

Memorandum

Date: April 4, 2022
To: Greg Wolff, Planning Director | City of Lafayette
From: Ellen Poling, P.E., and Ashlee Takushi | Fehr & Peers
Subject: **City of Lafayette General Plan Emergency Evacuation Assessment - [Revised](#)**

WC20-3744

Introduction

Fehr & Peers has completed a review of emergency evacuation times for the City of Lafayette. This assessment is intended to provide information to comply with the requirements of Assembly Bill (AB 747), signed in October 2019, which requires that the General Plan Safety Element be reviewed and updated to identify evacuation routes and their capacity, safety, and viability under a range of emergency scenarios. This is a requirement for all Safety Elements or updates to a Local Hazard Mitigation Plan (LHMP) completed after January 2022.

As the AB 747 requirement is new, there is no standard methodology, standard of care, or published guidelines for this analysis. In consultation with the City of Lafayette, we have adapted existing traffic analysis methodologies and resources that, in our knowledge and experience, we believe meet the intent of the AB 747 requirement. Nevertheless, these methodologies are necessarily limited by the project parameters for our work for this project and the current state of our knowledge.

This document is intended to provide an assessment of roadway capacities under the described fire scenarios and should not be considered an evacuation plan. Emergency evacuation may be needed due to any number of events. Additionally, fire movement is unpredictable as is individual behavior related to evacuation events. As such, this assessment is intended to provide the City with an informational assessment of the capacity of the transportation system during an evacuation scenario; it does not provide guarantees as to the adequacy of the system nor can it guarantee that the findings are applicable to any or all situations, emergency or otherwise. This memorandum was prepared for the specific and limited purpose of this project. It is not intended to be an exhaustive analysis of evacuation planning in the City or to be used as a specific plan.



The City should take care in planning and implementing any potential evacuation scenario, and this assessment should help the City better prepare for those events. This memorandum should not be used to prevent future City projects that enhance daily safety for residents. During an evacuation scenario, creative solutions should be in place to provide safe evacuation for residents while also addressing the City's Vision Zero goals¹. We would be happy to conduct additional analyses in further detail, analyzing different scenarios, and employing other methodologies if desired.

Current City resources related to emergency preparedness can be found at <https://www.lovelafayette.org/city-hall/commissions-committees/emergency-preparedness>.

Evacuation Capacity Analysis (AB 747)

Evacuation Scenarios

As part of the preparation for this work, Fehr & Peers prepared hazard zone maps and reviewed potential emergency events with City staff, emergency responder representatives (Contra Costa Fire Protection District and Lafayette Police Department), the Lafayette Emergency Preparedness Commission Chair, and Mayor Gerring. Maps showing high fire risk areas, flood hazard zones, landslide risk zones, and seismic faults are included in **Attachment 1**.

The following three events requiring evacuation were recommended by emergency responder representatives (Contra Costa Fire Protection District and Lafayette Police Department), and with concurrence by City staff, the Lafayette Emergency Preparedness Commission Chair, and Mayor Gerring:

1. Wildfire originating in the north (Briones Regional Park) and moving southeast – afternoon, August/September with schools in session
2. Wildfire originating in the eastern portion of the Lafayette Reservoir area and moving east – afternoon, August/September with schools in session
3. Wildfire originating in southeast Lafayette (Hunsaker Canyon Road) and moving north – nighttime, August/September

These scenarios were chosen based on the likelihood of occurrence, location in high fire risk areas, availability of evacuation routes, and the judgment of the emergency responder representatives. The evacuation routes used in this analysis are identified in the *City of Lafayette Emergency Operations Plan Wildland Fire Evacuation Plan (2018)*, available at the link above. These routes are shown in **Figure 1**.

¹ https://nacto.org/docs/usdg/effects_marked_vs_unmarked_crosswalks_zeeger.pdf



Analysis Assumptions

Wildfire events and corresponding evacuations can occur in myriad ways, some allowing for a range of advance logistical planning, and others requiring more immediate responses such as shelter-in-place for certain sites (such as schools). Given the infinite range of potential timelines and event and evacuation characteristics, a set of baseline assumptions were developed in consultation with and direction from emergency responders and city representatives. These assumptions include:

- The entire evacuation area is directed to evacuate at the same time.
- Evacuation times for each route and scenario are assessed on a bottleneck basis, whereby key collection points along each route are evaluated relative to the capacity and the estimated evacuating vehicles. The capacities incorporate operational assumptions as defined in the Transportation Research Board's *Highway Capacity Manual* (6th Edition), including per-lane flow rates by lane type (i.e. right turn, left turn, through lane, straight on-ramp, loop on-ramp, etc.), and capacity limits based on opposing flows. Evacuation times for each route include the bottleneck-based time required to serve the entire evacuating flow to reach SR 24 in Lafayette, or to reach the city limits on arterials leading away from the city toward the east; Contra Costa County Fire Protected District (CCCFPD) has indicated that, in general, evacuations should be toward the east of Lafayette via SR 24 and other arterials to avoid the wildland urban interface (WUI); however, certain routes accessing SR 24 westbound were also included where the route would lead away from the fire zone.
- County Connection buses (standing capacity 60 people) will be used to evacuate students; scenarios presume there is time for emergency responders to dispatch buses and drivers to the school sites.
- School staff will evacuate in their own vehicles.
- Evacuating school students and staff will be based on actual enrollment and staff counts as of March 2022.
- Evacuation areas are defined by the Zonehaven emergency response zones as directed by emergency responders (further definition for each scenario below).
- Evacuating residents and employees are based on the Contra Costa Countywide Travel Demand Model traffic analysis zone (TAZ) data for households and employees. Correspondence between the TAZs and Zonehaven zones, and determination of best available evacuation routes, is estimated Fehr & Peers; in many cases, the estimated evacuating vehicles are distributed to multiple routes.
- The scenarios include the proposed Housing Element residential growth, Distributed Sites Alternative for Scenario 1, and Downtown Alternative for Scenario 2. Scenario 3 is not affected by the Housing Element.



- Based on census data² for vehicle ownership in Lafayette, an average of 1.5 evacuating vehicles per household is used for existing households, and 1 evacuating vehicle per household is used for new housing built under the Housing Element, reflecting the likelihood of lower auto ownership for residential units within the Housing Element planning areas
- For scenarios that include evacuation of employment uses, it is assumed that every employee has their own vehicle and will generate a trip during an evacuation.
- To ensure a conservative analysis, and because reliable data on the number of adult residents who would be at work during daytime evacuation scenarios is not available, no reduction in residential evacuating vehicles is made for the two daytime scenarios (Scenarios 1 and 2).

The following information provides assumptions made for each evacuation scenario. The zones mentioned below correspond to the zones in the Zonehaven database and are overlaid on to the CCTA Travel Demand Model TAZs in **Figure 2**, **Figure 3**, and **Figure 4**.

Scenario 1: Wildfire Originating in the North (Briones Regional Park) and Moving Southeast

This scenario assumes a fire originating in the Briones Regional Park area, moving toward the southeast. The scenario timing is during fire season (August-September), in the afternoon (3-5 PM), when schools are in session.

Assumptions for this scenario include:

- All Lafayette zones north of SR 24 (LAF-1, 2, 3, 4, 5, 6, 7, 19, 20) are evacuated.
- The access routes used by the various zones are shown in **Figure 5**. As noted above, evacuating vehicles are distributed to multiple routes where available. The Happy Valley Road/Upper Happy Valley Road area is evacuated via those two roadways to SR 24 East and West, with the easterly portion of Happy Valley Road vehicles using both Deer Hill Road and Mount Diablo Boulevard to access SR 24 East at First Street, and some vehicles proceeding east on Deer Hill Road to Pleasant Hill Road south to access SR 24 East. The Springhill Road area is evacuated to Pleasant Hill Road south. The Reliez Valley Road area is evacuated partly to the south on Pleasant Hill Road and partly to the north on Pleasant Hill Road via Withers Avenue. The Quandt Road area is similarly split to Pleasant Hill Road north and south. The Stanley Boulevard/Springbrook Road area is evacuated to the east via Camino Diablo.

² US Census American Communities Survey 5-year average (2020).



Scenario 2: Wildfire Originating in the Eastern Portion of the Lafayette Reservoir Area and Moving East

This scenario was chosen due to the recreational activity that occurs at the Reservoir, increasing the chance of a fire start. The fire is assumed to originate east of the reservoir and move east. The scenario timing is during fire season (August-September), in the afternoon (3-5 PM), when schools are in session.

Assumptions for this scenario include:

- Lafayette zones at and east of the reservoir (LAF-12, 14, 15) and northern Moraga zones (MOR-1, 3, 4) are evacuated.
- The access routes used by the various zones are shown in **Figure 6**. Most of the evacuation is via Mount Diablo Boulevard and Moraga Road to SR 24 West at Oak Hill Road, SR 24 East at First Street, and SR 24 East at Pleasant Hill Road. The easternmost portion of Zone LAF-12 is evacuated via Mount Diablo Boulevard to SR 24 East and West at the Acalanes interchange. The northern Moraga zones, including Campolindo High School, are evacuated to the south and west via Moraga Road, Rheem Boulevard and Moraga Way.³ The southern half of Zone LAF-15 is evacuated via Glenside/Reliez Station Road.

Scenario 3: Wildfire Originating in Southeast Lafayette (Hunsaker Canyon)

This scenario was chosen due to the dead-end roadway, terrain, and remote location of the potential fire start. The fire is assumed to start at the southeast limit of the City and travel north. The scenario timing is during fire season (August-September) at night (10:00 – 11:00 PM).

Assumptions for this scenario include:

- Lafayette zones in the southeast area of the City, generally south of Glenside/Woodview (LAF-17) are evacuated.
- The access routes used by the various zones are shown in **Figure 7**. Evacuation routes include Glenside Road – Reliez Station Road – Olympic Boulevard, with some continuing east on Olympic Boulevard to I-680, and others turning left to Pleasant Hill Road to access SR 24; and St. Mary's Road – Moraga Road – Mount Diablo Boulevard – First Street – SR 24 East. The southernmost portion of the evacuation area is assumed to evacuate via St. Mary's Road to the south, continuing on to downstream routes in Moraga and Orinda such as Rheem Boulevard, Moraga Road and Moraga Way.

³ Note that Moraga evacuation times were not assessed; based on the number of residents and expected vehicles, the capacity on Moraga Road south and downstream roadways are not expected to create bottlenecks for these vehicles. It is expected that the Town of Moraga will conduct its own AB 747 evacuation time assessment.



Evacuation Capacity Assessment

The above sources were used to determine the number of evacuating vehicles for each scenario.

Table 1 summarizes land uses and vehicle estimates.

Table 1: Land Uses and Evacuating Vehicles

Land Use	Scenario 1		Scenario 2		Scenario 3	
	Amount	Vehicles	Amount	Vehicles	Amount	Vehicles
Households	5,119	7,138	3,660 4,321	6,279 5,254	1,487	2,305
Employment	527	527	6,116	6,116	403	403
School Students ¹	2,165	74	1,327	46	-	-
School Staff	240	240	114	114	-	-
Reservoir Visitors ²	-	-	300	300	-	-
Total Vehicles		7,979 5		12,089 12,395		2,708

Note: All uses and evacuating vehicles are shown in this table, including those that are assumed to evacuate via routes in Moraga/Orinda (for scenarios 2 and 3).

1. Students are evacuated in buses at 60 students/bus; buses are converted to passenger car equivalents with a factor of 2.0. Thus, the vehicle count in this row is double the number of actual buses.

2. Assumption for reservoir evacuation is that short-term parking lot is full plus about 150 vehicles in the long-term lot.

Source: Contra Costa Countywide Travel Demand Model; US Census; Fehr & Peers, April 2022.

The evacuation routes for each scenario were evaluated for expected bottleneck locations, using the Transportation Research Board's *Highway Capacity Manual, 6th Edition* traffic operations analysis methods. The time to evacuate for each route would be controlled by locations where the evacuating traffic volume exceeds capacity. The following capacities were used to assess conditions at key intersections along each route:

- Through lane: 950 vehicles/hour
- Channelized right turn lane: 950 vehicles/hour
- Left turn lane: 450 vehicles/hour
- Shared lane (left-through-right, left-through, through-right, left-right): 450 vehicles/hour
- Roundabout circulating lane: 1,200 vehicles/hour
- Freeway straight on-ramp: 950 vehicles/hour
- Freeway loop on-ramp: 1,500 vehicles/hour

At some locations, local network conditions require adjustments to the above capacity assumptions.

The results of the evacuation analysis for Scenarios 1, 2 and 3 are presented and discussed below.



Scenario 1 – Wildfire Originating in the North

Table 2 shows the range of estimated evacuation times for the available routes in this scenario. Times range from just under an hour to about an hour and a half.

Note that these evacuation times would vary depending on directions residents and employees may receive from emergency responders and individual decisions regarding which route to take. Some evacuees may also choose to travel west of Lafayette, which would allow use of additional freeway on-ramp capacity not included in this analysis. Emergency scenarios are unpredictable and driver behavior can be disorderly. There is also general unpredictability in operational issues such as traffic signal synchronization issues or power issues that would trigger traffic signals to operate in “red flash.” Additionally, evacuation events are not linear in nature (that is, having an even distribution during the evacuation time period) and it is anticipated that evacuees would vacate at a rate that more closely resembles a bell curve from the time that the evacuation order is issued. These are conditions which would affect the total evacuation time estimated in our assessment that are not captured in the methodology used here.

Table 2: Evacuation Times by Route – Scenario 1

Route	Total Time to Evacuate (hours)
Upper Happy Valley-El Nido Ranch – SR 24 West	0.92
Upper Happy Valley-El Nido Ranch – SR 24 East	1.63
Dolores-Mount Diablo-First-SR 24 East	1.13
Happy Valley-Mount Diablo-First-SR 24 East	1.57
Lower Happy Valley/Glen Neighborhood/Direct Deer Hill Access-Deer Hill-First-SR 24 East	1.44
Lower Happy Valley/Glen Neighborhood/Direct Deerhill Access -Deerhill-SR 24 West	1.44
Lower Happy Valley/Glen Neighborhood/Direct Deerhill Access-Deerhill-Pleasant Hill Road South-SR 24 East	1.44
Springhill-Pleasant Hill South-SR 24 East	1.37
Springbrook-Camino Diablo-Mount Diablo East	1.17
Quandt-Pleasant Hill South-SR 24 East	1.37
Reliez Valley-Pleasant Hill South-SR 24 East	1.37
Reliez Valley-Pleasant Hill North	0.99
Reliez Valley-Withers-Pleasant Hill North	1.38
Withers-Pleasant Hill North	1.14

Source: Fehr & Peers, April 2022.



Scenario 2 – Wildfire Originating in the Eastern Portion of the Lafayette Reservoir Area

Table 3 shows the range of estimated evacuation times for the available routes in this scenario. Times range from about an hour and a half to ~~nearly four over three~~ hours. The route via Glenside Drive and Reliez Station Road has the shortest evacuation time, and could be a preferable route for more vehicles than assumed in this analysis, given the longer times on the other routes.

The same notes regarding evacuation behavior described above apply to this scenario.

Table 3: Evacuation Times by Route – Scenario 2

Route	Total Time to Evacuate (hours)
Mount Diablo West-SR 24 East	3.323 .77
Mount Diablo West-El Nido Ranch-SR 24 West	3.732 .84
Mount Diablo East-First-SR 24 East	3.463 .09
Oak Hill-Deer Hill-SR 24 West	2. 87 64
Mount Diablo East-SR 24 East	3. 21 04
Brook-Moraga-Mount Diablo-First-SR 24 <u>East</u>	3. 46 09
Moraga-Mount Diablo-First-SR 24 <u>East</u>	3. 46 09
St. Mary's Burton-Glenside-Reliez Station-Olympic-I-680	1.34

Source: Fehr & Peers, April 2022.

Scenario 3 – Wildfire Originating in Southeast Lafayette

Table 4 shows the range of estimated evacuation times for the available routes in this scenario. Evacuation times range from about 45 minutes to just over an hour and a half.

The same notes regarding evacuation behavior described above apply to this scenario.

Table 4: Evacuation Times by Route – Scenario 3

Route	Total Time to Evacuate (hours)
Florence-Rohrer -St. Mary's-Moraga-Mount Diablo-First-SR 24 <u>East</u>	1.29
FlorenceRohrer -St. Mary's <u>South</u> -Moraga-Mount Diablo-First-SR 24	0.78
Burton-Glenside-St. Mary's-Moraga-Mount Diablo-First-SR 24 <u>East</u>	1.64
Burton-Glenside-Reliez Station-Olympic-Pleasant Hill-SR 24 <u>East</u>	1.64
Burton-Glenside-Reliez Station-Olympic-I-680	1.64

Source: Fehr & Peers, April 2022.



Recommendations

The City of Lafayette, Contra Costa County Fire Protection District, and Lafayette Police Department maintain resources to inform residents and employees about emergency preparedness and evacuation procedures. These resources should be updated as technologies and best practices evolve. The results of the above analysis indicate the following potential improvements and enhancements to existing resources could reduce evacuation times.

- Develop emergency evacuation traffic signal timing plans for traffic signals on evacuation routes, prioritizing evacuation flows and minimizing opposing traffic flows. Emergency response vehicle access into evacuation areas can be maintained through traffic signal pre-emption. Coordinate with neighboring jurisdictions to develop corridor evacuation timing plans.
- As part of evacuation messaging, ensure evacuees are informed of the availability of multiple evacuation routes, to allow effective use of all available capacity.
- Consider the impact on potential bottleneck locations when determining the timing for evacuation of different zones.
- When considering roadway or intersection design modifications, especially in areas that have less accessibility and on key evacuation routes, consider evacuation capacity and consider design treatments that could allow reversible lanes or temporary auxiliary lanes to provide additional capacity in an evacuation event scenario.
- Educate residents and employees about the importance of carpooling in evacuations to minimize evacuation times.
- Areas that have a high concentration of residents with social vulnerability indicators such as age, disability, and other mobility factors should be further examined to determine other potential barriers to evacuation besides distance to and capacity of evacuation routes. Advanced coordination between first responders to ensure an efficient and well-communicated process for evacuation may be needed in response to various hazard scenarios.
- Identify routes where reversible traffic lanes are feasible. During an evacuation, this could allow the City and emergency responder personnel to reverse traffic lanes to add additional capacity to the evacuation route.

Please call us if you have any questions about this analysis.

Attachments:

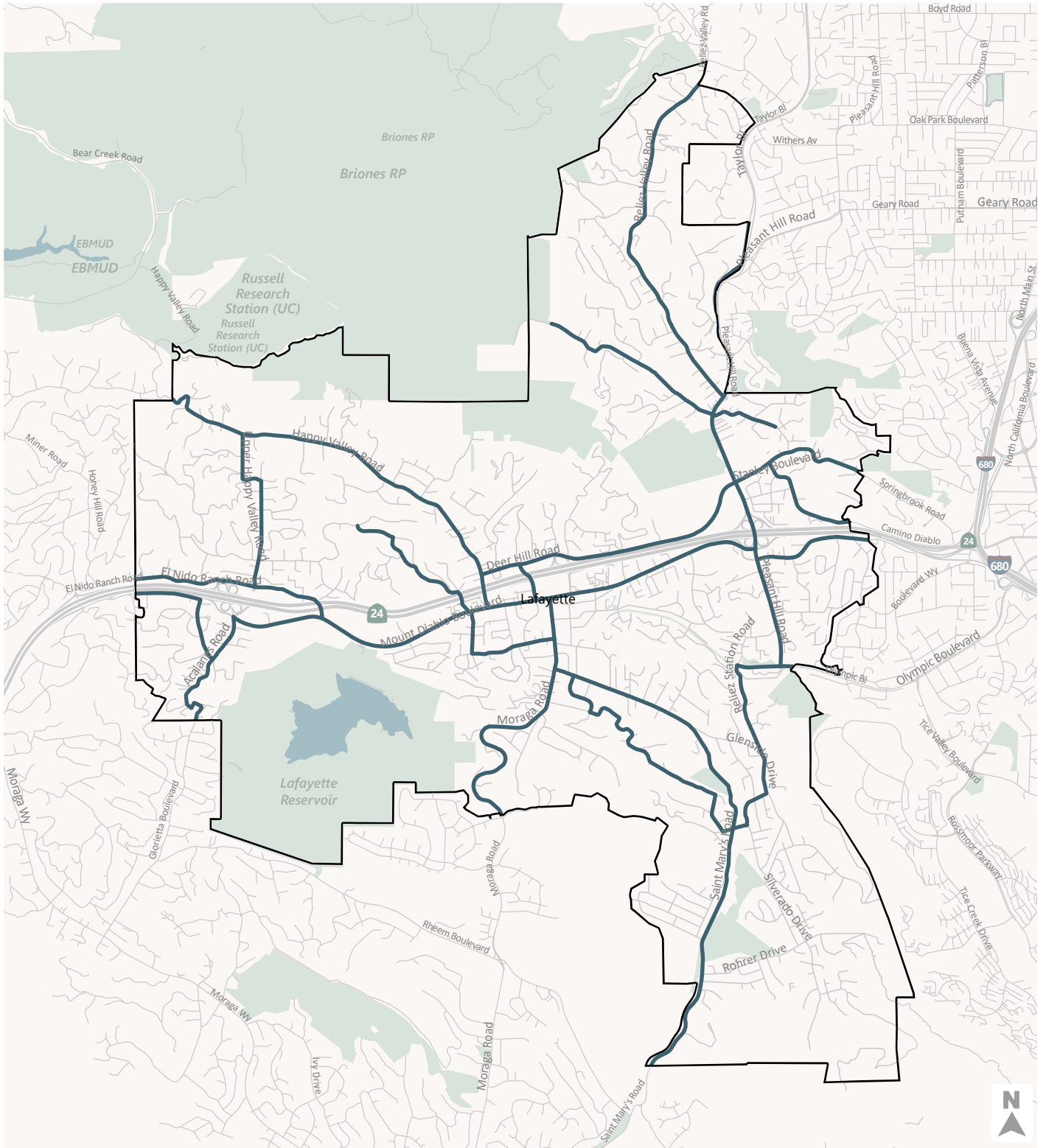
Figure 1 – Evacuation Routes

Figure 2 – Scenario 1 Evacuation Areas



- Figure 3 – Scenario 2 Evacuation Areas
- Figure 4 – Scenario 3 Evacuation Areas
- Figure 5 – Scenario 1 Evacuation Routes
- Figure 6 – Scenario 2 Evacuation Routes
- Figure 7 – Scenario 3 Evacuation Routes

| Attachment 1: Hazard Zone Maps



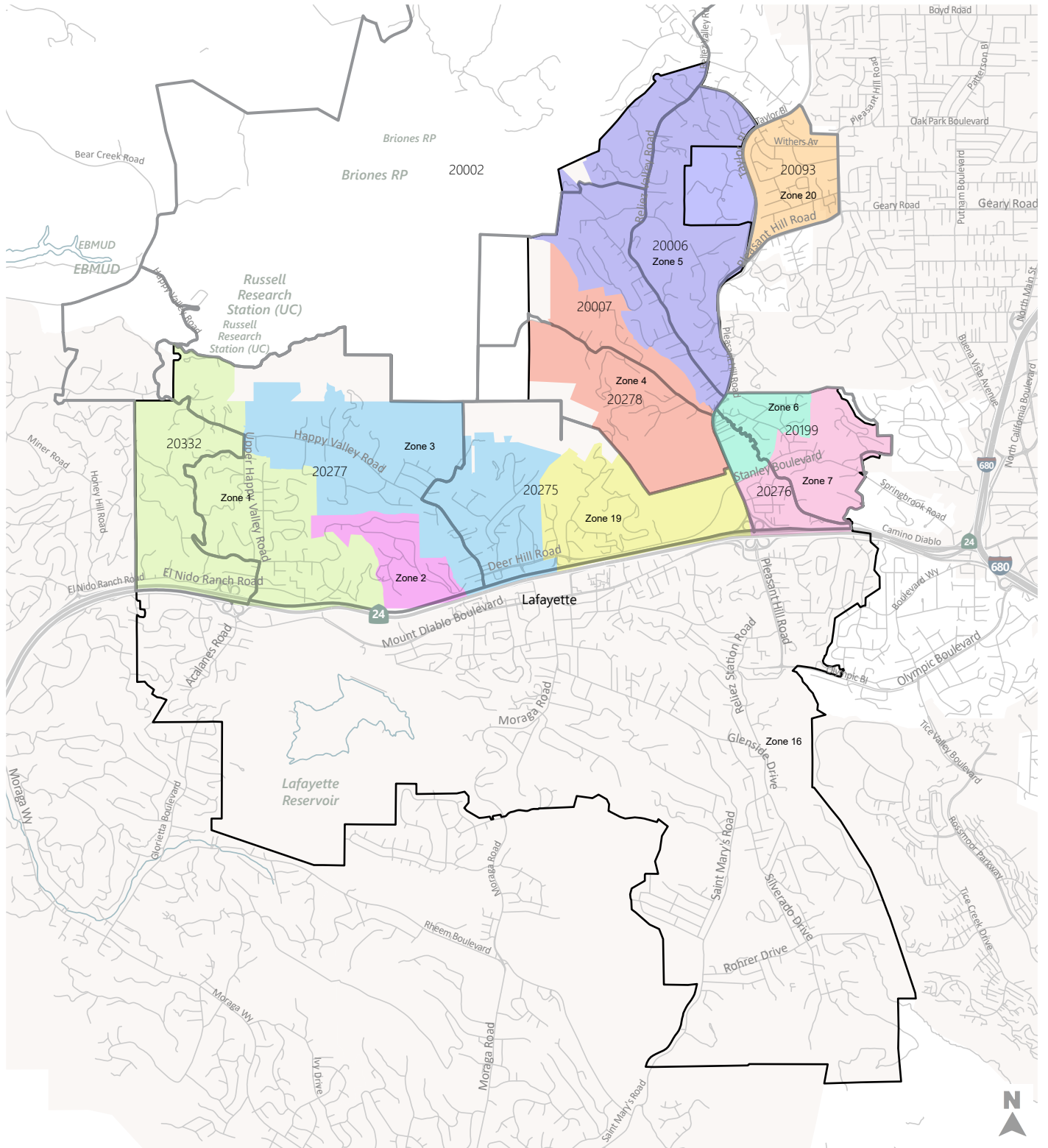
— Evacuation Routes (City of Lafayette Emergency Operations Plan Wildland Fire Evacuation Plan (2018))

□ City Limits



Figure 1

Evacuation Routes






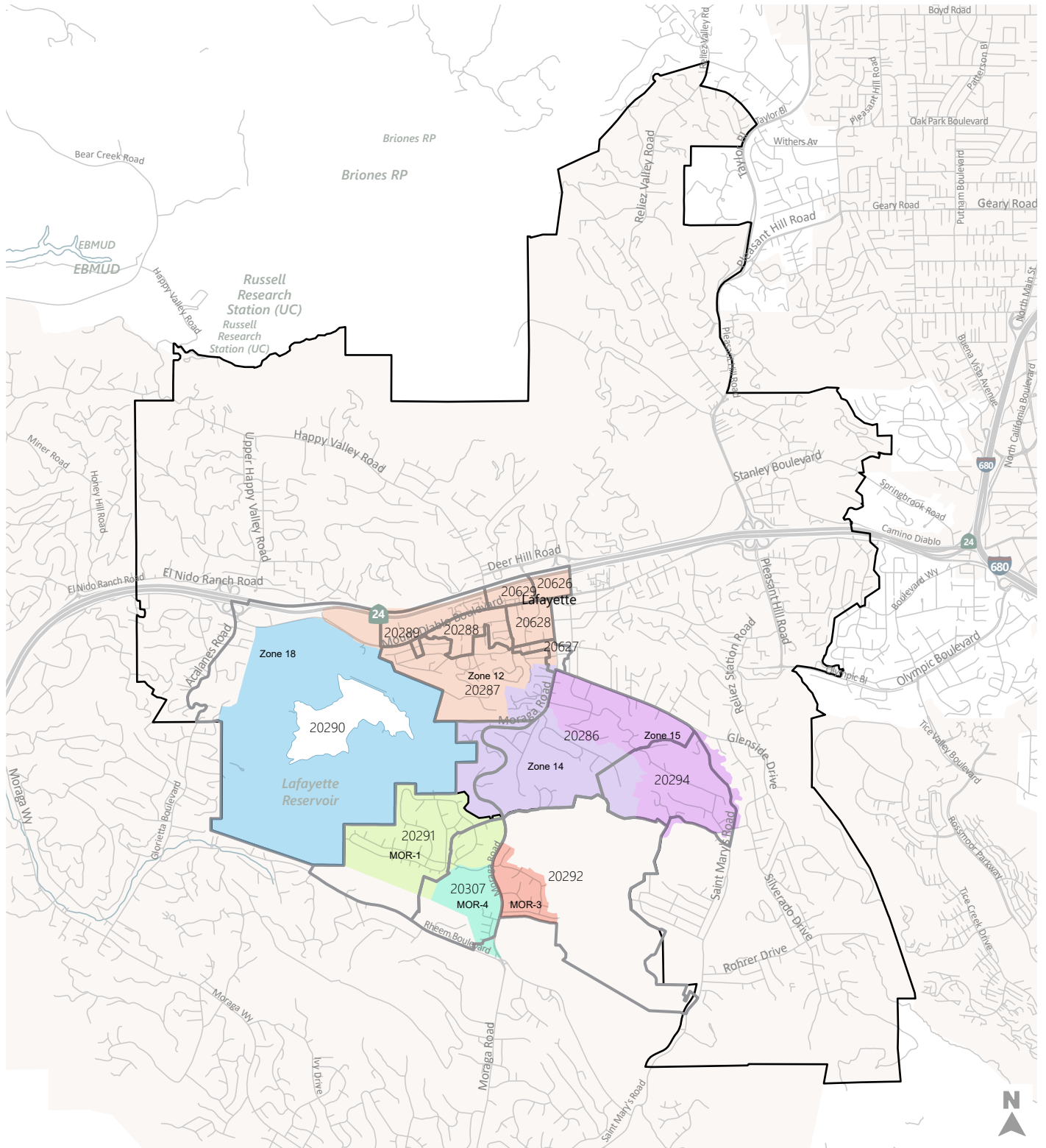
-  TAZs
-  Zonehaven Zones
-  City Limits



Figure 2

Scenario 1 Evacuation Areas






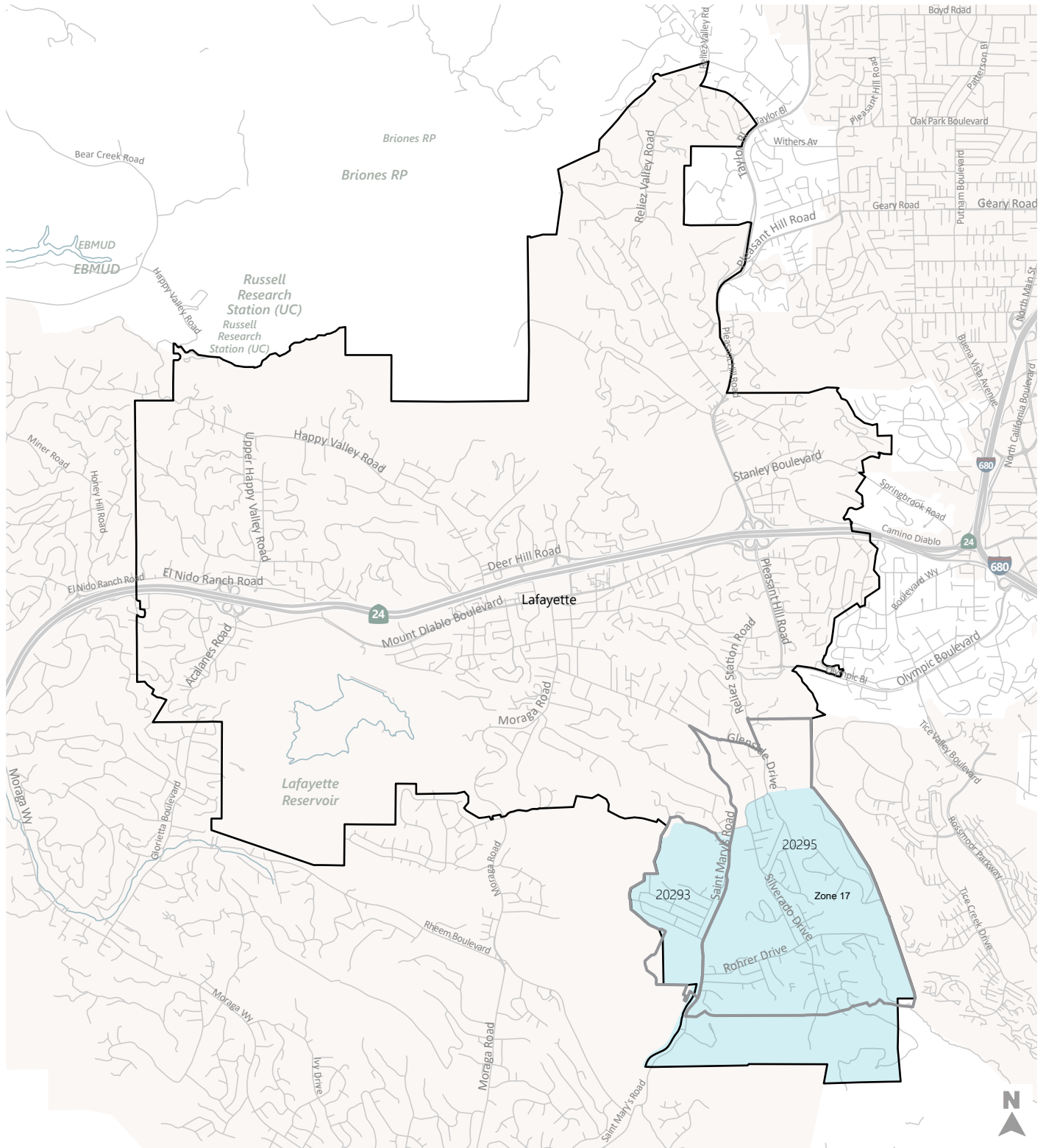
-  TAZs
-  Zonehaven Zones
-  City Limits



Figure 3

Scenario 2 Evacuation Areas






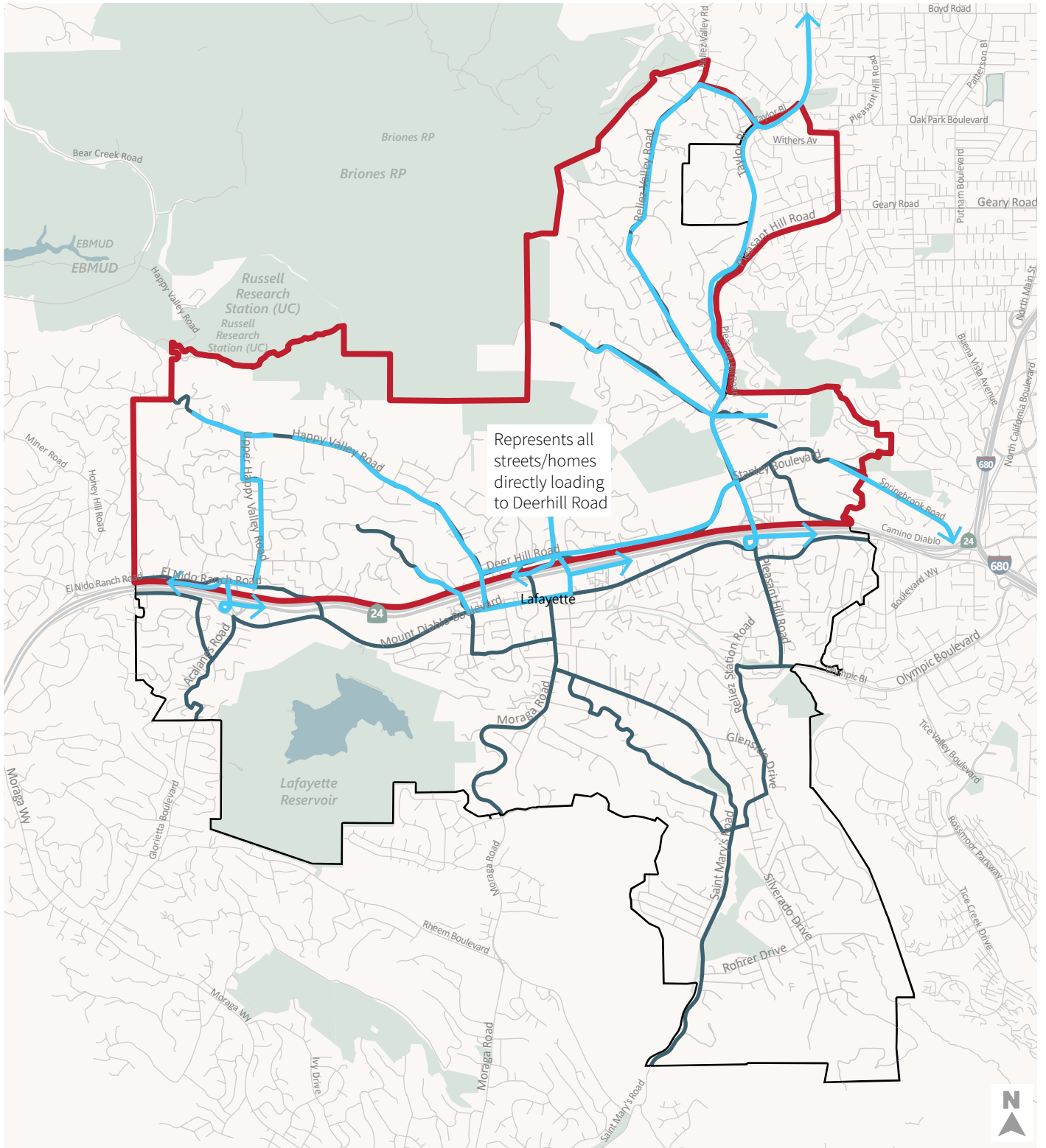
-  TAZs
-  Zonehaven Zones
-  City Limits



Figure 4

Scenario 3 Evacuation Areas







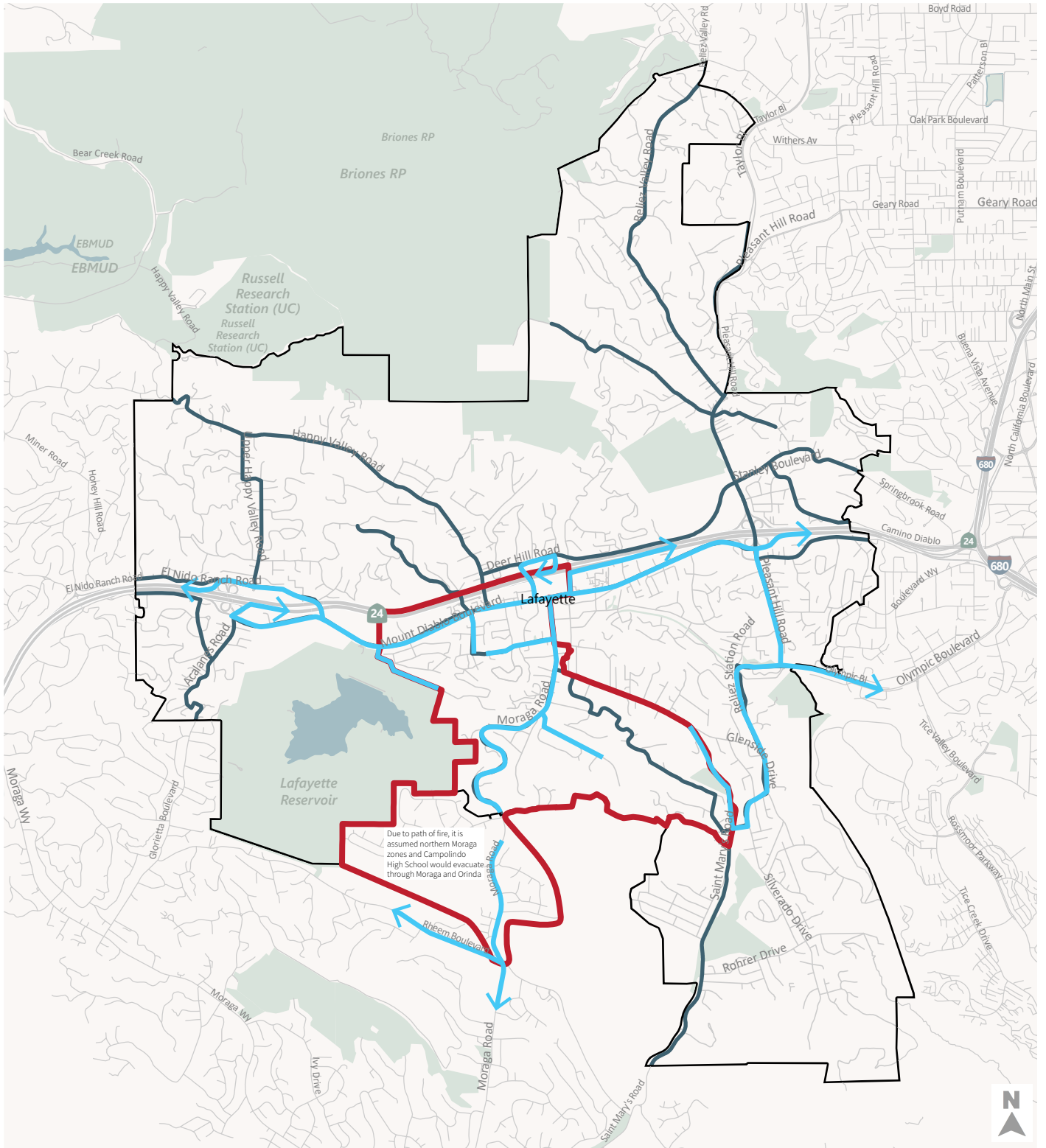
-  Evacuation Routes (City of Lafayette Emergency Operations Plan Wildland Fire Evacuation Plan (2018))
-  Evacuation Area
-  Scenario 1 Evacuation Routes
-  City Limits



Figure 5

Scenario 1 Evacuation Routes







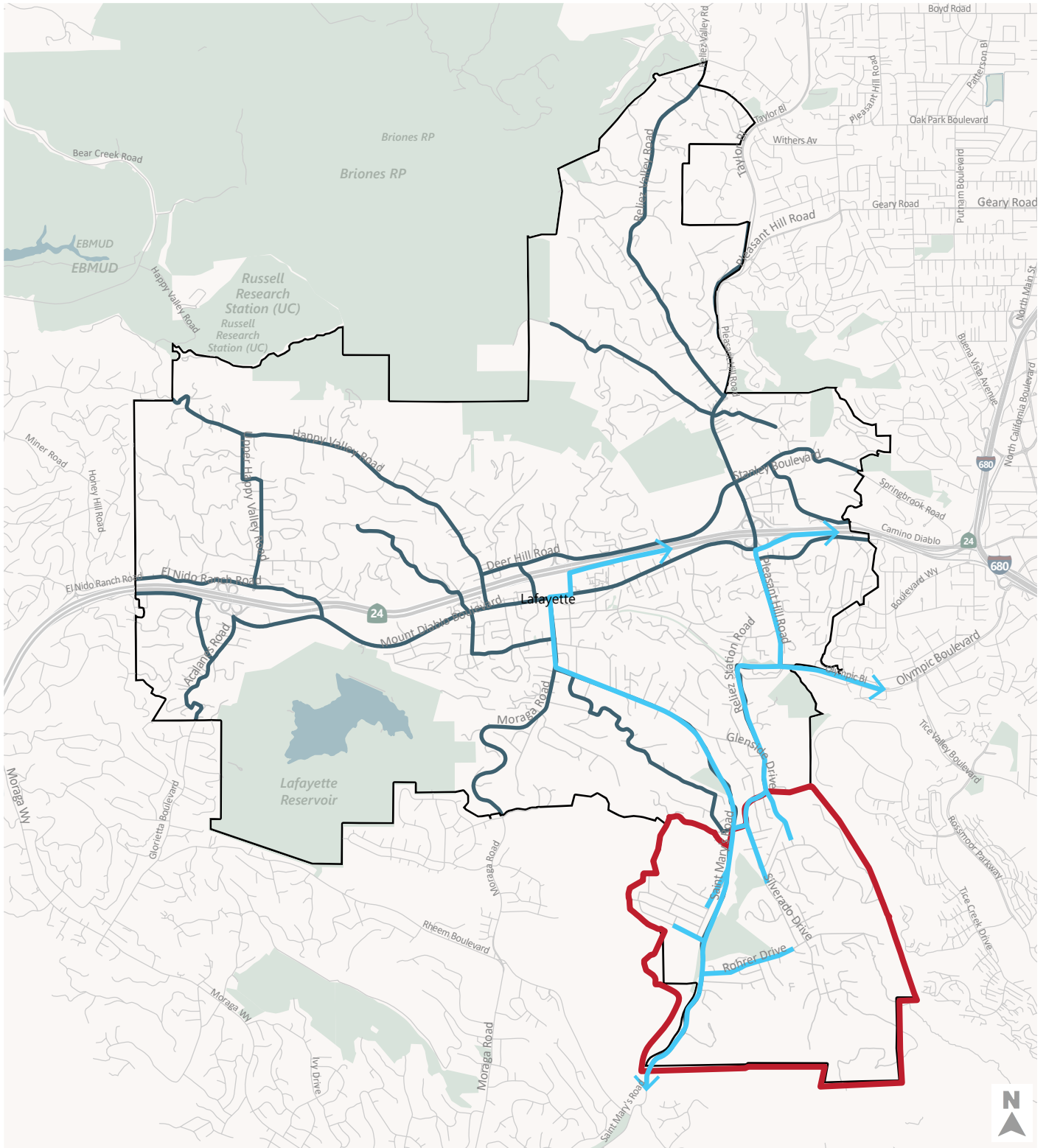
-  Evacuation Routes (City of Lafayette Emergency Operations Plan Wildland Fire Evacuation Plan (2018))
-  Evacuation Area
-  Scenario 2 Evacuation Routes
-  City Limits



Figure 6

Scenario 2 Evacuation Routes



- Evacuation Routes (City of Lafayette Emergency Operations Plan Wildland Fire Evacuation Plan (2018))
- ▭ Evacuation Area
- Scenario 3 Evacuation Routes
- ▭ City Limits

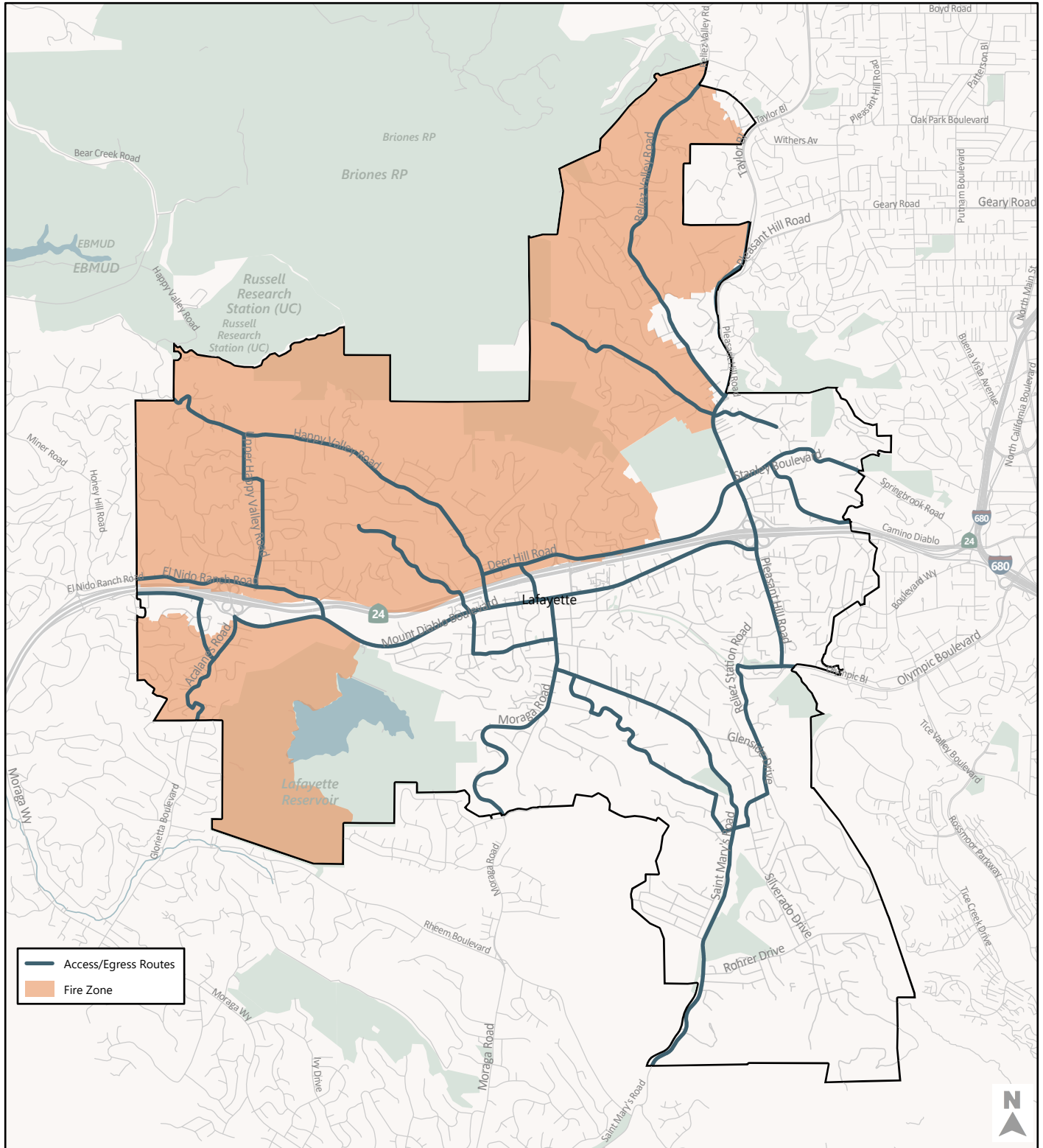


Figure 7

Scenario 3 Evacuation Routes

Attachment 1

Hazard Zone Maps

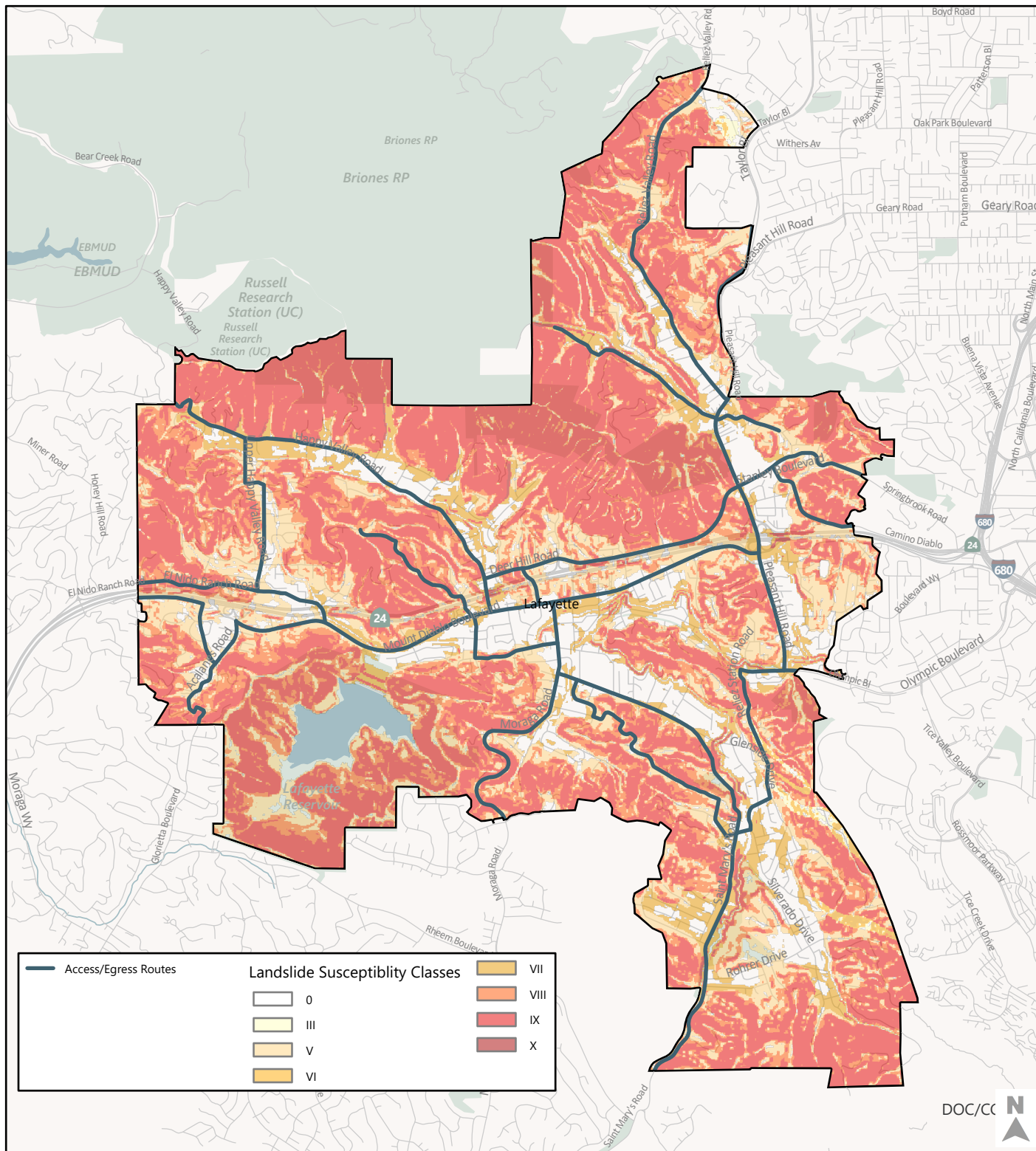


Source: FEMA - Flood Hazard Zones Mapping

Figure A-1

High Risk Fire Areas



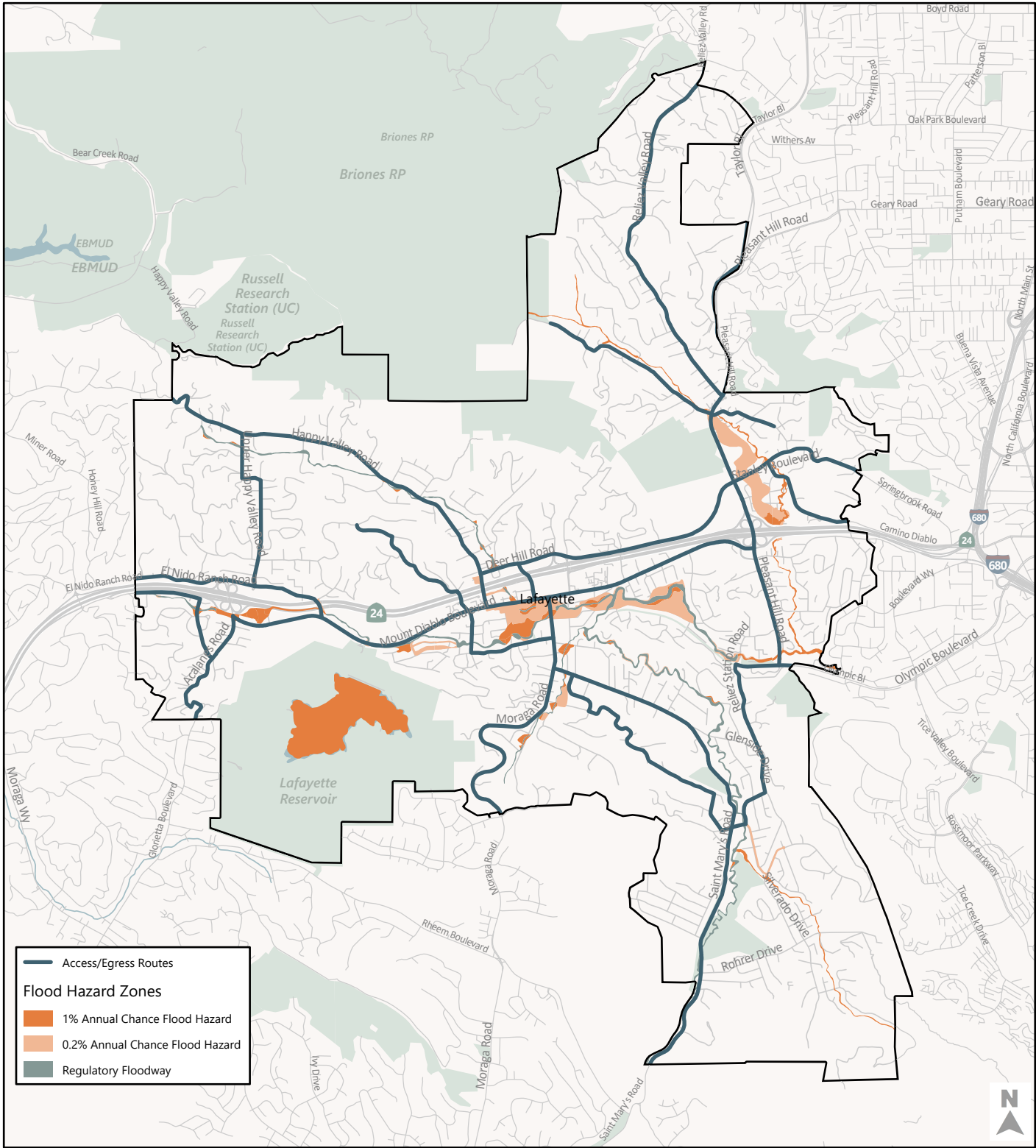


Source: FEMA - Flood Hazard Zones Mapping

Figure A-2

Landslide Zones



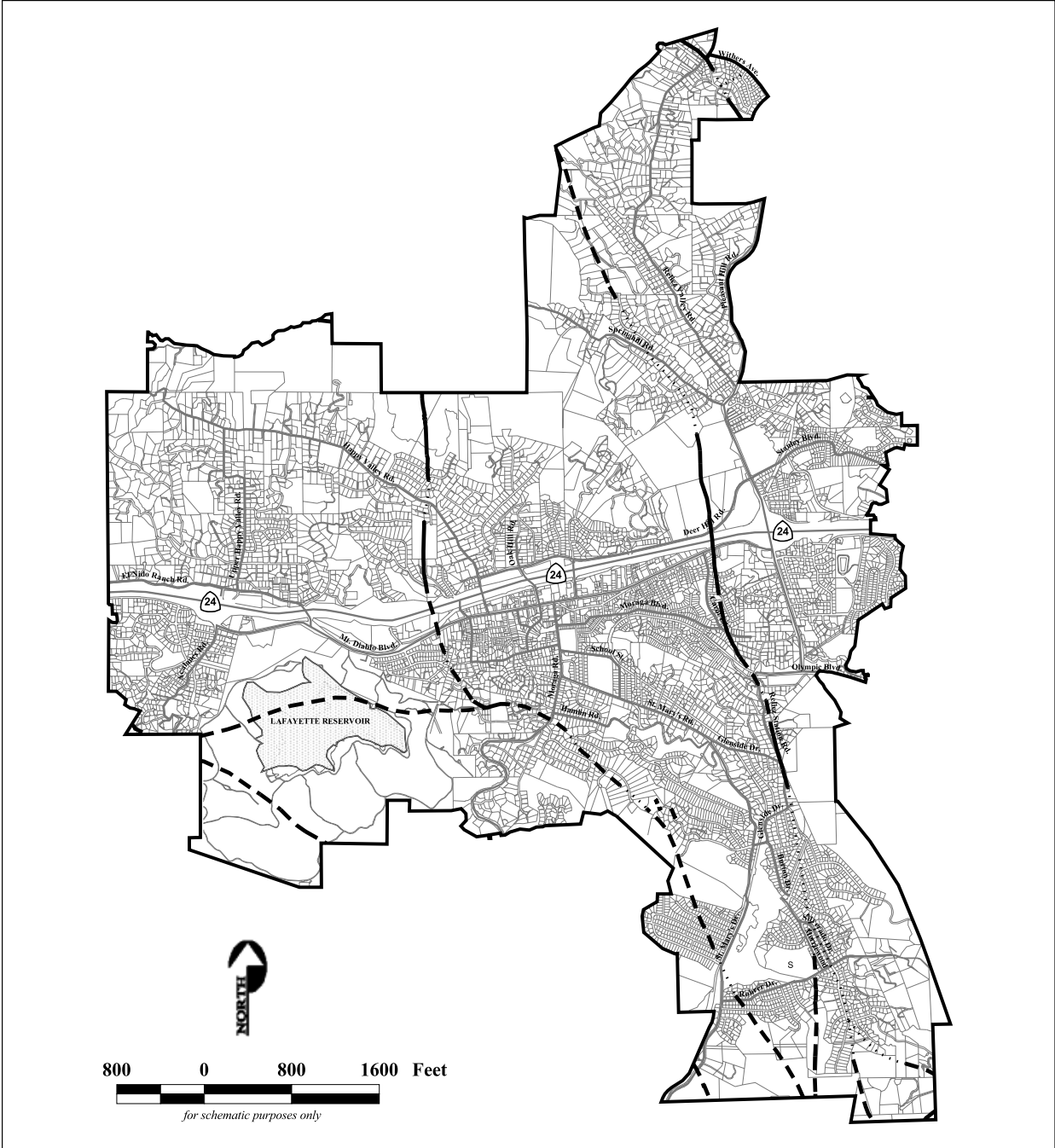


Source: FEMA - Flood Hazard Zones Mapping

Figure A-3




Flood Hazard Zones





Legend

Fault Locations:

-  Fault, certain
-  Fault, approximately located
-  Fault, concealed



Earthquake Hazard

City of Lafayette General Plan

Sources: Lafayette General Plan Geologic and Seismic Safety Element (1976)
Landslide Hazard Identification Map No. 32 (Haydon, 1995)

Figure A-4



Appendix A2

Housing Element Update Emergency Evacuation Comparison

Memorandum

Date: April 19, 2022
To: Greg Wolff, Planning Director | City of Lafayette
From: Ellen Poling, P.E., and Valerie Tan | Fehr & Peers
Subject: **City of Lafayette General Plan Emergency Evacuation Assessment: Comparison of Existing Conditions and Existing With Housing Element Conditions**

WC20-3744

Introduction

Fehr & Peers prepared a review of emergency evacuation times for the City of Lafayette in a memorandum dated April 4, 2022. The assessment provides information to comply with the requirements of Assembly Bill (AB 747), signed in October 2019, which requires that the General Plan Safety Element be reviewed and updated to identify evacuation routes and their capacity, safety, and viability under a range of emergency scenarios. This is a requirement for all Safety Elements or updates to a Local Hazard Mitigation Plan (LHMP) completed after January 2022.

For each of the three evacuation event scenarios assessed in the April 4, 2022 memorandum, the highest-household land use assumption was used for the evacuation area:

- Scenario 1: Existing Plus Housing Element Update With Distributed Sites
- Scenario 2: Existing Plus Housing Element Downtown Only Alternative
- Scenario 3: Existing (no Housing Element sites are in the evacuation area for this scenario)

This memorandum presents comparative estimated evacuation times for Existing conditions and each Housing Element alternative, for Scenarios 1 and 2. This information may be of interest to the City in its consideration of the Housing Element With Distributed Sites and the Housing Element Downtown Only Alternative.

Please refer to the April 4, 2022 memorandum for a description of the analysis methodology and assumptions. The results of the comparative analysis are presented below.



Evacuation Capacity Assessment

Scenario 1 – Wildfire Originating in the North

Table 1 shows the land uses and vehicles within the evacuation area for Existing Conditions, Existing Plus Housing Element With Distributed Sites, and Existing Plus Housing Element Downtown Only Alternative. **Table 2** shows the comparative evacuation times for the three cases.

Table 1: Land Uses and Evacuating Vehicles – Scenario 1

Land Use	Existing		Existing + HE With Distributed Sites		Existing + HE Downtown Only Alternative	
	Amount	Vehicles	Amount	Vehicles	Amount	Vehicles
Households	3,669	5,687	5,119	7,138	3,984	6,002
Employment	527	527	527	527	527	527
School Students ¹	2,165	74	2,165	74	2,165	74
School Staff	240	240	240	240	240	240
Total Vehicles		6,528		7,979		6,843

Note:

1. Students are evacuated in buses at 60 students/bus; buses are converted to passenger car equivalents with a factor of 2.0. Thus, the vehicle count in this row is double the number of actual buses.

Source: Contra Costa Countywide Travel Demand Model; US Census; Fehr & Peers, April 2022.

Table 2: Evacuation Times by Route – Scenario 1

Route	Total Time to Evacuate (Hours)		
	Existing	Existing + HE With Distributed Sites	Existing + HE Downtown Only Alternative
Upper Happy Valley-El Nido Ranch – SR 24 West	0.92	0.92	0.92
Upper Happy Valley-El Nido Ranch – SR 24 East	1.63	1.63	1.63
Dolores-Mount Diablo-First-SR 24 East	0.90	1.13	0.95
Happy Valley-Mount Diablo-First-SR 24 East	1.09	1.57	1.19
Lower Happy Valley/Glen Neighborhood/Direct Deer Hill Access-Deer Hill-First-SR 24 East	0.52	1.44	0.72
Lower Happy Valley/Glen Neighborhood/Direct Deer Hill Access-Deer Hill-Pleasant Hill Road South-SR 24 East	1.10	1.44	1.16



Table 2: Evacuation Times by Route – Scenario 1

Route	Total Time to Evacuate (Hours)		
	Existing	Existing + HE With Distributed Sites	Existing + HE Downtown Only Alternative
Lower Happy Valley/Glen Neighborhood/Direct Deer Hill Access-Deer Hill-SR 24 West	0.52	1.44	0.72
Springhill-Pleasant Hill South-SR 24 East	1.10	1.37	1.16
Springbrook-Camino Diablo-Mount Diablo East	1.17	1.17	1.17
Quandt-Pleasant Hill South-SR 24 East	1.17	1.37	1.17
Reliez Valley-Pleasant Hill South-SR 24 East	1.10	1.37	1.16
Reliez Valley-Pleasant Hill North	0.99	0.99	0.99
Reliez Valley-Withers-Pleasant Hill North	1.38	1.38	1.38
Withers-Pleasant Hill North	1.14	1.14	1.14

Source: Fehr & Peers, April 2022.

Evacuation times are the same across all cases for six routes; for the remaining routes, the Existing Plus Housing Element With Distributed Sites evacuation time is longer than the evacuation time for the Existing Plus Housing Element Downtown Only Alternative, which in turn is longer than the evacuation time for Existing conditions. For most routes with different evacuation times, the difference between the longest and shortest evacuation time is less than a half hour; however, for the routes feeding to the First Street on-ramp to SR 24 eastbound and to the Deer Hill on-ramp to SR 24 westbound, the difference is about one hour.

Please see the April 4, 2022 memorandum for further discussion of evacuation period characteristics, and recommendations for further evacuation planning that the City and emergency responders may consider.

Scenario 2 – Wildfire Originating in the Eastern Portion of the Lafayette Reservoir Area

Table 3 shows the land uses and vehicles within the evacuation area for Existing Conditions, Existing Plus Housing Element With Distributed Sites, and Existing Plus Housing Element Downtown Only Alternative. **Table 4** shows the comparative evacuation times for the three cases.



Table 3: Land Uses and Evacuating Vehicles – Scenario 2

Land Use	Existing		Existing + HE With Distributed Sites		Existing + HE Downtown Only Alternative	
	Amount	Vehicles	Amount	Vehicles	Amount	Vehicles
Households	3,015	4,673	3,660	5,318	4,321	6,279
Employment	6,116	6,116	6,116	6,116	6,116	6,116
School Students ¹	1,327	46	1,327	46	1,327	46
School Staff	114	114	114	114	114	114
Reservoir Visitors ²	300	300	300	300	300	300
Total Vehicles		11,249		11,734		12,395

Note:

All uses and evacuating vehicles are shown in this table, including those that are assumed to evacuate via routes in Moraga/Orinda.

1. Students are evacuated in buses at 60 students/bus; buses are converted to passenger car equivalents with a factor of 2.0. Thus, the vehicle count in this row is double the number of actual buses.

2. Assumption for reservoir evacuation is that short-term parking lot is full plus about 150 vehicles in the long-term lot.

Source: Contra Costa Countywide Travel Demand Model; US Census; Fehr & Peers, April 2022.

Table 4: Evacuation Times by Route – Scenario 2

Route	Total Time to Evacuate (Hours)		
	Existing	Existing + HE With Distributed Sites	Existing + HE Downtown Only Alternative
Mount Diablo West-SR 24 East	3.21	3.48	3.77
Mount Diablo West-El Nido Ranch-SR 24 West	2.71	3.15	3.73
Mount Diablo East-First-SR 24 East	2.91	3.22	3.46
Oak Hill-Deer Hill-SR 24 West	2.61	2.72	2.87
Mount Diablo East-SR 24 East	3.02	3.10	3.21
Brook-Moraga-Mount Diablo-First-SR 24 East	2.91	3.22	3.46
Moraga-Mount Diablo-First-SR 24 East	2.91	3.22	3.46
St. Mary's-Glenside-Reliez Station-Olympic-I-680	1.34	1.34	1.34

Source: Fehr & Peers, April 2022.

Evacuation times are the same across all cases for one route; for the remaining routes, the Existing Plus Housing Element Downtown Only Alternative evacuation time is longer than the evacuation time for the Existing Plus Housing Element With Distributed Sites, which in turn is longer than the



evacuation time for Existing conditions. The difference between the longest and shortest evacuation times for these routes is generally a half hour or less, with the exception of the Mount Diablo Boulevard to El Nido Ranch Road to SR 24 westbound route, where the difference is about one hour.

Please see the April 4, 2022 memorandum for further discussion of evacuation period characteristics, and recommendations for further evacuation planning that the City and emergency responders may consider.

Please call us if you have any questions about this analysis.