RANCHO CUCAMONGA

Evacuation Assessment

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FEHR PEERS

ATLAS PLANNING SOLUTIONS
NAVIGATING A COMPLEX WORLD

Table of Contents

List of Figures

List of Tables

Attachments

Executive Summary

There are a variety of events that could require an evacuation of parts of the City of Rancho Cucamonga. These events could be caused or fueled by nature, including wildfires, floods, geological or seismic events; while others can be caused by human initiated events such as utility failures, infrastructure failures or other factors (such as airplane crashes or vehicular crashes). With climate change increasing drought conditions and weather events throughout the state, it is prudent to review the capacity of the evacuation system (e.g. capacity of the evacuation roadways) to assist with planning for these events. Additionally, recent events like the Camp Fire in Paradise, California, reinforce the notion to better prepare for rapid evacuations during these types of events.

This study provides a detailed look at the evacuation system and focuses on estimating the time needed to evacuate. The results are intended to provide information to help inform the on-going PlanRC General Plan Update (especially related to network redundancy and connectivity) in addition to meeting the legislative requirements associated with two recent legislative requirements:

- ***SB 99 (2019) -*** Requires review and update of the safety element to include information to identify residential developments in hazard areas that do not have at least two emergency evacuation routes. In essence, this legislation assists in identifying neighborhoods and households within a hazard area that have limited accessibility. Even though this legislative requirement applies specifically to designated hazard areas, this evacuation assessment has identified all residential developments in the City, including those that are not in a designated hazard area, that have only one emergency evacuation route. This is intended to assist the City with identifying opportunities to improve connectivity and evacuation capacity generally.
- ***AB 747 (2019) -*** Requires that the safety element be reviewed and updated to identify evacuation routes and their capacity, safety, and viability under a range of emergency scenarios. This will be a requirement for all safety elements or updates to hazard mitigation plans completed after January of 2022. Although not required at the time of the 2021 General Plan Update, City and Fire District officials felt that an evacuation assessment that included the level of detail required by AB 747 would be an important complement to all the other planning documents that were either updated or created in 2021.

Evacuation Focus Areas and Scenarios

The following evacuation scenarios were identified by the City as part of this effort:

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
A wildfire that starts east of the City during Santa Ana wind conditions and takes 1-3 full days to arrive in the City.	A wildfire that starts west of the City with onshore winds and takes 6-24 hours to arrive in the City.	A fire that starts in the City during Santa Ana wind conditions.	A major earthquake that causes at least several of the bridges across the SR-210 freeway to collapse between Euclid Avenue and I-15.	Heavy rain or rapid snow melt that result in large scale flooding and flash flooding.

These scenarios all require different approaches to evacuation orders. Specifically, the amount of advanced warning before an evacuation changes the time needed to evacuate as longer lead times flatten the response curve for evacuations; whereas shorter evacuation needs condense the response curve and focus more traffic into a shorter period of time. Additionally, the movement of the disaster (e.g. how quickly a wildfire moves based on fuel availability and weather conditions) will change how an agency evacuates residents while maintaining accessibility for emergency personnel.

The intent of this study is not to estimate disaster behavior nor is it to evaluate every disaster that is possible in the City; rather it is to help the City understand the amount of time needed to facilitate an evacuation, understand the most vulnerable areas where evacuations would occur (e.g. those with the least amount of redundant access and those areas furthest from evacuation centers), and look for strategies to improve emergency egress during these events.

Vulnerable Area Assessment – SB 99 Evaluation

Mapping for the SB 99 Assessment is presented as **Figure ES-1.** As shown on the mapping, there are a variety of parcels with only one point of access within the City. This SB 99 assessment was supplemented with a network redundancy assessment, where the distances needed to travel from neighborhoods to evacuation centers or the external access points of the City were identified. This information is presented on **Figure ES-2** and **Figure ES-3.**

Reviewing these three figures together provides an interesting perspective as it relates to emergency evacuation. Areas in the northwest part of the City that are identified as having only one point of access are also identified as areas with the furthest distance to travel in the event of an evacuation.

Recommendations were made for this part of the City to assist in the event of an evacuation. These recommendations range from suggestions about additional City connectivity to be considered as part of the PlanRC General Plan Update process (such as providing a western connection from this area to the City of Upland and/or completing Wilson Avenue) to traffic management techniques (such as maximizing green time to evacuation movements, placing traffic control officers at key intersections, and evacuating these neighborhoods first during an evacuation event).

Figure ES-1: SB-99 Parcel Identification

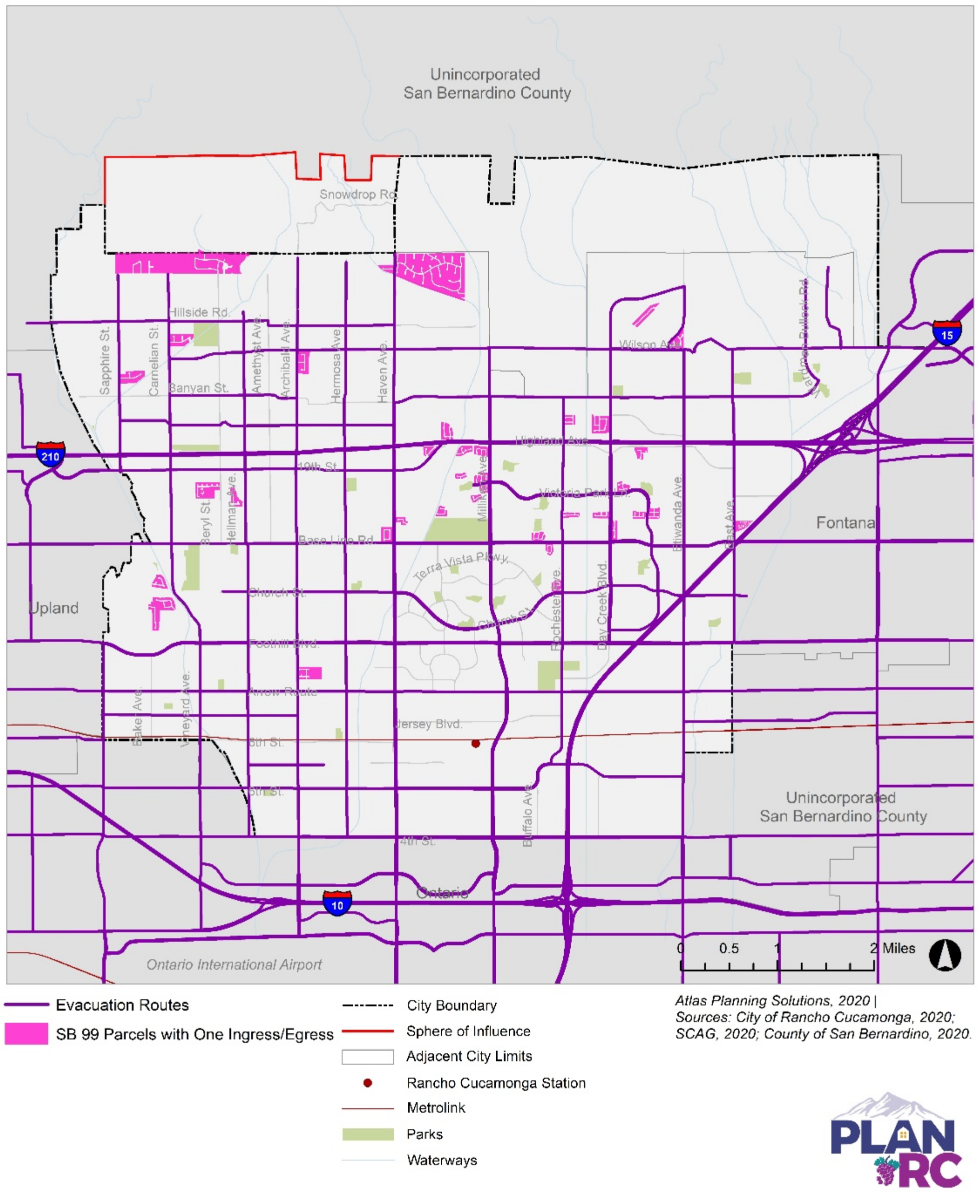


Figure ES-2: Distance from Neighborhoods (TAZs) to the City Boundary

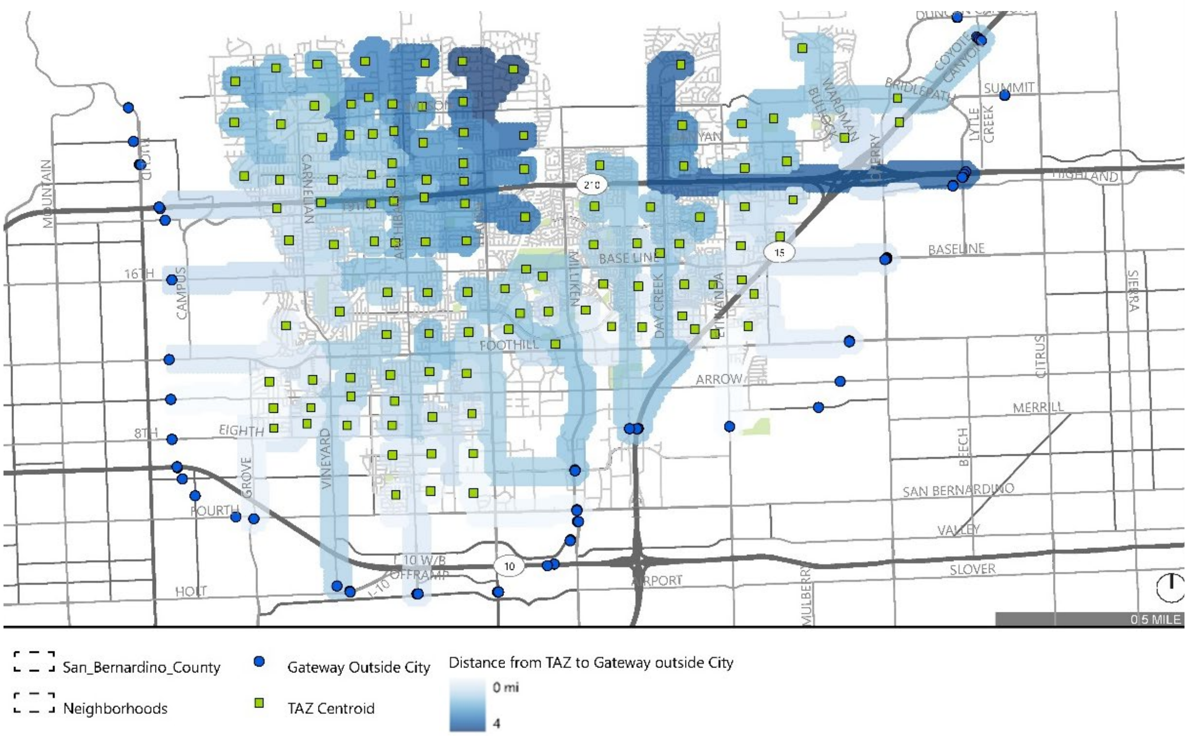
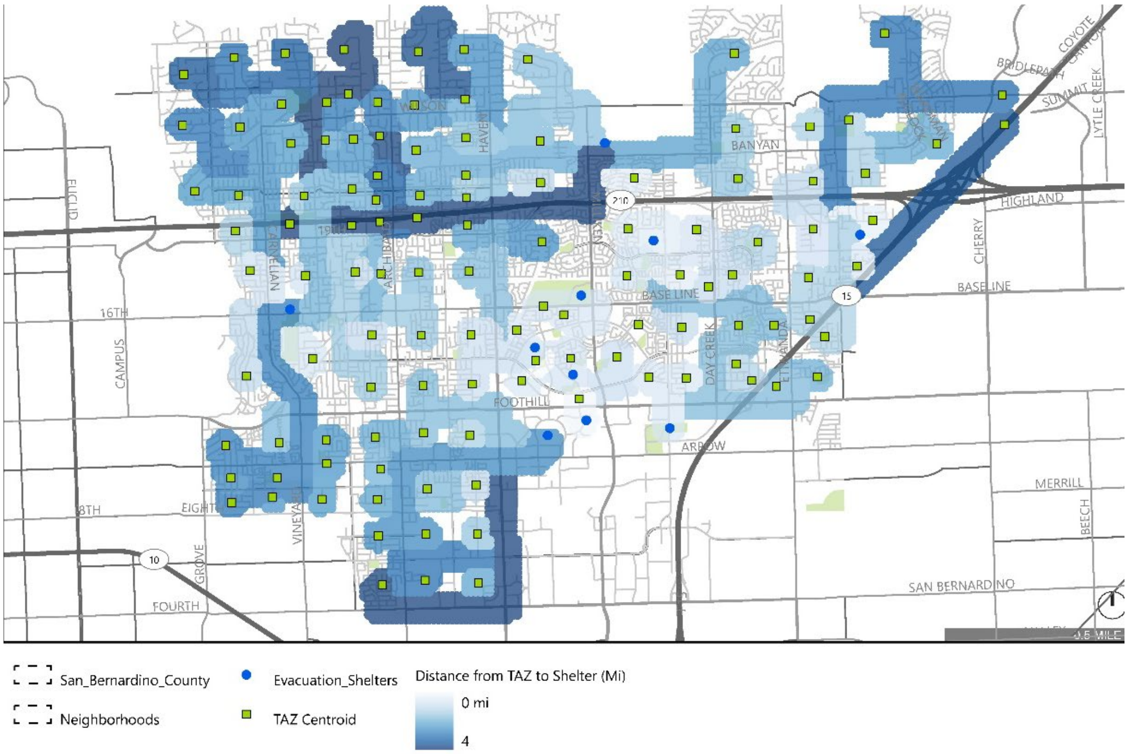


Figure ES-3: Distance from Neighborhoods (TAZs) to Evacuation Shelters

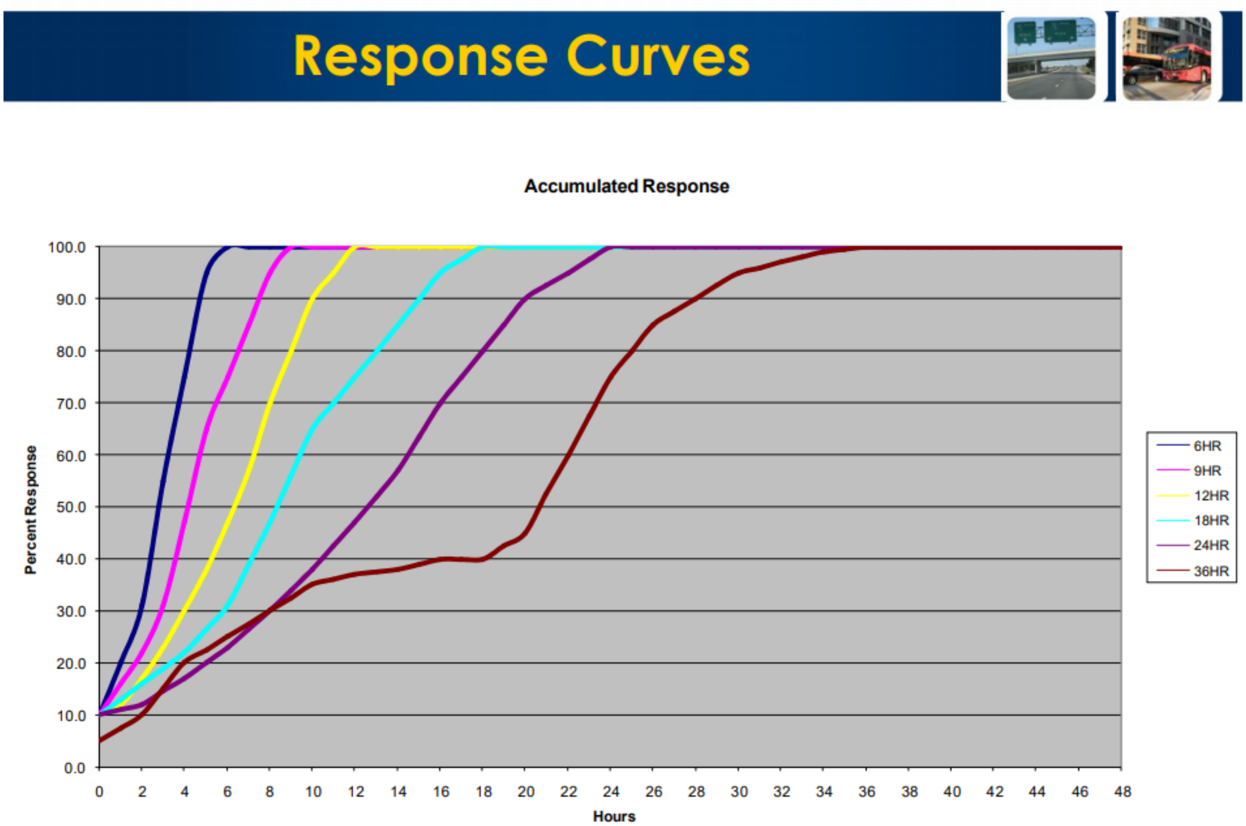


Evacuation Time Assessment - AB 747 Assessment

AB 747 requires the evaluation of the capacity of the evacuation network under a range of emergency scenarios. However, when looking at the capacity of the system, one must also consider the length of time available for an evacuation which is directly dependent on the amount of lead time available to plan for the evacuation. With ample notice, roadway capacity typically does not become an issue during an evacuation except for minor locations of congestion. However, during short-notice evacuations, like that experienced during the Camp Fire in Paradise, California, a short evacuation window was required, and the capacity of the evacuation system became an issue.

Figure ES-4 shows evacuation response curve times related to how much notice is provided for evacuation events in Florida during hurricane events. As shown, the curves "flatten out" longer lead-time evacuations; and the capacity of the network is tested the most during short term evacuations.

Figure ES-4: Evacuation Response Curve Times



The hourly capacity of the City's evacuation network was tested to estimate the amount of time required to evacuate key areas of the City. These tests look at the identified events and the hourly roadway capacity to estimate the time required for an evacuation. The assessment considered the average per-hour capacity of the roadway and considered a consistent loading to the network. Additionally, a distribution of traffic that more resembled a bell-curve was assumed form a loading perspective (instead of a more linear loading), more consistent with the observed evacuation curves shown on **Figure ES-4,** was also reviewed to account for how peaking characteristics during evacuation events affect the evacuation time estimates. The table below presents the results of the evacuation analysis to estimate times required to evacuation under the scenarios noted above.

	Scenario 1	Scenario 2	Scenario 3 and 5	Scenario 4
Total Vehicle Trips	8,667	17,940	26,596	99,126
Exit Link Hourly Capacity*	10,695	11,098	17,038	43,078
Link Time for Evacuation Assuming All Trips are Evenly Loaded on the System**	49 minutes	97 minutes	94 minutes	138 minutes
Time To Exit Evacuation Area***	75 minutes	105 minutes	150 minutes	255 minutes

Note: No work or school return trips included, as those trips have not yet been made when the evacuation occurs.
*: only includes the capacity of the direction out of the evacuation area.
**: the time that the exit links require to handle all the evacuation trips assuming those trips are evenly loaded at the same time, used as reference.
***: assumes a bell curve distribution for traffic loading from receipt of the evacuation order.

In addition to the capacity assessment noted above, the network was stress tested during evacuation events to assist in identifying potential congestion locations on the evacuation network.

Observations

The area north of SR-210 shows up in the evacuation analysis as:

- The area of the City with the highest concentration of dead end roads
- The area of the City that has the furthest travel distance to the external boundaries of the City
- The area that has to travel the farthest to evacuation centers
- The area needing the longest lead times to facilitate an evacuation

Additionally, this is an area of the City that is closest to the wildland urban interface (WUI), closest to the historic wildfire perimeters in the City, has areas that are within a flood hazard area, and is just south of the Cucamonga Fault line (plus the Etiwanda Avenue Fault and portions of the Red Hill Fault). Given the convergence of these activities in this particular area of the City, evacuations north of SR-210 should be a focus area for the City.

Additionally, the following recommendations are applicable to most of the evacuation events that were investigated:

- Provide east-west connection(s) to the City of Upland north of SR-210.
- Complete Wilson Avenue through the northern part of the City.
- Look for additional opportunities to improve connectivity throughout the City to increase the facilities that can be used during an evacuation; including completing any "missing" links on the transportation network, providing increased block densities with developing or redeveloping large areas of the City, creating new connections across major barriers of the city, and implementing system redundancy.
- Facilitate evacuation management to relieve pressure on local streets.
- Work with Caltrans and other regional agencies to investigate limiting accessibility to major regional routes to facilitate evacuation; this could be particularly effective for east-west facilities where SR-210 could be closed except for evacuation purposes and typical trips could be forced down to I-10 and SR-60.
- Work with Caltrans to develop signal flush plans at off-ramps to prioritize signal timing for evacuees at Caltrans' ramp locations.
- Work with the City's Engineering Services Department to investigate signal timing plans to assist with flushing traffic; particularly along north/south routes.
- Utilize traffic control personnel along key routes experiencing congestion, especially at unsignalized intersection north of SR-210.
- North of SR-210, consider a higher "density" of fire stations and emergency response locations to ensure that emergency response time is not compromised.
- Consider a method of communication that could inform residents of an evacuation. This could be some type of application that could be installed on a resident's phone, use of the existing emergency response infrastructure, other warning systems (like large sirens), or other forms of notification.
- Consider evacuation drills for residents north of SR-210 so that they are aware of what to expect during an evacuation event and are prepared in such a scenario.

1. Introduction

This initial assessment of the evacuation capacity of the City of Rancho Cucamonga coincides with significant mobility momentum in the City and the surrounding region. This includes the Brightline High Speed Rail connection to Las Vegas and The Loop tunnel connecting the Rancho Cucamonga Station to Ontario Airport. In addition to these major transportation projects, the City continues to improve connectivity of its roadway network as in-fill projects progress toward build out of the City.

Given the comprehensive nature of the City's planning efforts, which include updates to the General Plan, the Development Code, the Local Hazard Mitigation Plan, the Emergency Operations Plan, and the creation of a Community Wildfire Protection Plan, it is appropriate to also assess emergency evacuation capacity.

This assessment has been completed to provide the City with information related to the need for evacuation as a result of natural and human-caused hazard related events and is consistent with requirements outlined in Assembly Bill (AB) 747 and Senate Bill (SB) 99 from the 2019 legislative session, specifically requiring agencies to evaluate the capacity of their evacuation routes and identify key routes with only one point of access.

1.1 Disclaimer

This document is intended to provide an assessment of roadway capacity and time needed to evacuate under the described evacuation scenarios. Please note that emergency evacuation can occur due to any number of events. Additionally, any emergency movement is unpredictable because it has an element of individual behavior related to personal risk assessment for each hazard event as the associated evacuation instructions are provided. As such, this assessment is intended to provide the City with a broad understanding of the capacity of the transportation system during an evacuation scenario; it does not provide a guarantee that evacuations will follow modeling that is used for analysis purposes, nor does it guarantee that the findings are applicable to any or all situations.

Moreover, as emergency evacuation assessment is an emerging field, there is no established standard methodology. Fehr & Peers has adopted existing methodologies in transportation planning that, in our knowledge and experience, we believe are the most appropriate. Nevertheless, such methodologies are necessarily also limited by the tools and data available and the budgetary and time constraints in the scope of work, and by current knowledge and state of the practice.

While this assessment should help the City better prepare for hazard related events and associated evacuations, the City should take care in planning and implementing any potential evacuation scenario. Fehr & Peers cannot and does not guarantee the efficacy of any of the information used from this assessment as such would be beyond our professional duty and capability.

1.2 Background

A variety of events can cause the need for evacuation. In the City of Rancho Cucamonga, the most likely hazards include:

- Wildfire
- Flood
- Geologic and Seismic, and
- Human-Caused

These key hazards are described in detail below.

1.2.1 Wildfire Hazards

The most common natural hazard in California is a wildfire. These fires can burn large areas of undeveloped or natural land in a short amount of time. They often begin as smaller fires caused by weather related events such lightning strikes and arcing or downed power lines during high winds or a seismic event. They are also caused by intentional, careless, or accidental human behavior such as unattended campfires, discarded smoking materials, vehicle fires, and even arson. During critical fire weather conditions of low humidity, high heat, and sustained winds, small fires may rapidly expand in size. The recent trend toward more prolonged periods of drought increases the likelihood of a wildfire occurring.

Typically, wildfires pose minimal threat to people and buildings in urban areas. However, in more suburban and rural areas where there is human encroachment into natural areas or where large portions of land are designated as conservation or preservation areas, the likelihood that wildfires will cause injuries, death, and/or property damage increases. As such, there is a need to effectively evacuate people from the hazard area to get them out of harm's way before and during a wildfire event.

While Rancho Cucamonga is primarily an urban environment, its geographical location and proximity to the Angeles and San Bernardino National Forests creates a wildland-urban interface. The Federal Emergency Management Agency (FEMA) defines the wildland-urban interface as a transition zone between human development and unoccupied land with naturally occurring vegetation. "It is the line, area or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels." [1] Having a wildland-urban interface increases a community's risk of and susceptibility to wildfires. The presence of wildland-urban interface on the north, east, and west edges of the City, coupled with the high velocity, warm and arid desert winds (Santa Ana Winds) that occur in the fall, increase the opportunity for wildfires to ignite, grow, and spread into the City.

Figure 1 depicts the Rancho Cucamonga Wildland Urban Interface Fire Area (WUIFA). This area includes Cal FIRE Very High Fire Hazard Severity Zones within the City's Sphere of Influence (State Responsibility Area), the City's Local Responsibility Area, and other areas potentially threatened by wildfires based on

[1] FEMA. (2021). US Fire Administration. *What is the WUI?*

historical fire activity and prevalent vegetation types. Properties located within these areas must adhere to State and Rancho Cucamonga Fire Protection District wildfire requirements. **Figure 2** displays the historic fire perimeters that have encroached into the City of Ranch Cucamonga since the 1960s.

1.2.2 Flood Hazards

Floods in and near Rancho Cucamonga are classified as inland floods. They are generally caused naturally by steady rainfall over a longer period that saturates the soil or by short, intense periods of high-volume rainfall or rapid snowmelt that generates more water than the soil can absorb. Flooding can also result from failures of flood management infrastructure such as dam failures and flood management channels blocked by debris. Drought conditions can increase the likelihood of flooding as surfaces that normally absorb water dry out because of the drought and become less permeable.[2]

Rancho Cucamonga has a long history of flooding and is especially vulnerable during the winter storm season. Over the past several decades, the City and San Bernardino County have invested in flood control infrastructure to reduce flood impacts. Without many of these facilities larger portions of the community would experience flooding and erosion. These investments have changed areas for potential flood within the City. **Figure 3** identifies the significant flood areas of concern, which include both 100-year[1] and 500-year[2] floodplains. **Figure 4** identifies the City areas where inundation could occur if a flood control facility fails, causing downstream impacts.

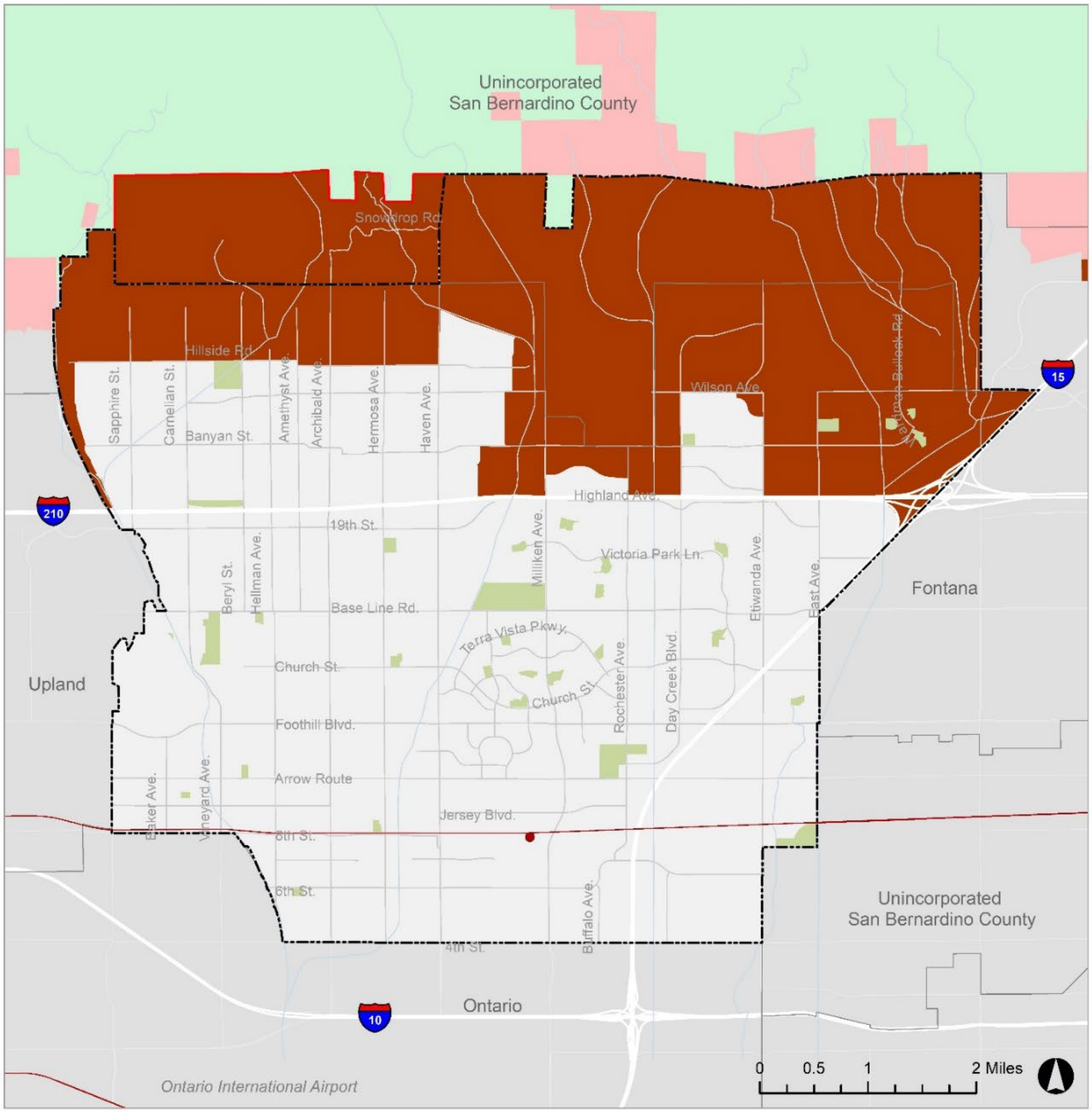
1.2.3 Geologic and Seismic Hazards

Rancho Cucamonga is susceptible to geologic and seismic hazards. Seismic hazards can be categorizedas primary or secondary, as indicated below. *Primary Seismic Hazards* refer to seismic shaking and fault rupture and are shown on **Figure 5**. *Secondary Seismic Hazards*, shown on **Figure 6**, refer to liquefactionand earthquake-induced landslides. Since the occurrence of an earthquake is unpredictable and the effects are realized almost immediately, it is impossible to plan or implement an evacuation prior to a primary seismic hazard event. Rather, evacuations will be associated with hazards and risks produced by the shaking and fault rupture.

Seismic hazard events that are significant enough to require evacuation will generally be large events that affect the entire region. As such, mass evacuations of people to places out of harm's way, such as the evacuations undertaken during wildfire and flood events, are not possible. Evacuations associated with seismic hazards are likely to be very localized where people are moved out of areas that are vulnerable to or experiencing a secondary event due to the earthquake. Such secondary events include an imminent landslide that could result from an aftershock, active flooding due to ruptured water mains, potential flooding due to damage to flood management infrastructure, and potential for fire or explosion due to ruptured natural gas lines.

[2] Earth Networks. (2021). *What is a Flood?* https://www.earthnetworks.com/flooding/

Figure 1: Wildland Urban Interface Area (WUIFA)



Raimi + Associates, 2020 | Sources: City of Rancho Cucamonga, 2020; SCAG, 2020; County of San Bernardino, 2020; Cal FIRE, 2007

PLAN RC

Fire Hazard Severity Zones

- Rancho Cucamonga Wildland Urban Interface Fire Area
- Cal Fire State Responsibility Areas
- National Forest (Federal Responsibility Area)

- Rancho Cucamonga City Limits
- Sphere of Influence
- Adjacent City Limits
- Parks
- Waterways
- Metrolink Station
- Metrolink

Figure 2: Historic Wildfire Perimeters

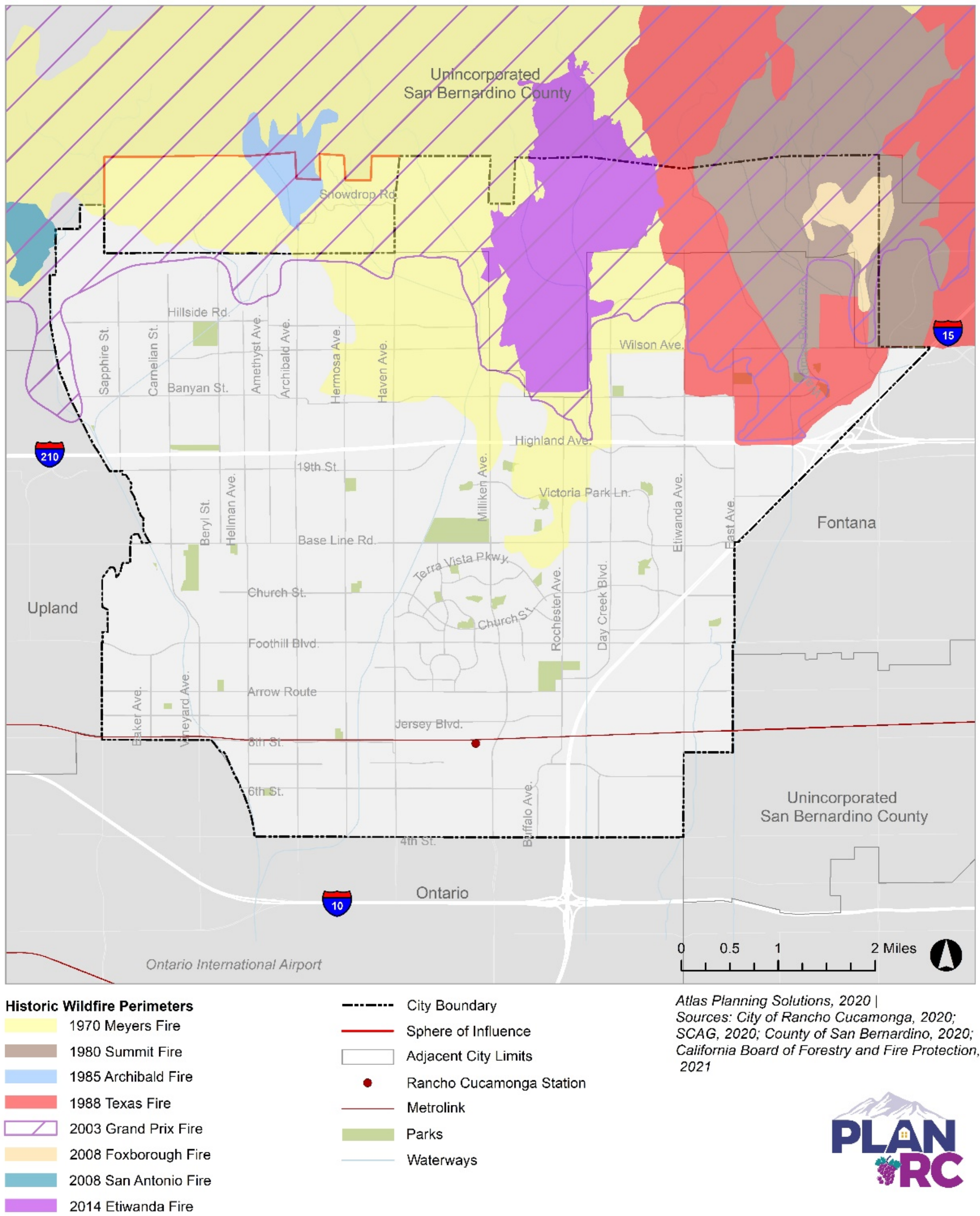
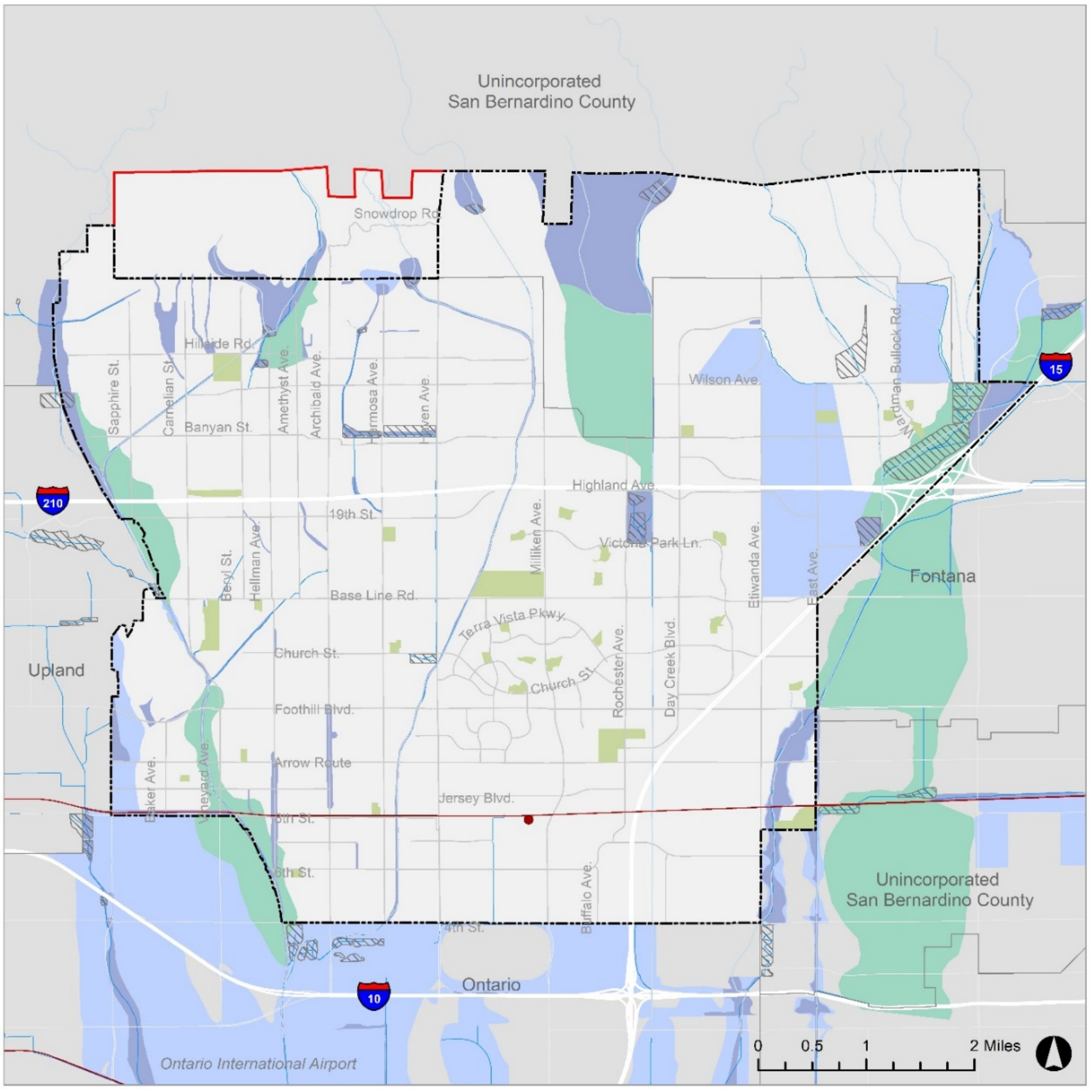


Figure 3: FEMA Flood Hazard Zones



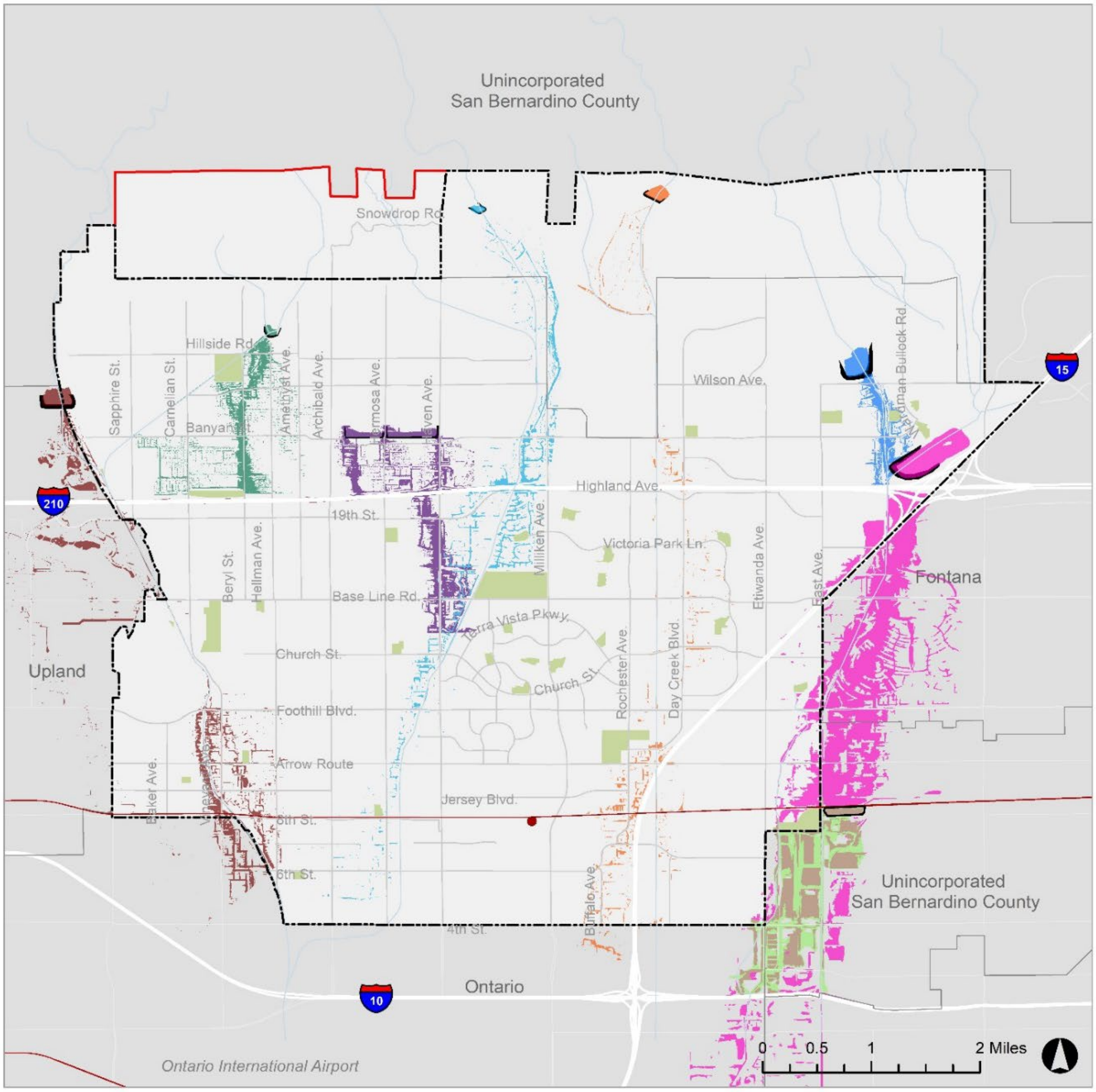
Raimi + Associates, 2020 | Sources: City of Rancho Cucamonga, 2020; SCAG, 2020; County of San Bernardino, 2020; FEMA 2019

PLAN RC

Flood Hazard Zones

- Channels
- Basins and Dams
- 100 Year Flood Zone
- 500 Year Flood Zone
- 500 Year Flood Zone (Protected By Levee)
- Rancho Cucamonga City Limits
- Sphere of Influence
- Adjacent City Limits
- Parks
- Waterways
- Metrolink Station
- Metrolink

Figure 4: Dam Inundation Zones in Rancho Cucamonga



Raimi + Associates, 2020 | Sources: City of Rancho Cucamonga, 2020; SCAG, 2020; County of San Bernardino, 2020; California Department of Water Resources, 2020.

Dam Inundation Zones

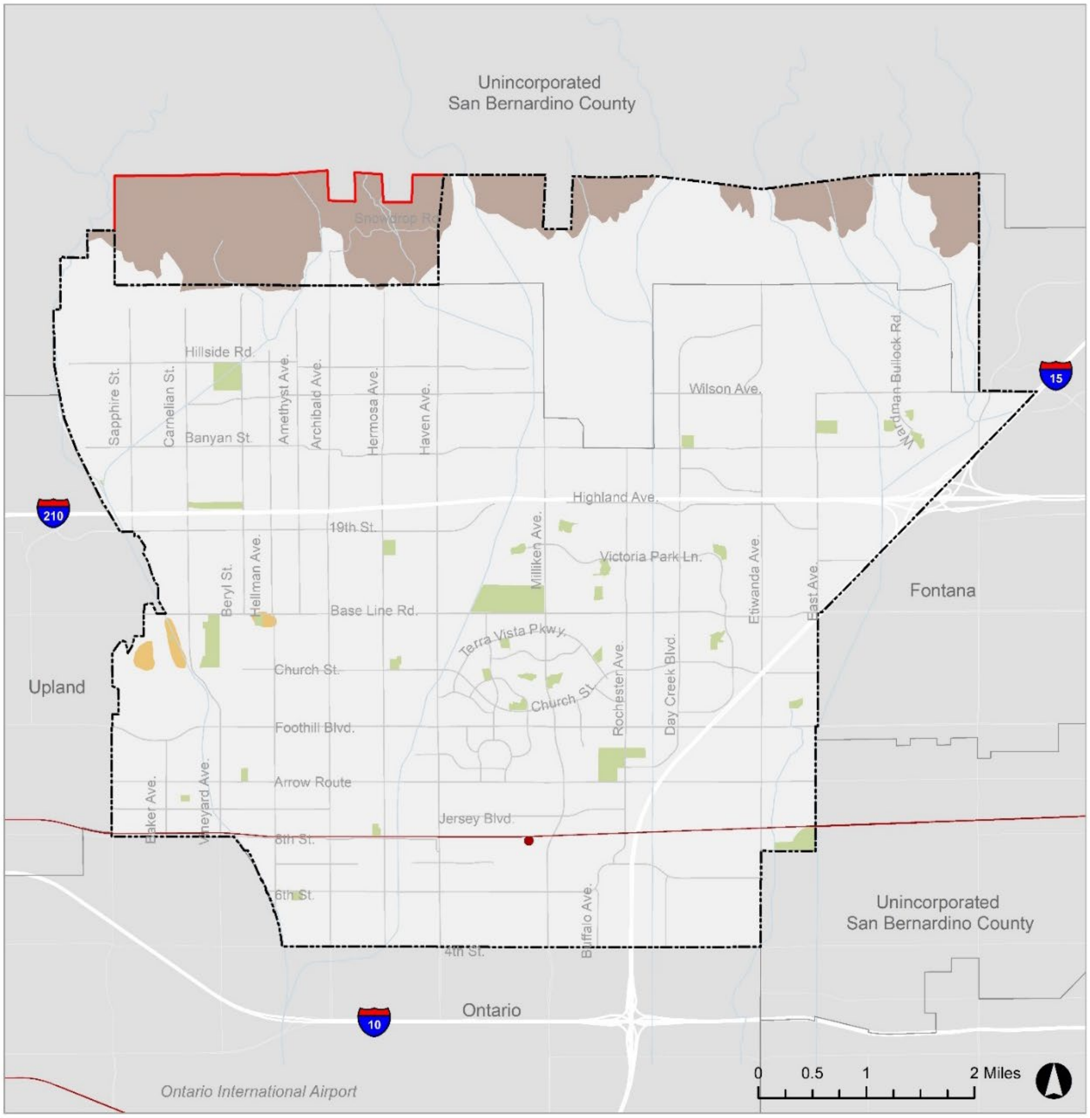
- Hickory Basin
- San Sevaine #5
- Etiwanda Basin
- Demens Creek
- Day Creek
- Deer Canyon
- Alta Loma Basins #1 & #2
- Cucamonga Creek

- Rancho Cucamonga City Limits
- Sphere of Influence
- Adjacent City Limits
- Parks
- Waterways
- Metrolink Station
- Metrolink

Figure 5: Rancho Cucamonga Special Study Fault Zones

Raimi + Associates, 2020 | Sources: City of Rancho Cucamonga, 2020; SCAG, 2020; County of San Bernardino, 2020.

Figure 6: Potential Liquefaction and Earthquake-Induced Landslides



Raimi + Associates, 2020 | Sources: City of Rancho Cucamonga, 2020; SCAG, 2020; County of San Bernardino, 2020; California Geological Survey Seismic Hazards Mapping Program, 2020.

PLAN RC

Secondary Seismic Hazards

- Earthquake-Induced Landslide Hazard Zone
- Liquefaction Hazard Zone

- Rancho Cucamonga City Limits
- Sphere of Influence
- Adjacent City Limits
- Parks
- Waterways
- Metrolink Station
- Metrolink

1.2.4 Human-Caused Hazards

Rancho Cucamonga is vulnerable to human-caused hazard events associated with transportation, industrial operations, and utility infrastructure. These events could necessitate an evacuation. Incidents related to air transportation could occur in the southern or northwestern portions of the City due to their proximity to Ontario International Airport and Cable Airport respectively. Transportation incidents that occur on interstate freeways and state highways, as well as rail lines, could affect large areas of the City. Incidents that result from industrial accidents or sabotage, or incidents caused by utility infrastructure failures, could require the evacuation of whole neighborhoods or larger areas of the City. The magnitude of the event and the number of people placed at risk will determine the scope and scale of evacuation.

1.3 Legislative Requirements

Recent legislation, including SB 99 and AB 747, has been passed by the state to require additional review ofaccessibility and evacuation routes when specific elements within the General Plan or other emergency planning documents (such as a Hazard Mitigation Plan) are completed or updated by a local agency. These two legislative requirements, described below, are specific to the transportation system:

- ***SB 99 (2019) -*** Requires review and update of the safety element to include information to identify residential developments in hazard areas that do not have at least two emergency evacuation routes. In essence, this legislation assists in identifying neighborhoods and households within a hazard area that havelimited accessibility. Even though this legislative requirement applies specifically to designated hazard areas, this evacuation assessment has identified all residential developments in the City, including those that are not in a designated hazard area, that have only one emergency evacuation route. This is intended to assist the City with identifying opportunities to improve connectivity and evacuation capacity generally.
- ***AB 747 (2019) -*** Requires that the safety element be reviewed and updated to identify evacuation routes and their capacity, safety, and viability under a range of emergency scenarios. This will be a requirement for all safety elements or updates to hazard mitigation plans completed after January of 2022. Although not required at the time of the 2021 General Plan Update, City and Fire District officials felt that an evacuation assessment that included the level of detail required by AB 747 would be an important complement to all the other planning documents that were either updated or created in 2021.

1.4 Report Organization

The remainder of this report summarizes the following:

- Approach and Methodology
- SB 99 Accessibility Assessment
- Emergency Evacuation Assessment
- Observations and Behavioral Considerations
- Conclusions and Recommendations

2. Approach and Methodology

This analysis is focused on evacuation activities during an evacuation event. As such, **Exhibit A** presents the process that was utilized to assist in addressing key issues during an evacuation event:

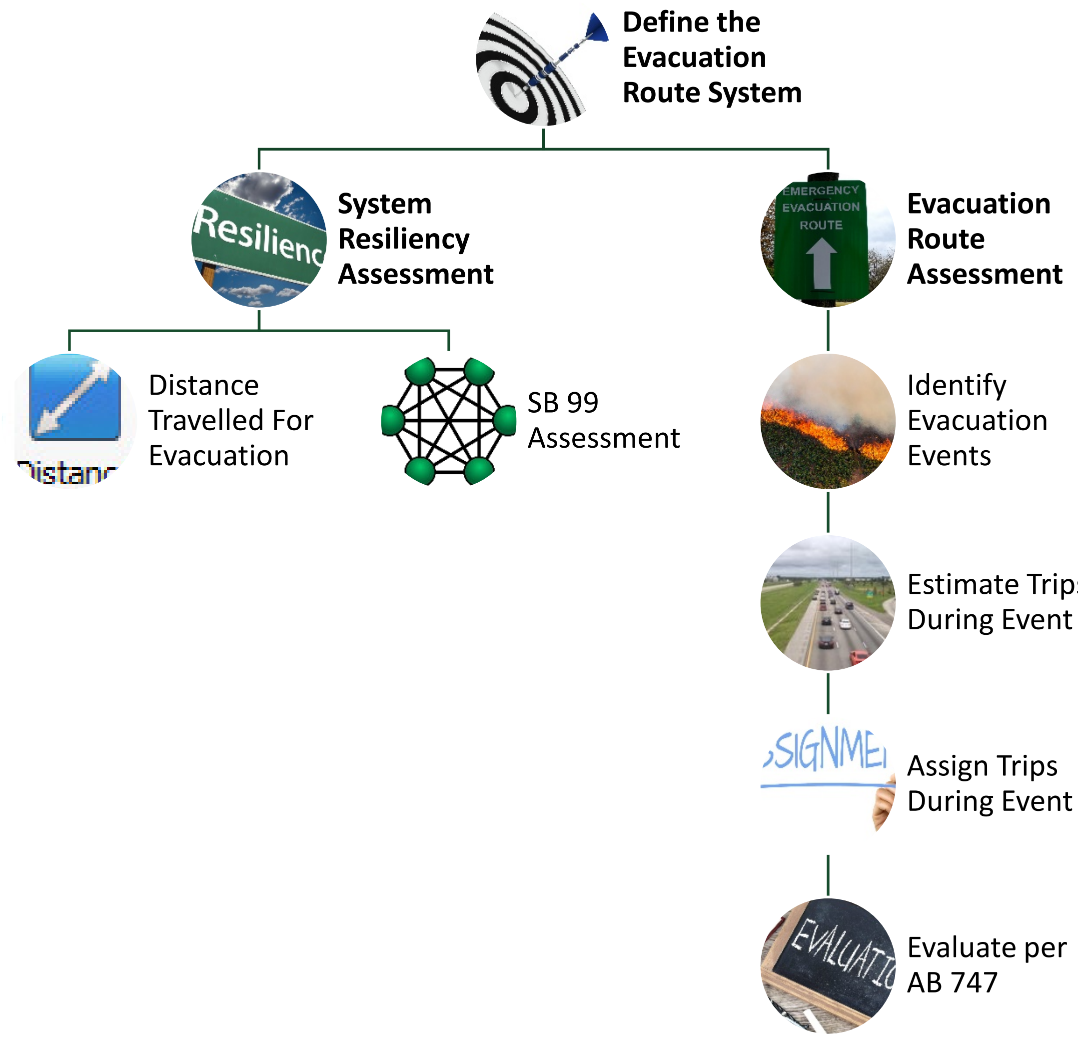


Exhibit A – Evacuation Study Process

These key considerations are described in detail below.

2.1 Define the Evacuation Route System

The Resilient IE project was developed in collaboration between the Western Riverside Council of Governments (WRCOG) and the San Bernardino County Transportation Authority (SBCTA) with funding from Caltrans. Resilient IE works to support regional and local efforts to prepare for and mitigate risks associated with climate adaptation on the region's transportation infrastructure with five primary project components:

1) A newly established regional climate collaborative, the Inland Southern California Climate Collaborative (ISC3);
2) Subregional vulnerability assessments and adaptation strategies;
3) City-level, climate-related transportation hazards and evacuation maps;
4) A regionally-tailored climate-resilient transportation infrastructure guidebook; and
5) A template regional climate adaptation and resiliency element.

As part of the Resilient IE project, initial evacuation routes were developed for the whole WRCOG and SBCTA region. The Resilient IE routes can be accessed at: https://bit.ly/2Q0OgBi and are generally shownin **Exhibit B** as the purple routes. The green, yellow, orange, and red shading represents the number of extreme heat days experienced per year (green representing 27-30 extreme heat days per year, the red representing 45-50 extreme heat days per year).

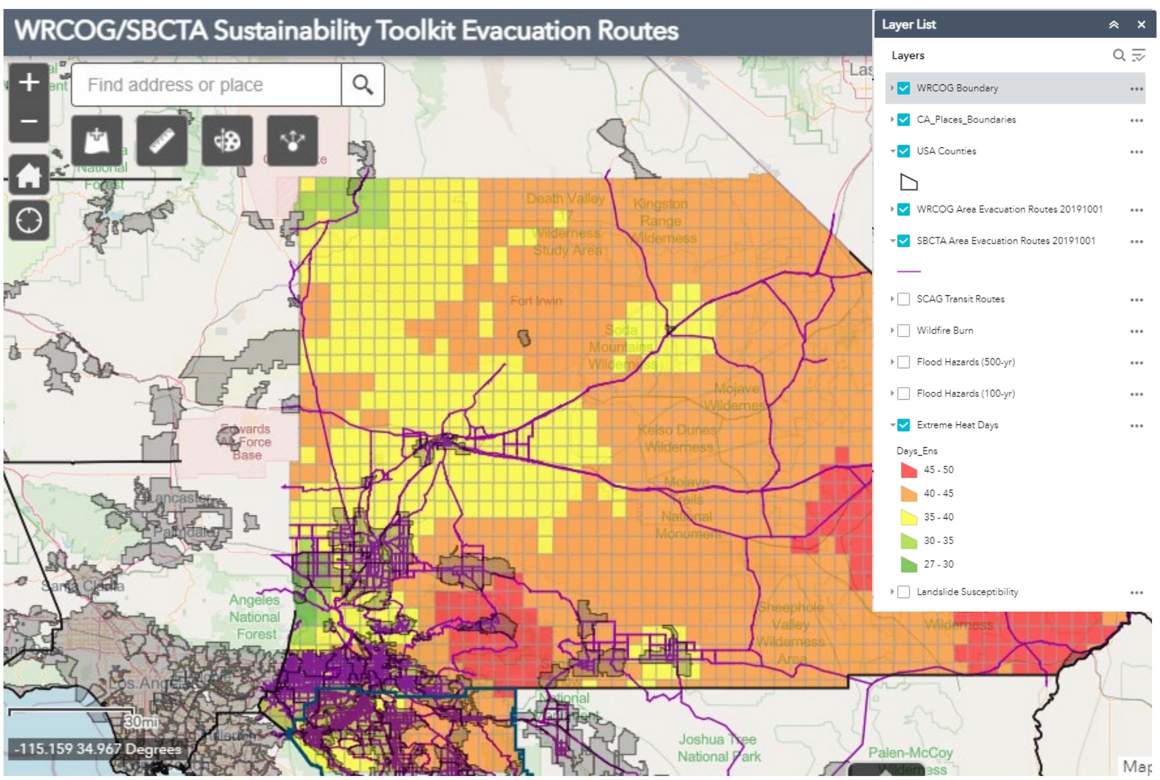


Exhibit B – Resilient IE Evacuation Route Toolkit

The Resilient IE evacuation routes were used as a starting point for engaging City staff in discussions about defining emergency evacuation routes. Collaborative discussions with staff from the City's Engineering and Planning Departments along with staff from the Fire District refined the preferred evacuation routes in the City. The Fire District's Emergency Management staff also identified likely evacuation shelters that would be utilized during an event. **Figure 7** shows the City's preferred evacuation routes and shelter locations, which are the primary routes assessed as part of the analysis. However, since each evacuation event will have different surrounding circumstances, alternative routes may be selected during the event by the emergency response command staff to provide the safest, most effective routes possible.

2.2 System Resiliency Assessment

To assess system resiliency, the analysis uses two specific approaches. The first looked at the travel distance required to get from evacuation areas to safe locations (evacuation shelters or external areas of the City. This was completed using GIS shortest route analysis and helps to identify areas where accessibility is limited or long-distance travel is required. This assessment used the Traffic Analysis Zones (TAZs) incorporated into the San Bernardino Traffic Analysis Model (SBTAM) developed by SBCTA and shown on **Exhibit C**. A TAZ is a geographic shape that parcels are aggregated into. TAZs are used to organize data before assigning it to the transportation system. The TAZ geography for the City is detailed enough to generally represent "neighborhoods", which is an appropriate scale for this planning level assessment. The socio-economic data by TAZ is attached to this document.

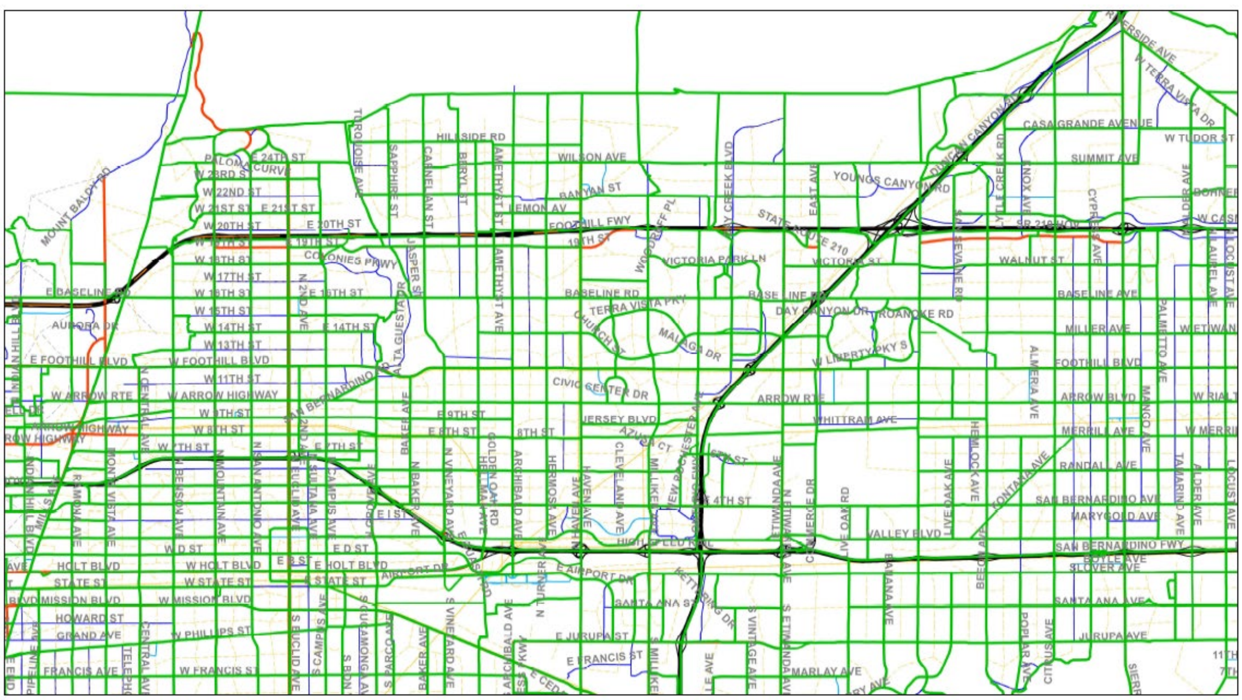


Exhibit C – TAZs in Rancho Cucamonga

In addition to the accessibility assessment, connectivity was also evaluated for consistency with requirements outlined in SB 99. This assessment focuses on the hazardous fire areas shown on **Figure 1.** Effectively, this assessment identifies parcels that have only one point of access; typically, because they are located atthe end of a long, dead-end road that has limited redundancy for accessibility. This assessment was completed using GIS and the City's roadway system.

2.3 Evacuation Route Assessment

AB 747 requires that the capacity of the evacuation system be assessed. That can be completed in different ways, from identifying the hourly theoretical capacity of the system to full simulation of theCity's roadway system to assesses how traffic will redistribute to alternative routes during an evacuation and identification of congested locations in the event of an evacuation.

For this assessment, a robust assessment of the evacuation system within the City was completed, This assessment included the development of Fehr & Peers' EVAC+ tool.

2.3.1 Identify Evacuation Events

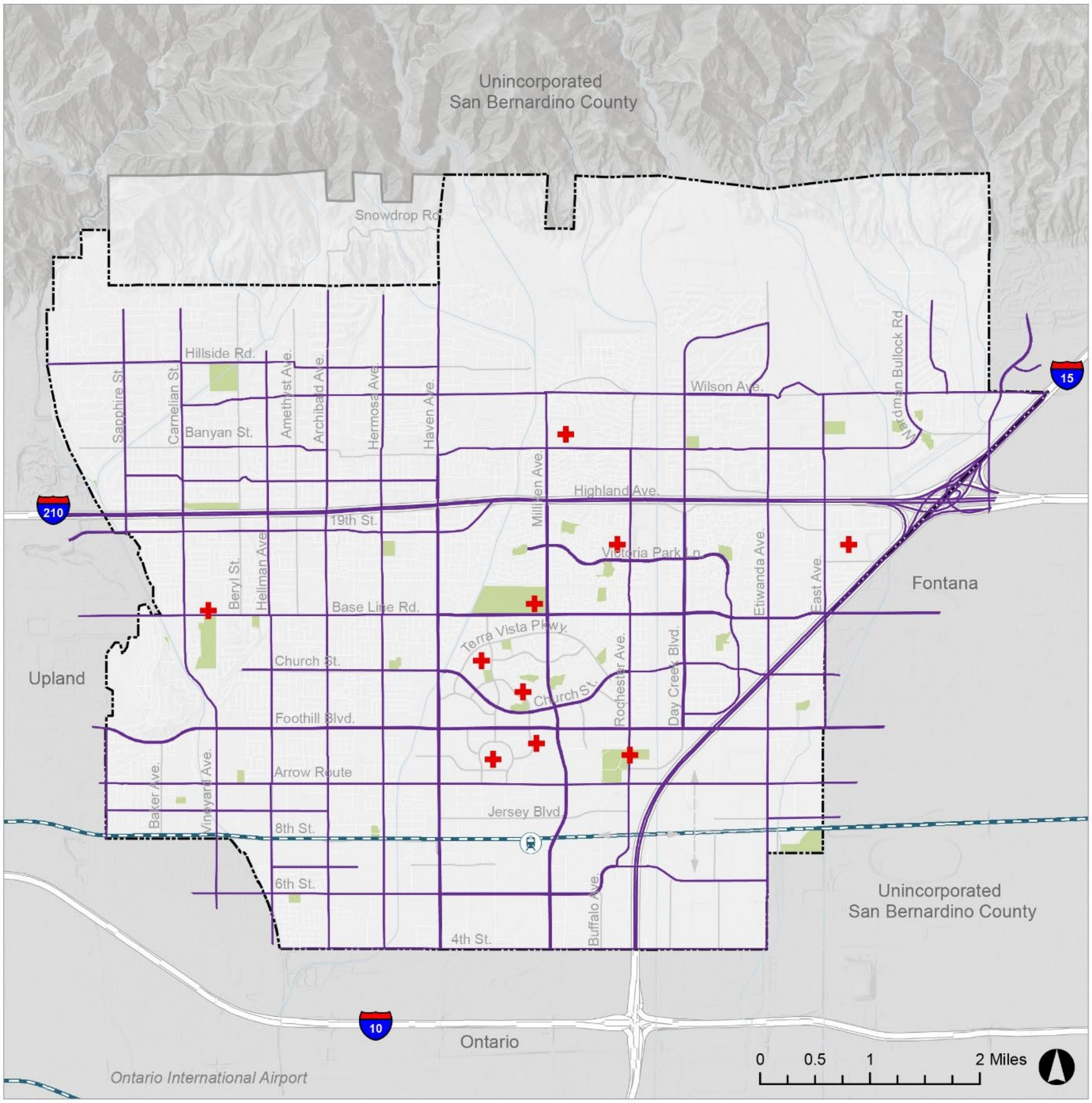
There are a wide range of potential events that could cause the need for evacuation within the City. Many of these events are described and classified in Chapter 1; however, to test the evacuation system through EVAC+, a set number of evacuation events were defined for the technical assessment. **Table 1** includes the five key evacuation scenarios developed with City staff as part of this assessment. For this assessment, an evacuation order occurring at 6:00 AM is utilized for all scenarios. Assuming this start time allows for most residents to still be at home, but also includes traffic from the morning commute window on the roadways. This provides a more conservative evacuation route assessment compared to the middle of the night (when there is limited commute traffic on the network) or middle of the day assessment (when fewer residents are at home to evacuate).

2.3.2 Estimate Trips During an Evacuation Event

Like the accessibility assessment, the TAZ geographies were used to represent neighborhoods and estimate the number of trips per household or trips per employee. Table 1 information related to vehicle trips was informed by the existing land use and Socio-Economic Data (SED) in each TAZ. The SED includesa variety of information based on census data, including persons per household, number of employees, auto-ownership information, population, and other factors that could affect the number of vehicles per household used during an evacuation event.

It should also be noted that trip-making behavior changes depending on the time of day. For example, an evacuation event during the middle of the night would create an evacuation trip for most that wouldbegin at their residence and end at either the evacuation center or somewhere external to the City.

Figure 7: Evacuation Routes and Shelters



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- Evacuation Routes
- Evacuation Shelters
- Metrolink Station
- Metrolink
- Rancho Cucamonga City Limits
- Sphere of Influence
- Parks
- Waterways

Table 1: Evacuation Scenario Summary

Criteria	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Description	A wildfire that starts east of the City during Santa Ana wind conditions and takes 1-3 full days to arrive in the City	A wildfire that starts west of the City with onshore winds and takes 6-24 hours to arrive in the City	A fire that starts in the City during Santa Ana wind conditions	A major earthquake that causes at least several of the bridges across the SR-210 freeway to collapse between Euclid Avenue and I-15	Heavy rain or rapid snow melt that results in large scale flooding and flash flooding
TAZ Location	In the northeast part of the City, to the north of SR-210 and to the east of Milliken Avenue	In the northwest part of the City, to the north of SR-210 and to the west of Milliken Avenue	North of SR-210	Citywide. Scenario is run by closing off 50% of the bridges across SR-210	North of SR-210
Population	16,236	30,468	46,704	176,000	46,704
Household (HH)	4,496	9,495	13,991	56,603	13,991
Employment	2,525	5,035	7,560	88,144	7,560
Total Vehicle Trips	8,667	17,940	26,596	99,126	26,596
Vehicle Trips/HH	1.93	1.89	1.90	1.75	1.90

Source: Fehr & Peers, 2021.
Note: No work or school return trips are included, as those trips have not yet been made when the evacuation occurs.

Conversely, an event that occurred during the middle of the day (when children are in school) could add trips (a trip to pick up children at school, a trip home to pick up pets or belongings, and then a trip to the ultimate evacuation destination). Additionally, route congestion changes as background trips on the transportation network occur based on the time of day.

This assessment assumes an evacuation event during the morning commute period to maximize population evacuating from primarily residential neighborhoods but also includes significant commute background traffic on the area roadways associated with typical commute travel patterns.

2.3.3 Trip Assignment

Trips were assigned using the EVAC+ tool. The EVAC+ tool relies on the City's TAZs and existing roadway network extracted from the SBTAM model. The tool then references trip tables for areas outside of the City to form the "background" traffic estimates on the roadways not affected during an evacuation event. Areas affected by the evacuation event are then processed through the EVAC+ tool trip estimator to estimate the number and sequencing of trips that occur due to the event.

The sub-area extracted network and new trip tables are then input into a Dynamic Traffic Assignment (DTA) model. A DTA model estimates traffic and levels of congestion on 15-minute intervals and, as linkcongestion builds (roads fill with cars), it dynamically reassigns traffic to less congested routes. This is a more accurate way of estimating trip assignment and identifying congested locations on the network thatshould be considered during an evacuation event.

The EVAC+ tool processes are outlined as **Exhibit D** and **Exhibit E.**

2.3.4 Additional Consideration

The trips assigned to the transportation system are estimated based on household and employer demographics (e.g. number of people per household, vehicles owned per household, and mode assumedto/from work) and are useful to assist with the amount of time needed during an evacuation event.

However, one component that is not addressed in the roadway capacity assessment is facilitating evacuation of people who do not have access to a vehicle. Although not completely assessed under this analysis, this is a critical consideration for emergency personnel to ensure that compete evacuation is provided. Further research into possible means of evacuating people who do not have access to a vehicle is recommended. Options for assisting with evacuation in such situations could include, but not be limited to, the following:

- Neighborhood "buddy" program to link people needing assistance with people willing to assist
- Coordination with Omnitrans to provide transit assistance
- Coordination with local school districts to provide school bus access
- Partnership with Transportation Network Companies (TNCs, like Uber and Lyft) to provide reduced-rate access
- Increased coordination with emergency services personnel to assist with accessibility

City of Rancho Cucamonga Evacuation Tool Design

0 Tool Objective

Estimate evacuation travel time and identify roadway bottleneck.

Note: this tool will not include the estimation of the time people need to prepare for the evacuation.

1 Tool Coverage Area:

Entire city area, and

Neighboring area capturing the major exit points or network bottleneck (e.g., freeway exits).

2 Planning Scenarios:

General Setting:

Natural disaster, including, but not limited to: fire, flood, and earthquake, or any other requiring evacuation

Evacuation Area for each scenario:

Citywide, or

Neighborhood (selected TAZs)

Demand Scenarios:

Scenario #1: everyone is at home when the evacuation order is issued in the night time.

Everyone needs to be evaluated.

Number of cars (=min(autos, drivers)) on the roads

Designated destinations, such as designated shelters or other suitable indoor areas.

Scenario #2: sometime in the daytime, when people already be at school or work location.

Everyone (workers and students) has to go back home first. If in the daytime, not only the residents, but also:

Visitors

Employees working in the evacuation zones Students attending schools in the evacuation zones Not consider resident shopping for evacuation.

Assumptions:

Dependents are the adults' responsibility to take to the evacuation shelter. Schools do not take students to the shelter.

Everyone leaves around the same time.

Supply Scenarios:

Scenario #1: normal roadway condition

Scenario #2: reduced roadway capacity due to smoke, etc. Scenario #3: contra-flow

Planning Scenarios:

Selected combinations of demand and supply scenarios

3 Evacuation Trip Characteristics Data Requirement

Land use characteristics:

number of households, population, workers, drivers, children, car ownership, employment, school enrollment

Destinations:

local hotel, shelter, and the City's major exits

Distribution pattern:

from big data or other source(s), if available.

Roadway characteristics:

Terrain (slope), area type, free-flow speed

Related City plans (optional):

Emergency transit service plan for evacuation only, for the area with 0-auto households Traffic management plan: signal timing to reflect intersection delay

Evacuation of special facilities: hospitals, nursery homes, animal shelters

4 Evacuation Modeling >>>

Three Modules:

TransCAD Subarea Module & Evacuation Module & DTA Module

Subarea model boundary (see "Tool Coverage Area" above)

TAZ structure: revisit based on the evacuation roadways within the City

5 DTA Framework

Import network and trip tables out of the subarea module and the evacuation module. High-level validation, if needed

DTA Platform

TravelCast/VISUM:

Dynamic Assignment

Double check VISUM's DTA function to see if it satisfies the needs of this project.

Static Assignment

Generate vehicle trips for designated time interval

Not allow traffic onto the links with V/C>1; allow unassigned trips to the trip table of the next interval Consider intersection delay with the inputs of turning capacity & signal timing

Other platforms, e.g., Cube Avenue, Dynameq (INRO), DynusT (Metropia), TransDNA (Caliper), FHWA DTA software

Given the size of the subarea, microsimulation software may not fit due to the level of effort to subarea network coding

Exhibit D – EVAC+ Model Framework

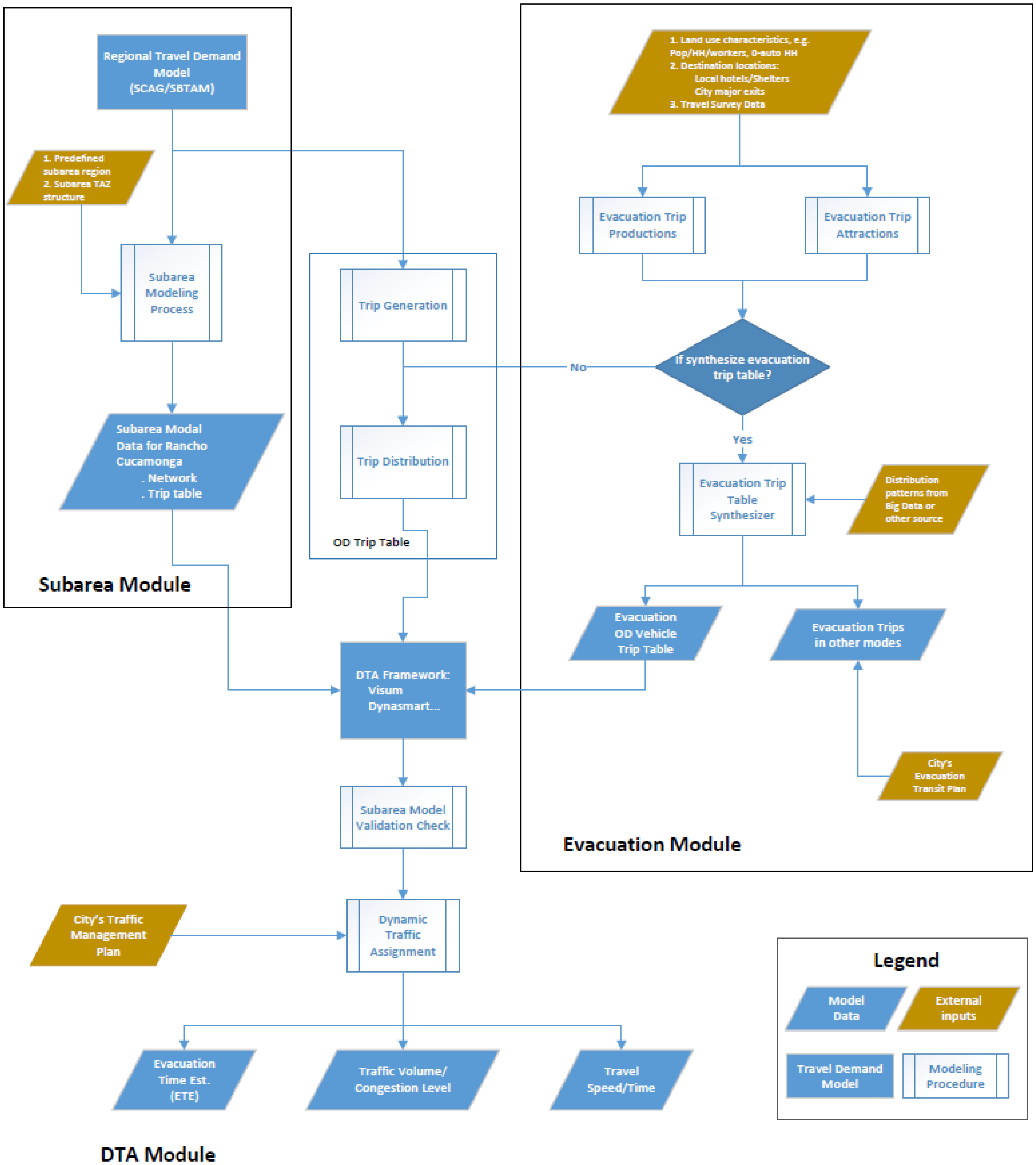


Exhibit E – EVAC+ Dynamic Traffic Assignment Module

3. SB 99 Accessibility Assessment

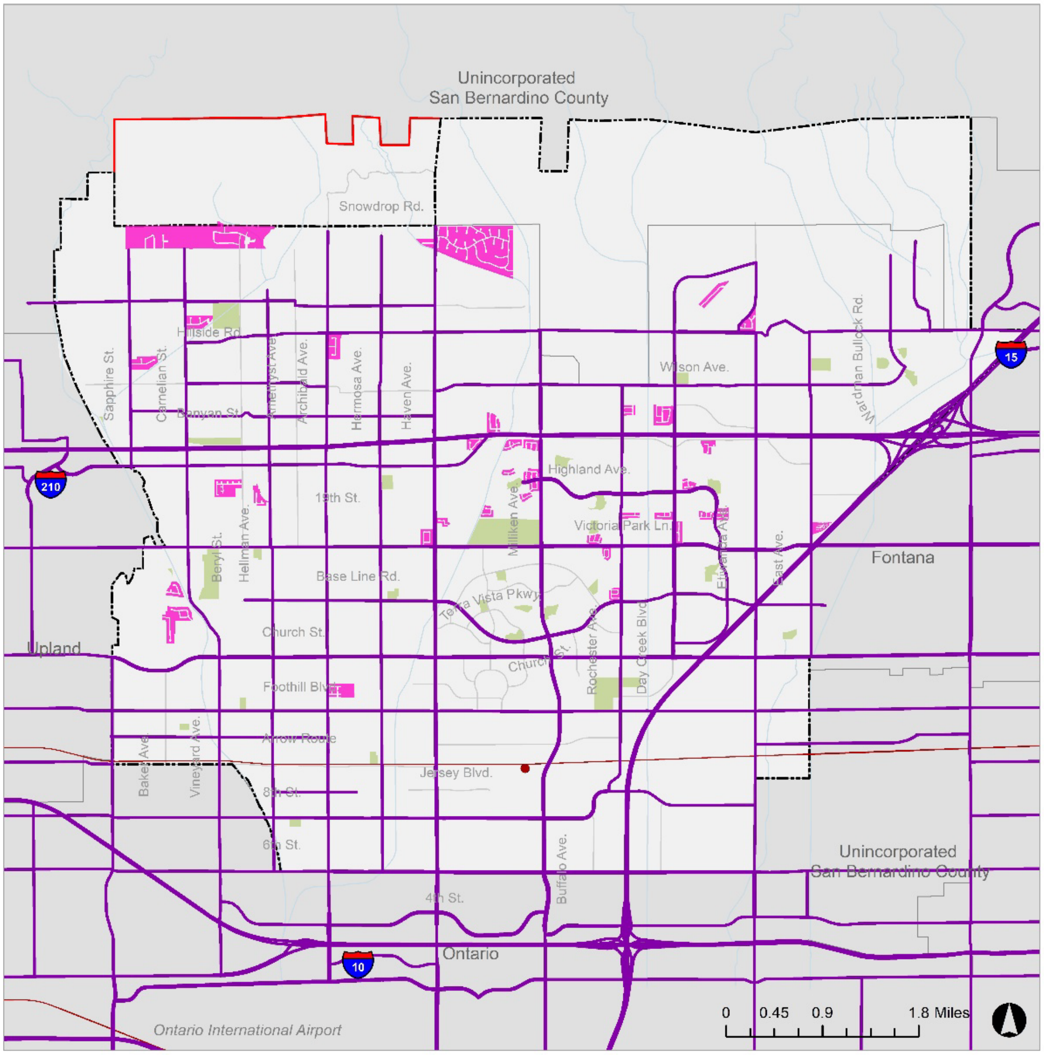
SB 99 requires an accessibility assessment of the transportation network. Specifically, it requires review and update of the safety element to include information to identify residential developments in hazard areas that do not have at least two emergency evacuation routes. In essence, this legislation assists in identifying and recognizing housing in hazard areas that could be vulnerable during an evacuation event if their only point of access is compromised or cut off during the event.

Although identification of such properties is useful for emergency planning purposes, it is also beneficial to look at the resiliency of the transportation network. For example, there are potential risks associated with evacuation events when neighborhoods have further distances to travel to get to either an evacuation shelter or outside of the City as longer distances increase evacuation time, burden facilities more, and increase risks if the event closes a specific travel route. Given these considerations, this evacuation assessment identifies all neighborhoods in the City that have just one emergency evacuation route. This information can be helpful, especially during a General Plan update, with identifying opportunities for street network improvements that would improve connectivity during an evacuation event.

Figure 8 identifies the parcels within the City that have only one point of access. This includes parcels in hazard areas that are required by SB 99 (2019) legislation to be identified in the General Plan. As of April 2021, the required guidance for conducting this analysis has not been released by Cal Fire. Based on informal consultation with this state agency, the mapping in Figure 8 depicts locations within the City where 30 or more developed parcels could experience evacuation challenges resulting from only one point of ingress/egress to the City's transportation network. The analysis indicates the following:

- Approximately 35 locations within the City have only one point of access
- 18 of those locations are within a designated dam inundation hazard area
- Seven of those locations are within the wildland urban interface (WUI) area and are required by SB 99 (2019) to be reported in the General Plan.

Figure 8: SB-99 Parcel Identification



Raimi + Associates, 2020 | Sources: City of Rancho Cucamonga, 2020; SCAG, 2020; County of San Bernardino, 2020.

Residential Neighborhoods Evacuation Analysis

- Evacuation_Routes
- SB 99 Parcels with One Ingress/Egress
- Rancho Cucamonga City Limits
- Sphere of Influence
- Adjacent City Limits
- Parks
- Waterways
- Metrolink Station
- Metrolink

Figure 9: Distance from Neighborhoods (TAZs) to the City Boundary

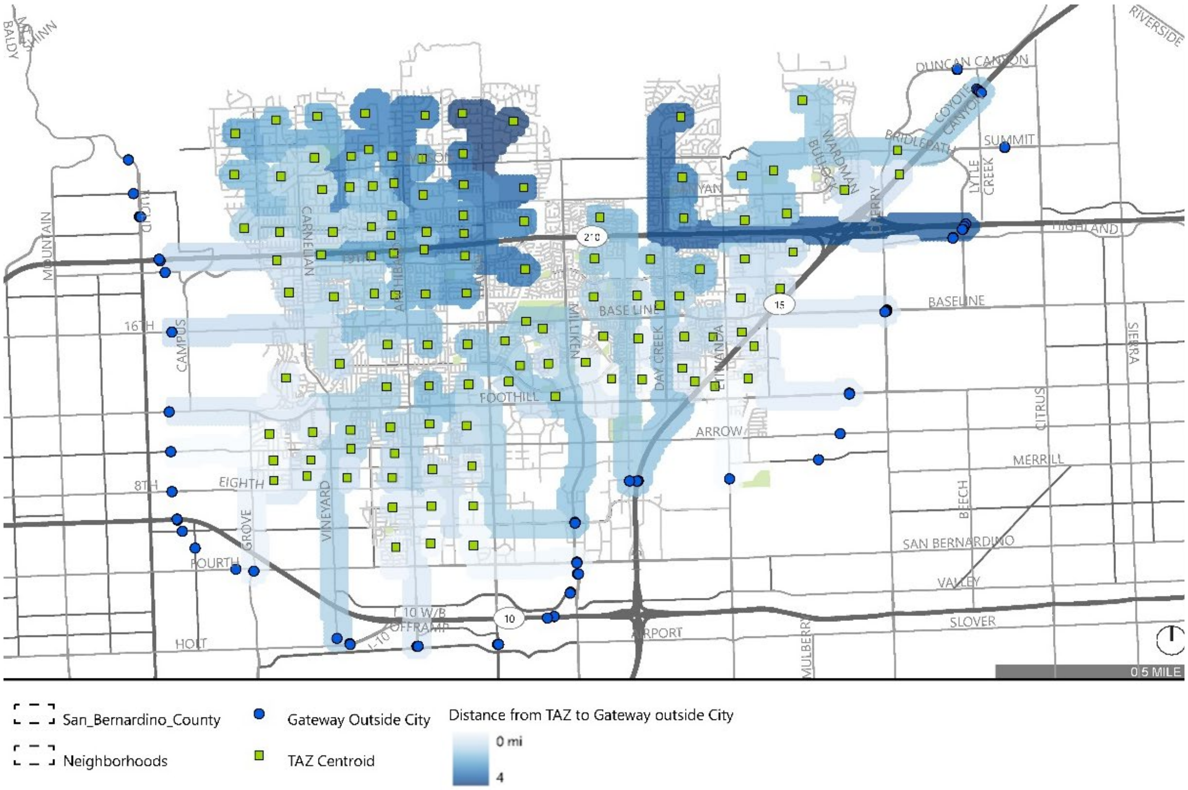
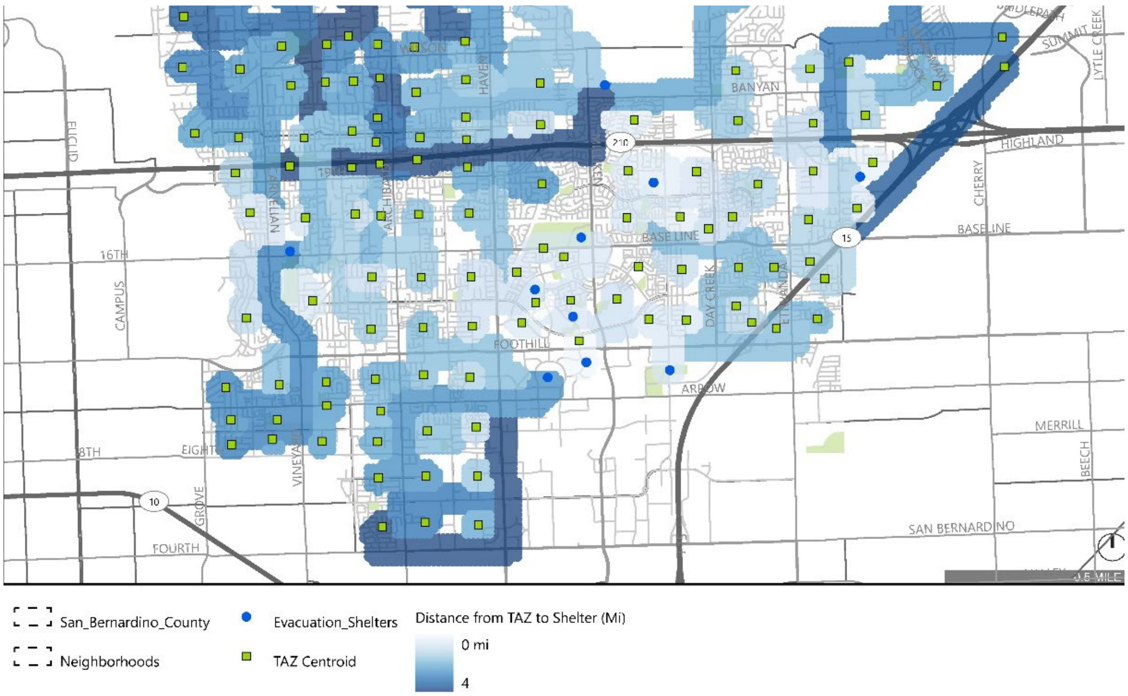


Figure 10: Distance from Neighborhoods (TAZs) to Evacuation Shelters



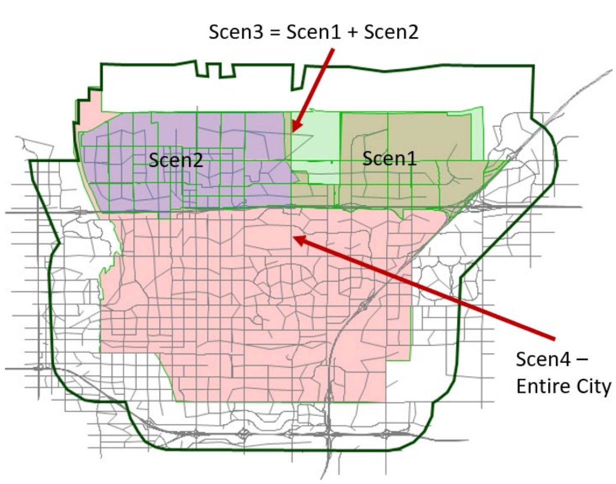
4. Emergency Evacuation Assessment

The EVAC+ tool was utilized to evaluate the estimated travel time for five evacuation scenarios. The model uses inputs from the travel demand model for a typical day and modifies the travel demand and transportation network to represent the evacuation condition. After determining the evacuation travel demand and associated transportation network, a dynamic traffic assignment with 15-minute intervals is performed to reflect congestion and departure time to estimate travel time. Note that this model does not include estimating the time people need to prepare for the evacuation.

As previously shown in **Table 1**, the following five evacuation scenarios were evaluated within this assessment. These scenarios and their assumed evacuation areas are depicted on **Figure 11**.

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
A wildfire that starts east of the City during Santa Ana wind conditions and takes 1-3 full days to arrive in the City. The assumed evacuation area is shaded as Scen1 on Figure 11.	A wildfire that starts west of the City with onshore winds and takes 6-24 hours to arrive in the City. The evacuation area is shaded as Scen2 on Figure 11.	A fire that starts in the City during Santa Ana wind conditions. The evacuation area includes Scen1 and Scen2 and is shaded in light green on Figure 11.	A major earthquake that causes at least several of the bridges across the SR-210 freeway to collapse between Euclid Avenue and I-15. The evacuation area is Citywide and includes everything inside the green line on Figure 11.	Heavy rain or rapid snow melt that results in large scale flooding and flash flooding. The assumed evacuation area is the same as Scen3 on Figure 11.

Figure 11: Evacuation Scenarios



4.1 Travel Demand and Activity Estimation

The travel demand considers the number of people and automobiles used by those evacuating, the background vehicle traffic, and the type of activities being conducted based on the type and timing of the evacuation event.

4.1.1 Vehicle Travel Demand

The dynamic traffic assignment model only reflects personal vehicle traffic. Due to the nature of this model, travel made by those in publictransit, other shared modes (i.e., vanpool), or walking/biking are not considered. The overall vehicle travel demand was based on the typical travel for each hour of daily activity until the evacuation notice was given. The travel demand for evacuation zones was separated from background traffic not associated with evacuation zones.

4.1.2 Evacuation Traffic

The evacuation traffic consists of traffic generated by residents, employees, students, and visitors of evacuation zones. Depending on the event, the traffic may be evacuating only or may be returning homebefore evacuating, allowing for families to regroup prior to evacuating. The number of vehicle trips depends on the type and time of the event, the number of drivers in the household, and the number of vehicles available.

The number of residents, anticipated vehicle trips per household, and employees in the area were referenced to estimate the number of vehicles that would need to evacuate.

4.1.3 Background Traffic

Background traffic is associated with trips traveling to or from evacuation zones and is taken directly from the travel model for a typical day, then distributed over each hour of the day.

4.1.4 Vehicle Travel Activity

The activity and purpose of travel for evacuation traffic and background traffic vary by type and time of the event. In some cases, the trip destination also changes, especially for travel associated with evacuation zones. The description of evacuation and background travel activity is described below.

4.1.5 Evacuation Departure Time

The departure time leaving the evacuation zones varies by the time and type of the event. For events where ample notice is given or the family unit is already together, less time is needed to prepare for the evacuation. On the other hand, where little notice of an event or when the family unit is not together, the time required to prepare for an evacuation is typically longer as residents need to pack belongings, collecttheir animals, and conduct other coordination before beginning their evacuation trip.

With different evacuation starting times, the impact of the evacuation trips on the roadway conditions will be different. For example, evacuation occurring at nighttime when all household members are at home with no visitors will be different from evacuations occurring when all or part of household members have made their regular trips from or to the evacuation TAZs. For the evacuation scenario testing of this assessment, the starting time for all evacuations was set at 6:00 AM. Return trips are not included in this round of analysis because these types of trips are assumed to be negligible due to the evacuation beginning at 6:00 AM. This represents a worst-case scenario for testing the roadway network as most residents are at home (maximizing demand on the roadway system) while non-evacuated commuters are also beginning to load onto the transportation system.

4.1.6 Evacuation Time Window

The evacuation time window is the time between when the evacuation starts and how many hours the evacuation zones will require to be fully evacuated, based upon the evacuation order. The distribution across the evacuation time window for the five evacuation scenarios is shown in **Table 2**. Although this is the assumed distribution for the EVAC+ model, emergency scenarios are often unpredictable, and driver behavior can be disorderly. Additionally, evacuation events are not linear (e.g., even distribution during the evacuation time period), and it is anticipated that evacuees would vacate at arate that more closely resembles a bell curve from the time that the evacuation order is issued (as shown in **Table 2**). This is consistent with other research on short-notice evacuation events as documented in the *Approach to Modeling Demand and Supply for a Short-Notice Evacuation* (Noh, Chiu, Zheng, Hickman, and Mirchandani, Transportation Research Record 2091) and the *Florida Statewide Hurricane Evacuation Model / TIME* (Roberto Miguel, AICP, December 9, 2015) presentation (although that distribution was for a much longer time period due to advanced warnings of hurricanes).

The capacity assessment of the network also changes the time needed for an evacuation. For example, scenarios where a 2-hour time window is assumed for evacuation (generally representing the time from evacuation order to the time most people begin their trip to leave the area), the total time needed for evacuation can be longer due to time in congestion and total distance traveled into/out of the area.

4.1.7 Evacuation Destination

Trips departing evacuation zones are allocated to shelters (i.e., hotels or large gathering spaces) or model gateways representing the destinations outside of the model area. The capacity of each shelter within the model area and the shelter opportunities represented at the gateways are used to determine the destination of evacuation trips. An iterative process is used to ensure that shelters within the model are not overcapacity. If so, the additional trips are assigned to shelters outside of the model areas representedby the gateways.

Table 3 summarizes the evacuation shelter capacity in Rancho Cucamonga. An evacuation space capacity is assumed as 20 square feet/person.

Table 2: Evacuation Time Distribution Assumptions for Network Stress Testing

Time Interval (AM)	Percent Evacuating in 1-hr	Percent Evacuating in 2-hr
6:00-6:14	13%	1%
6:15-6:29	30%	3%
6:30-6:44	39%	7%
6:45-6:59	14%	12%
7:00-7:14	3%	18%
7:15-7:29	1%	20%
7:30-7:44	--	19%
7:45-7:59	--	14%
8:00-8:14	--	5%
8:15-8:29	--	1%

Source: Fehr & Peers, 2021.

Table 3: Evacuation Shelters and Capacity

Evacuation Shelters	Capacity (Persons)
Abundant Living Family Church	200
Alta Loma High School	n/a
Calvary Faith Center	66
Coyote Canyon Elementary School	300
Etiwanda High School	300
Goldy S. Lewis Community Center	520
Los Osos High School	300
Rancho Cucamonga High School	275
RC Sports Center	525
Ruth Musser Middle School	512

4.1.8 Evacuation Travel

For events with ample notice, when the family unit is together, or a typical daily trip has not been madeyet, the evacuation trip is made directly to the evacuation destination (i.e., shelter or external gateway).

When a typical daily trip has already been made by the resident of an evacuation zone, there may be travel back to the home from their current location to regroup the family before evacuating. Similarly, employees or visitors who have already traveled to an evacuation zone when the evacuation order is given may return home if their home is not in an evacuation zone or will travel to a shelter or out of the model area if their home is also in an evacuation zone.

4.1.9 Background Activity

Trips that do not end in evacuation zones go about their normal activity regardless of if the evacuation order has been given. Trips that end in the evacuation zone after the evacuation order is given do not travel and stay in the original zone.

4.1.10 Transportation Network

Depending on the event, the dynamic traffic assignment can have a change in the accessibility and capacity of the roadway over the duration of the event. This may be due to debris, flooding, or other hazards that change throughout the model evaluation period. It is presumed that the intersection control will be implemented through signal control or human direction such that the roadway segment capacity is the constraint for travel. Beyond the individual roadway and location details that may vary over time, there are three fundamentally different operating conditions that the model can evaluate, as described below.

4.1.10.1 Normal Roadway Conditions

The typical daily operating conditions for both the number of travel lanes per direction and associated hourly capacity per lane. This condition allows for the opposite direction of evacuation traffic to be used for emergency responders to access the evacuation area and for background traffic to operate normally.

4.1.10.2 Reduced Operational Capacity

The typical daily number of travel lanes per direction and reduced hourly capacity per lane to account for smoke, cautious drivers, etc. This condition allows for the opposite direction of evacuation traffic to be used for emergency responders to access the evacuation area and for background traffic to operate normally.

4.1.10.3 Contra-Flow Operations

The typical daily operating conditions for both the number of travel lanes per direction and associated hourly capacity per lane. This condition does not allow for the opposite direction of evacuation traffic to be used for emergency responders to access the evacuation area and prohibits background traffic travel the opposite direction from the evacuation traffic.

4.1.11 Vehicle Accessibility

Vehicle accessibility was reviewed to identify the number of households in the area that would potentiallyhave issues during an evacuation event due to limited mobility options. Since SBTAM does not provide granular information regarding driver's license holders in a household, we have applied an Auto Utilization Factor based on the household size and number of vehicle ownership that is reflected in thesocio-economic data within the SCAG dataset (which is derived from household census data).

This estimate assumes that the zero vehicle households would require outside assistance (although outside the scope of this assessment, the City may want to consider a program that ensures evacuation of these households is achievable via public transit or other neighborhood programs). This estimate also assumes that employment centers would provide evacuation assistance to employees without access to a vehicle. Additionally, it was assumed that some households with more than two vehicles likely would not be able to utilize all vehicles during an evacuation event (e.g., homes with three or four vehicles but with only two licensed drivers).

4.2 Evacuation Capacity Assessment

The newly developed City of Rancho Cucamonga Emergency Evacuation Planning Tool (EVAC+) incorporates the SBTAM roadway network and TAZ structures and a Dynamic Trip Assignment (DTA) in VISUM to generate and assign vehicle trips in a designated time interval to simulate an evacuation scenario.

The Dynamic Trip Assignment by time interval and the results of the tool output for each scenario are shown in the following pages. The result plots are color-coded by Volume/Capacity ratio from green to red (green being free-flow traffic and red being heavily congested), while the width of the lines represents traffic volume.

4.2.1 AB 747 Assessment

The EVAC+ tool was utilized to determine the amount of time required for the identified evacuation scenarios based on the available roadway capacity information. This information is presented in **Table 4.**

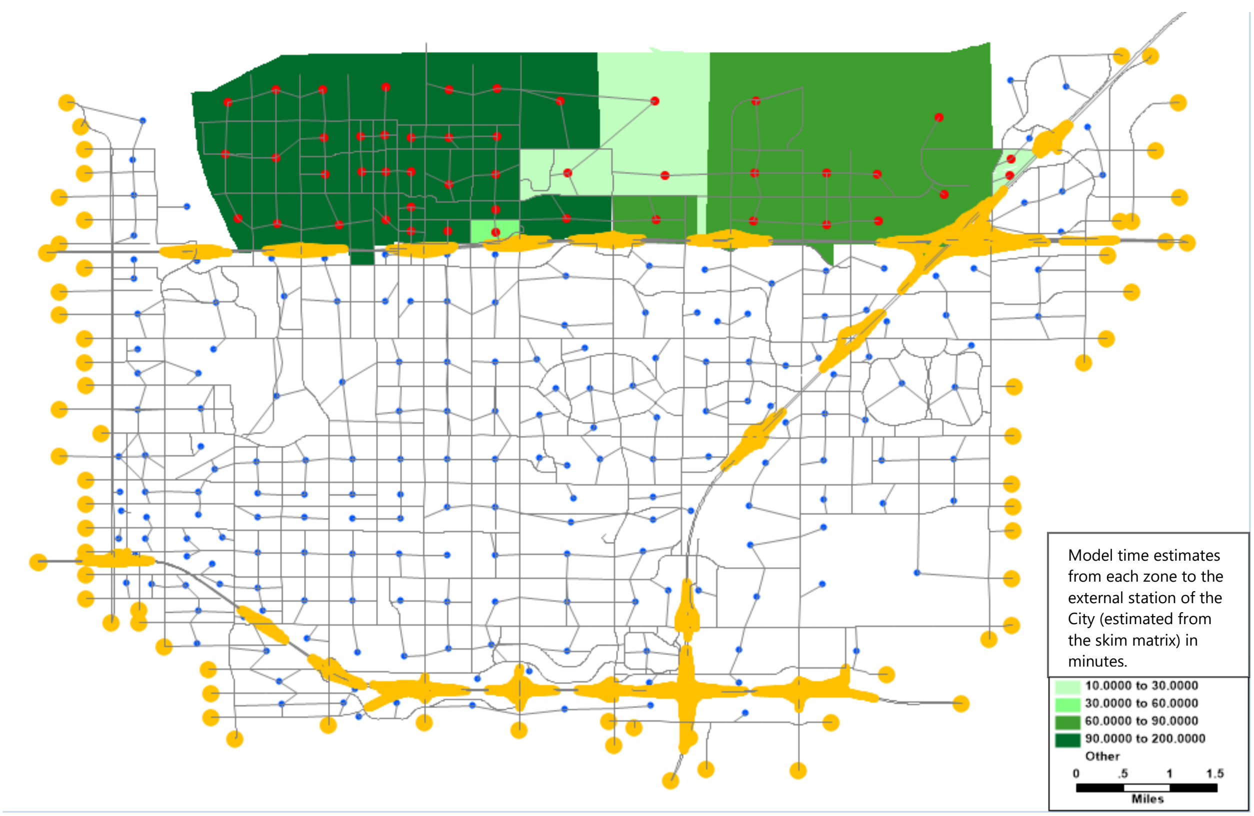
In addition to these time estimates, individual evacuation times from each TAZ north of SR-210 were analyzed. This analysis assumed that the evacuations were to City exit points. This information is helpful from a planning perspective as it accounts for the total time to get out of the City as opposed to exiting the evacuation area and assists in identifying key areas of the City where evacuation is of greater concern. The results of this review, as estimated by the EVAC+ model, is presented on **Figure 12.**

Table 4: Roadway System Capacity Assessment

	Scenario 1	Scenario 2	Scenario 3 and 5	Scenario 4
Total Vehicle Trips	8,667	17,940	26,596	99,126
Exit Link Hourly Capacity*	10,695	11,098	17,038	43,078
Link Time for Evacuation Assuming All Trips are Evenly Loaded on the System**	49 minutes	97 minutes	94 minutes	138 minutes
Time To Exit Evacuation Area***	75 minutes	105 minutes	150 minutes	255 minutes

Note: No work or school return trips included, as those trips have not yet been made when the evacuation occurs.
*: only includes the capacity of the direction out of the evacuation area.
**: the time that the exit links require to handle all the evacuation trips assuming those trips are evenly loaded at the same time, used as reference.
***: assumes a bell curve distribution for traffic loading from receipt of the evacuation order.

Figure 12: Time to Evacuate Areas North of SR-210



As shown on **Figure 12**, the areas of the City requiring the longest amount of time to evacuate are in the northwest part; where evacuation times from those TAZs are estimated to be between 90 and 200 minutes. The northeast part of the area has the second longest evacuation times, which range between 60 and 90 minutes. Finally, the easiest part of the area to evacuate is the central part, where evacuation times are generally between ten and 30 minutes.

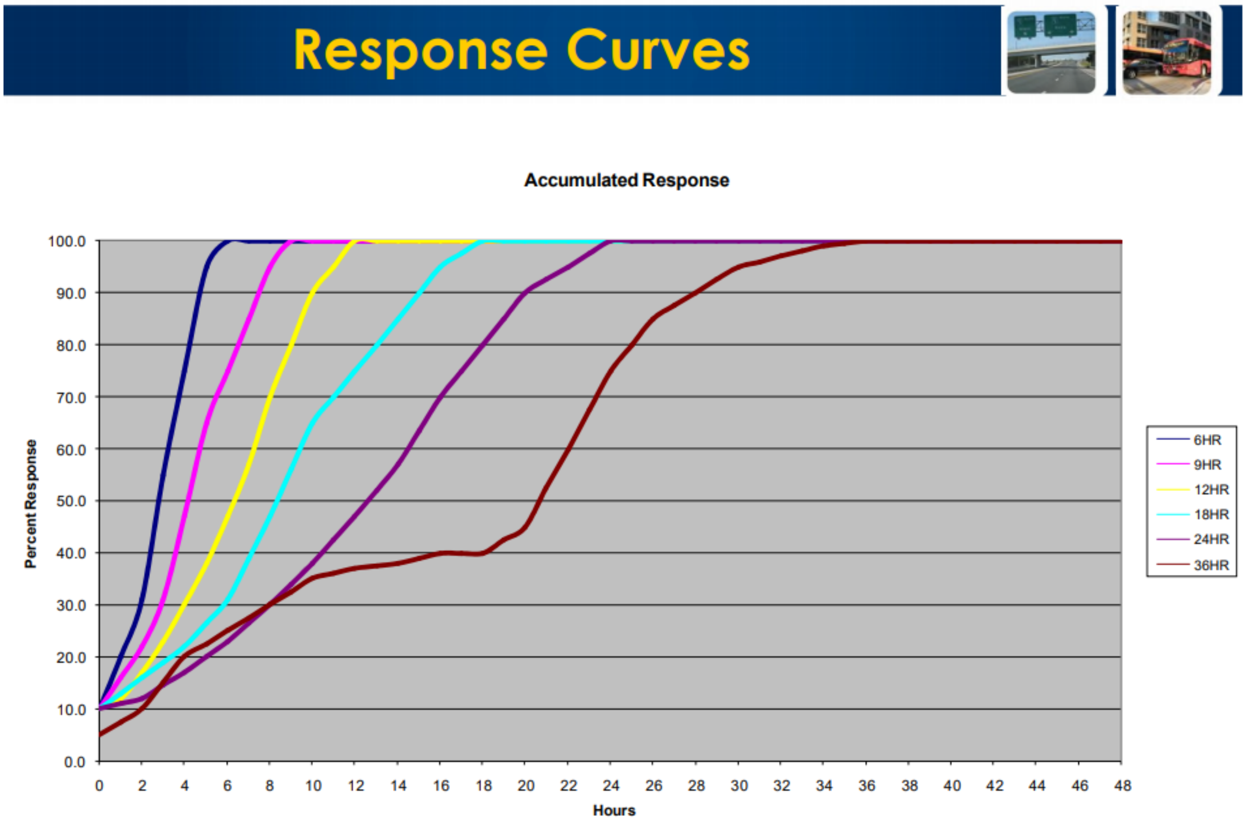
4.3 Evacuation Scenario Testing

The EVAC+ tool was used to test the different evacuation scenarios and the time needed to facilitate different evacuation scenarios and events. This testing was completed in two different ways: (1) to estimate the amount of time needed to facilitate an evacuation from a specific area, and (2) to stress-test the network to understand how much time the network would require to evacuate an area and to better understand potential capacity constraint areas within the City. Each of these testing conditions is further described below.

4.3.1 Evacuation Time Estimates

As noted previously, the EVAC+ model was utilized to estimate evacuation times after an evacuation order was given to a specific area of the City. To better understand the nature of community responsiveness to evacuation orders with varying advanced notice, accumulated response curves published in the *Florida Statewide Hurricane Evacuation Model/TIME* (Roberto Miguel, AICP, December 9, 2015) were reviewed and provided below as **Figure 13**. These curves show evacuation response as it related to advanced warning times of different hurricane evacuation events. In this case, the 6-hour response period generates the highest levels of congestion as the highest percentage of evacuations occur in the shortest period of time. Distributions of evacuees for longer-lead evacuation events still follow the same distribution pattern – it is just spread out over a longer period of time which would results in less congestion on the transportation system. These response curve estimates are consistent with the distribution of evacuation as noted in **Table 2** of this report and supports use of this type of distribution within this evacuation assessment.

Figure 13: Evacuation Response Curve Times



Source: Florida Statewide Hurricane Evacuation Model/TIME (Roberto Miguel, AICP, December 9, 2015)

Each evacuation event was tested in a couple different ways. First, estimates of the amount of time needed to facilitate an evacuation are estimated. Next, the network was stress-tested through the EVAC+ tool to assist in identifying key constrains along the network. Each scenario and its results are summarized below.

4.3.1.1 Scenario 1

4.3.1.1.1 Description

This evacuation scenario analyzes a setting where a wildfire starts east of the City during Santa Ana wind event and is estimated to take 1-3 full days to arrive in Rancho Cucamonga. The evacuation TAZs are located in the northeast part of the City, to the north of SR-210 and to the east of Milliken Avenue.

4.3.1.1.2 Capacity Assessment

As shown in **Table 4**, the average evacuation time is 75 minutes for the whole area; with a total time for evacuees to exit the City between 90-200 minutes if requested to evacuate all at once as shown on **Figure 12**. This indicates that the average time for an evacuee to leave the area is 75 minutes, but would be better to assume a longer (200 minute or more) to facilitate evacuation in more congested conditions and from areas that require additional time to evacuate.
Figure 13 identifies that, for longer-lead evacuation events (like the one described in Scenario 1) approximately 40% of evacuees depart the area prior to when the highest demand occurs. As such, the 1-3 day evacuation window would result in 40% less demand during the peak evacuation period modeled with the EVAC+ tool; effectively reducing the time to evacuate accordingly (e.g. reducing the peak evacuation time from 75 minutes to 45 minutes or, for planning purposes, ensuring at least a 120 minute evacuation). With 1-3 days of advance notice to facilitate this evacuation, this provides the City with some flexibility during an evacuation event.

4.3.1.1.3 Recommendations

The City could begin by evacuating the residents in the northeast part of the City first (e.g. north of SR-210 and east of Day Creek Boulevard). Depending on the fire behavior, the next staged evacuation would be for the area north of Banyan Street and west of Milliken Avenue. The final evacuation stage would focus on the remaining areas north of SR-210, with a focus on the area west of Haven Avenue as it has more people with fewer connections than individuals between Haven Avenue and Day Creek Boulevard.

4.3.1.2 Scenario 2

4.3.1.2.1 Description

This evacuation scenario analyzes a setting where a wildfire starts west of the City with onshore winds and takes between 6 and 24 hours to arrive in Rancho Cucamonga. The evacuation TAZs are located in the northwest part of the City, to the north of SR-210 and to the west of Milliken Avenue.

4.3.1.2.2 Capacity Assessment

As shown in **Table 4**, the average evacuation time is 105 minutes; with a total time for evacuees to exit the City between 90-200 minutes as shown on **Figure 12** depending on the area of evacuation and if requested to evacuate all at once. This indicates that the average time for each evacuee could be 105 minutes, but some of these areas can take up to 200 minutes to evacuate the City given how little connectivity there is in this area. Based on these findings, the latest that a full evacuation could be ordered is 3.5 hours prior to the anticipated arrival of the fire (although more advanced notifications are always advised). **Figure 13** identifies that, in this type of event, the evacuation curve flattens if the evacuation is ordered and completed across the full 6 to 20.5 hours prior to the anticipated arrival of the fire. As such, the 20.5 hour evacuation window would result in more available capacity during peak evacuation time less demand than modeled with the EVAC+ tool; effectively reducing the time to evacuate accordingly by spreading that peak out and reducing it by 30% (or reducing the evacuation time to approximately 90 minutes on average during the peak evacuation time period).

4.3.1.2.3 Recommendations

With a needed evacuation time of 200 minutes for less-connected areas of the City, and less warning for this type of fire event, it is particularly critical to evacuate the areas north of Banyan Street and west of Haven Avenue as soon as possible. The remaining phases of evacuation can occur for areas south of Banyan Street, east of Day Creek Boulevard, and finally between Haven Avenue and Day Creek Boulevard.

4.3.1.3 Scenario 3

4.3.1.3.1 Description

This evacuation scenario analyzes a setting where a wildfire starts in the City during Santa Ana wind conditions. The evacuation TAZs are located to the north of SR-210.

4.3.1.3.2 Capacity Assessment

As shown in **Table 4**, the average evacuation time is 150 minutes; with a total time for evacuees to exit the City ranging between 10 and 200 minutes as shown on **Figure 12** depending on which part of the City they are evacuating from. This demonstrates the benefits of roadway connectivity; the areas that are well connected have minimal evacuation times to exit the City; whereas less-connected neighborhoods require up-to 20-times more evacuation time to exit the City.

4.3.1.3.3 Recommendations

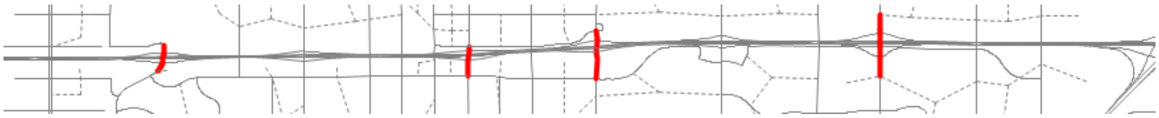
In this scenario, evacuating those in the most danger (e.g. closest to the fire) should be the primary focus. City resources will need to be dispatched to assist in maximizing roadway network capacity, including implementation of a flushing timing plan and manual traffic control. Of particular concern are the areas with higher evacuation times; most notably those residents in the northwest and northeast parts of the City where maximizing egress along the emergency evacuation routes would be critical.

4.3.1.4 Scenario 4

4.3.1.4.1 Description

This evacuation scenario analyzes a setting where a major earthquake causes at least several of the bridges across the SR-210 freeway to collapse between Euclid Avenue and I-15. The evacuation TAZs are located citywide, and the scenario is run by closing off 50% of the bridges across SR-210, as shown below.

Evacuation events during this scenario will need to be focused on areas in the greatest harm. That harm can be caused by any number of circumstances, including damage to facilities, potential utility ruptures, and general building structure safety concerns which cannot be anticipated as part of this effort. However, to help the City understand where congestion areas are within the City during a much larger evacuation event, all traffic was loaded onto the network as a “super stress test” of the network. Although little insight can be gained and applied to this specific emergency, it is useful in identifying potential congestion points on the network and identifying where additional network resiliency could be helpful during other unforeseeable evacuation events.



4.3.1.4.2 Capacity Assessment

As shown in **Table 4**, the average evacuation time for the area north of SR-210 is 255 minutes (or more than four hours). Areas south of SR-210 are able to evacuate quickly due to the accessibility built into the network south of SR-210. The increase in egress time is reflective of the reduced capacity due to the freeway closures (generally halving the available capacity for evacuation) and more than doubling the evacuation time for some areas in the northwest part of the City - increasing it up-to 400 minutes.

4.3.1.4.3 Recommendations

This scenario demonstrates any key concerns related to network redundancy and how evacuations are affected by the lack of network redundancy. If this event were to occur, the City will need to focus on getting people out of harm's way, but the area north of SR-210 and west of Archibald will be particularly problematic with high evacuation times (more than six hours) due to reduced network connectivity; especially to the west of the City. The next most difficult area of the City will be the area east of Day Creek Boulevard, with evacuation times up to three hours to egress the City. Again, this is largely due to less network connectivity to the east and less east-west connectivity due to Wilson Avenue being in complete.

4.3.1.5 Scenario 5

4.3.1.5.1 Description

This evacuation scenario analyzes a setting where heavy rain or rapid snowmelt results in large-scale flooding and flash flooding. The evacuation TAZs are located in the north part of the City.

4.3.1.5.2 Capacity Assessment

As shown in **Table 4**, the average evacuation time is 150 minutes; with a total time for evacuees to exit the City ranging between 10 and 200 minutes as shown on **Figure 12**. This demonstrates the benefits of roadway connectivity; the areas that are well connected have minimal evacuation times to exit the City; whereas less-connected neighborhoods require up-to 20-times more evacuation time to exit the City.

The floodplain maps shown on **Figure 3** show potential flooding areas in this type of event. The key areas of concern are north of Hillside Road in the northwest part of the City, between Day Creek Boulevard and Milliken Avenue (north of SR-210), and east of Etiwanda Avenue.

4.3.1.5.3 Recommendations

Given the locations of the floodplain in these areas, the City should consider a phased evacuation that focuses on the following (which generally reflects the timing of flooding during this type of event):

Evacuate the area north of Hillside Road, west of Archibald Avenue first

- Evacuate the following areas next:
    - North of Wilson Avenue, east of Day Creek Boulevard
    - North of Wilson Avenue, Between Wardman Bullock Road and San Servaine Road
    - East of Etiwanda Avenue and north of Base Line Road
- Evacuate the areas between Milliken Avenue and Day Creek Road, north of Victoria Park Lane.

Figure 14: DTA Stress Test Assignment Results by Time Interval for Scenario 1

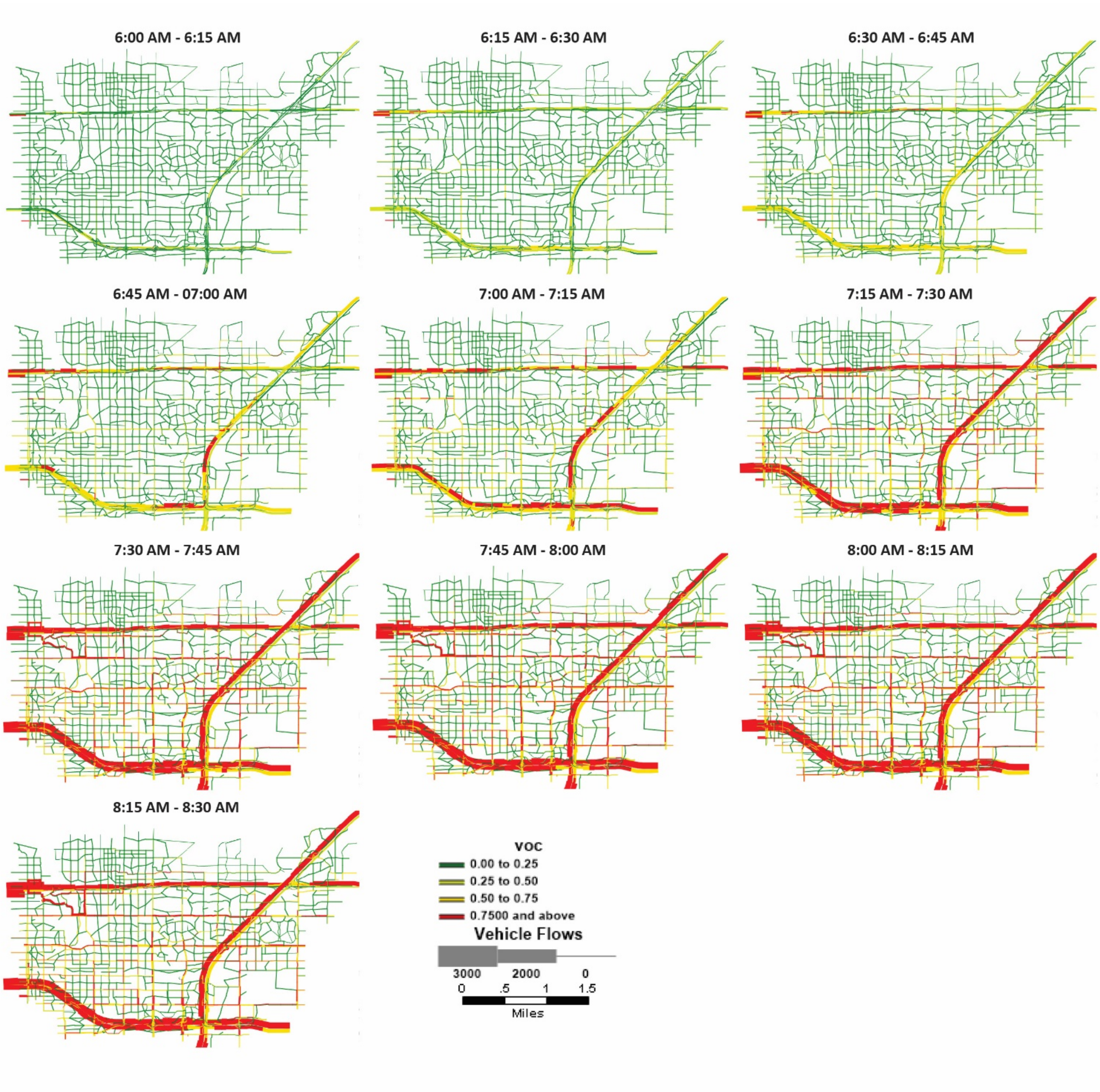


Figure 15: DTA Stress Test Assignment Results by Time Interval for Scenario 2

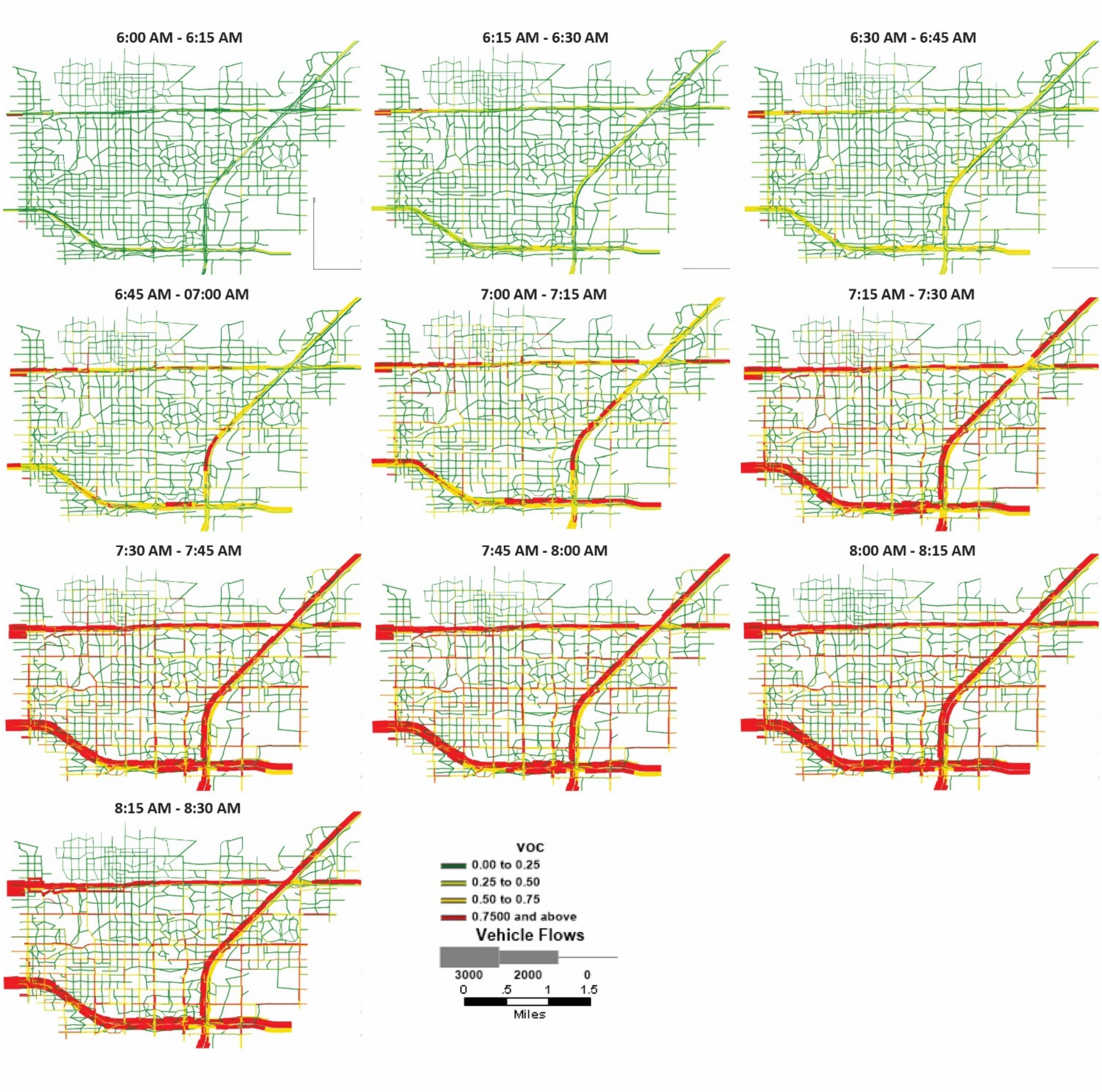


Figure 16: DTA Stress Test Assignment Results by Time Interval for Scenario 3

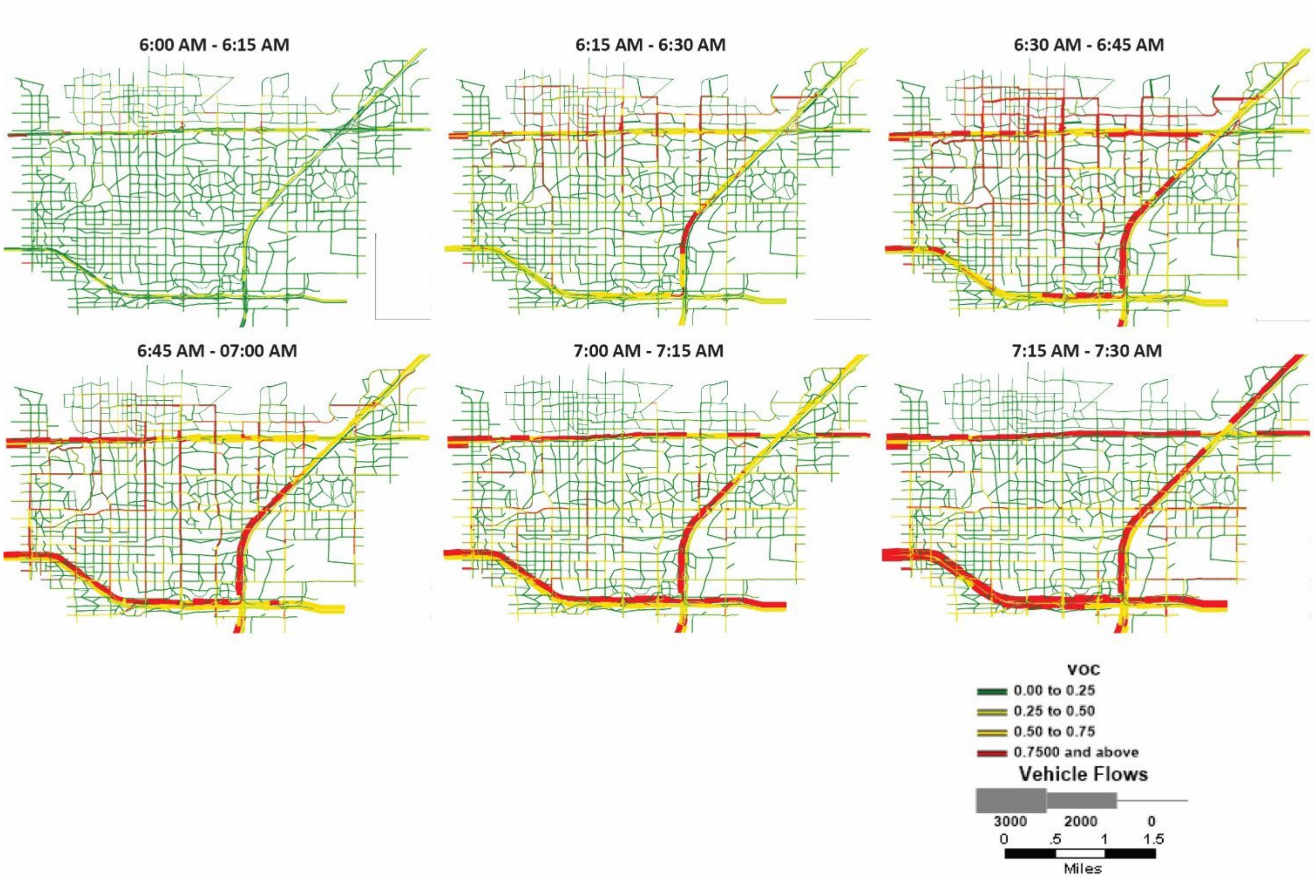


Figure 17: DTA Assignment Stress Test Results by Time Interval for Scenario 4

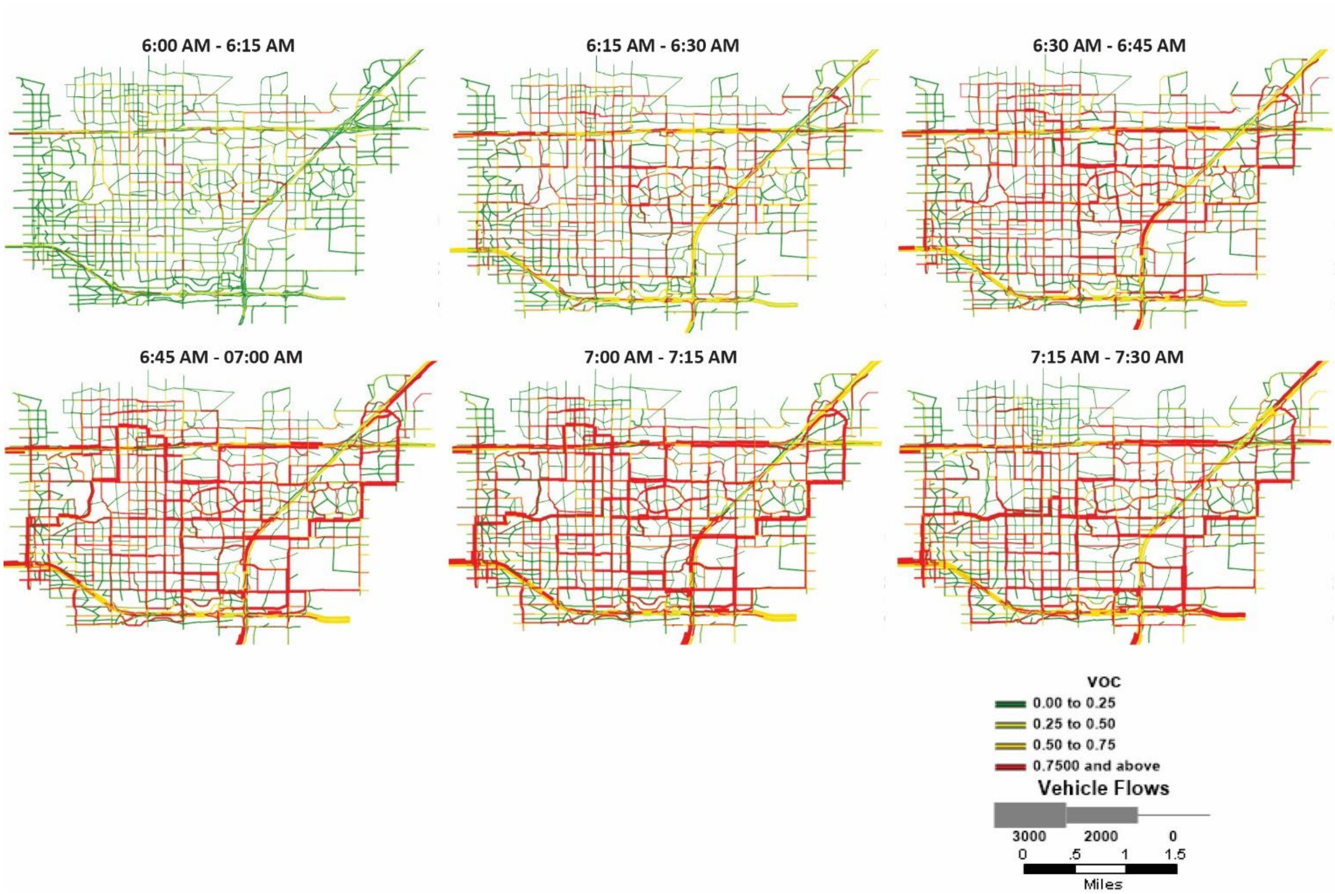
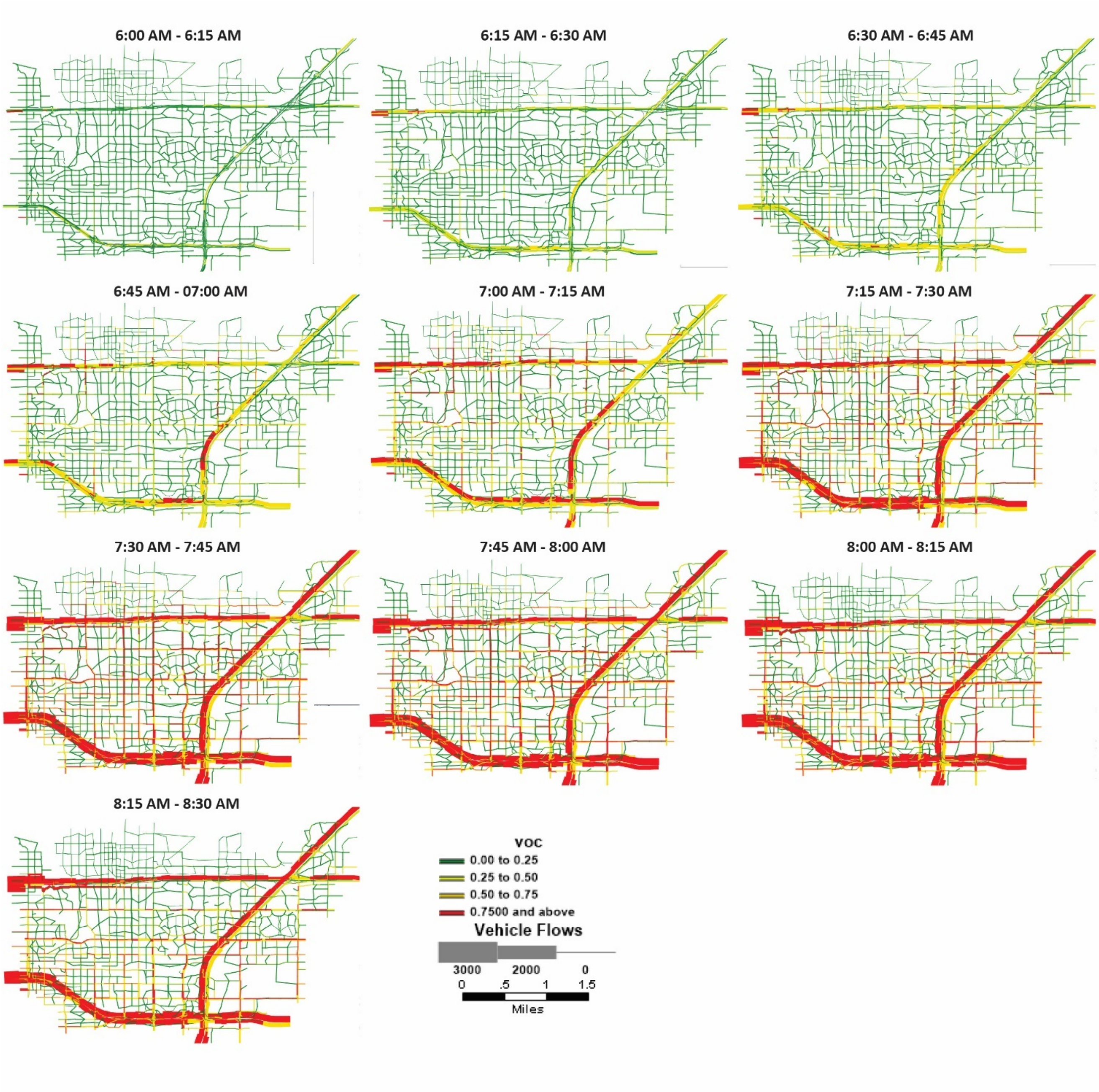


Figure 18: DTA Assignment Stress Test Results by Time Interval for Scenario 5



5. Evacuation Assessment Observations and Behavioral Considerations

Chapter 4 summarized the results of the evacuation assessment for Rancho Cucamonga, summarized the mapping for the SB 99 assessment and provided a detailed review of the capacity assessment consistent with AB 747. This chapter provides a high-level overview of those assessments along with observations, recommendations, and other considerations associated with evacuations within the City.

5.1 General Observations

The key observation of the data relates to the comparison of **Figure 12** (the time needed to evacuate areas north of SR-210) to the SB 99 assessment presented in **Figure 8** through **Figure 10**. The area north of SR-210 shows up in this analysis as:

- The area of the City with the highest concentration of dead end roads
- The area of the City that has the furthest travel distance to the external boundaries of the City
- The area that has to travel the farthest to evacuation centers
- The area needing the longest lead times to facilitate an evacuation

Additionally, this is an area of the City that is closest to the WUI, is closest to the historic wildfire perimeters in the City, has areas that are within a flood hazard area, and is just south of the Cucamonga Fault line (plus the Etiwanda Avenue Fault and portions of the Red Hill Fault). Given the convergence of these activities in this particular area of the City, evacuations north of SR-210 should be a focus area for the City.

5.1.1 Recommendations For All Evacuation Scenarios

The following recommendations are informed by the assessment summarized in **Chapter 4** and are applicable to most of the evacuation events that were investigated:

- Provide east-west connection(s) to the City of Upland north of SR-210.
- Complete Wilson Avenue through the northern part of the City.
- Look for additional opportunities to improve connectivity throughout the City to provide better evacuation potential; including completing any "missing" links on the transportation network, providing increased block densities with developing or redeveloping large areas of the City, creating new connections across major barriers of the city, and implementing system redundancy.
- Facilitate evacuation management to relieve pressure on local streets.
- Work with Caltrans and other regional agencies to investigate limiting accessibility to major regional routes to facilitate evacuation; this could be particularly effective for east-west facilities

where SR-210 could be closed except for evacuation purposes and typical trips could be forced down to I-10 and SR-60.

- Work with Caltrans to develop signal flush plans at off-ramps to prioritize signal timing for evacuees at Caltrans' ramp locations.
- Work with the City's Engineering Services Department to investigate signal timing plans to assist with flushingtraffic; particularly along north/south facilities.
- Utilize traffic control personnel along key routes experiencing congestion, especially at unsignalized intersection north of SR-210.
- North of SR-210, consider a higher "density" of fire stations and emergency response locations to ensure that emergency response time is not compromised.
- Consider a method of communication that could inform residents of an evacuation. This could be some type of application that could be installed on a resident's phone, use of the existing emergency response infrastructure, other warning systems (like large sirens), or other forms of notification.
- Consider evacuation drills for residents north of SR-210 so that they are aware of what to expect during an evacuation event and are prepared in such a scenario.
- Implement the following scenario-specific measures to further enhance evacuation capacity:
  - Scenario 1
    - Work with the City of Upland to dispatch traffic control officers to 19th Street and Campus Avenue near the western City limit due to excessive demand during the evacuation.
    - Dispatch traffic control officers and maximize green time allocation for evacuees on Day Creek Boulevard and Base Line Road.
  - Scenario 2
    - Work with the City of Upland to dispatch traffic control officers to 19th Street and Campus Avenue near the western City limit due to excessive demand during the evacuation.
    - Dispatch traffic control officers and look to maximize green time allocation for evacuees on Base Line Road, Foothill Boulevard, Carnelian Street, and most City arterials between Sapphire Street and Amethyst Avenue.
  - Scenario 3
    - Work with the City of Upland to dispatch traffic control officers to 19th Street and Campus Avenue near the western City limit due to excessive demand during the evacuation.
    - Dispatch traffic control officers and allocate green time at traffic signals to prioritize evacuees on Wilson Avenue, Hillside Road, Carnelian Street, Archibald Avenue, Haven Avenue, Milliken Avenue, Day Creek Boulevard, and Banyan Street.
  - Scenario 4

- Identify routes where reversible lanes could be considered during an evacuation. These would typically be identified on four lane roadways without a center median where one lane in the opposite direction could be used during an evacuation.
- Consider north-south signal flushing plans through the City to provide north-south egress from the City.

- Scenario 5
    - Work with the City of Upland to dispatch traffic control officers to 19th Street and Campus Avenue near the western City limit due to excessive demand during the evacuation.
    - Dispatch traffic control officers and look to maximize green time allocation for evacuees on Base Line Road, Foothill Boulevard, Carnelian Street, and most north/south City arterials.

5.2 Additional Behavioral Considerations

Planning for evacuation should also consider factors beyond what the theoretical roadway capacity analyses show above. The effectiveness of these evacuations also relies on a combination of both the planning and preparedness conducted by the agencies overseeing evacuation and the individuals involved in the evacuation itself. For evacuations to be effective there are a variety of factors that have to be effectively navigated. These often include the following components that define the new situation and affect the development of new behaviors:

- Warning message confirmation
- The level of perceived personal risk
- Personal characteristics and family context
- Hazard characteristics
- Level of preparedness
- Extent of social networks
- Level of belief that the event will occur[3].

Based on of these components, the outcomes and effectiveness of evacuation efforts can be highly variable based on the type of event and the various factors that affect each resident's decision making.

Much of the research in the psychology of evacuation suggests that the decisions made by potentially affected property owners are based on the ability of individuals to mitigate the effects of disasters, which is determined by the amount of warning they have and the relative severity of the potential event.

[3] TIERNEY, K.J., M.K. LINDELL, AND R.W. PERRY. 2001. Facing the unexpected: Disaster preparedness and response in the United States. Joseph Henry Press, Washington, DC. 306 p.

Research conducted on the preparation, response, and recovery of bush fires in Australia[4] have concluded that there are typically eight responses to an evacuation situation, which include:

LEAVE EARLY	STAY AWAY	TRY TO RETURN	RETURN TO RESCUE	LEAVE IMMEDI-ATELY	WAIT AND SEE	DO AS MUCH AS POSSIBLE BEFORE LEAVING	STAY

For those that do not comply with evacuation orders the motivation may be rooted in a desire to protect valued assets (property, pets, livestock), the potential evacuee may be less prepared to evacuate (psychologically or logistically), or they may believe the threat is remote and not deserving of action[5]

Based on these responses it is entirely possible that the real-world responses to an evacuation situation may vary significantly compared to the analysis completed in this assessment. Much of the research and modeling indicates that 100% participation in an evacuation event is not likely. So, while this assessment uses scenarios to capture the effects from all members of the area of potential effect (which is prudent in modeling evacuations), it is likely that some residents may not evacuate or, if they take a "Wait and See" approach, they may evacuate much later in the evacuation order – either shifting the entire evacuation curve or compressing that curve toward the end of the assumed evacuation event. That is why the analyses presented above use a relatively short (one- to two-hour evacuation time period) to reflect the potential for these evacuation curves to be compressed.

When considering evacuation orders, public safety officials need to balance allowing residents time to prepare to leave with the dangers of delaying evacuation. Delaying the evacuation could mean that some evacuation routes would become unavailable, that traffic jams may result, and that evacuees would impede access by firefighting personnel. A concern for law enforcement personnel was how to manage residents who refused to leave–mostly because they wanted to defend their properties or protect them from looters. What law enforcement officers saw as discharging their responsibilities to protect members of the public, some residents saw as infringing their rights as US citizens[5].

Participation rates for much of the hurricane evacuation planning within Florida assumes between 65% and 80%, based on the size and severity of the potential hurricane[6]. This would indicate that many events will not include a 100% participation rate like that assumed in the above analysis. Again, the assumption

[4] Reinholdt S., Rhodes A. and Scillio M. (1999a) Stay or go: understanding community responses to emergencies. Burwood, Country Fire Authority.

[5] Jim McLennan et al. 2018. Should We Leave Now?: Behavioral Factors in Evacuation Under Wildfire Threat. Fire Technology, 55, 487-516

[6] XUWEI CHEN, JOHN W. MEAKER and F. BENJAMIN ZHAN. Agent-Based Modeling and Analysis of Hurricane Evacuation Procedures for the Florida Keys. Texas Center for Geographic Information Science (TxGISci), Department of Geography, Texas State University, 601 University Dr. San Marcos, TX 78666, USA

of 100% participation does provide another layer of conservative estimates to this assessment – in that the evacuation times noted above represent a participation rate beyond that which may occur during an evacuation event.

6. Implementation and Recommendations

As the City builds out the Mobility Element roadway network, special considerations should be taken to facilitate emergency evacuation, especially in the hazard areas north of SR-210.

These considerations are provided below:

- Ensure redundancy of critical transportation routes to allow for continued access and movement in the event of an emergency. This may also include addressing vulnerabilities of bridges, major roadways and highways, railways, traffic signals/traffic control centers, and other transportation facilities and infrastructure components to ensure there are multiple viable evacuation routes.
  - Wilson Avenue is currently partially disconnected at multiple locations. Providing an east-west connection through the City and to the west via Banyan Street to 22nd Street in the City of Upland would provide better emergency access under emergency evacuation scenarios for the north part of the City.
- Future roadway design, especially in areas that have less accessibility and on key evacuation routes, should consider evacuation capacity and consider design treatments such as painted medians (instead of raised medians) that could assist in creating reversible lanes and facilitate additional capacity in an evacuation event scenario.
  - In evacuation events, painted medians could operate as additional egress lanes. Furthermore, a four-lane roadway with a painted median could operate with four egress lanes and one ingress lane (for emergency vehicles).
  - Inclusion of dynamic shoulder lanes (e.g. utilize shoulder space that is otherwise used for parking or bikeways) that can be used for emergency vehicles or additional evacuation lanes.
- Implement transportation operations strategies for evacuation events.
  - In the assessment above, the capacities are based on typical signal green time allocations that tend to be the limiting control on capacity. If an evacuation coordination plan was developed in the direction of the evacuation, additional capacity could be achieved.
  - Consider prioritizing traffic signals in vulnerable areas for improvements to be brought online and connected to the Traffic Management Center, with contingency plans for loss of power and communications grids.
  - Investigate adaptive signal control (ASC) systems that can adjust traffic signal timing to account for high volumes that occur during hazard events. Provide redundancy in the form of a static evacuation coordination plan in case of ASC system disruption.
  - Coordinate release/timed evacuation from different locations in areas with heavy volumes and a high potential for bottlenecks. This was most notably present in the northwest most part of the City; where phased evacuation in longer lead-time events

would be helpful. In a short-term evacuation event, consider evacuating the residents that are in the highest amount of danger first and stagger evacuation of people closer to the freeway later in the evacuation period.

  - Deploy clear wayfinding, signs, and barriers to direct traffic. Consider permanent identification of evacuation routes; particularly in areas of the City that have high visitors (Victoria Gardens, the Government Center, event centers like the baseball stadium, etc.).
  - Provide tenth-mile markers for assisting travelers and emergency responders with location, mainly when communications grids are down.
- Ensure targeted evacuation management to areas of the community that do not have redundancy in critical transportation routes, such as those that rely on one roadway or highway for evacuations and the movement of goods and services, as well as areas that have multiple evacuation routes but are not as prepared for an evacuation event.
  - These areas include those located in mountainous or rural areas that can easily be blocked by wildfire, flooding, or landslides.
  - Consideration should be given to neighborhoods and households where different communication may be required (e.g. homes where English is not the primary language, households with hearing impaired individuals, etc.).
- Require new developments to provide an adequate amount of ingress/egress connections to the City's circulation network.
- Develop an Impaired Access Mitigation Fee for new developments to assist in funding the mitigation and enhancement of the circulation network to alleviate evacuation constraints. This fee could assist in delivering redundant infrastructure that would assist in evacuation events.
- Increase connectivity within areas with evacuation constraints through the use of easements, and emergency access roadways, if the addition of new roadways or roadway extensions are deemed infeasible by the City.
- Consider evacuation drills in critical areas of the City; especially north of SR-210.
- Investigate communications infrastructure to warn residents of potential evacuation events.

6.1 Available Implementation Programs

6.1.1 Local

6.1.1.1 Measure I

The San Bernardino County Transportation Authority (SBCTA) administers Measure I funding based on the Measure I Strategic Plan. Local jurisdictions receive allocations on a per capita basis and must annually adopt a Five-Year Capital Improvement Plan which details the specific projects to be funded using the measure. The Measure I Strategic Plan focuses mostly on project delivery guidance. Resilient transportation strategies can help fulfill some of this guidance, particularly with respect to the cost containment strategies in the Strategic Plan.

6.1.2 Regional

6.1.2.1 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS)

Aligning with the RTP/SCS goals and performance measures often helps local jurisdictions receive federal and State funding and is sometimes an explicit evaluation criterion for grant funds. The 2016-2040 RTP/SCS states that “working to make our region more resilient to the inevitable consequence of future climate change is a major priority of this Plan, and it will continue to resonate in future updates as we head toward 2040 and well beyond.” Resiliency strategies can help meet several of the nine formal RTP/SCS goals, especially the goal to “Preserve and ensure a sustainable regional transportation system.”

6.1.3 State

SB 1 funded sources for local jurisdictions in the WRCOG-SBCTA region include, among others:

Local Partnership Program (LPP) formula and competitive funds, available to agencies that have passed sales tax measures or developer fees, for road maintenance, rehabilitation, and other improvements.

Solution for Congested Corridor Programs (SCCP) - Caltrans, regional transportation planning agencies, and county transportation commissions are eligible to apply for this program that currently has $250 million available annually. To be eligible, all projects must be included in an existing comprehensive corridor plan or regional transportation plan. To-date, the congested corridor plan for the County only includes the freeway system; however, local roads could be included into the plan (especially those that are part of the evacuation system) that provide system redundancy within the corridor. The City should consider working with SBCTA and Caltrans to add roadways identified in Chapter 5 to the congested corridors plan to assist with system redundancy in the event of an evacuation event.

Trade Corridor Enhancement Program (TCEP) offers roughly $300 million annually for infrastructure improvements on federally designated trade corridors of national and regional significance, on the primary freight network, and on other corridors that have a high volume of freight movement. This program could be investigated for potential funding, especially on north/south corridors in the City that also assist with goods movement.

Active Transportation Program (ATP) encourages increased use of active modes of transportation, such as walking and biking, increase safety and mobility for pedestrians, reduce greenhouse gas emissions, improve public health, and focus benefits toward disadvantaged communities. Bike and pedestrian trail improvements that might be funded through this program could serve an alternative purpose for evacuation during an emergency event.

State of Good Repair Program (SGR) - The purpose of SGR is to provide funding to support transit maintenance, rehabilitation, and capital projects. The City would need to coordinate with SBCTA and/or Omnitrans to consider this funding source.

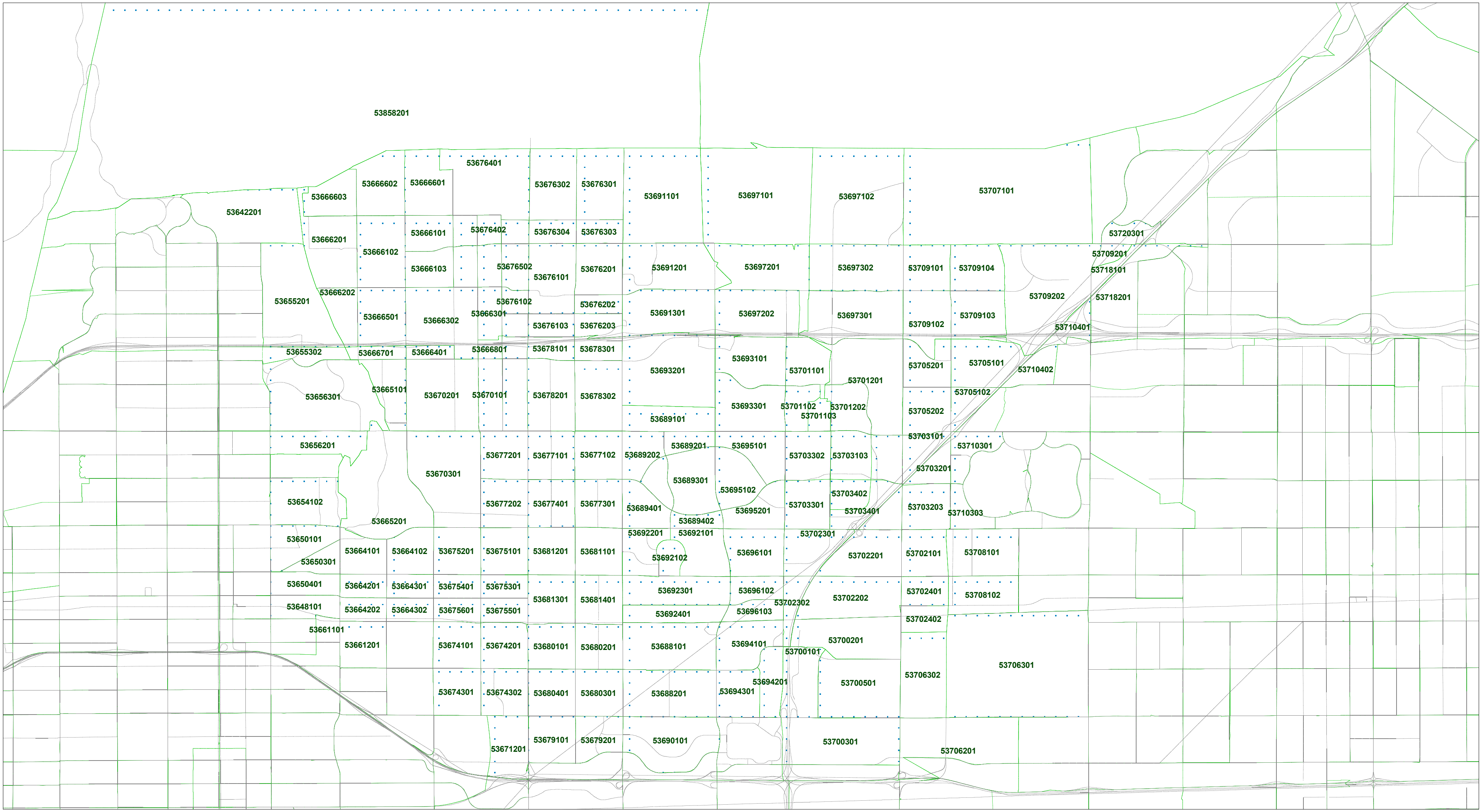
Affordable Housing and Sustainable Communities (AHSC) - Funded by cap-and-trade appropriations, AHSC provides funding to local governments, transportation and transit agencies, joint power authorities, schools, tribal governments, and housing developers to fund affordable housing development and transportation infrastructure.

6.1.4 Federal

Hazard Mitigation Grant Program (HMGP) aims to enact mitigation measures that reduce the risk of loss of life and property from future disasters. HMGP funds activities such as elevating structures, mitigating flood and drought conditions, and managing wildfire risk.

Building Resilient Infrastructure and Communities (BRIC) Grant Program provides resources to assist jurisdictions with a pre-disaster natural hazard mitigation. This program awards planning and project grants and provides opportunities for raising public awareness about reducing future losses before disaster strikes.

Attachment - SED Information



SubregionTAZ:1	CNTY:1	POP	RES	HH	GN	K12	COLLEGE	TOT_EMP
53674301	San Bernardino	2567	2567	743	0	0	0	394
53674302	San Bernardino	1816	1816	490	0	0	0	255
53680301	San Bernardino	0	0	0	0	0	0	2383
53680401	San Bernardino	0	0	0	0	0	0	1282
53688201	San Bernardino	2267	2267	1148	0	0	0	4306
53694201	San Bernardino	0	0	0	0	0	0	840
53694301	San Bernardino	0	0	0	0	0	0	2233
53700101	San Bernardino	0	0	0	0	0	0	1447
53700501	San Bernardino	2641	0	0	0	0	0	2295
53706301	San Bernardino	0	0	0	0	0	0	286
53706302	San Bernardino	0	0	0	0	0	0	193
53690101	San Bernardino	1406	1406	660	0	0	0	5038
53679101	San Bernardino	54	54	16	0	0	0	179
53671201	San Bernardino	478	478	160	0	0	0	118
53679201	San Bernardino	3119	3119	1241	0	752	0	364
53706201	San Bernardino	0	0	0	0	0	0	1038
53700301	San Bernardino	0	0	0	0	0	0	2347
53688101	San Bernardino	959	959	474	0	0	0	3821
53689101	San Bernardino	620	620	207	0	0	0	778
53689202	San Bernardino	2085	2085	730	0	0	0	43
53689203	San Bernardino	2187	2187	819	0	1037	0	163
53689401	San Bernardino	0	0	0	0	0	0	2076
53691101	San Bernardino	1957	1957	565	0	0	0	123
53691201	San Bernardino	643	643	205	0	3364	18830	2068
53691301	San Bernardino	4240	4240	1432	0	696	0	726
53692201	San Bernardino	1	1	1	0	0	0	4890
53692301	San Bernardino	0	0	0	0	0	0	3666
53692401	San Bernardino	0	0	0	0	0	0	879
53693201	San Bernardino	6638	6634.8335	2017	0	588	0	293
53858201	San Bernardino	703	703	264	0	109	0	48
53642201	San Bernardino	1091	1085.368	377	0	0	0	137
53648101	San Bernardino	1766	1766	539	0	0	0	355
53650101	San Bernardino	1626	1512.1424	648	0	0	0	1054
53650301	San Bernardino	780	603.07317	218	0	0	0	971
53650401	San Bernardino	2688	2609.5356	745	0	0	0	298
53654102	San Bernardino	2931	2922.1956	927	0	438	0	1028
53655201	San Bernardino	158	158	53	0	0	0	67
53655302	San Bernardino	0	0	0	0	0	0	1114
53656201	San Bernardino	800	796.19048	378	0	0	0	43
53656301	San Bernardino	4407	4407	1450	0	0	0	1007
53666102	San Bernardino	1293	1285.9522	390	0	794	0	159
53666103	San Bernardino	682	678.2826	209	0	0	0	42
53666201	San Bernardino	1432	1432	440	0	0	0	91
53676101	San Bernardino	1556	1556	471	0	0	0	47
53676201	San Bernardino	1522	1522	471	0	554	0	108
53676501	San Bernardino	394	394	127	0	0	0	105
53676502	San Bernardino	557	557	157	0	0	0	26
53676503	San Bernardino	330	330	92	0	0	0	54
53665201	San Bernardino	2244	2239.9946	775	0	539	0	687
53666302	San Bernardino	2255	2230.4325	726	0	805	0	203
53670201	San Bernardino	3786	3781.8825	1165	0	3327	0	733
53670301	San Bernardino	4101	4088.6723	1308	0	0	0	1422
53674101	San Bernardino	2156	2156	604	0	0	0	130
53675201	San Bernardino	3983	3983	1478	0	510	0	299
53675401	San Bernardino	0	0	0	0	0	0	1016
53675601	San Bernardino	0	0	0	0	0	0	819
53677202	San Bernardino	2245	2226.7988	717	0	0	0	294
53677301	San Bernardino	1887	1887	599	0	0	0	1773

53677401	San Bernardino	2196	2190.7913	842	0	611	0	541
53661201	San Bernardino	2440	2434.2588	532	0	0	0	34
53664101	San Bernardino	2003	2003	605	0	0	0	429
53664201	San Bernardino	1135	1132.888	235	0	505	0	60
53664202	San Bernardino	1541	1538.1325	452	0	35	0	115
53664302	San Bernardino	40	40	13	0	0	0	272
53661101	San Bernardino	423	416.52551	107	0	0	0	0
53664102	San Bernardino	2356	2356	961	0	0	0	123
53664301	San Bernardino	842	842	316	0	0	0	306
53665101	San Bernardino	1724	1710.3757	518	0	592	0	189
53666501	San Bernardino	1982	1982	611	0	0	0	77
53666701	San Bernardino	476	470.50346	141	0	0	0	135
53666202	San Bernardino	647	647	207	0	0	0	24
53666401	San Bernardino	843	843	412	0	0	0	383
53675501	San Bernardino	11	11	3	0	0	0	1113
53680101	San Bernardino	87	87	19	0	0	0	2010
53681201	San Bernardino	2237	2237	944	0	0	0	392
53681301	San Bernardino	2617	2613.5368	705	0	1464	0	525
53681401	San Bernardino	1826	1826	560	0	0	0	291
53674201	San Bernardino	1290	1285.9113	329	0	22	0	728
53675101	San Bernardino	1863	1850.0763	491	0	0	0	714
53675301	San Bernardino	2	2	1	0	0	0	2646
53680201	San Bernardino	57	57	12	0	0	0	1130
53681101	San Bernardino	3660	3660	1544	0	0	0	380
53670101	San Bernardino	1354	1290.4628	424	0	0	0	494
53676103	San Bernardino	999	999	317	0	27	0	48
53677101	San Bernardino	1754	1750.6717	538	0	0	0	326
53678101	San Bernardino	1296	1296	454	0	342	0	508
53678201	San Bernardino	3976	3971.3981	1505	0	0	0	236
53678202	San Bernardino	1359	1357.4271	660	0	520	0	564
53678302	San Bernardino	2859	2848.7329	1056	0	662	0	237
53677201	San Bernardino	1802	1787.3904	661	0	928	0	566
53666301	San Bernardino	780	771.50215	252	0	0	0	13
53666801	San Bernardino	518	518	315	0	148	0	135
53676102	San Bernardino	372	372	112	0	0	0	2
53676104	San Bernardino	382	382	122	0	0	0	8
53678102	San Bernardino	437	437	183	0	0	0	68
53677102	San Bernardino	1438	1435.2713	426	0	585	0	162
53676202	San Bernardino	1107	1107	325	0	0	0	39
53676203	San Bernardino	489	489	162	0	811	0	366
53678301	San Bernardino	753	750.29586	236	0	0	0	32
53676401	San Bernardino	1019	1019	321	0	0	0	83
53676403	San Bernardino	194	194	51	0	0	0	33
53666601	San Bernardino	801	801	249	0	0	0	79
53666602	San Bernardino	867	867	291	0	0	0	121
53666603	San Bernardino	672	672	199	0	0	0	18
53666101	San Bernardino	400	397.81971	115	0	0	0	22
53676301	San Bernardino	934	934	271	0	0	0	145
53676302	San Bernardino	801	801	251	0	0	0	126
53676304	San Bernardino	313	313	101	0	0	0	44
53676402	San Bernardino	191	191	61	0	0	0	1
53676404	San Bernardino	251	251	78	0	0	0	7
53676303	San Bernardino	406	406	114	0	0	0	27
53697201	San Bernardino	14	14	4	0	0	0	248
53697302	San Bernardino	2367	2367	608	0	880	0	244
53705101	San Bernardino	759	759	207	0	3289	0	417
53705102	San Bernardino	843	843	240	0	0	0	80
53707101	San Bernardino	2334	2334	646	0	0	0	155
53708101	San Bernardino	2749	2710.9226	651	0	46	0	258

53708102	San Bernardino	406	400.37635	83	0	0	0	1244
53709101	San Bernardino	224	224	65	0	923	0	272
53709103	San Bernardino	30	30	10	0	0	0	53
53709104	San Bernardino	43	43	11	0	1017	0	444
53709202	San Bernardino	1781	1781	492	0	0	0	56
53710301	San Bernardino	1736	1734.686	396	0	424	0	263
53718101	San Bernardino	0	0	0	0	0	0	0
53718201	San Bernardino	3	3	1	0	0	0	624
53689301	San Bernardino	6187	6187	2095	0	800	0	203
53695102	San Bernardino	3491	3487.6957	1338	0	0	0	166
53695201	San Bernardino	1122	1122	453	0	0	0	639
53697301	San Bernardino	1876	1876	473	0	0	0	230
53700201	San Bernardino	0	0	0	0	0	0	180
53701101	San Bernardino	744	744	202	0	0	0	235
53701103	San Bernardino	190	190	47	0	0	0	2
53701201	San Bernardino	3929	3929	1211	0	565	0	256
53702201	San Bernardino	2	2	1	0	0	0	1644
53702202	San Bernardino	0	0	0	0	0	0	1242
53702301	San Bernardino	6	6	2	0	0	0	1817
53703202	San Bernardino	804	803.55371	355	0	313	0	181
53703203	San Bernardino	1349	1348.2512	431	0	676	0	186
53703301	San Bernardino	2335	2328.4994	944	0	0	0	711
53703302	San Bernardino	1508	1503.8018	436	0	0	0	39
53703401	San Bernardino	0	0	0	0	0	0	1092
53703402	San Bernardino	167	167	71	0	0	0	5316
53710303	San Bernardino	1238	1237.063	329	0	0	0	24
53694101	San Bernardino	0	0	0	0	0	0	1063
53696101	San Bernardino	0	0	0	0	0	0	1337
53696102	San Bernardino	0	0	0	0	0	0	559
53696103	San Bernardino	0	0	0	0	0	0	523
53702302	San Bernardino	0	0	0	0	0	0	336
53689402	San Bernardino	0	0	0	0	0	0	673
53692101	San Bernardino	0	0	0	0	0	0	3055
53692102	San Bernardino	0	0	0	0	0	0	748
53693101	San Bernardino	2909	2909	789	0	3359	0	796
53693301	San Bernardino	3805	3805	1101	0	649	0	203
53695101	San Bernardino	3324	3320.8538	1050	0	773	0	445
53697202	San Bernardino	3588	3588	1097	0	447	0	159
53701102	San Bernardino	1054	1054	287	0	0	0	36
53689201	San Bernardino	1545	1545	560	0	0	0	79
53702101	San Bernardino	1941	1941	566	0	0	0	18
53702401	San Bernardino	150	150	36	0	0	0	590
53702402	San Bernardino	36	36	8	0	0	0	126
53701202	San Bernardino	2131	2131	684	0	0	0	107
53703101	San Bernardino	919	919	288	0	0	0	50
53703201	San Bernardino	1608	1607.1074	461	0	0	0	22
53705201	San Bernardino	695	695	192	0	13	0	14
53705202	San Bernardino	527	527	133	0	1931	0	305
53709102	San Bernardino	788	788	223	0	0	0	28
53703102	San Bernardino	1502	1502	398	0	0	0	124
53703103	San Bernardino	1902	1902	537	0	0	0	466
53697102	San Bernardino	3191	3191	867	0	1259	0	636
53697101	San Bernardino	0	0	0	0	0	0	0
53710401	San Bernardino	0	0	0	0	0	0	0
53710402	San Bernardino	0	0	0	0	0	0	23
53709201	San Bernardino	0	0	0	0	0	0	0
53720301	San Bernardino	992	992	262	0	0	0	20