

Appendix A: Active Trip Potential





To: Marquis Williams, Project Manager, RTC Washoe

From: Cole Peiffer, David Wasserman, Izzy Youngs, Alta Planning + Design

Date: May 15, 2024

Re: Active Trip Potential Technical Memorandum

Active Trip Potential Analysis

Introduction

Sustainable transportation is a key part of a climate strategy that involves reducing carbon emissions from transportation. Sustainable transportation includes public transit as well as active transportation modes: walking, bicycling, bike share, and scooter share. Active modes often fill first- and last-mile gaps for transit trips and on their own may provide more flexibility for short trips that are not well-served by transit. Understanding demand for active transportation can help Washoe County guide growth and development to support sustainable transportation in two ways:

- Identifying areas where latent demand for active transportation exists, and supportive infrastructure could encourage more people to convert motor vehicle trips to active trips; and
- Identifying areas where many active trips are already made, and more development around those areas could build on existing strengths in the transportation network.

Not all locations can support active transportation modes easily because of unsupportive infrastructure or long distances from key destinations. While emerging technologies such as e-bikes and e-scooters provide new options, ranges, and convenience, their ability to affect change is still dependent on the surrounding land use and transportation context. The results of this analysis can be used to estimate how different land use scenarios would impact greenhouse gas emissions.

Alta conducted an active trip potential analysis to identify areas of Washoe County where people make a high level of short trips and there is strongest potential to see a reduction in vehicle trips if supportive infrastructure were available for people to choose active modes of travel for these short trips. This memo presents findings and methodology for that analysis.

Key Findings

Short Trips < 1 Mile

- Central Reno, Central Sparks, some areas of Cold Springs, West Reno, South Reno, and Sun Valley have a high concentration of trips under 1 mile.
- The origin-destination pairs with greatest walking trip potential are between the University of Nevada, Reno, downtown Reno, and Midtown.
- There are also a significant number of short trips between Plumb Lane and Moana Lane as well as South Reno around Meadowood Mall and South Meadows.
- These areas are typically commercial developments or planned communities where amenities are built adjacent to housing and job centers.

Trips 1 – 3 Miles

- A significant proportion of trips across the region are between 1 and 3 miles, making this a particularly suitable modality to focus on.
- The origin-destination pairs with the greatest bike potential are between South Reno and Central Reno and between the Grand Sierra Resort, Renown Medical, and downtown Reno.
- There are also a large proportion of trips between 1 and 3 miles along South Virginia Street.

Trips 3 – 6 Miles

- Southwest Reno has the largest proportion of trips between 3 and 6 miles in the region.
- The origin-destination pairs with the greatest e-bike potential are between Central Sparks and Central Reno, South Meadows and Central Reno, and Northwest Reno and Central Reno.

Results

This analysis identifies where there are short trips that land use and transportation strategies could more effectively convert to active trips.

Active Trip Potential

Active trip potential maps show areas where large numbers of short vehicle trips (under six miles) end. These trips have distances that are short enough for the trips to possibly be taken by an active mode. However, they are subject to the limitations described in the Limitations section.

Figure 1, the analysis of overall active trip potential, shows all motor vehicle trips under six miles ending in each Transportation Analysis Zone (TAZ). The areas with the highest active trip potential include some TAZs in Cold Springs, Central Reno, and South Reno. When short vehicle trips are viewed as a percentage of all trips, the spatial distribution changes slightly. **Figure 2** illustrates the number of motor vehicle trips under 3 miles per square mile in the Truckee Meadows modeled area. Some areas such as Cold Springs have a high number of trips suitable for active transportation, but due to the suburban/ex-urban context may not be suitable for pedestrian or bicycle infrastructure. Additional measures such as intersection density, community demographics, and street design need to be evaluated against the potential benefits of active transportation infrastructure investments.

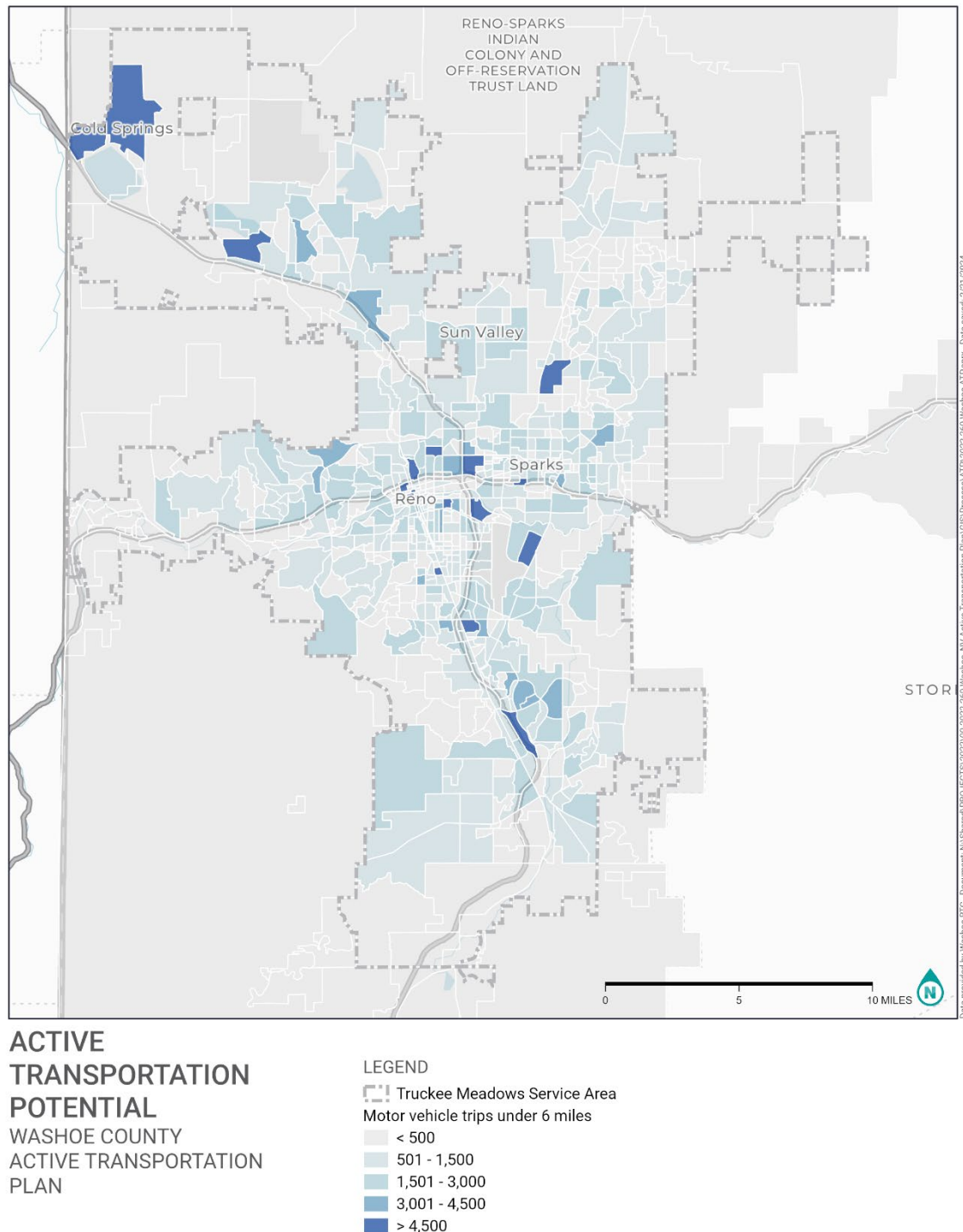


Figure 1: Motor Vehicle Trips Under 6 miles

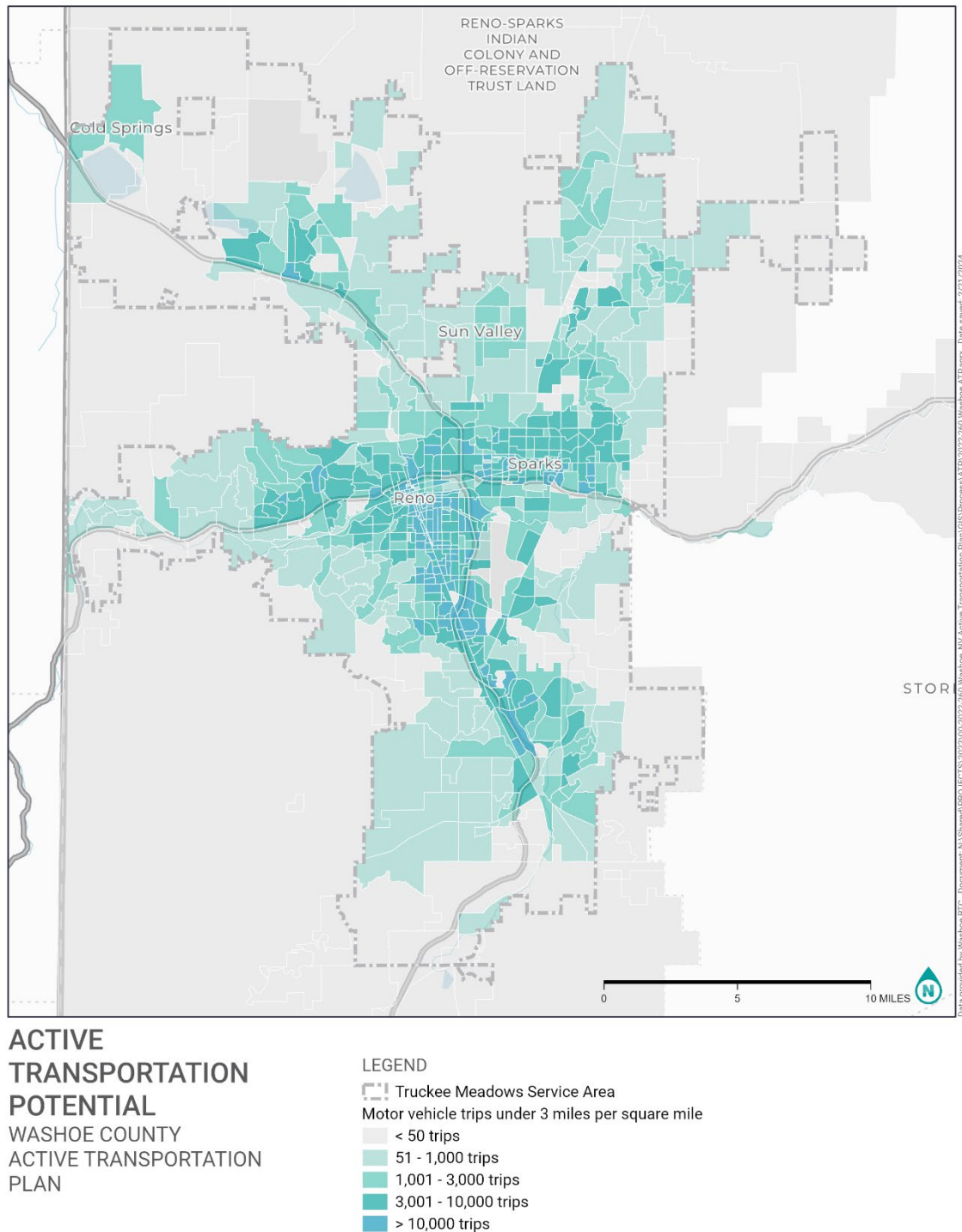


Figure 2: Motor Vehicle Trips Under 3 Miles per Square Mile

Figure 3 highlights the percent of motor vehicle trips which are under 1 mile. These areas of active trip potential are not necessarily TAZs with the highest number of trips but where street grids are generally denser and local amenities and jobs are closer so that long trips are not as necessary. These TAZs are generally suitable for a shift to a walking modality. Central Reno, Central Sparks, West Reno, South Reno, North Valleys, Spanish Springs, and Sun Valley have a high concentration of trips under 1 mile. **Figure 4** and **Figure 5** illustrate the percent of motor vehicle trips between 1 and 3 miles and between 3 and 6 miles, respectively. Most of the Truckee Meadows modeled area has a high concentration of trips between 1 and 3 miles. These areas are most suitable for a shift to biking modes and may be areas where investing in additional bike infrastructure could increase ridership. As distance from the urban core increases, the share of short trips decreases, and the share of longer trips (between 3 and 6 miles) increases. These areas are most suitable for e-biking modes.

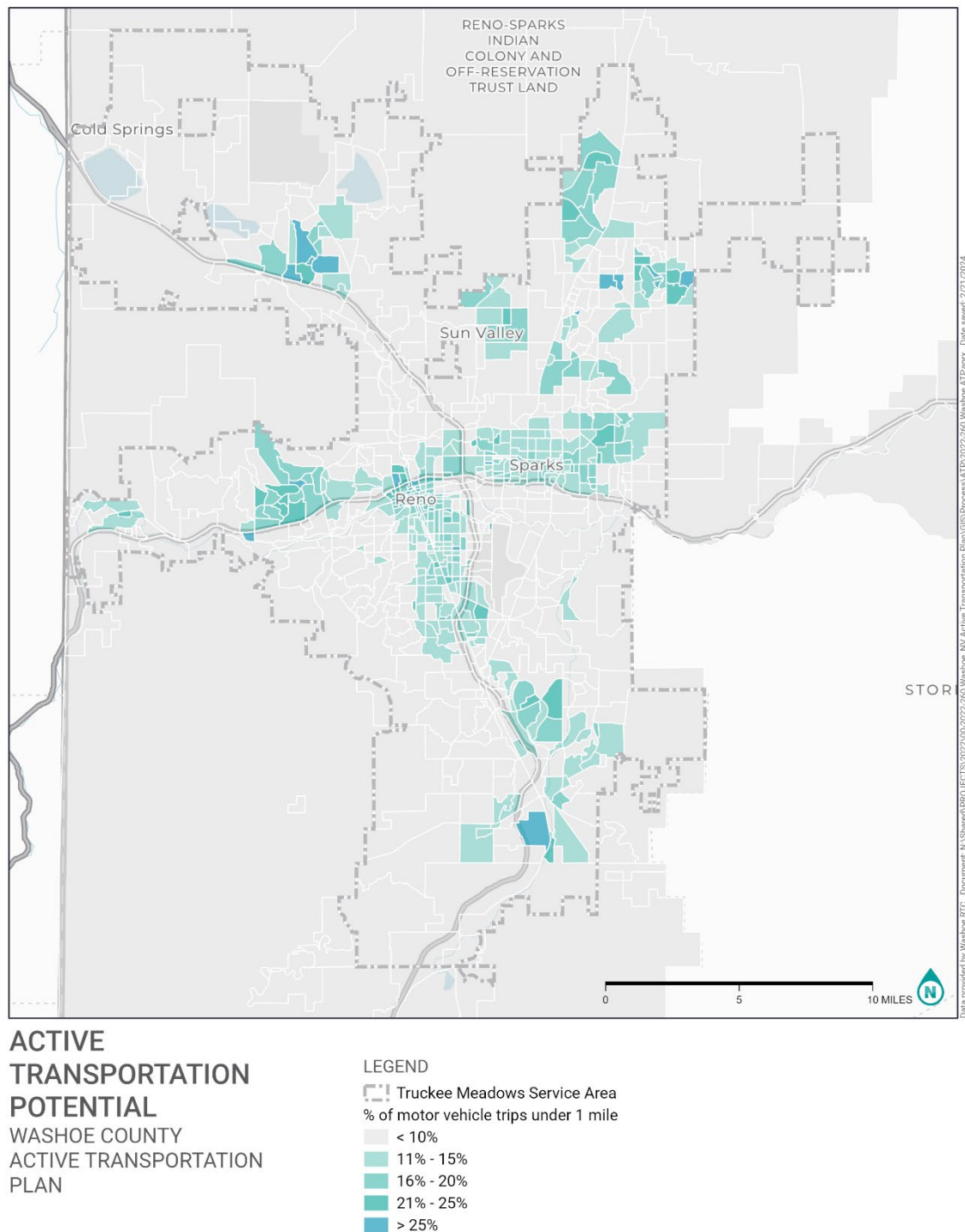


Figure 3: Percent of Motor Vehicle Trips Under 1 Mile

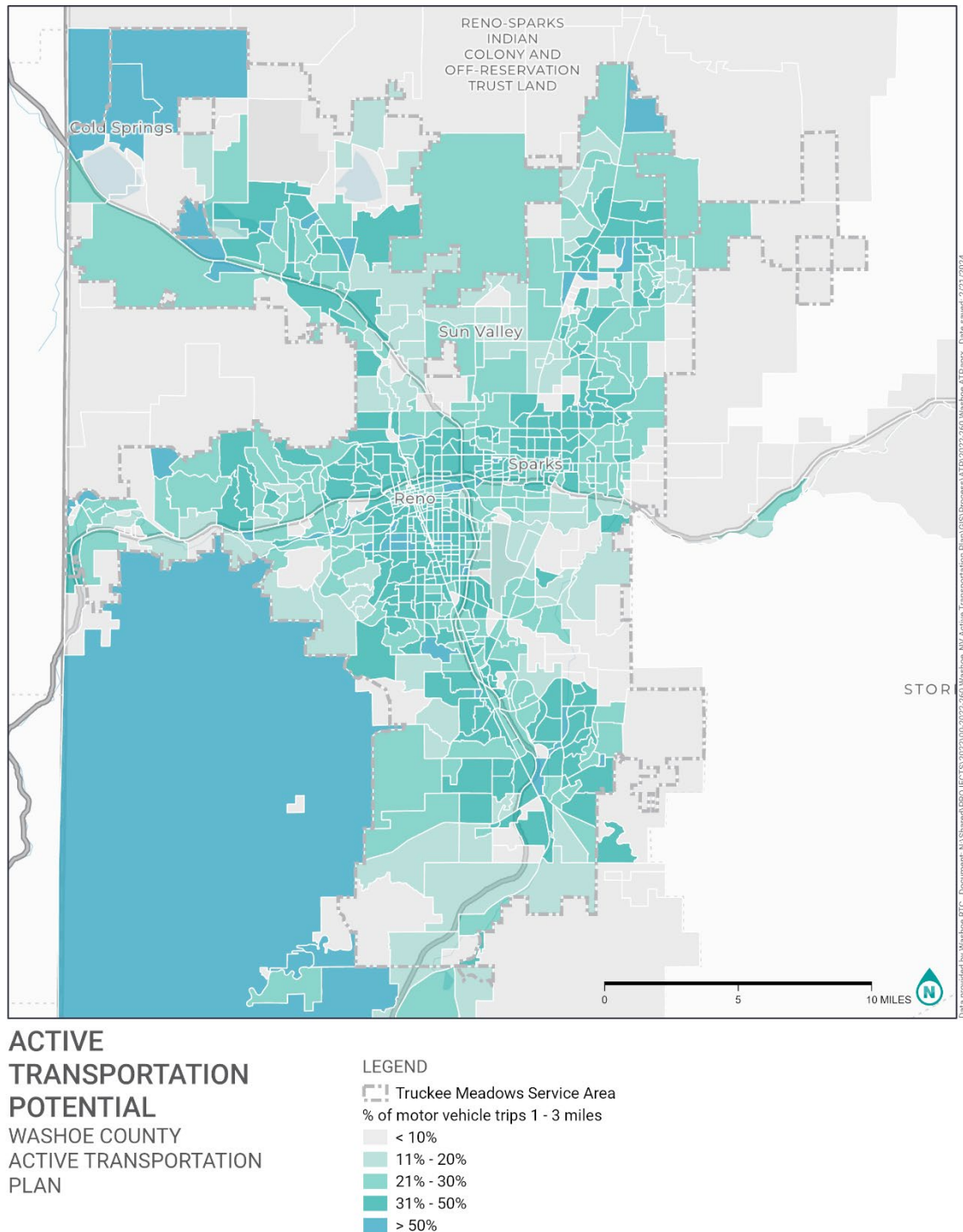


Figure 4: Percent of Motor Vehicle Trips Between 1 and 3 Miles

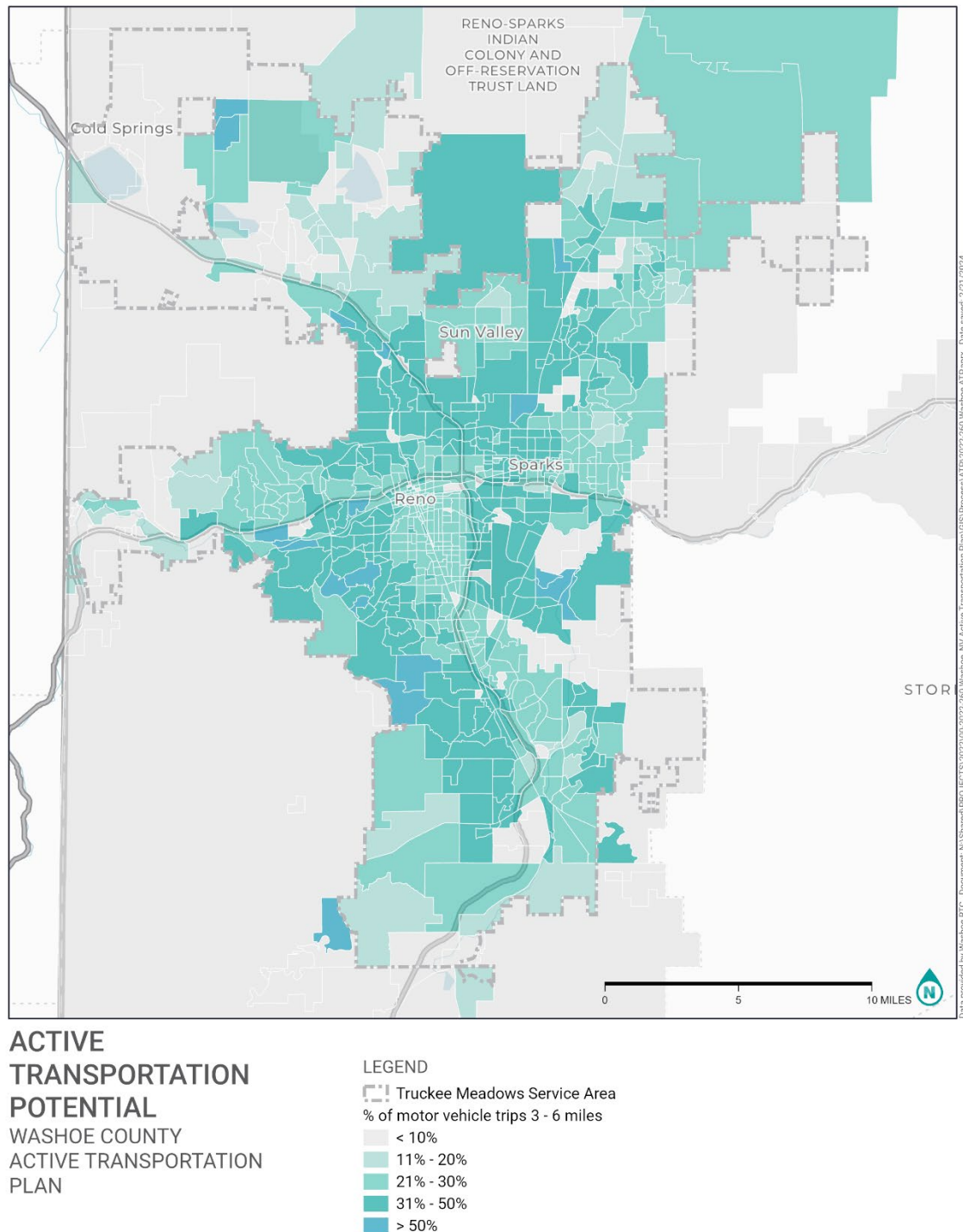


Figure 5: Percent of Motor Vehicle Trips Between 3 and 6 Miles

Appendix A shows a more detailed breakdown of the active trip potential breakdown for TAZs across the Truckee Meadows. Maps for active trip potential by mode suitability are provided in **Appendix B**. These maps individually show short vehicle trips that could convert to e-bike, bike, or walking trips. Active trip potential for individual modes is distributed similarly to active trip potential for all active modes combined, meaning that all areas mentioned above have high potential for e-bike, bike, and walk trips.

Active Trip Potential Desire Line Maps

Alta prepared maps showing origins and destinations of short motor vehicle trips, again indicating active trip potential.¹ Origins and destinations are aggregated to the TAZ level, with points placed in the middle of each TAZ. Trips within the TAZ are represented as dots. **Figure 6** shows that hubs of potential active trips are found in TAZs in Central Reno, as well as trips along the South Virginia corridor. These locations are hubs for short trips.

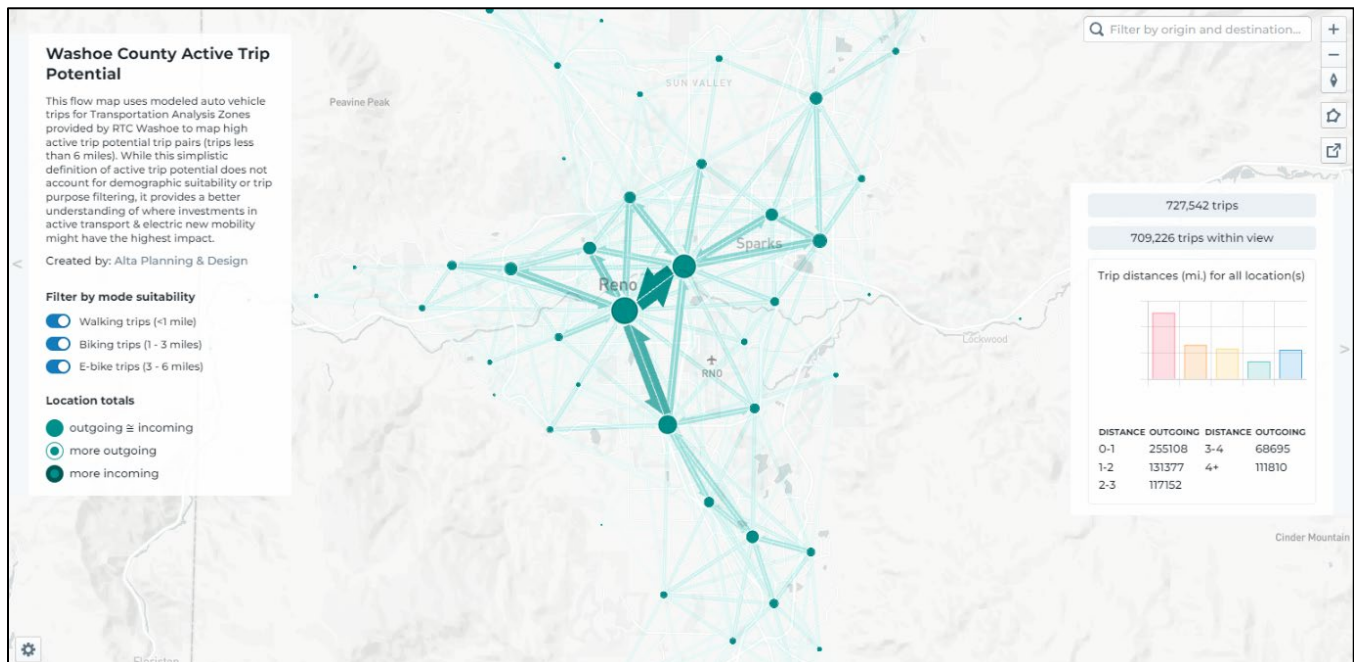


Figure 6: Origins-Destinations of Active Trip Potential: Vehicle trips under 6 miles

Methodology

Alta used modeled trips from Washoe RTC for this analysis. There were two data sets received from Washoe RTC: 1) Average distances between each Traffic Analysis Zone (TAZ); and 2) Trips taken between each TAZ. The data was filtered for private vehicle trips within the Truckee Meadows modeled area. Data was aggregated and analyzed based on the TAZ-level geometries. The two data sources from Washoe RTC were joined so that the final data contained the origin TAZ, the destination TAZ, the average distance, and the number of auto trips. An example of the data structure is in **Table 1**.

¹ <https://flowmap.altago.site/1aStEUrcghRX2GlvrvVjEubzMxfp2OmbkYqmRP5Q1ADE/5b36ff8>

Table 1: Example Origin-Destination Data Structure

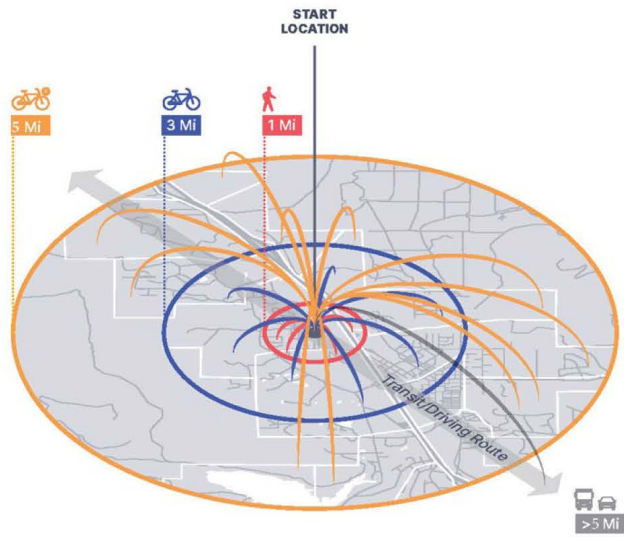
Origin TAZ	Destination TAZ	Count of Auto Trips	Average Distance
101	101	74	.239 miles
101	102	72	.347 miles
101	103	60	.329 miles

Each origin-destination pair was classified based on the average distance field. **Figure 7** illustrates the philosophy behind the classifications, where trip distance is an indicator of the suitability for various mode shifts. Each pair was assigned an active trip mode based on the distance field:

- **Trips less than 1 mile:** Potential Walking Trips
- **Trips 1 to 3 miles:** Potential Biking Trips
- **Trips 3 to 6 miles:** Potential E-Bike Trips
- **Trips over 6 miles:** Not Suitable for Active Trip Mode

Alta then counted the number and percent of trips for each TAZ by mode shift suitability category. This allowed Alta to understand the starting and ending points of vehicle trips under six miles. To create these origin-destination lines, Alta used an open-source tool called [Flowmap.Blue](#) which allows for dynamic visualization of origin-destination pairs and trip volumes for custom geographies. Alta's maps provided in the body of this memo show estimates of potential for active trips of any mode. Maps in the appendix show active trip potential for specific modes based on the trip distance assumptions noted above.

Active Trip Potential



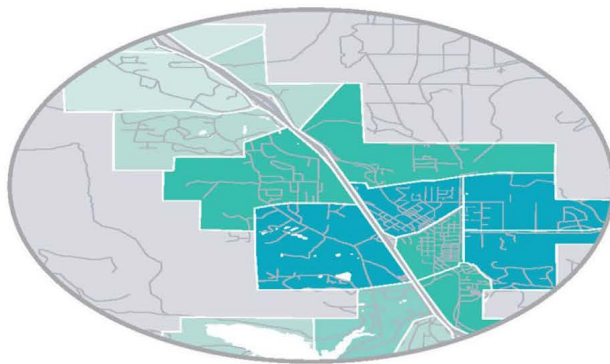
Active Trip Potential (ATP)

Identifies trips whose distances are short enough to be accommodated by walking or biking.

Our evaluation of ATP includes looking at the number of trips less than 3 miles.

Different modes are suitable for different trips based on the transportation options that support them.

- Walk Trip Potential (0-1mi)
- Bike Trip Potential (1-3mi)
- E-Bike Trip Potential (3-5mi)
- Drive and Transit Trip Potential (>6mi)



ATP Zonal Summary

When we look at all the activity occurring within a zone, we scrutinize both the estimated number of trips in the zone and their lengths. Locations with high rates short trips are potential candidates for active transportation investments.

ATP TRIPS

% of Trips less than or equal to 3mi

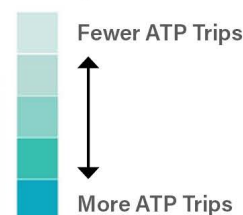


Figure 7: This Active Trip Potential Explainer helps illustrate the concept behind stratifying trips by trip distance to understand whether they could be met by walking, biking, or e-biking.

Limitations of Active Trip Potential

While short trips are indicators of trips that can potentially be met using active modes, it is unrealistic to expect all short trips can be converted to active transportation. Even if supportive infrastructure is provided, there are a number of reasons why a trip would still be made by non-active modes, including:

- **Heavy Loads.** In many cases, cargo bikes can support many types of grocery or shopping trips, but some heavy loads are often bulky or heavy enough to warrant the use of the vehicle.
- **Multiple Passengers.** While some cargo bikes can accommodate small children, people carrying multiple passengers or who do not feel comfortable navigating a loaded cargo bike (which can make it more difficult to maintain balance) may still opt for a vehicle.
- **Trip Chaining.** Some trips are chained in a way that make it difficult to envision using active transportation for the entire tour/trip. For example, if one leg of a trip that is part of a chain of trips is too long to consider using an active mode, the entire tour/trip may be better made using a vehicle. For example, a pedestrian typically walks half a mile to work on most days but on occasion needs to travel from work to a doctor's appointment that is two miles away. On these days, they might drive rather than walk.
- **Physical Impairment.** Some members of the community may have an impairment that prevents them from comfortably walking or may not know how to ride a bicycle.
- **Seasonal Weather.** Active trips become more difficult to accomplish in some weather conditions. While walking and biking trips may still be viable in many instances, there may be sometimes where it is inadvisable, such as in heavy rain, a heat wave or unhealthy air conditions.
- **Formal occasions.** If someone needs to wear formal clothing for an event, including work, they may be less inclined to walk or ride a bike if they would need to shower or change clothes at their destination.
- **Structural barriers:** Some people experience structural barriers to active travel, regardless of the specific trip. These include concerns about the security of one's bike while parked, harassment from police or passerby, or street crime.
- **Personal Preference.** Some members of the community may elect to never bike or walk even if an all ages and ability network is provided in a community.

Conclusion

Active transportation supports climate goals by reducing vehicle trips and facilitating access to transit. The Truckee Meadows is rich with opportunities to support more active trips. The hubs of current activity highlighted here are areas that could support new development that support even more active trips. Meanwhile, the active trip potential shows areas that, with more infrastructure investment, could help convert vehicle trips to active modes.

Appendix A

Active Trip Potential by Outreach Area

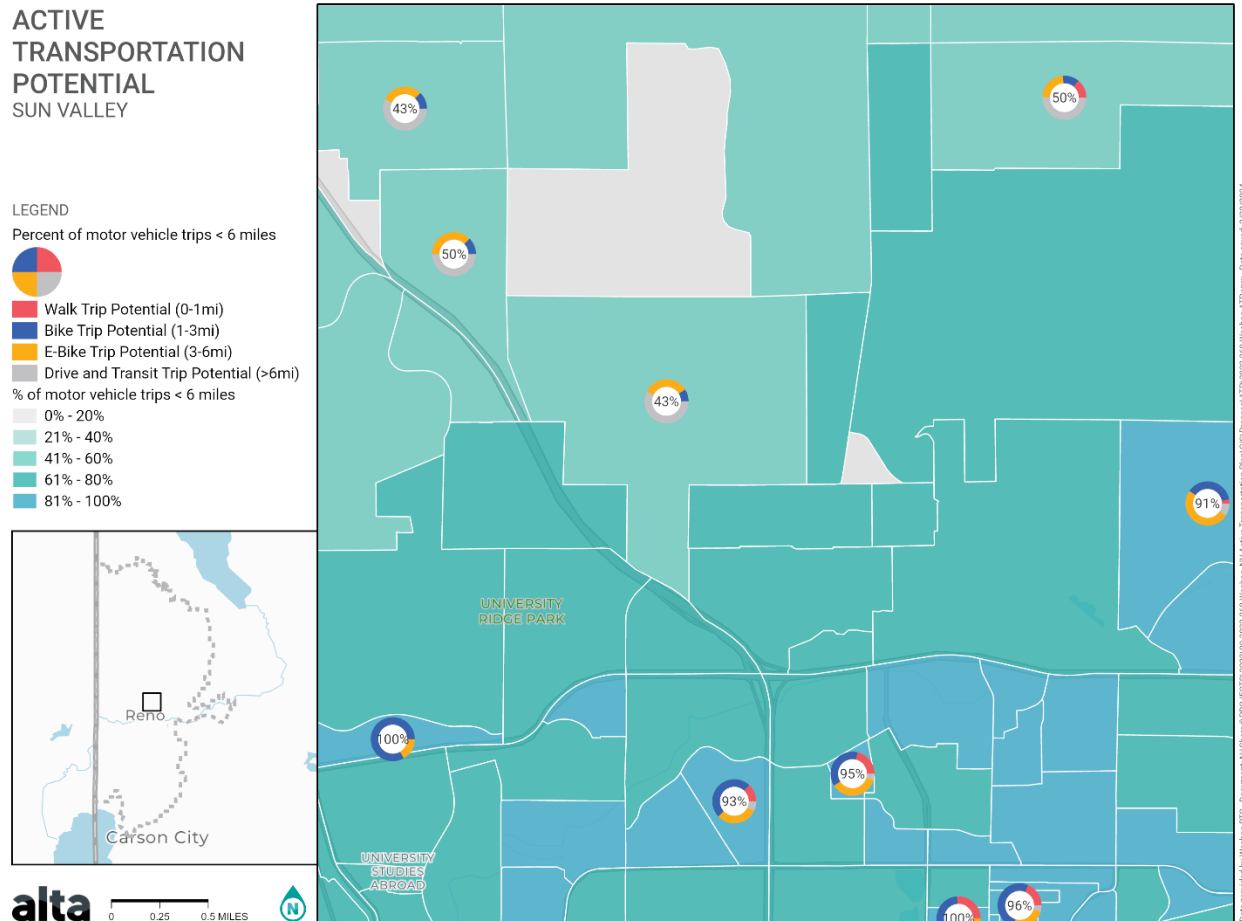


Figure 8: Active Trip Potential in Sun Valley

ACTIVE TRANSPORTATION POTENTIAL

VERDI

LEGEND

Percent of motor vehicle trips < 6 miles



Walk Trip Potential (0-1mi)

Bike Trip Potential (1-3mi)

E-Bike Trip Potential (3-6mi)

Drive and Transit Trip Potential (>6mi)

% of motor vehicle trips < 6 miles

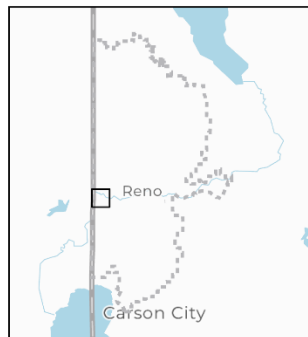
0% - 20%

21% - 40%

41% - 60%

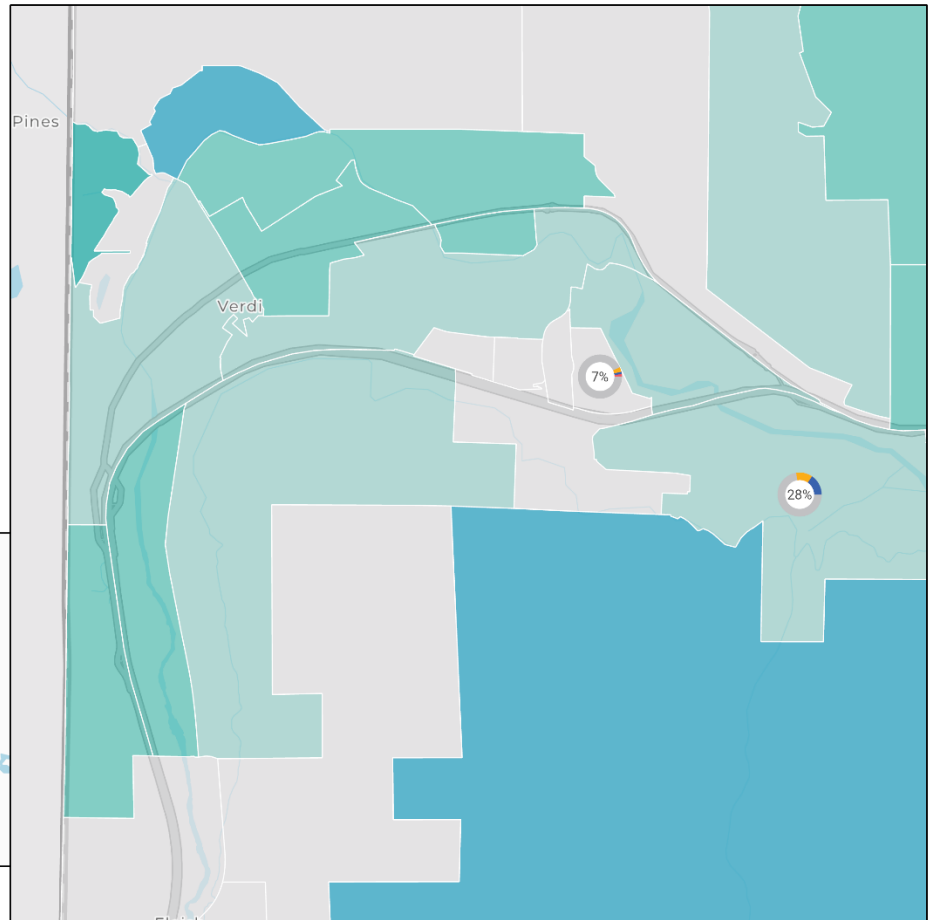
61% - 80%

81% - 100%



alta

0 0.25 0.5 MILES



Data provided by Washoe RTC. Document: N:\Shared\PRD - JET\7530222-00-0022-256\Washoe NV Active Transportation Plan\0022-256\Washoe RTP Page. Date issued: 2/20/2024

Figure 9: Active Trip Potential in Verdi

ACTIVE TRANSPORTATION POTENTIAL NORTH VALLEYS

LEGEND

Percent of motor vehicle trips < 6 miles



Walk Trip Potential (0-1mi)

Bike Trip Potential (1-3mi)

E-Bike Trip Potential (3-6mi)

Drive and Transit Trip Potential (>6mi)

% of motor vehicle trips < 6 miles

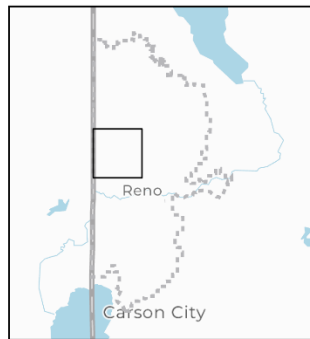
0% - 20%

21% - 40%

41% - 60%

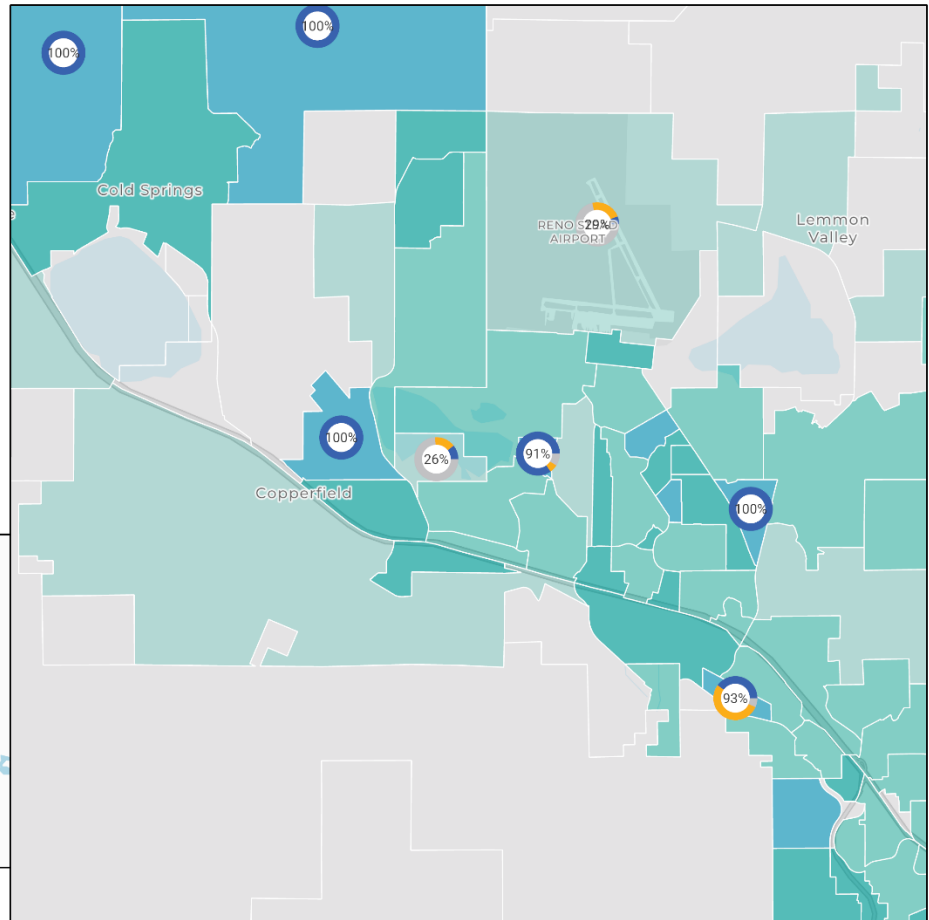
61% - 80%

81% - 100%



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0 0.8 1.6 MILES



Data provided by Washoe RTC. Document: N:\Shared\PRG\JET\7/23/2022\05-2022-256\Washoe NV Active Transportation Plan\05-2022-256\Washoe RTP.mxd. Date issued: 2/20/2024.

Figure 10: Active Trip Potential in North Valleys

ACTIVE TRANSPORTATION POTENTIAL SOUTH RENO

LEGEND

Percent of motor vehicle trips < 6 miles



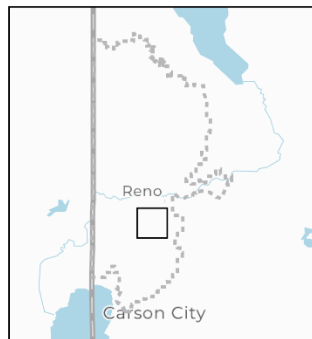
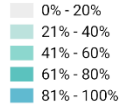
Walk Trip Potential (0-1mi)

 Bike Trip Potential (1-3mi)

■ E-Bike Trip Potential (3-6mi)

Drive and Transit Trip Potential (>6mi)

% of motor vehicle trips < 6 miles



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A horizontal scale bar with vertical tick marks at 0, 0.5, and 1. The text "0", "0.5", and "1 MILES" is positioned below the corresponding tick marks.

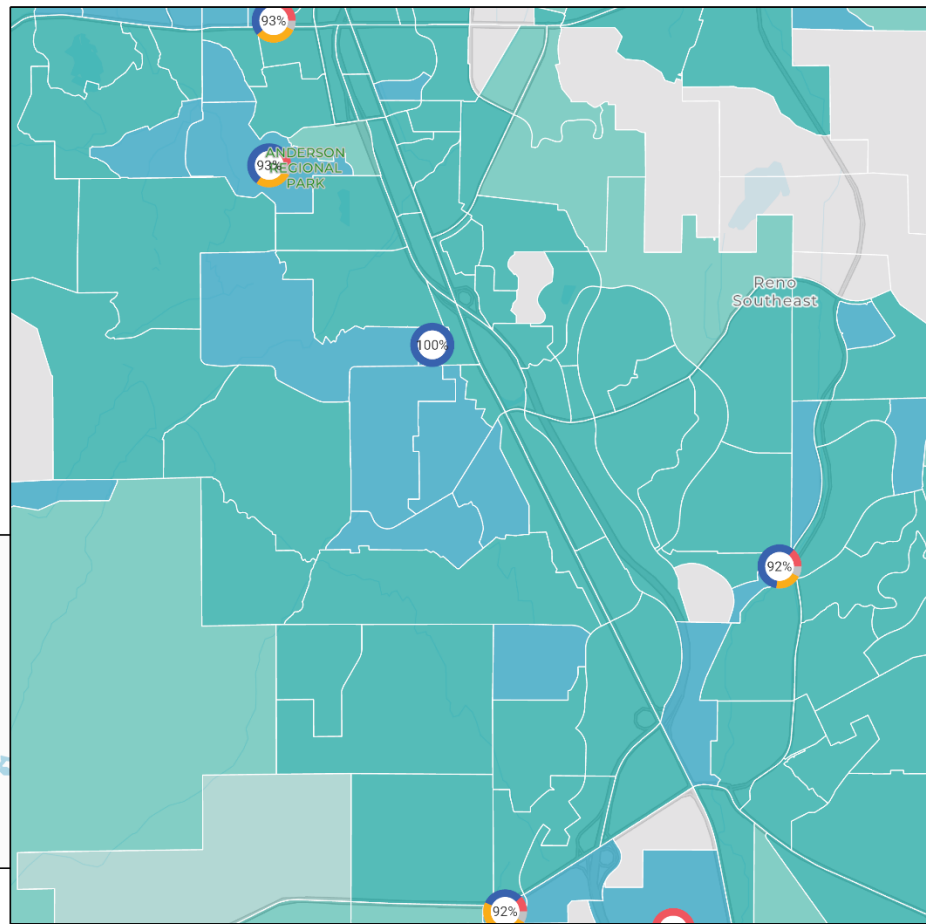


Figure 11: Active Trip Potential in South Reno

**ACTIVE
TRANSPORTATION
POTENTIAL**
CENTRAL SPARKS

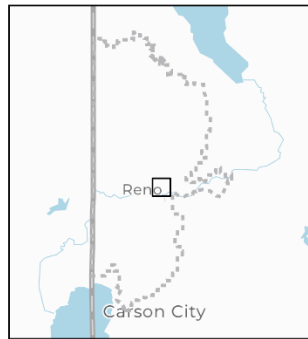
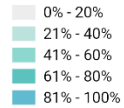
LEGEND

Percent of motor vehicle trips < 6 miles



- Walk Trip Potential (0-1mi)
- Bike Trip Potential (1-3mi)
- E-Bike Trip Potential (3-6mi)
- Drive and Transit Trip Potential (>6mi)

% of motor vehicle trips < 6 miles



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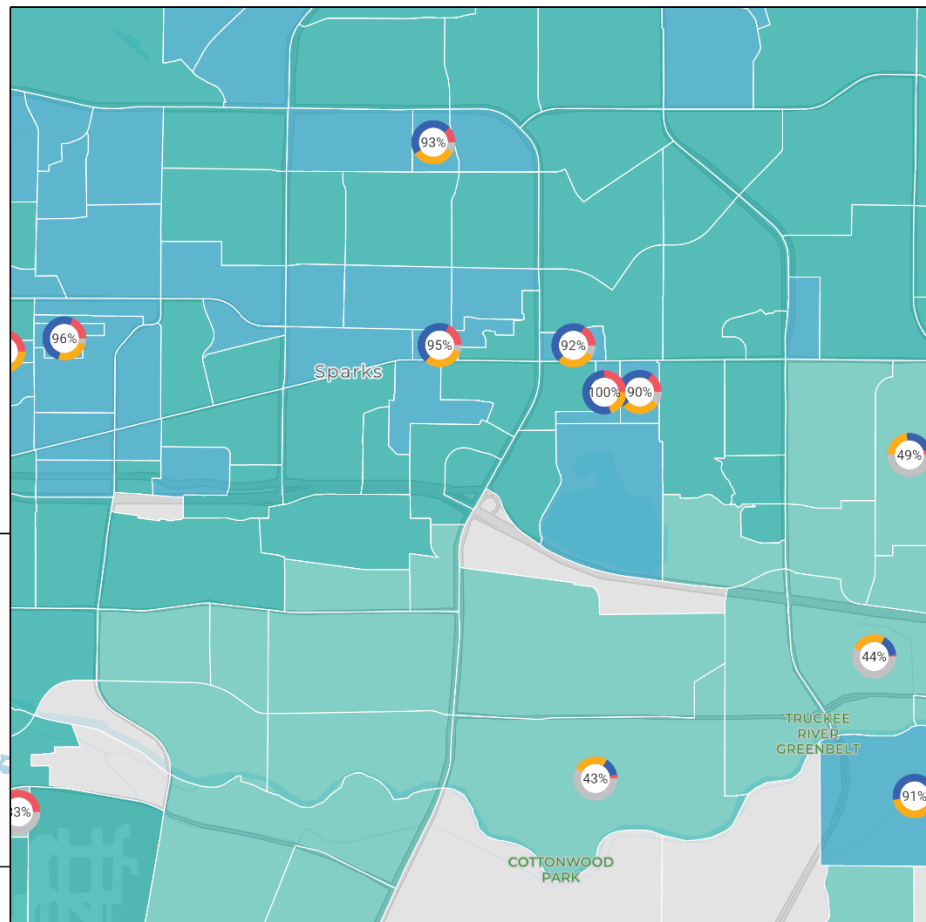
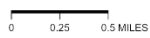
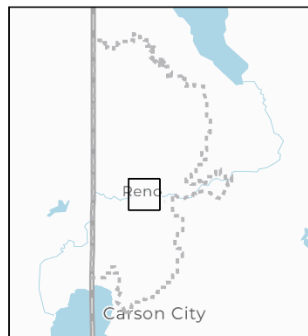


Figure 12: Active Trip Potential in Central Sparks

LEGEND

- % of motor vehicle trips < 6 miles



0 0.5 1 MILES

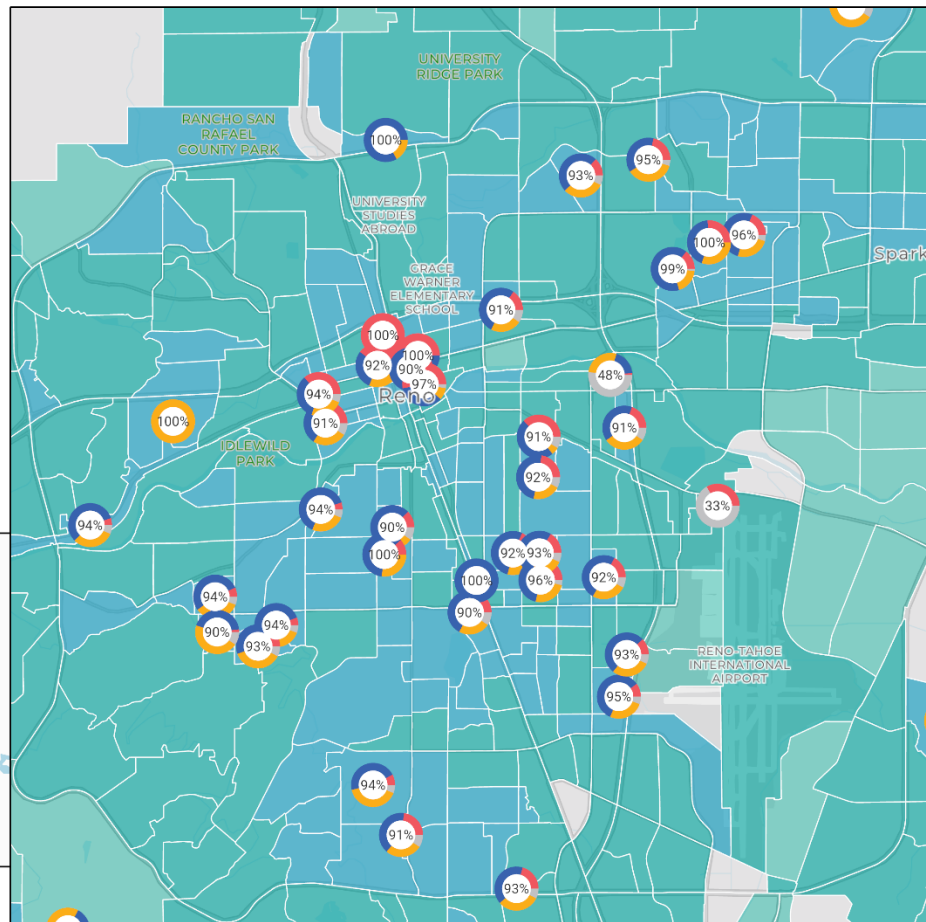


Figure 13: Active Trip Potential in the McCarran Loop

ACTIVE TRANSPORTATION POTENTIAL SPANISH SPRINGS

LEGEND

Percent of motor vehicle trips < 6 miles



Walk Trip Potential (0-1mi)

Bike Trip Potential (1-3mi)

E-Bike Trip Potential (3-6mi)

Drive and Transit Trip Potential (>6mi)

% of motor vehicle trips < 6 miles

0% - 20%

21% - 40%

41% - 60%

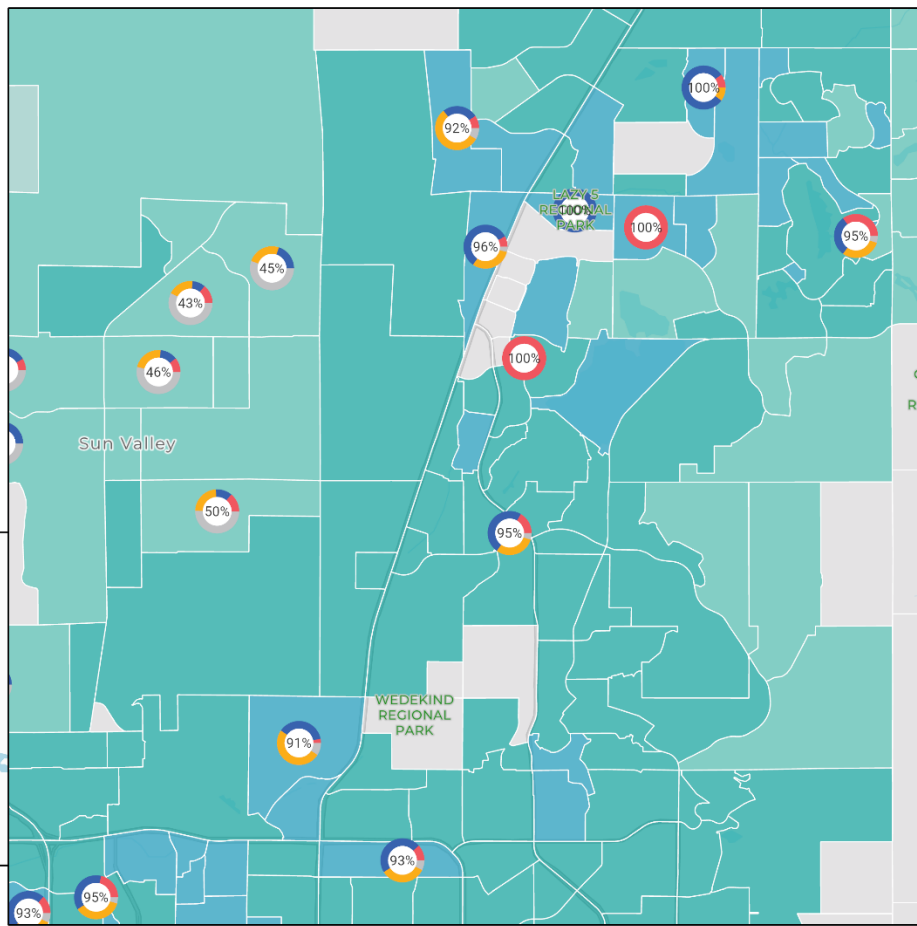
61% - 80%

81% - 100%



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0 0.5 1 MILES



Data provided by Washoe RTC. Document: NV Shared Plan - ERTC Active Transportation Plan (2022-2024). Worksheet: NV Shared Plan - ERTC Active Transportation Plan (2022-2024). Date saved: 2/20/2024.

Figure 14: Active Trip Potential in Spanish Springs

Appendix B

Active Trip Potential by Mode Suitability

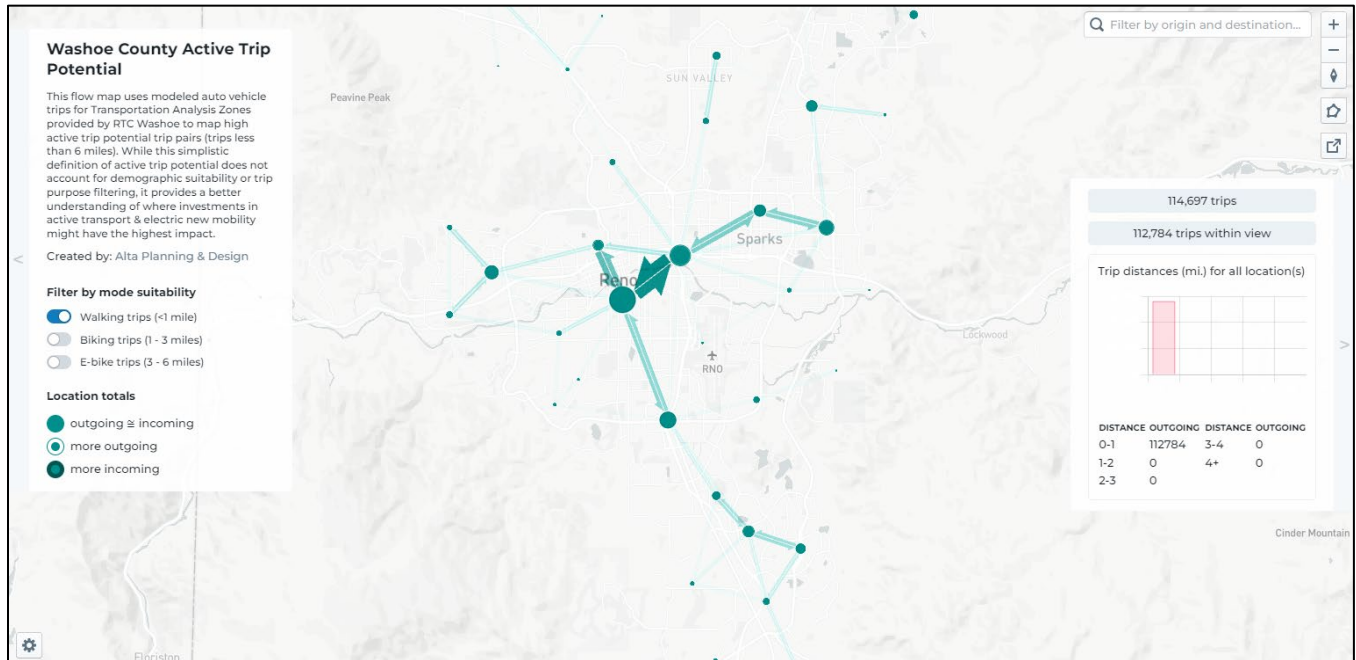


Figure 15: Walk Trip Potential: Daily motor vehicle trips under 1 mile

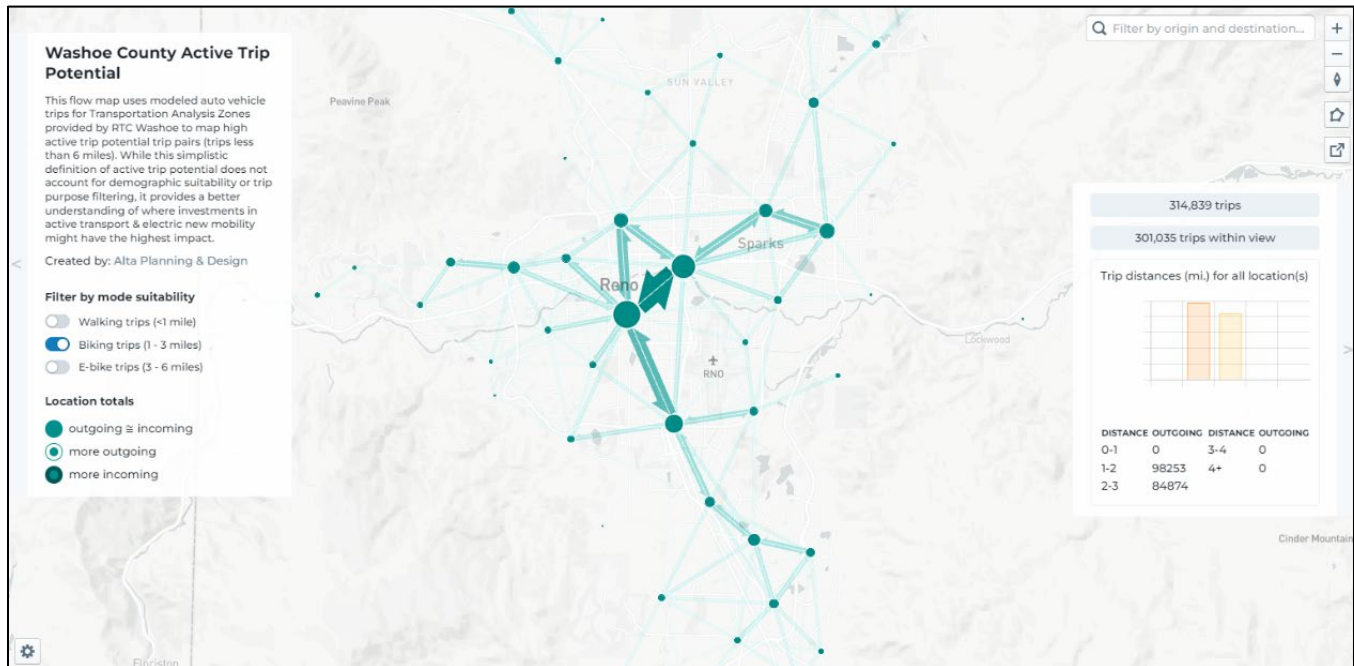


Figure 16: Bike Trip Potential: Vehicle trips between 1 and 3 miles

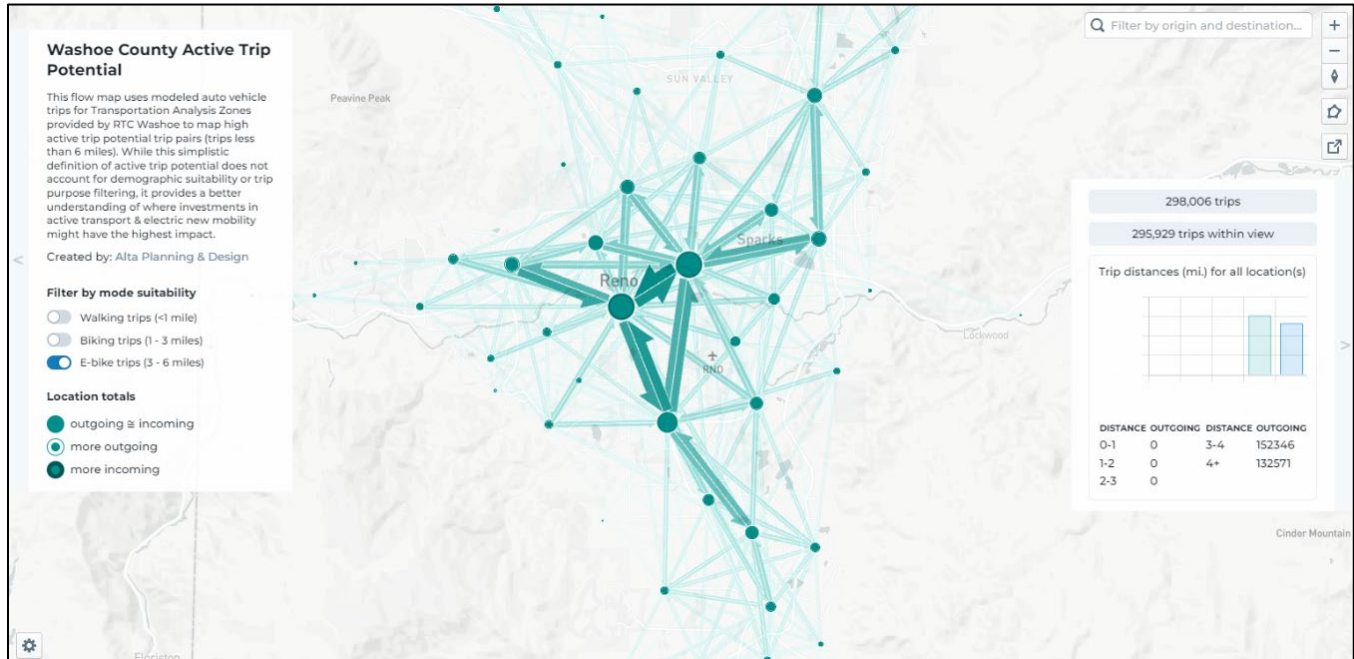


Figure 17: E-bike Trip Potential: Vehicle trips between 3 and 6 miles.