane, then the evacuation time reduces to 1 hours and 33 minutes (Scenario 2).

Evacuating the Project Traffic only (Scenario 3) would take up to 31 minutes.

Evacuating all existing land uses and the Project would take up to 2 hours and 40 minutes to evacuate the existing land uses via South Grade Road and Alpine Boulevard (Scenario 4). If the TWLTL along

Alpine Boulevard is utilized as an evacuation lane, then the evacuation time reduces to 1 hours and 41 minutes (Scenario 5). Thus, the Project increases the total evacuation time by 9 Minutes and 8 Minutes, respectively.

Under the cumulative year scenario, it would take up to 2 hours and 43 minutes to evacuate the cumulative land uses via South Grade Road and Alpine Boulevard (Scenario 6). If the TWLTL along Alpine Boulevard is utilized as an evacuation lane, then the evacuation time reduces to 1 hours and 50 minutes (Scenario 7).

Evacuating all cumulative land uses and the Project would take up to 2 hours and 53 minutes to evacuate the cumulative land uses via South Grade Road and Alpine Boulevard (Scenario 4). If the TWLTL along Alpine Boulevard is utilized as an evacuation lane, then the evacuation time reduces to 1 hours and 55 minutes (Scenario 9). Thus, the Project's increase the total evacuation time by 10 minutes and 5 minutes, respectively.

The Project provides several features that would enhance evacuation, but which are not reflected in the average evacuation time results above. These features include substantial fuel modification zones within the Project site as well as fuel modification along the Project's frontage, and temporary areas for safe refuge and "shelter-in-place" options. Because the Project would provide a sizable ignition resistant landscape that emulates urbanized areas that have halted wildfire spread, emergency managers may halt evacuations of the Project at any point during an evacuation event to move traffic that is of higher priority. The Project may also serve as a temporary evacuation point for evacuees from other areas due to its design as a fire-resistant zone. Evacuations throughout San Diego County operate on a priority basis, with those populations that are of greatest risk or highest exposure considered the highest priority. Downstream traffic flow is managed to move these populations first and the Project provides an opportunity to protect the park uses and nearby residents (if they evacuate to the Project's site) while prioritizing movement of populations that are at greater risk, reducing the evacuation times for those populations, possibly substantially.

Analysis and Conclusion

Neither CEQA, nor the County has adopted numerical time standards for determining whether an evacuation timeframe is appropriate. Public safety, not time, is generally the guiding consideration for evaluating impacts related to emergency evacuation. The County considers a project's impact on evacuation significant if the project will significantly impair or physically interfere with implementation of an adopted emergency response or evacuation plan; or if the project will expose people or structures to a significant risk of loss, injury, or death involving wildland fires.

The County of San Diego has historically had an extremely high success rate for safely evacuating large numbers of people and doing so in a managed and strategic way using available technological innovations. Safely undertaking large-scale evacuations may take several hours or more and require moving people long distances to designated areas. Further, evacuations are fluid and timeframes may vary widely depending on numerous factors, including, among other things, the number of vehicles evacuating, the road capacity to accommodate those vehicles, residents' awareness and preparedness, evacuation messaging and direction, and on-site law enforcement control.

Notwithstanding evacuation challenges and variables, the success rate in the County of San Diego in safely managing both mass and targeted evacuations is nearly 100% safe evacuations based on research showing there were no fire-caused deaths during an evacuation. Technological advancements and improved evacuation strategies learned from prior wildfire evacuation events have resulted in a system that is many times more capable of managing evacuations. With the technology in use today in the County, evacuations are more strategic and surgical than in the past, evacuating smaller areas at highest risk and phasing evacuation traffic so that it flows more evenly and minimizes the surges that may slow an evacuation. Mass evacuation scenarios where large populations are all directed to leave simultaneously, resulting in traffic delays, are thereby avoided, and those populations most at risk populations are able to safely evacuate.

Based on the evacuation simulations above, evacuation traffic generated by Project would not significantly increase the average evacuation travel time or result in unsafe evacuation timeframes. Evacuation flow would be able to be effectively managed.

The information presented here will be provided to emergency managers for use in pre-planning scenarios to better inform the field decisions made pursuant to adopted Emergency Operations Plans. Emergency personnel who issue an evacuation order may take into account these time estimates in determining when and where to issue evacuation orders. In a real evacuation scenario, emergency managers may use alternative actions/options to further expedite evacuation. Such actions may include providing additional lead time in issuing evacuation orders, providing alternative signal control at downstream intersections, utilizing additional off-site routes or directing traffic to roadways with additional capacity, implementing contra-flow lanes, issuing "shelter-in-place" orders when determined to be safer than evacuation, or considering the possibility of a delayed evacuation where parts of the population could be directed to remain on-site until the fire burns out in the sparse fuels around the evacuation route. These options require "in the field" determinations of when evacuations are needed and how they are phased to maximize efficiency. Overall, safe evacuation of the Project and the surrounding community is possible under all modeled scenarios.

Limitations

CRA has presented here a conservative analysis simulating evacuation during an extreme wildfire event. As previously noted, the analysis presents the total time to complete evacuation of all evacuees under the various scenarios, and not the average travel time for a single evacuee.

However, as discussed above, wildfires are variable events. The underlying planning principle for fire preparedness, given the dynamic nature of a fire, is to demonstrate the availability of multiple route alternatives and response strategies to permit emergency professionals to manage their response according to the specific circumstances. The Project area provides route and response alternatives too numerous to be considered in this model. Emergency responders will coordinate the safest possible evacuation based on the dynamic circumstances of the actual event, including the appropriate phasing of the evacuation, and utilization of the most appropriate ingress and egress routes for area residents and emergency responders.

The scope of route alternatives and response strategies available to emergency professionals to manage a potential fire in the County cannot be and should not be evaluated using this evacuation analysis alone. However, a more comprehensive view of the Project's fire safety is gained by understanding this memorandum, Alpine County Park Fire & Emergency Assessment by Rohde & Associates (June 2021), and decision making of emergency responders as detailed in the County Emergency Operations Plan.

The net result of changing the variables selected could yield an average evacuation travel time shorter or longer than the results detailed in the analysis. Many factors can shorten or lengthen the vehicle time from the results shown herein. For example:

1. Changing the possible evacuation routes selected would affect the results. For instance, utilizing roads for ingress and/or egress that are not utilized in this analysis could shorten vehicle travel times relative to the results shown herein.

2. Increasing or decreasing the number of path permutations and percentage of the population utilizing each route that leads out of the immediate area could shorten or lengthen vehicle travel time relative to the results shown herein.

3. Emergency professionals electing to reserve certain travel lanes for emergency vehicle ingress for periods of time could affect the travel time relative to the results shown herein.

4. Assuming evacuees utilize fewer or more vehicles to evacuate from their homes relative to the vehicle utilization rate selected in the analysis would shorten or lengthen vehicle travel time relative to the results shown herein.

5. Changing the mix of vehicle trips allocated to each evacuation route could shorten or lengthen vehicle travel time relative to the results shown herein.

6. Assuming different road condition adjustment factors could shorten or lengthen the vehicle travel time relative to the results shown herein.

7. Assuming fewer people are at home when the evacuation notice is given would reduce the number of vehicle trips and shorten vehicle travel time relative to the results shown herein.

8. Assuming some portion of vehicle trips are made in advance of the evacuation notice would reduce the number of vehicle trips relative to the results shown herein.

9. Assuming emergency professionals elect to implement contraflow on certain roadways to open up additional lanes for emergency evacuation egress could reduce the travel time results shown herein.

This evacuation time analysis is necessarily limited in scope given the numerous variables inherent in a wildfire and evacuation event. However, as discussed above, it is not anticipated that the Project will significantly impact evacuation of the Project site or existing surrounding communities based on evacuation times and other qualitative considerations.

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Attachment A
Evacuating Vehicles Calculation

Average Vehicle Ownership Summary

VEHICLES AVAILABLE			
Occupied housing units	Housing Unit	Veh Ownership	Total
No vehicles available	205	0	0
1 vehicle available	1567	1	1567
2 vehicles available	2459	2	4918
3 or more vehicles available	2453	3	7359
Total	6684		13844
Average Veh Ownership			2.071

SELECTED HOUSING CHARACTERISTICS

United States® Census Bureau

Note: This is a modified view of the original table produced by the U.S. Census Bureau. This download or printed version may have missing information from the original table.

Notes Geos Years Topics Surveys Codes Hide Transpose Margin of Error Restore Excel CSV ZIP Print Map

Label	Total housing units	Occupied housing units	No vehicles available	1 vehicle available	2 vehicles available	3 or more vehicles available
Census Tract 212.02, San Diego County, California						
Estimate	1,288	1,100	28	178	335	559
Percent	1,288	1,100	2.5%	16.2%	30.5%	50.8%
Census Tract 212.04, San Diego County, California						
Estimate	1,902	1,848	42	200	808	798
Percent	1,902	1,848	2.3%	10.8%	43.7%	43.2%
Census Tract 212.05, San Diego County, California						
Estimate	2,781	2,603	112	1,012	828	651
Percent	2,781	2,603	4.3%	38.9%	31.8%	25.0%
Census Tract 212.06, San Diego County, California						
Estimate	1,147	1,133	23	177	488	445
Percent	1,147	1,133	2.0%	15.6%	43.1%	39.3%

Sub Area	Number of Dwelling Units	Average Veh. Ownership	Acres of Office	SF of Office	ITE Park Gen (Saturday - Highest)	Acres of Retail	SF of Retail	Category	ITE Park Gen Rate	SF of Other	Category	ITE Park Gen Rate	Other Parking - full occupancy	Total (Existing)	Cumulative
1	88	2.071	0			0								182	200
2	17	2.071	0			0								35	39
3	60	2.071	0			0								124	136
4	131	2.071	0			0								271	298
5	174	2.071	0			0								360	396
6	6	2.071	0			0								13	14
7	19	2.071	0.9	4214	0.76	7.9	70,469	Neighborhood Shopping Center	3.64					300	330
8	149	2.071	0			0				11,008	Light Industrial	0.65	61	377	415
9	467	2.071	3.1	15600	0.76	7.2	64,136		3.5					1,204	1324
10	406	2.071	0.5			10.7	82,830		3.5				32	1,163	1280
Total														**4,029**	**4,432**
Project													240	240	240
Total with Project														**4,269**	**4,672**

Source: SF of land uses - SANDAG Parcel Data

Note: Sub Area 8 Other Parking = Shadow Mountain Grace Church, Sub Area 10 Other Parking = Janet Montana Cafe

Attachment B

Evacuation Analysis Worksheets

Existing Conditions

Run	Min (Start)	Max (End)	Total (Seconds)
1	421.8	9576.2	9154.4
2	423.7	9348.7	8925
3	422.2	9563.7	9141.5
4	399.3	9383.9	8984.6
5	397.7	9406.3	9008.6
6	401.4	9194	8792.6
7	398.3	9260.8	8862.5
8	399.1	9331.3	8932.2
9	399.2	9342.2	8943
10	410.3	9496.8	9086.5
11	407.8	9662.2	9254.4
12	408.5	9429.3	9020.8
13	400	9596.2	9196.2
14	427.9	9550.2	9122.3
15	421	9709.7	9288.7
16	419.3	9652	9232.7
17	409.4	9527.3	9117.9
18	409.6	9607.2	9197.6
		Average	9070.083333
		Time	2:31

Scenario 2 – Existing Land Uses with Two-Way Left-Turn Lane (TWLTL)

Run	Min (Start)	Max (End)	Total (Seconds)
1	428.3	5935.7	5507.4
2	403.1	5884.4	5481.3
3	421.8	5997.3	5575.5
4	423.7	6174.8	5751.1
5	422.2	5887	5464.8
6	399.3	5806.1	5406.8
7	397.7	6439.8	6042.1
8	401.4	5686.8	5285.4
9	398.3	5740.7	5342.4
10	399.1	6231	5831.9
11	399.2	6274	5874.8
12	410.3	5810.8	5400.5
13	407.8	6072.8	5665
14	408.5	5925	5516.5
15	400	6092.7	5692.7
16	427.9	5838.9	5411
17	421	6252.4	5831.4
18	419.3	6319.1	5899.8
19	409.4	6107.9	5698.5
20	409.6	5791.1	5381.5
		Average	5603.02
		Time	1:33

Scenario 3 – Project Only

Run	Min (Start)	Max (End)	Total (Seconds)
1	428.1	2284.9	1856.8
2	438.2	2390.2	1952
3	425.7	2282.8	1857.1
4	476.4	2313	1836.6
5	409.6	2265.9	1856.3
6	428.1	2313.2	1885.1
7	446.4	2317	1870.6
8	449.5	2344.7	1895.2
9	415.2	2331.9	1916.7
10	430.8	2352.7	1921.9
11	448.8	2261.9	1813.1
12	425.8	2294.3	1868.5
13	449.4	2274.8	1825.4
14	409.7	2421.4	2011.7
15	428.2	2300.9	1872.7
16	446.6	2400.6	1954
17	441.8	2247	1805.2
18	415.3	2291.2	1875.9
19	416.2	2265	1848.8
20	458.7	2340.3	1881.6
		Average	1880.26
		Time	0:31

Scenario 4 – Existing with the Project

Run	Min (Start)	Max (End)	Total (Seconds)
1	428.3	9830.9	9402.6
2	403.1	10077.3	9674.2
3	421.8	10071.5	9649.7
4	423.7	9918.9	9495.2
5	422.2	10098.4	9676.2
6	399.3	9921.3	9522
7	397.7	9898.7	9501
8	401.4	9679.5	9278.1
9	398.3	9784.4	9386.1
10	399.1	9890.7	9491.6
11	399.2	9905.3	9506.1
12	410.3	10084.1	9673.8
13	407.8	10216.4	9808.6
14	408.5	10021.8	9613.3
15	400	10155	9755
16	427.9	10073.1	9645.2
17	421	10149.7	9728.7
18	419.3	10145.4	9726.1
19	409.4	10162	9752.6
20	409.6	10141.2	9731.6
		Average	9600.885
		Time	2:40

Scenario 5 – Existing Land Uses with the Project with Two-Way Left-Turn Lane

Run	Min (Start)	Max (End)	Total (Seconds)
1	428.3	6424.1	5995.8
2	403.1	6481.9	6078.8
3	421.8	6465.4	6043.6
4	423.7	6655	6231.3
5	422.2	6468.3	6046.1
6	399.3	6300.3	5901
7	397.7	6996.2	6598.5
8	401.4	6095.1	5693.7
9	398.3	6223.8	5825.5
10	399.1	6575.8	6176.7
11	399.2	6708.4	6309.2
12	410.3	6154.8	5744.5
13	407.8	6569.4	6161.6
14	408.5	6452.8	6044.3
15	400	6646.4	6246.4
16	427.9	6033.6	5605.7
17	421	6798.7	6377.7
18	419.3	6798.8	6379.5
19	409.4	6678	6268.6
20	409.6	6221.8	5812.2
		Average	6077.035
		Time	1:41

Scenario 6 – Cumulative Land Uses

Run	Min (Start)	Max (End)	Total (Seconds)
1	428.1	10121.3	9693.2
2	428.1	10121.3	9693.2
3	402	10090.1	9688.1
4	421.5	10172.2	9750.7
5	423.7	10170.1	9746.4
6	422.1	10215.4	9793.3
7	398.9	10141.9	9743
8	397.3	10280.4	9883.1
9	400.8	9919.5	9518.7
10	397.9	10171	9773.1
11	398.7	10139.1	9740.4
12	398.7	10318.2	9919.5
13	409.9	10201.9	9792
14	407.5	10319.8	9912.3
15	408.2	10391	9982.8
16	399.5	10491.3	10091.8
17	427.7	10511.8	10084.1
18	419.4	10242	9822.6
19	417.3	10386.6	9969.3
20	409.1	10430	10020.9
		Average	9830.925
		Time	2:43

Scenario 7 – Cumulative Land Uses with Two-Way Left-Turn Lane

Run	Min (Start)	Max (End)	Total (Seconds)
1	428.1	6830.7	6402.6
2	402	6867	6465
3	421.5	7023.7	6602.2
4	423.7	7190.5	6766.8
5	422.1	6624	6201.9
6	398.9	6706	6307.1
7	397.3	6748.4	6351.1
8	400.8	6772.8	6372
9	397.9	7211.9	6814
10	398.7	7023.5	6624.8
11	398.7	7210.1	6811.4
12	409.9	7224.5	6814.6
13	407.5	6943.6	6536.1
14	408.2	7151.9	6743.7
15	399.5	7012.7	6613.2
16	427.7	6648.1	6220.4
17	419.4	7245.5	6826.1
18	417.3	7392	6974.7
19	409.1	7363.6	6954.5
20	408.9	7274.6	6865.7
		Average	6613.395
		Time	1:50

Scenario 8 – Cumulative Land Uses with Project

Run	Min (Start)	Max (End)	Total (Seconds)
1	428.1	10640.4	10212.3
2	402	10661.2	10259.2
3	421.5	10796.2	10374.7
4	423.7	10727.9	10304.2
5	422.1	10640.6	10218.5
6	398.9	10659.6	10260.7
7	397.3	10784.8	10387.5
8	400.8	10480.5	10079.7
9	397.9	10576.3	10178.4
10	398.7	10631.4	10232.7
11	398.7	10824.8	10426.1
12	465.3	10717.4	10252.1
13	407.5	10811.6	10404.1
14	408.2	10961.4	10553.2
15	399.5	11067	10667.5
16	427.7	11051	10623.3
17	419.4	10909.3	10489.9
18	417.3	10848.8	10431.5
19	409.1	11015.4	10606.3
20	408.9	11038.9	10630
		Average	10379.595
		Time	2:53

Scenario 9 – Cumulative Land Uses with Project with Two-Way Left-Turn Lane

Run	Min (Start)	Max (End)	Total (Seconds)
1	422.5	7825.7	7403.2
2	424.7	7392.5	6967.8
3	421.5	7423.7	7002.2
4	423.7	7190.5	6766.8
5	399.9	7215.9	6816
6	412.9	7430.5	7017.6
7	398.9	7213.9	6815
8	411.9	7228.5	6816.6
9	377.9	7211.9	6834
10	410.9	7226.5	6815.6
11	398.7	7210.1	6811.4
12	409.9	7224.5	6814.6
13	407.5	7343.6	6936.1
14	408.2	7251.9	6843.7
15	399.5	7012.7	6613.2
16	427.7	7448.1	7020.4
17	419.4	7245.5	6826.1
18	417.3	7592	7174.7
19	409.1	7363.6	6954.5
20	408.9	7274.6	6865.7
		Average	6905.76
		Time	1:55