

# EXHIBIT 1

## GLENDALE VISION ZERO ACTION PLAN

July 12, 2024

Project: Glendale Vision Zero Action Plan

**Re: Glendale Vision Zero Action Plan Crash Analysis**

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## Summary of Findings

**Years of Crash Data Analyzed:** 2012 - 2021

**Total Crashes:** 5,125

**Total Fatal Crashes:** 37

**Total Serious Injury Crashes:** 192

**Total Killed and Serious Injury Crashes (KSI):** 229

**Crashes by Year:** Crashes peaked in 2013, with a peak of KSI crashes in 2015, before falling to a low point in 2020. In 2021, both the total number of crashes and KSI crashes grew.

### **Injury Severity By Mode:**

- 103 pedestrian crashes, or 44.9% of all KSI crashes in the city, resulted in a death or severe injury
- 20 bicycle crashes resulted in a death or severe injury
- 40 motorcycle crashes resulted in a death or severe injury

**Crashes by Mode:** 71.8% of all crashes were motor vehicle-only; 17.0% of crashes were pedestrian-involved; 7.7% of crashes were bicycle-involved; 4.6% of crashes were motorcycle-involved

**Leading KSI Violations:** Pedestrian right of way was the most common KSI crash violation type, at 17.9% of KSI crashes, followed by pedestrian violations (17.5%). Unsafe vehicle speed and failure to follow traffic signals and signs were also common violations, at 13.5% and 11.4% of KSI crashes respectively.

**HPI and Equity:** When normalized by miles of roadway per census tract, tracts in the lowest quartile of HPI (Healthy Places Index) scores experienced the highest rates of overall crashes and KSI crashes.

**HIN Description:** The proposed High Injury Network accounts for 13% of local streets in the city of Glendale, where 71% of crashes and 78% of KSI crashes occurred. Streets in the HIN are predominantly arterials in central, downtown, and West Glendale.

## Descriptive Crash Analysis Methodology

### Crash Data Overview

Crash data was obtained from the Transportation Injury Mapping System (TIMS), maintained by the UC Berkeley Safe Transportation Research and Education Center for the 10 most recent years of available data. Crashes cover the years 2012 through 2021, as available data for 2022 is currently considered provisional. TIMS provides crashes from the Statewide Integrated Traffic Records Systems (SWITRS), which is composed of data collected and maintained by the California Highway Patrol. Crashes within the study area but occurring on grade-separated federal- and state-controlled freeways, were excluded from the analysis, given the Action Plan's focus on local roadways.

### Data Sources

| Dataset                  | Source               | Attributes                                                                |
|--------------------------|----------------------|---------------------------------------------------------------------------|
| Crash Data               | TIMS/SWITRS          | Attributes consistent with information documented in SWITRS crash reports |
| Road Inventory           | City of Glendale     | Number of lanes<br>Functional Classification                              |
| Healthy Places Index 3.0 | Healthy Places Index | Health Places Index percentile scores                                     |
| Land Use Classification  | City of Glendale     | Land use type by parcel                                                   |
| Open Space               | City of Glendale     | Parks and recreation centers                                              |

### Study Limitations

#### *Temporal Consistency Limitations*

The consultant team studied crashes that occurred during a period of ten years, from 2012 through 2021. The compiled roadway data reflects current conditions according to the data made available at the time of this analysis. It can be assumed that some changes in roadway design and operations have occurred over the previous years that cannot be accounted for. For example, if a crash occurred in 2016 and number of lanes on that street were later reduced from four to two, the crash would be recorded as occurring on a two-lane street. As crash data is viewed at an aggregate level within this document, the impacts of these temporal inconsistencies are expected to be minor.

#### *Exposure Data*

The analyses reported here do not adjust for exposure rates based on volumes by modes. Therefore, results show crash density but not frequency of crashes normalized by level of traffic or pedestrian and bicycle volumes, which is also called exposure. For example, in many communities, pedestrian crashes are more common during daylight conditions than dark conditions. This does not mean that daylight conditions are more dangerous than dark conditions. Rather, it reflects the fact that people are more likely to travel, and especially more likely to travel by walking, in light conditions than in dark conditions. Some proxies for exposure are noted in this analysis, such as land use and functional classification.

### Transportation Data for Future Study

As the City monitors its progress on Vision Zero, additional data can assist departments in understanding crash risk and identifying proactive countermeasures and strategies. Below are some recommendations for additional data components that were not available for this analysis.

- Complete citywide collected bicycle and pedestrian volume data would allow for a measure of crash exposure for bicyclists and pedestrians.
- Several datasets listed below would help further identify or refine risk factors. These datasets, when combined with crash data, may grant further detail into factors potentially evident in crash patterns. At this time, this data is either not available in a geospatial format, or were available, but with limited coverage:
  - Vehicle operating speeds
  - Crosswalk style
  - Street width
  - Traffic signal phasing
  - Vehicle volumes
  - Intersection control type

## Descriptive Crash Analysis

### General Crash Trends

Figure 1 depicts the trend in all crashes and KSI crashes for all modes over the ten-year period analyzed. Crashes in Glendale have fallen gradually from a peak of 644 in 2015, reaching the city's lowest annual rate in the time period studied in 2020. Changes in travel patterns and behaviors associated with the COVID-19 pandemic may have influenced this drop somewhat, and are discussed further below in this memo. KSI crashes in 2019, however, had already dropped significantly from the previous year, by 33.3%, preceding the pandemic. Both overall crashes and KSI crashes later increased in 2021, with KSI crashes growing 76.9% in one year.

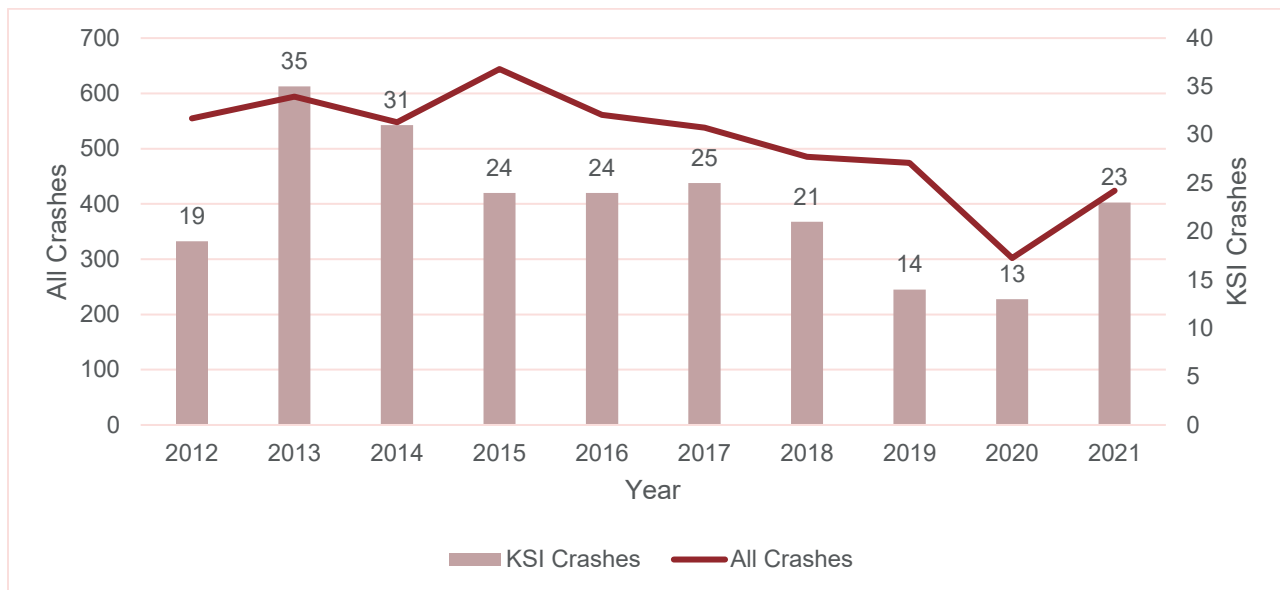


Figure 1. Crashes by Year, 2012 - 2021

### Crashes by Severity by Year

Table 1 shows crash severity by year in the city of Glendale, across all modes. 2014 and 2017 had the most fatal crashes, though 2013 covers the highest rate of severe injury and combined KSI crashes, with 30 and 35, respectively.

|              | <i>Complaint of Pain</i> | <i>Other Visible Injury</i> | <i>Severe</i> | <i>Fatal</i> | <i>Total</i> |
|--------------|--------------------------|-----------------------------|---------------|--------------|--------------|
| 2012         | 347                      | 189                         | 17            | 2            | 555          |
| 2013         | 389                      | 170                         | 30            | 5            | 594          |
| 2014         | 357                      | 160                         | 25            | 6            | 548          |
| 2015         | 423                      | 197                         | 22            | 2            | 644          |
| 2016         | 382                      | 155                         | 19            | 5            | 561          |
| 2017         | 348                      | 165                         | 19            | 6            | 538          |
| 2018         | 323                      | 141                         | 18            | 3            | 485          |
| 2019         | 317                      | 143                         | 12            | 2            | 474          |
| 2020         | 180                      | 109                         | 10            | 3            | 302          |
| 2021         | 248                      | 153                         | 20            | 3            | 424          |
| <b>Total</b> | <b>3314</b>              | <b>1582</b>                 | <b>192</b>    | <b>37</b>    | <b>5125</b>  |

Table 1. Crashes by Severity by Year

### Crashes Per Mode

Table 2 shows crashes by modes involved, between 2012 and 2021, in the city of Glendale. The vast majority of collisions were motor vehicle-only, comprising 71.0% of all collisions on Glendale streets. While pedestrian-involved crashes make up just 17.0% of crashes, they are disproportionately represented in KSI crashes, making up nearly half of those. Motorcycle-involved crashes and bicycle-involved crashes, too, have higher shares of KSI crashes than overall crashes, suggesting a greater vulnerability for these modes.

Note: the total number of crashes listed in the first column exceeds the total number analyzed, as there are a small number of pedestrian-bicycle collisions and pedestrian-motorcycle collisions.

|                                  | <i># of Crashes</i> | <i>% of Crashes</i> | <i># of KSI Crashes</i> | <i>% of KSI Crashes</i> |
|----------------------------------|---------------------|---------------------|-------------------------|-------------------------|
| <i>Pedestrian-Involved Crash</i> | 870                 | 17.0%               | 103                     | 44.9%                   |
| <i>Bicycle-Involved Crash</i>    | 393                 | 7.7%                | 20                      | 8.7%                    |
| <i>Motorcycle-Involved Crash</i> | 237                 | 4.6%                | 40                      | 17.5%                   |
| <i>Motor Vehicle-Only Crash</i>  | 3637                | 71.0%               | 66                      | 28.8%                   |

Table 2. Crashes by Mode

### Crash Causation

#### Crash Dynamics

The crash dynamics listed in Table 3 describe the general type of crash. Broadside crashes were the most common among all crashes in Glendale (1,987 of 5,125 crashes), but they made up only 22.3% of KSI crashes. Vehicle/pedestrian crashes were the most common KSI crash type, at 39.3% of KSI crashes. Bicycle-involved

crashes, though another vulnerable road user category as a road user not in a motor vehicle, are not categorized separately as pedestrian-involved crashes are. Rear end crashes were also a common overall dynamic, and this type was less likely to result in KSI crashes (21.0% of all crashes, 7.0% of KSI crashes).

| <b>Crash Dynamic</b>      | <b># of Crashes</b> | <b>% of Crashes</b> | <b># of KSI Crashes</b> | <b>% of KSI Crashes</b> |
|---------------------------|---------------------|---------------------|-------------------------|-------------------------|
| <i>Broadside</i>          | 1987                | 38.8%               | 51                      | 22.3%                   |
| <i>Head-On</i>            | 417                 | 8.1%                | 28                      | 12.2%                   |
| <i>Hit Object</i>         | 145                 | 2.8%                | 13                      | 5.7%                    |
| <i>Overtaken</i>          | 59                  | 1.2%                | 4                       | 1.7%                    |
| <i>Rear End</i>           | 1078                | 21.0%               | 16                      | 7.0%                    |
| <i>Sideswipe</i>          | 472                 | 9.2%                | 12                      | 5.2%                    |
| <i>Vehicle/Pedestrian</i> | 754                 | 14.7%               | 90                      | 39.3%                   |
| <i>Other</i>              | 80                  | 1.6%                | 9                       | 3.9%                    |
| <i>Not provided</i>       | 133                 | 2.6%                | 6                       | 2.6%                    |
| <b>Grand Total</b>        | <b>5125</b>         | <b>100.0%</b>       | <b>229</b>              | <b>100.0%</b>           |

**Table 3. Crash Dynamics**

### *Leading Crash Violations*

Table 4 shows the most common crash violations recorded for all crashes and KSI crashes. Automobile Right of Way, which includes violations where a driver did not cede proper right-of-way to other drivers while making a turn or proceeding at an intersection, was the most common overall with 23.6% of crashes. Unsafe speed is also commonly cited as a violation, with 20.4% of all crashes.

The most common violation cited in KSI crashes was Pedestrian Right of Way, in which a driver has failed to properly yield to a pedestrian. Pedestrian Violations, cited when a pedestrian does not yield to a vehicle outside of crosswalks and intersections, was the second-highest violation for crashes resulting in KSIs.

| <b>Violation Types</b>                                             | <b># of Crashes</b> | <b>% of Crashes</b> | <b># of KSI Crashes</b> | <b>% of KSI Crashes</b> |
|--------------------------------------------------------------------|---------------------|---------------------|-------------------------|-------------------------|
| <i>Automobile Right of Way</i>                                     | 1208                | 23.6%               | 23                      | 10.0%                   |
| <i>Unsafe Speed</i>                                                | 1043                | 20.4%               | 31                      | 13.5%                   |
| <i>Improper Turning</i>                                            | 577                 | 11.3%               | 22                      | 9.6%                    |
| <i>Traffic Signals and Signs</i>                                   | 720                 | 14.1%               | 26                      | 11.4%                   |
| <i>Pedestrian Right of Way</i>                                     | 462                 | 9.0%                | 41                      | 17.9%                   |
| <i>Pedestrian Violation</i>                                        | 187                 | 3.7%                | 40                      | 17.5%                   |
| <i>Driving or Bicycling Under the Influence of Alcohol or Drug</i> | 146                 | 2.9%                | 17                      | 7.4%                    |
| <i>Unsafe Starting or Backing</i>                                  | 119                 | 2.3%                | 4                       | 1.8%                    |
| <i>Wrong Side of the Road</i>                                      | 144                 | 2.8%                | 2                       | 0.9%                    |

|                                  |     |               |            |               |
|----------------------------------|-----|---------------|------------|---------------|
| <i>Other Hazardous Violation</i> | 72  | 1.4%          | 2          | 0.9%          |
| <i>Unsafe Lane Change</i>        | 79  | 1.5%          | 2          | 0.9%          |
| <i>Other Violations</i>          | 440 | 8.6%          | 10         | 9.2%          |
| <b>Total</b>                     |     | <b>100.0%</b> | <b>229</b> | <b>100.0%</b> |

**Table 4. Top Crash Violations**

### *Contributing Behaviors*

Table 4 and Table 5 depict crash behaviors contributing to crashes and severity. The former shows crashes cited where one of the parties was found to have been drinking. This occurred at higher rates for KSI crashes, making up 14.0% of crashes resulting in fatalities and severe injuries.

Table 5 shows the share of crashes that involved a hit and run, where the at-fault party left the scene of the crash. Felony hit and run charges represent crashes resulting in more serious injuries and outcomes, while misdemeanor charges are typically charged when a hit and run did not result in an injury to other parties. Hit and runs were slightly more common for KSI crashes, making up 12.7%, than for crashes overall, where they occurred in 7.7%.

| <b><i>Alcohol Involvement</i></b> | <b><i># of Crashes</i></b> | <b><i>% of Crashes</i></b> | <b><i># of KSI Crashes</i></b> | <b><i>% of KSI Crashes</i></b> |
|-----------------------------------|----------------------------|----------------------------|--------------------------------|--------------------------------|
| Yes                               | 293                        | 5.7%                       | 32                             | 14.0%                          |
| No                                | 4832                       | 94.3%                      | 197                            | 86.0%                          |
| <b>Grand Total</b>                | <b>5125</b>                | <b>100.0%</b>              | <b>229</b>                     | <b>100.0%</b>                  |

**Table 5. Crashes by Alcohol Involvement**

| <b><i>Hit and Run Type</i></b> | <b><i># of Crashes</i></b> | <b><i>% of Crashes</i></b> | <b><i># of KSI Crashes</i></b> | <b><i>% of KSI Crashes</i></b> |
|--------------------------------|----------------------------|----------------------------|--------------------------------|--------------------------------|
| <i>Felony</i>                  | 233                        | 4.5%                       | 29                             | 12.7%                          |
| <i>Misdemeanor</i>             | 164                        | 3.2%                       | 0                              | 0.0%                           |
| <i>Not Hit and Run</i>         | 4728                       | 92.3%                      | 200                            | 87.3%                          |
| <b>Grand Total</b>             | <b>5125</b>                | <b>100.0%</b>              | <b>229</b>                     | <b>100.0%</b>                  |

**Table 6. Crashes by Hit and Run Type**

## **Roadway Characteristics**

### *Crash Location*

Nearly half of all crashes in Glendale took place at an intersection, as reported by responding officers via collected SWITRS data. That rate was lower for KSI crashes, which were more likely to take place along a street segment or away from an intersection. KSI crashes occurred at an intersection at slightly lower rates, about 39.7% of the time.

|                       | <b>All Crashes</b> | <b>% of All Crashes</b> | <b># of KSI Crashes</b> | <b>% of KSI Crashes</b> |
|-----------------------|--------------------|-------------------------|-------------------------|-------------------------|
| <i>Intersection</i>   | 2366               | 46.2%                   | 91                      | 39.7%                   |
| <i>Street Segment</i> | 2735               | 53.4%                   | 138                     | 60.3%                   |

**Table 7. Crash Location**

### *Functional Classification*

Across the approximately 355 miles of streets and alleys in Glendale, both overall crashes and KSI crashes predominantly on streets classified as major and minor arterials. Approximately 41.0% of crashes occurred on major arterial roadways, and 40.2% of KSI crashes. Normalized by mile, the classification saw 65 crashes per mile and 2.84 KSI crashes per mile. Minor arterials and urban collector roadways also saw higher rates of crashes, and represented 1.83 and 1.62 KSI crashes per mile, respectively.

Though minor/local streets make up 58% of streets in the city by length, only about 14.6% of all crashes took place on one.

|                               | <b># of All Crashes</b> | <b>% of All Crashes</b> | <b># of KSI Crashes</b> | <b>% of KSI Crashes</b> | <b>Miles of Road</b> | <b>Crashes per Mile</b> | <b>KSI Crashes per Mile</b> |
|-------------------------------|-------------------------|-------------------------|-------------------------|-------------------------|----------------------|-------------------------|-----------------------------|
| <i>Major Arterial</i>         | 2085                    | 41.0%                   | 91                      | 40.2%                   | 32.1                 | 65.0                    | 2.84                        |
| <i>Minor Arterial</i>         | 1083                    | 20.6%                   | 44                      | 18.8%                   | 24.1                 | 45.0                    | 1.83                        |
| <i>Urban Collector</i>        | 654                     | 12.7%                   | 32                      | 14.3%                   | 19.8                 | 33.0                    | 1.62                        |
| <i>Community Collector</i>    | 345                     | 6.7%                    | 20                      | 8.6%                    | 35.9                 | 9.6                     | 0.56                        |
| <i>Neighborhood Collector</i> | 87                      | 1.7%                    | 6                       | 2.5%                    | 16.6                 | 5.2                     | 0.36                        |
| <i>Minor/Local</i>            | 763                     | 14.6%                   | 34                      | 14.7%                   | 226.2                | 3.4                     | 0.15                        |
| <i>Alley</i>                  | 10                      | 0.2%                    | 0                       | 0.0%                    | 29.6                 | 0.3                     | 0                           |
| <i>Not Captured</i>           | 98                      | 2.2%                    | 2                       | 0.8%                    | N/A                  | N/A                     | N/A                         |
| <b>Total</b>                  | <b>5125</b>             | <b>100.00%</b>          | <b>229</b>              | <b>100.00%</b>          | <b>354.7</b>         |                         |                             |

**Table 8. Crashes by Street Classification**

### *Number of Lanes*

A plurality of overall crashes and KSI crashes (47.4% and 48.0%) occurred on streets with four through lanes. Normalized by mileage, however, streets with five through lanes saw the most crashes of both categories. Streets with five through lanes are less common in Glendale, making up just about 2.7 miles of roadway in the city. They include portions of streets such as Mountain Street, Brand Boulevard, Glendale Avenue and Central Avenue.

| <b>Number of Lanes</b> | <b># of Crashes</b> | <b>% of Crashes</b> | <b># of KSI Crashes</b> | <b>% of KSI Crashes</b> | <b>Crashes by Mile</b> | <b>KSI Crashes by Mile</b> |
|------------------------|---------------------|---------------------|-------------------------|-------------------------|------------------------|----------------------------|
| <i>0 (Alleys)</i>      | 10                  | 0.2%                | 0                       | 0.0%                    | 0.3                    | 0.0                        |
| <i>2</i>               | 2066                | 40.3%               | 100                     | 43.7%                   | 6.8                    | 0.3                        |
| <i>3</i>               | 64                  | 1.2%                | 1                       | 0.4%                    | 54.4                   | 0.8                        |
| <i>4</i>               | 2427                | 47.4%               | 110                     | 48.0%                   | 55.0                   | 2.5                        |
| <i>5</i>               | 216                 | 4.2%                | 8                       | 3.5%                    | 80.7                   | 3.0                        |

|                    |             |               |            |               |      |     |
|--------------------|-------------|---------------|------------|---------------|------|-----|
| 6                  | 238         | 4.6%          | 8          | 3.5%          | 53.3 | 1.8 |
| 7                  | 6           | 0.1%          | 0          | 0.0%          | 46.3 | 0.0 |
| No data            | 98          | 1.9%          | 2          | 0.9%          |      |     |
| <b>Grand Total</b> | <b>5125</b> | <b>100.0%</b> | <b>229</b> | <b>100.0%</b> |      |     |

Table 9. Crashes and Number of Lanes

## Environmental Characteristics

### Crashes by Time of Year

Table 10 shows crashes grouped by the month. The distribution of crashes over the year is largely even, with slightly more crashes occurring overall in December and November. KSI crashes occurred most frequently in October (13.1%) and were also slightly more frequent in November and December.

| <b>Months</b> | <b># of Crashes</b> | <b>% of Crashes</b> | <b># of KSI Crashes</b> | <b>% of KSI Crashes</b> |
|---------------|---------------------|---------------------|-------------------------|-------------------------|
| Jan           | 367                 | 7.2%                | 16                      | 7.0%                    |
| Feb           | 405                 | 7.9%                | 16                      | 7.0%                    |
| Mar           | 445                 | 8.7%                | 17                      | 7.4%                    |
| Apr           | 442                 | 8.6%                | 19                      | 8.3%                    |
| May           | 396                 | 7.7%                | 15                      | 6.6%                    |
| Jun           | 403                 | 7.9%                | 12                      | 5.2%                    |
| Jul           | 417                 | 8.1%                | 15                      | 6.6%                    |
| Aug           | 405                 | 7.9%                | 18                      | 7.9%                    |
| Sep           | 410                 | 8.0%                | 20                      | 8.7%                    |
| Oct           | 446                 | 8.7%                | 30                      | 13.1%                   |
| Nov           | 470                 | 9.2%                | 28                      | 12.2%                   |
| Dec           | 519                 | 10.1%               | 23                      | 10.0%                   |
| <b>Total</b>  | <b>5125</b>         | <b>100.0%</b>       | <b>229</b>              | <b>100.0%</b>           |

Table 10. Crashes by Month

### Crashes by Lighting Condition

The vast majority of crashes in Glendale took place during daylight conditions. Fewer than a quarter of crashes took place under dark conditions, with most of those occurring where there are already street lights. Pedestrian crashes in the dark took place at a slightly higher rate than all crashes overall.

| <b>Lighting Condition</b>            | <b># of Crashes</b> | <b>% of Crashes</b> | <b># of KSI Crashes</b> | <b>% of KSI Crashes</b> | <b># of Bicycle Crashes</b> | <b>% of Bicycle Crashes</b> | <b># of Ped Crashes</b> | <b>% of Ped Crashes</b> |
|--------------------------------------|---------------------|---------------------|-------------------------|-------------------------|-----------------------------|-----------------------------|-------------------------|-------------------------|
| Dark - No Street Lights              | 42                  | 0.8%                | 5                       | 2.2%                    | 2                           | 0.5%                        | 14                      | 1.6%                    |
| Dark - Street Lights                 | 1221                | 23.8%               | 92                      | 40.2%                   | 69                          | 17.6%                       | 223                     | 25.6%                   |
| Dark - Street Lights Not Functioning | 8                   | 0.2%                | 3                       | 1.3%                    | 0                           | 0.0%                        | 5                       | 0.6%                    |

|                     |      |        |     |        |     |        |     |        |
|---------------------|------|--------|-----|--------|-----|--------|-----|--------|
| <i>Daylight</i>     | 3678 | 71.8%  | 123 | 53.7%  | 308 | 78.4%  | 601 | 69.1%  |
| <i>Dusk - Dawn</i>  | 151  | 2.9%   | 6   | 2.6%   | 11  | 2.8%   | 24  | 2.8%   |
| <i>Not Provided</i> | 25   | 0.5%   | 0   | 0.0%   | 3   | 0.8%   | 3   | 0.3%   |
| <i>Total</i>        | 5125 | 100.0% | 229 | 100.0% | 393 | 100.0% | 870 | 100.0% |

**Table 11. Crashes by Lighting Condition**

### COVID-19 Pandemic Impact

The COVID-19 pandemic significantly reshaped travel patterns due to lockdown periods, increased rates of telework, and broader socioeconomic changes. Overall, the rates of collisions slowed during the COVID-19 pandemic, which continued across other vulnerable modes such as bicyclists and pedestrians. However, KSI crashes increased slightly during the first two years of the pandemic, comprising a greater percent (4.9%) of all crashes in that period. Immediately prior to the pandemic, KSI crashes made up 3.6% of all crashes.

|                               | <b>All Crashes</b> | <b>KSI Crashes</b> | <b>Bicycle Crashes</b> | <b>Pedestrian Crashes</b> | <b>Motorcycle Crashes</b> |
|-------------------------------|--------------------|--------------------|------------------------|---------------------------|---------------------------|
| <b><i>Pre-Covid Total</i></b> | <b>959</b>         | <b>35</b>          | <b>58</b>              | <b>164</b>                | <b>44</b>                 |
| <i>2018</i>                   | 485                | 21                 | 28                     | 77                        | 25                        |
| <i>2019</i>                   | 474                | 14                 | 30                     | 87                        | 19                        |
| <b><i>COVID-19 Total</i></b>  | <b>726</b>         | <b>36</b>          | <b>42</b>              | <b>141</b>                | <b>35</b>                 |
| <i>2020</i>                   | 302                | 13                 | 23                     | 64                        | 15                        |
| <i>2021</i>                   | 424                | 23                 | 19                     | 77                        | 20                        |

**Table 12. Crashes by COVID-19 Impact**

### Crashes by Day of Week and Time of Day

Crashes in Glendale most commonly occurred in the afternoon, between the hours of 3:00 pm and 6:00pm on most days. On Fridays and weekends, slightly more crashes occur later at night and in the early morning. Most crashes, 15.8%, occurred on Fridays.

Table 14 shows KSI crashes by time of day and day of the week. KSI crashes were more likely to take place later in the evening, between 6:00 pm and 9:00 pm, and on Fridays and Saturdays. Mondays, however, saw the most KSI crashes, with 39 crashes or 17.0%.

| <b><i>Day of the Week</i></b> | <b>12-3 AM</b> | <b>3-6 AM</b> | <b>6-9 AM</b> | <b>9 AM-12 PM</b> | <b>12-3 PM</b> | <b>3-6 PM</b> | <b>6-9 PM</b> | <b>9 PM-12 AM</b> | <b><i>Left Blank</i></b> | <b>Total</b> |
|-------------------------------|----------------|---------------|---------------|-------------------|----------------|---------------|---------------|-------------------|--------------------------|--------------|
| <i>Monday</i>                 | 15             | 10            | 90            | 138               | 158            | 186           | 138           | 47                |                          | 782          |
| <i>Tuesday</i>                | 15             | 9             | 103           | 141               | 153            | 189           | 117           | 55                |                          | 782          |
| <i>Wednesday</i>              | 7              | 8             | 90            | 130               | 165            | 208           | 127           | 54                | 1                        | 790          |
| <i>Thursday</i>               | 14             | 6             | 86            | 111               | 170            | 172           | 149           | 51                |                          | 759          |
| <i>Friday</i>                 | 9              | 9             | 79            | 140               | 168            | 191           | 149           | 68                |                          | 813          |
| <i>Saturday</i>               | 34             | 12            | 35            | 128               | 173            | 127           | 95            | 54                |                          | 658          |
| <i>Sunday</i>                 | 37             | 10            | 30            | 89                | 129            | 112           | 88            | 46                |                          | 541          |

|              |            |           |            |            |             |             |            |            |          |             |
|--------------|------------|-----------|------------|------------|-------------|-------------|------------|------------|----------|-------------|
| <b>Total</b> | <b>131</b> | <b>64</b> | <b>513</b> | <b>877</b> | <b>1116</b> | <b>1185</b> | <b>863</b> | <b>375</b> | <b>1</b> | <b>5125</b> |
|--------------|------------|-----------|------------|------------|-------------|-------------|------------|------------|----------|-------------|

Table 13. Crashes by Day of Week and Time of Day

| <b>Days of the Week</b> | <b>12-3 AM</b> | <b>3-6 AM</b> | <b>6-9 AM</b> | <b>9 AM-12 PM</b> | <b>12-3 PM</b> | <b>3-6 PM</b> | <b>6-9 PM</b> | <b>9 PM-12 AM</b> | <b>Total</b> |
|-------------------------|----------------|---------------|---------------|-------------------|----------------|---------------|---------------|-------------------|--------------|
| <i>Monday</i>           | 4              |               | 3             | 5                 | 3              | 13            | 8             | 3                 | 39           |
| <i>Tuesday</i>          | 1              | 1             | 3             | 1                 | 2              | 4             | 14            | 4                 | 30           |
| <i>Wednesday</i>        | 1              |               | 1             | 7                 | 3              | 4             | 12            | 4                 | 32           |
| <i>Thursday</i>         | 2              | 1             | 4             |                   | 4              | 3             | 6             | 3                 | 23           |
| <i>Friday</i>           |                | 1             | 1             | 5                 | 7              | 12            | 9             | 3                 | 38           |
| <i>Saturday</i>         | 3              | 1             | 3             | 3                 | 5              | 4             | 7             | 3                 | 29           |
| <i>Sunday</i>           | 3              | 2             | 4             | 5                 | 10             | 5             | 3             | 6                 | 38           |
| <b>Total</b>            | <b>14</b>      | <b>6</b>      | <b>19</b>     | <b>26</b>         | <b>34</b>      | <b>45</b>     | <b>59</b>     | <b>26</b>         | <b>229</b>   |

Table 14. KSI Crashes by Day of Week and Time of Day

### Crashes by Land Use

Crash data was matched to the closest parcel to determine adjacent land use types. Crashes in Glendale (44.1% of all crashes, 41.5% of KSI crashes) in this period largely occurred near commercial land uses such as retail and offices, many of which are served by wide, arterial roadways.

The government use type refers to a range of city-owned uses, such as educational campuses and city facilities. Normalized miles of roadway by land use were not included due to a data limitation in the available data.

| <b>Land Use Type</b>  | <b># of Crashes</b> | <b>% of Crashes</b> | <b># of KSI Crashes</b> | <b>% of KSI Crashes</b> |
|-----------------------|---------------------|---------------------|-------------------------|-------------------------|
| <i>Commercial</i>     | 2262                | 44.1%               | 95                      | 41.5%                   |
| <i>Government</i>     | 619                 | 12.1%               | 37                      | 16.2%                   |
| <i>Industrial</i>     | 161                 | 3.1%                | 4                       | 1.7%                    |
| <i>Institutional</i>  | 96                  | 1.9%                | 1                       | 0.4%                    |
| <i>Irrigated Farm</i> | 1                   | 0.0%                | 0                       | 0.0%                    |
| <i>Recreational</i>   | 45                  | 0.9%                | 1                       | 0.4%                    |
| <i>Residential</i>    | 1809                | 35.3%               | 83                      | 36.2%                   |
| <i>Miscellaneous</i>  | 76                  | 1.5%                | 6                       | 2.6%                    |
| <i>No data</i>        | 56                  | 1.1%                | 2                       | 0.9%                    |
| <b>Grand Total</b>    | <b>5125</b>         | <b>100.0%</b>       | <b>229</b>              | <b>100.0%</b>           |

Table 15. Crashes by Land Use

### Crashes by Park Proximity

Crashes were identified as being adjacent to a Glendale park if they were within 250 feet from parcels identified as City recreation centers or city parks. This distance was selected in order to eliminate the inadvertent selection of crashes on the opposite side of blocks not facing parks, due to the short block length (about 330 feet) in some parts of the city.

About 5.6% of crashes occurred at or adjacent to parks in Glendale. Slightly more, 7.0%, KSI crashes and pedestrian-involved crashes occurred near parks.

| <b>Relation to Park</b> | <b># of Crashes</b> | <b>% of Crashes</b> | <b># of KSI Crashes</b> | <b>% of KSI Crashes</b> | <b># of Pedestrian Crashes</b> | <b>% of Pedestrian Crashes</b> |
|-------------------------|---------------------|---------------------|-------------------------|-------------------------|--------------------------------|--------------------------------|
| <i>Not at park</i>      | 4836                | 94.4%               | 213                     | 93.0%                   | 809                            | 93.0%                          |
| <i>At Park</i>          | 289                 | 5.6%                | 16                      | 7.0%                    | 61                             | 7.0%                           |
| <b>Total</b>            | <b>5125</b>         | <b>100.0%</b>       | <b>229</b>              | <b>100.0%</b>           | <b>870</b>                     | <b>100.0%</b>                  |

**Table 16. Crashes and Parks**

### Crashes by Healthy Places Index

The Healthy Places Index tracks social and economic indicators associated with public health and equitable outcomes. Census tracts receive a score under the index, which are then compared across the state on a percentile basis. A high score and high percentile are associated with indicators of healthier outcomes, such as higher per capita income and lower rates of air pollution. HPI quartiles represent the lowest-scoring 25% to highest-scoring 25% of census tracts.

In Glendale, as shown in Figure 2, the lower quartile census tracts are located in central, southwestern, and western parts of the city, while the higher-scoring tracts are in eastern and northern neighborhoods. Table 11 shows that nearly 40% of crashes and 38% of KSI crashes occurred in the census tracts that fell in the second-lowest quartile, the most of any quartile. Normalized by mile of roadway in those census tracts, tracts in the lowest quartile saw the highest rates of crashes and KSI crashes, indicating that communities under the greatest health, environmental, and socioeconomic burdens experience the highest rates and severity of crashes.

| <b>HPI Quartile</b> | <b># of Crashes</b> | <b>% of Crashes</b> | <b># of KSI Crashes</b> | <b>% of KSI Crashes</b> | <b>Crashes per Mile of</b> | <b>KSI Crashes per Mile</b> |
|---------------------|---------------------|---------------------|-------------------------|-------------------------|----------------------------|-----------------------------|
| <i>1, Lowest</i>    | 1713                | 33.4%               | 74                      | 32.3%                   | 27.7                       | 1.2                         |
| <i>2</i>            | 2043                | 39.9%               | 86                      | 37.6%                   | 24.8                       | 1.0                         |
| <i>3</i>            | 1138                | 22.2%               | 62                      | 27.1%                   | 7.0                        | 0.4                         |
| <i>4, Highest</i>   | 150                 | 2.9%                | 7                       | 3.1%                    | 1.7                        | 0.1                         |
| <i>No data</i>      | 81                  | 1.6%                | 0                       | 0.0%                    | 479.9                      | 0.0                         |
| <b>Totals</b>       | <b>5125</b>         | <b>100%</b>         | <b>229</b>              | <b>1.728503</b>         |                            |                             |

**Table 17. Crashes by Healthy Places Index**

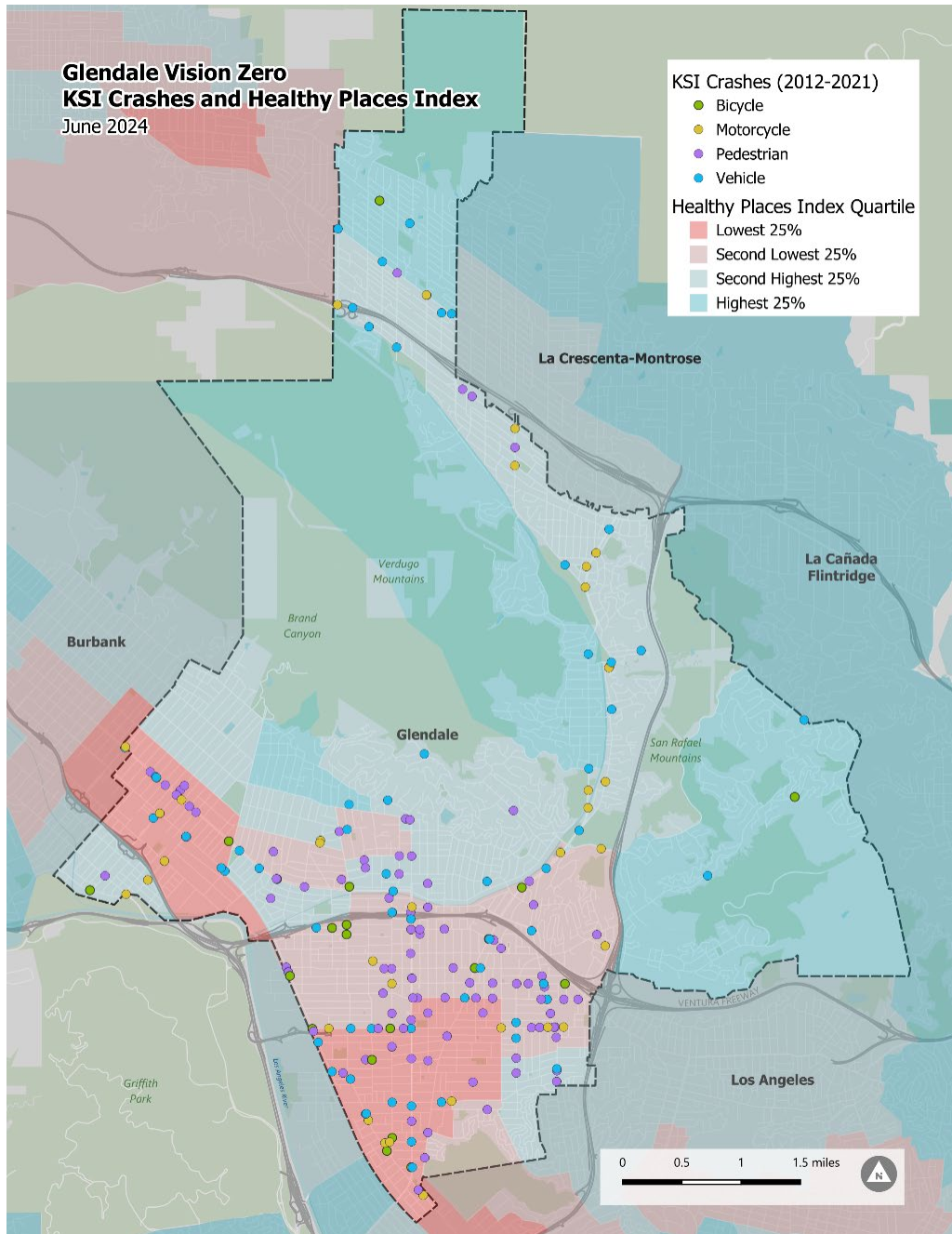


Figure 2. HPI and KSI Crashes

## Party Characteristics

### Victim Age

More than one-quarter of crash victims in Glendale were younger than 25 years old. Younger people make up a smaller portion of KSI crash victims, as 20.6% of KSI crash victims are younger than 25 years old.

Older people make up a larger portion of fatal and severe injury crash victims: 23.0% of KSI victims were 70 years old or older, compared to 9.8% of all crash victims.



**Figure 3. Crashes by Victim Age**

#### *Victim Gender*

Crash victims overall are more likely to be women than men (50.6% to 43.1%). Men, however, are more likely to be victims of KSI crashes, making up 59.7% of KSI crashes.

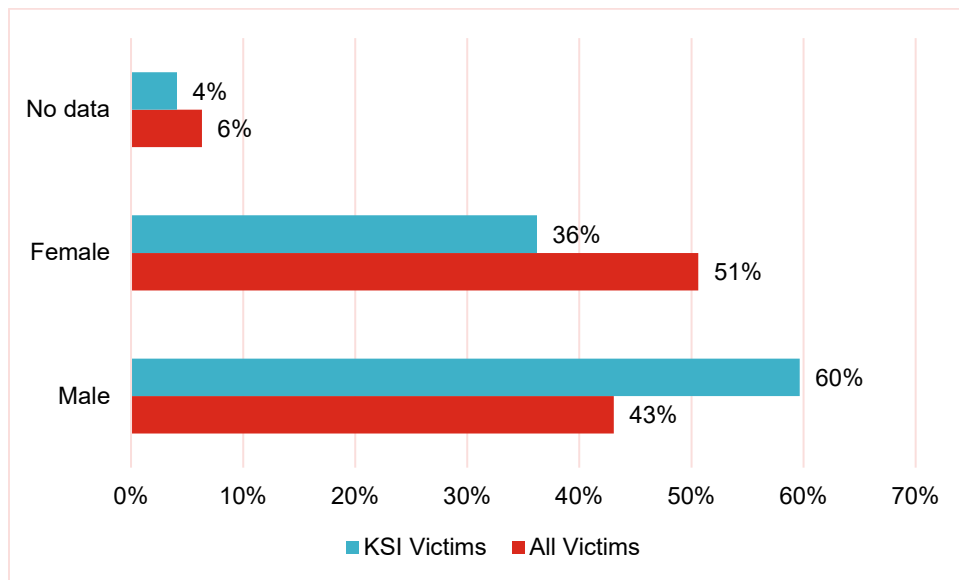


**Figure 4. Crashes by Victim Gender**

## High Injury Network

### *Overview*

Using the methodologies outlined in the Crash Analysis Methodology, the project team produced the crash density map results based on the Sliding Window analysis. Outcomes in this section set the foundation for High Injury Network development.

As described in the Crash Analysis Methodology, the Sliding Windows Analysis identifies segments with the highest crash density, weighted by crash severity. The analysis was conducted by determining the number and severity of crashes in a half-mile window on a roadway and shifting that virtual “window” along the roadway 1/10 of a mile at a time, counting the number of crashes by severity and mode that occurred within each successive half-mile segment. The sliding window scores weight the most severe crashes more heavily than lower severity crashes. The total number of crashes were then aggregated along a corridor while incorporating the crash severity weighting, resulting in scored results applied to roadway segments.

Sliding Windows outputs in the following pages are the result of scoring applied by crash severity and crash frequency, and maps are shown with the lowest-scoring segments hidden for legibility.

## Pedestrian Crash Density

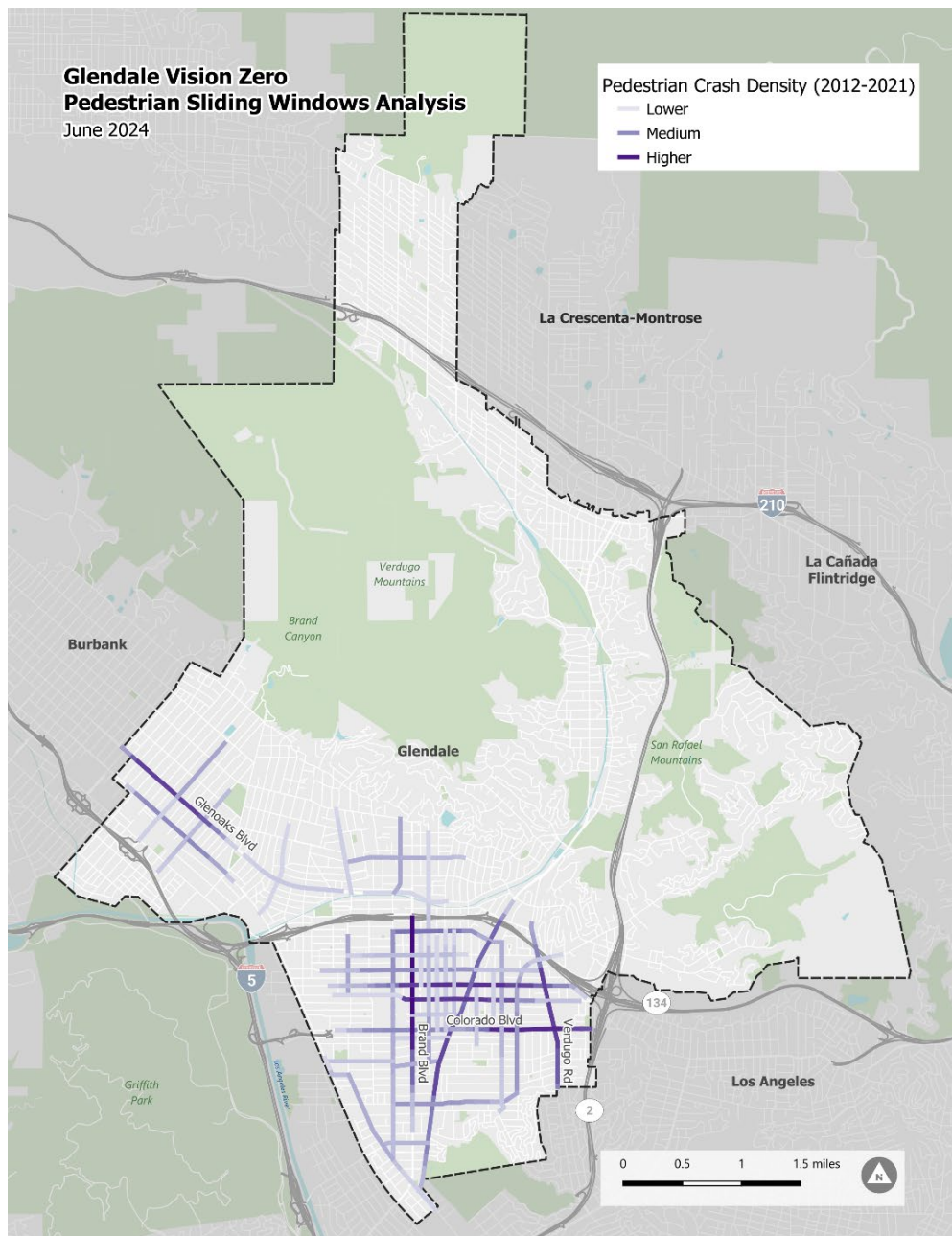


**Figure 5. Pedestrian Sliding Windows Analysis**

Pedestrian crashes largely occurred in the central, downtown, and eastern areas of Glendale, with a significant grouping of crashes in West Glendale near Glenoaks Boulevard and Sonora Avenue. Many of these areas have a high density of destinations, such as local shops, schools, and parks, where residents and visitors are more likely to be walking and in greater numbers. The highest scoring streets in the outputs include major arterials that connect to regional destinations, such as Brand Boulevard, Glendale Avenue, Verdugo Road south of the CA-134 freeway, and Colorado Boulevard. In addition, a number of smaller streets near downtown Glendale appear in the results, such as Louise Street.

# Bicycle Crash Density

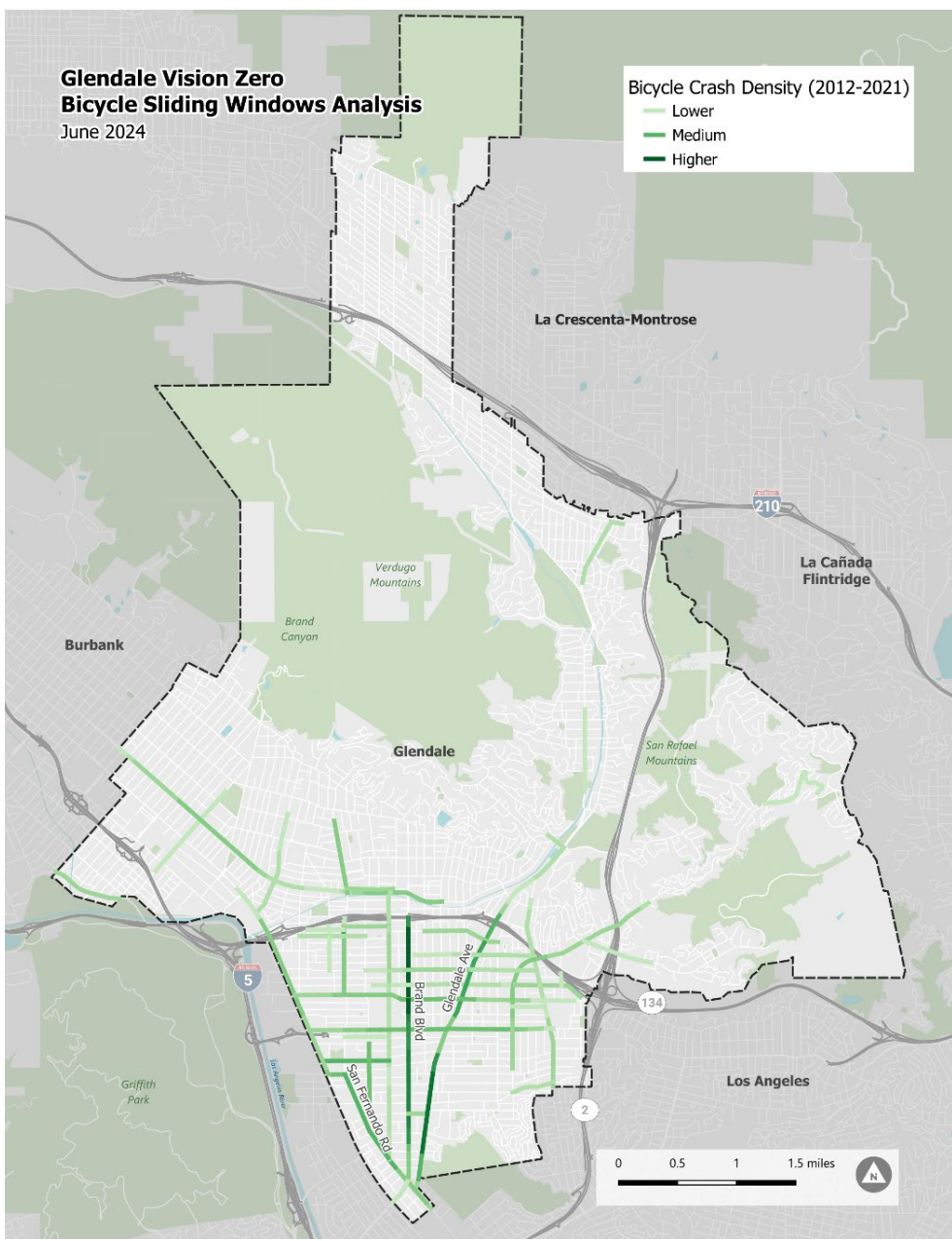


**Figure 6. Bicycle Sliding Windows Analysis**

Bicycle crashes were similarly focused on arterial streets throughout Glendale, but especially those that connect to central Glendale, the downtown core, and other central neighborhoods. Additionally, some smaller streets that may be used as common bike routes showed higher crash densities, likely due to a more frequent presence of people biking on those streets. These include Columbus Avenue and Maple Avenue in southwestern Glendale.

## Vehicle Crash Density

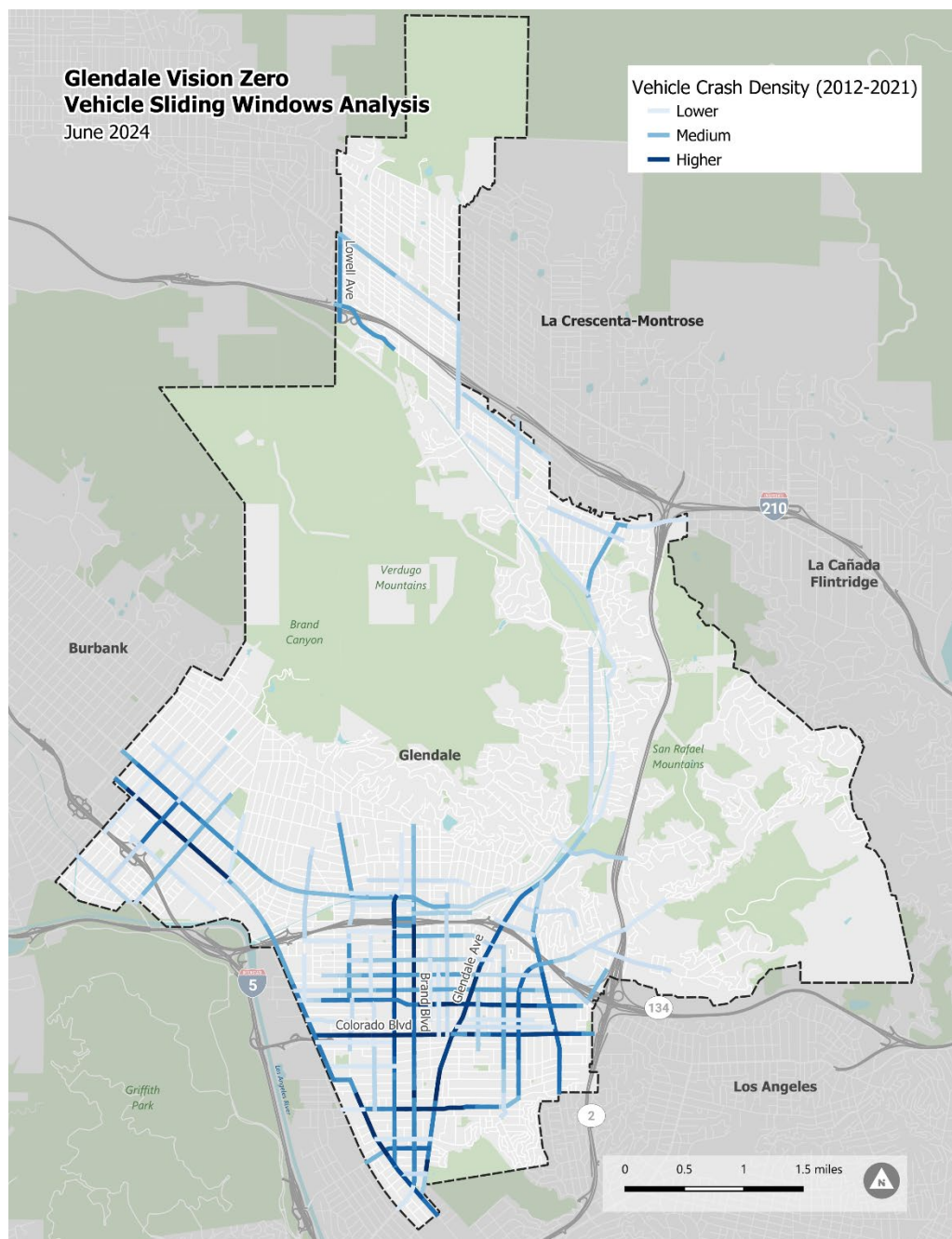


**Figure 7. Vehicle Sliding Windows Analysis**

Vehicle crashes, as shown in Figure 7, are spread further throughout the city. As with bicycle and pedestrian crashes, highest scoring segments appear on major arterials that connect to downtown Glendale, such as Brand Boulevard and Glendale Avenue. Other significant densities appear in major streets in western and northern Glendale, such as Verdugo Road in Montrose. However, a number of high-scoring segments also appear at access routes to the freeways that serve Glendale: these include Honolulu Avenue/Lowell Avenue at the I-210 on-ramps and Goode Avenue and Sanchez Drive near CA-134.

# Motorcycle Crash Density

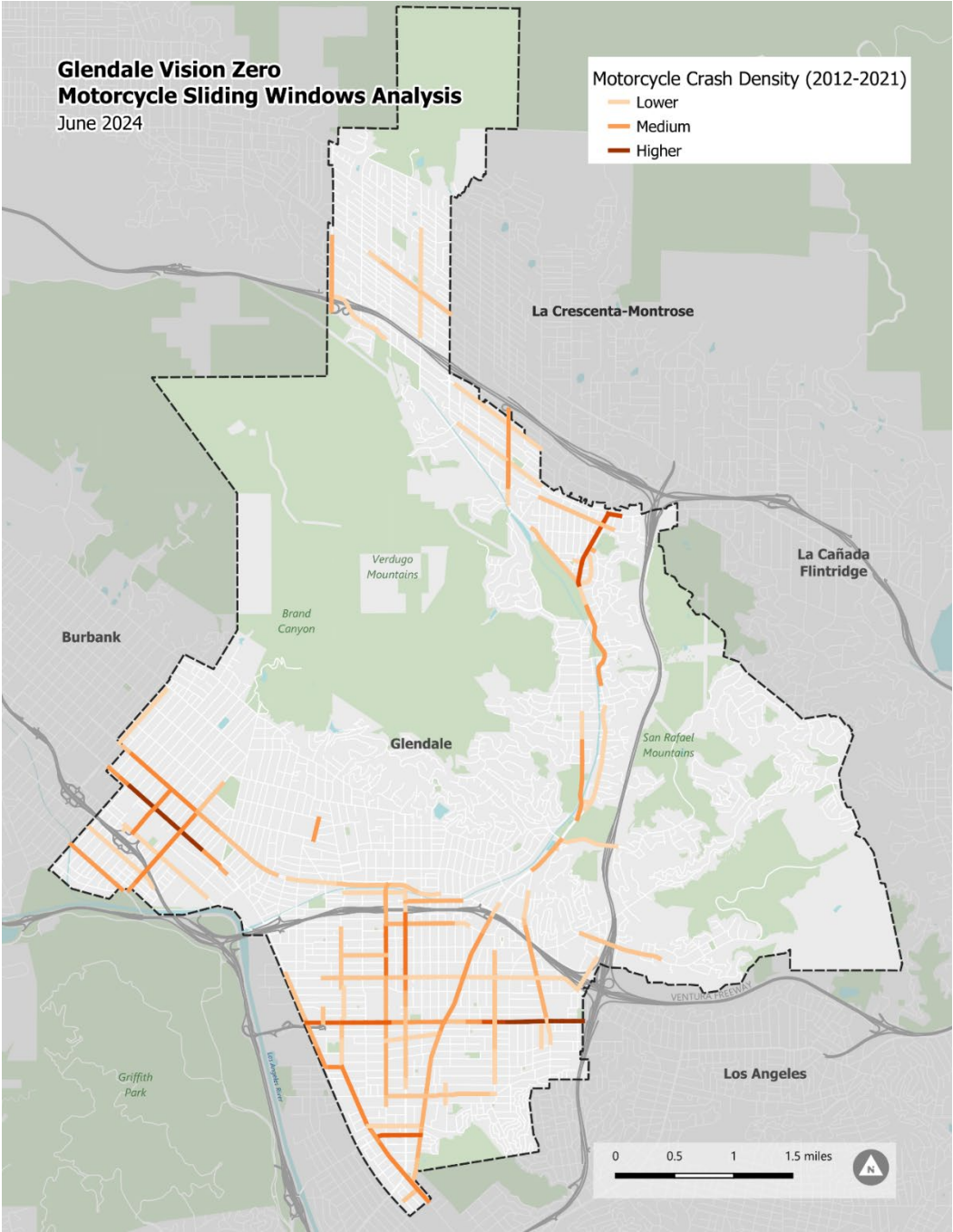


**Figure 8. Motorcycle Sliding Windows Analysis**

Motorcycle crashes, shown in Figure 8, are focused primarily on arterial streets that serve central Glendale. However, in addition to central streets such as Colorado Boulevard, higher scoring segments appear in arterials outside of the center of the city, such as Verdugo Road and Glenoaks Boulevard.

## Development of the High Injury Network

The draft High Injury Network is developed based on the results of the crash density maps from the sliding window analysis. The HIN aims to help identify corridors that may warrant special attention. Identification of these streets will help the City of Glendale prioritize investment in the areas where crash history demonstrates the most serious problems and easily communicate those priorities to the community.

Developing an HIN is an iterative process. It is expected that the City of Glendale will review the HIN produced through this analysis. The process of generating the HIN is as follows:

1. Map the Sliding Windows analysis results for each mode (pedestrian, bicycle, motorcycle, and motor vehicle) individually. As detailed in the Crash Analysis Methodology Memo, analysis outputs reflect the weighting applied by severity, that places a greater focus on fatal and severe injury (KSI) crashes: KSI crashes received a score of 3, and other injury crashes received a score of 1. See the above Crash Density maps for sliding window analysis results.
2. For each mode, determine the threshold of the Sliding Window score required to be included in the HIN. This step eliminates streets that have a lower crash density thereby prioritizing streets that have higher crash severities and frequencies.
3. Review and manually adjust for false-positive segments that have a high crash score due to a single intersection crash but do not have any other crashes along the corridor.

Segments manually excluded due factors such as false-positive intersection crashes are:

- Pioneer Avenue (Pacific Avenue to Central Avenue): excluded from the Bicycle HIN cutoff due to crashes being accounted for on Pacific and Central Avenue segments
- Palmer Avenue (Brand Boulevard to Glendale Avenue): excluded from the Bicycle HIN cutoff due to crashes already being accounted for in Brand Boulevard and Glendale Avenue segments
- Glenoaks Boulevard (service road north of the Glenoaks Boulevard arterial, Pacific Avenue to Central Avenue): excluded from the Bicycle HIN cutoff due to crash already being accounted for at the Pacific Avenue intersection
- El Cino Place (Verdugo Road to Montrose Community Park): excluded from the Motorcycle HIN cutoff due to crash being accounted for on Verdugo Road
- School Street (Glenwood Road to Olmsted Drive): excluded from the Motorcycle HIN cutoff due to short segment length (940 feet)

## High Injury Network Thresholds

The goal of the minimum HIN threshold setting process is to settle on a minimum sliding window score for each mode independently that will create a network that covers a selective set of the city streets but a relatively large share of crashes with an emphasis on KSI crashes, achieved via severity weighting.

Thresholds (inclusive and above the values listed) for each mode included in the HIN are listed below. A segment that meets or exceeds the weighted crash score threshold noted below for each mode were included in each mode-specific HIN and the overall HIN. The weighted crash score thresholds for areas included in the HIN do not exactly follow the weighted crash score ranges from the sliding windows, as the HIN is a compilation of the highest weighted crash scores.

- » **Pedestrian:** 16
- » **Bicycle:** 6
- » **Motorcycle:** 5
- » **Motor Vehicle:** 42

## Draft High Injury Network

The Draft High Injury Network shown in Figure 9 integrates the above threshold scores for crashes of all modes. It accounts for 68% of all crashes, and 75% of KSI crashes, on 12% of the local streets within the City of Glendale.

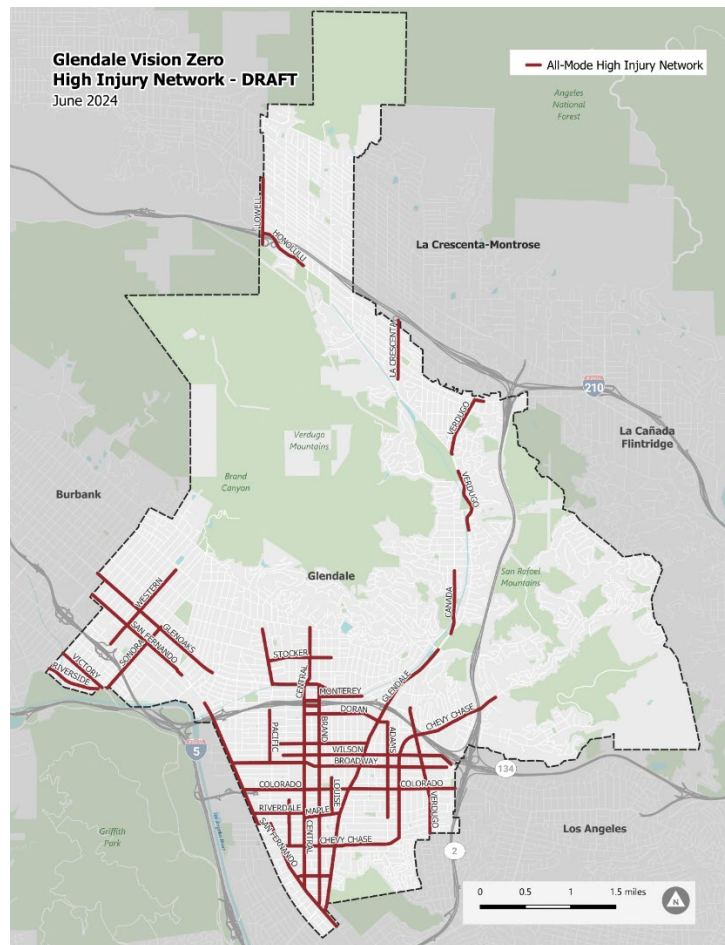


Figure 9. Draft High Injury Network

## Revised High Injury Network

Following the presentation to the Project Development Team, the Draft High Injury Network was revised based on stakeholder input regarding existing safety conditions and need. Additions included:

- Inclusion of the full extent of Foothill Boulevard in northern Glendale
- Inclusion of the segments of Verdugo Road previously excluded (Fern Lane to Mountain Street, Bagdad Place to La Crescenta Avenue) to cover the roadway's full extent
- Extension of Louise Avenue north from Harvard Street to Lexington Drive

Figure 10 on the following page depicts the High Injury Network with these revisions. This HIN accounts for 71% of all crashes, 78% of KSI crashes, and covers 13% of local streets within Glendale.

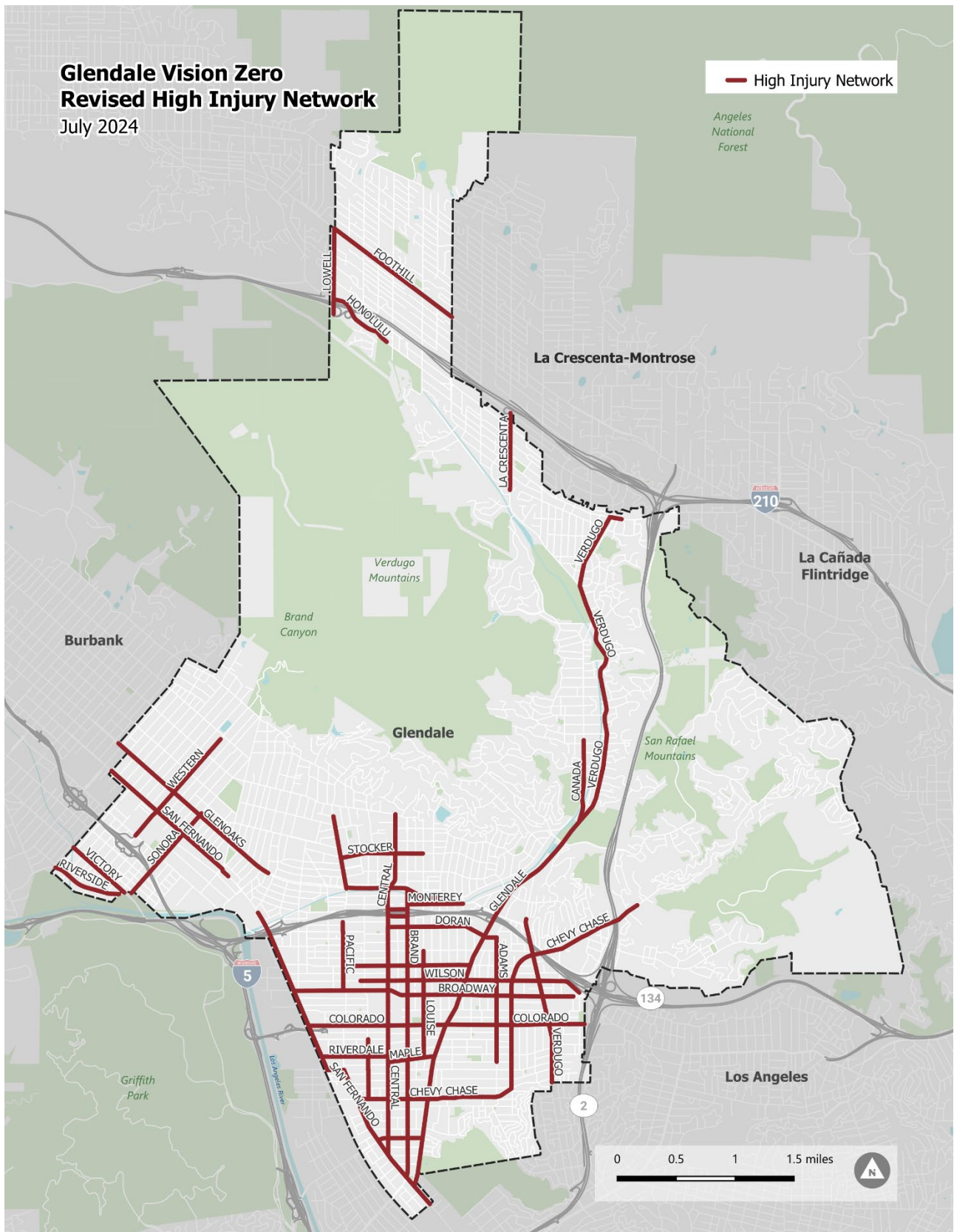


Figure 10. Revised High Injury Network

### High Crash Density Intersections

The intersections detailed in Table 18 were determined by identifying clusters of intersection crashes that took place within 50 feet of one another. The below list represents a set of intersections with the most crashes of any modes between 2012 and 2021. It should be noted that while these represent locations with frequent crashes, other intersections along each HIN segment similarly experience high rates of crashes and will also merit study for safety improvements.

| Primary Road      | Secondary Road    | Number of Crashes<br>(all) |
|-------------------|-------------------|----------------------------|
| San Fernando Road | Los Feliz Road    | 21                         |
| Central Avenue    | Chevy Chase Drive | 18                         |
| Brand Boulevard   | Colorado Street   | 18                         |
| Central Avenue    | Broadway          | 21                         |
| Verdugo Road      | Honolulu Avenue   | 21                         |
| San Fernando Road | Western Avenue    | 27                         |
| Brand Boulevard   | Goode Avenue      | 21                         |
| Brand Boulevard   | Sanchez Avenue    | 29                         |
| Honolulu Avenue   | Lowell Avenue     | 35                         |

Table 18. High Crash Density Intersections (all crashes)