MEMORANDUM

To: Simran Jhutti, Principal Planner, Fresno Council of Governments

From: Mauricio Hernandez, Alta Planning + Design

CC: David Wasserman, Izzy Youngs; Alta Planning + Design, and Ben Weber; Walker Consultants

Date: May 1, 2025

Re: Fresno County Mobility Hub Feasibility Study: Siting Analysis Approach Memo (3a)

Table of Contents

Introduction

The Fresno Council of Governments (FCOG) is developing a Mobility Hub Feasibility Study to identify feasible mobility hub locations in the cities and rural areas of the County that can facilitate multi-modal transportation, such as public transit, microtransit, micromobility[1], carsharing, ridesharing, and other modes. This study will culminate in concept designs and feasibility evaluations of four locations: one each in Clovis and Fresno and two in other cities or rural areas in the County. The mobility hubs may also include community amenities such as spaces for small businesses, public recreation and meeting areas, health and social services, and other uses.

As part of this study, the Project Team led by Alta Planning + Design (Alta) worked in collaboration with Walker Consultants and the local project team of FCOG, Clovis Transit, Fresno Area Express (FAX), and Fresno County Rural Transit Agency (FCRTA) to establish a methodology to assess potential sites for Mobility Hub suitability based on their relative regional impact. This memo explains the data-driven approach used to identify these sites.

Memo Organization

This memo includes seven sections:

1. Introduction provides context about the study area and the general approach for the mobility hub siting process.
2. Phase 1 – Quantitative Analysis identifies our overall approach for the regional siting analysis based on available data.
3. Results introduces the result maps of the quantitative regional analysis and the input factors driving it.
4. Discussion articulates some trends and key findings from the resulting maps.
5. Limitations outlines some of the key notes about data quality and findings limitations.
6. Next Steps provides a brief description of how the Phase 2 Qualitative Site Assessments will be conducted.
7. Appendices documenting sets of maps and results are also included in this memo.

[1] Micromobility refers to "shared-use fleets of small, fully or partially human-powered vehicles such as bikes, e-bikes and e-scooters. These vehicles are generally rented through a mobile app or kiosk, are picked up and dropped off in the public right-of-way and are meant for short point-to-point trips." Source: National Association of City Transportation Officials, *Guidelines for Regulating Shared Micromobility* (2019)

Study Area Definition

The goal of this spatial analysis is to inform the selection and siting of up to four (4) mobility hubs within the FCOG service area (see **Figure 1** below) and provide a starting framework for future hubs in the region. The methodology was informed by preliminary evaluation criteria based on discussions with project stakeholders in meetings with the project team. This technical memo outlines key aspects of the analysis methodology and identifies key results from it across the region.

Multistage Prioritization and Phasing

This analysis assumes that potential mobility hub sites will be evaluated in two stages: The first stage is a quantitative analysis across a hexagonal grid (hex grid) covering the FCOG region. This memo delineates a data-driven approach to completing this quantitative analysis. The project team's approach is intended to make use of considerations that can be readily analyzed to inform initial siting areas, but then integrate more qualitative criteria that are difficult to evaluate comprehensively for analysis.

The second stage of the process will include a more qualitative screening process that considers factors hard to integrate into a numeric prioritization process. This stage is NOT considered in this memo.

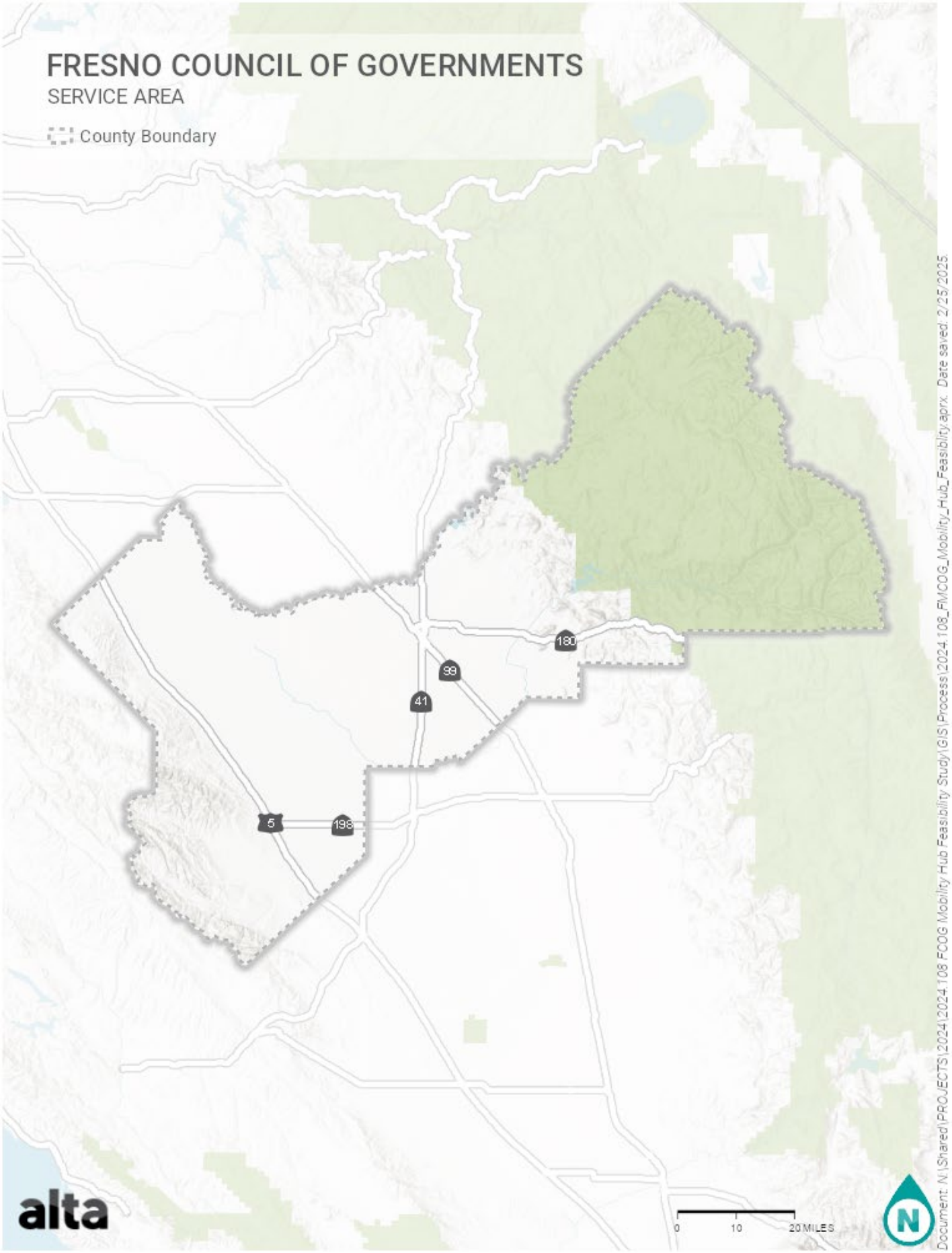

Figure 1. Map of Fresno Council of Government Service Area (Fresno County)

Phase 1: Quantitative Siting Analysis

Whole Area Aggregation

To standardize the unit of analysis, Alta used a hexagonal grid system to evaluate mobility hub suitability across the region (as noted in **Figure 2**).[2] Instead of relying on larger administrative boundaries like census tracts or block groups, which can vary in size and shape, the analysis applied a consistent hexagonal framework to ensure comparability across locations. To account for how people move within and beyond each hexagon, Alta applied a ¼ mile buffer around the center of each hex unit, representing a reasonable walking distance for the average person. Data from larger geographic areas, such as census tracts, was then proportionally allocated to each buffer area based on how much of the original data source overlapped with the buffer. This method ensured that the information assigned to each hexagon more accurately reflected the surrounding mobility environment rather than being limited strictly to its boundaries. By applying this approach, the analysis better captured real-world travel patterns, particularly for factors like transportation equity, land use activity, and multimodal access, where conditions often extend beyond a single hexagon. Proportional allocation is particularly useful for datasets that describe aggregate counts, such as population or employment figures, and continuous measures like VMT per capita, where an area-weighted averaging approach was used to maintain accuracy in localized calculations. **Figure 3** provides a visual example of how area-weighted proportional allocation was applied in this analysis.

[2] This hex grid will be based on an H3 grid. H3 hexagons have unique IDs and are popular for spatial analysis because any aggregation to H3 grids for other analysis could be easily joined using these unique IDs. For more information, see: Uber. (2018, June 27). *H3: Uber's hexagonal hierarchical spatial index*. Uber Blog. https://www.uber.com/blog/h3/

Figure 2. H3 Grid Example

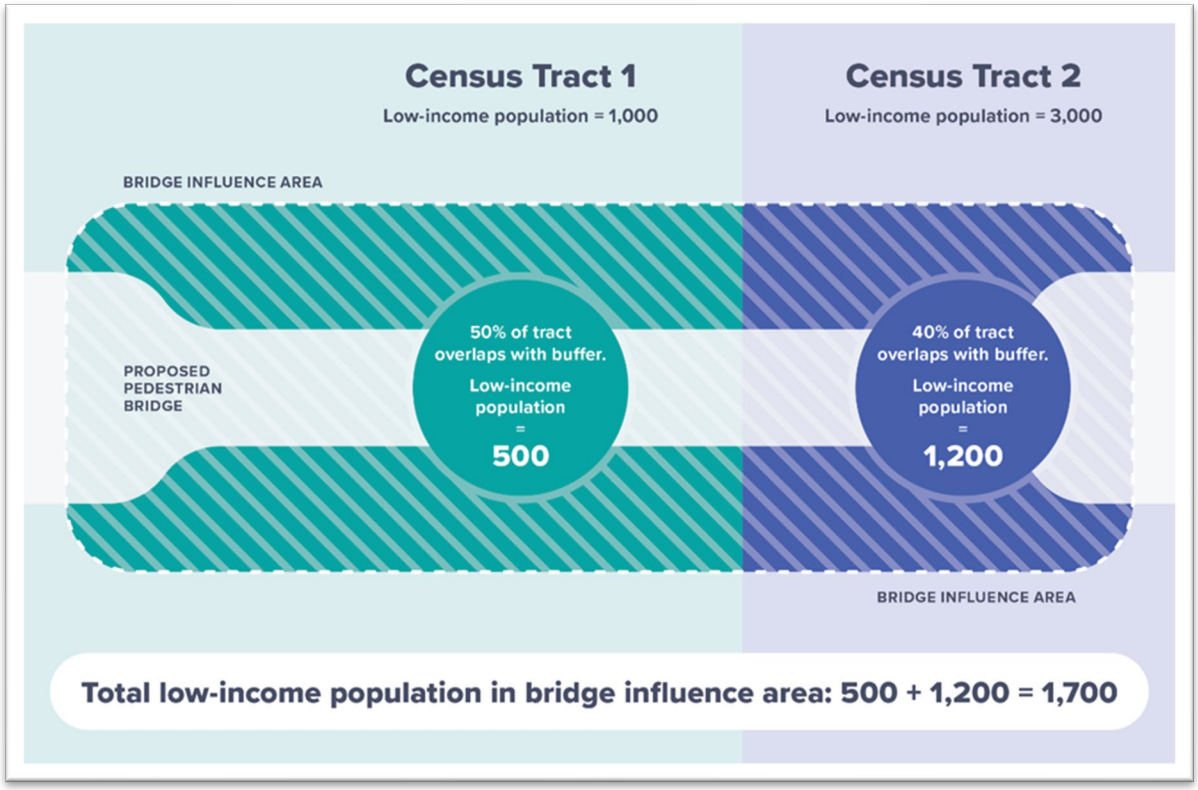

Figure 3. Area-Weighted Proportional Allocation Methodology

Scoring Potential Sites

A percentile ranking approach was then applied to continuous datasets for each ¼ mile buffer, translating raw values into a standardized 10-point scale across all scoring categories for a whole area prioritization. This method preserves the relative distribution of values, making it easier to compare different suitability factors while preventing extreme values from disproportionately influencing results. With the hex criteria percentile ranked, the final step was to aggregate and assign weights to the results to produce a composite suitability score for mobility hub siting (See **Figure 4** for an example).

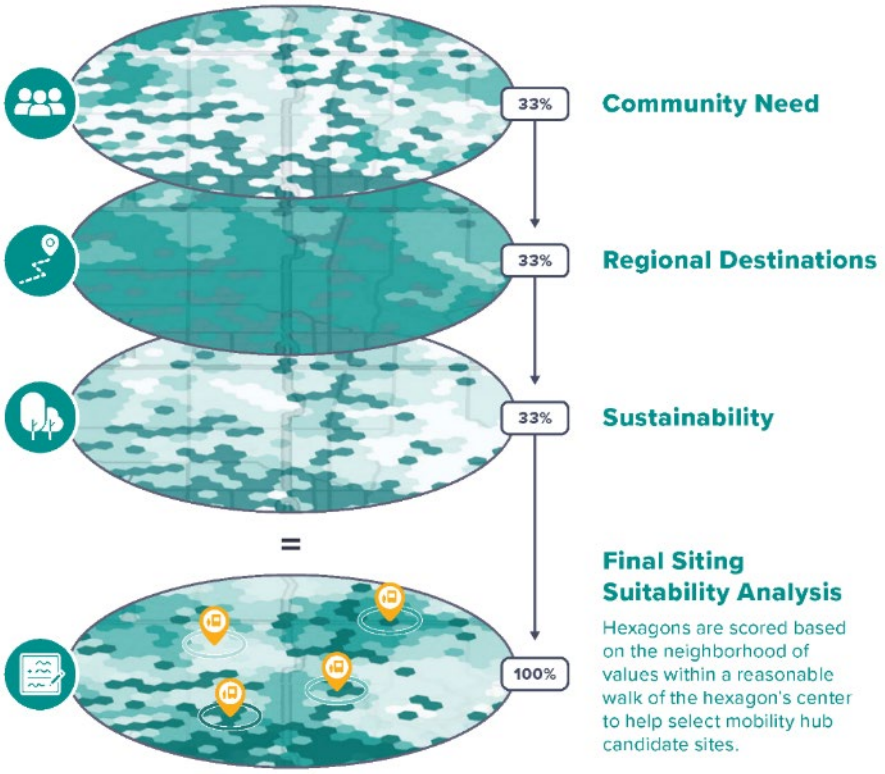

Figure 4. Conceptual diagram showing how hexagons can be used to score and identify prospective mobility hub sites.

Data and Criteria Selection

As previously noted, the criteria and data for this feasibility analysis were selected to align with the overarching goals of community need, access to regional destinations, and sustainability in mobility hub siting. Each dataset was chosen for its direct or indirect influence on these objectives, ensuring that the analysis captured demand-side factors, such as travel behavior and transportation equity, and supply-side considerations, such as land use patterns and infrastructure availability. By integrating these data sources, the analysis identifies locations where mobility hubs can have the greatest relationship to community needs, access to regional destinations, and sustainability outcomes while ensuring that investments are equitably distributed across Fresno County. The relative importance of each criterion was determined based on the weighting framework outlined in **Table 1**, ensuring that factors most relevant to mobility hub goals were appropriately emphasized in the final prioritization rankings. The following sections provide a detailed breakdown of the approach used to score each suitability metric, describing the methodological decisions that shaped the results.

Table 1. Criteria and Data Sources used for determining mobility hub suitability.

Goal	Criteria	Measures	Data Source	Hexagon Metric	Site Scoring	Scoring Explanation	Weight
Whole Area Criteria							
Community Need	**Transportation Equity**	Equity index leveraging a combination of demographic, access to destinations, and traffic exposure measures to identify socially vulnerable populations with high investment need.	Caltrans Equity Index (EQI)	Points are assigned to ¼ mile buffers based on whether they are a Transportation-Based Priority Population (10 points), have an access or exposure screen (8 points), or just a demographic overlay (6 points).	10-Point Scale – The average score of all hexagons within ¼ mile of a site percent ranked and rescaled. More social vulnerability equates to more points.	A higher Transportation Equity score corresponds to locations with greater concentrations of vulnerable populations, particularly those with transportation access limitations.	15%
	Environmental Burden	Environmental Justice focused equity index used to identify communicates disproportionately burdened by multiple sources of pollution and demographic characteristics that increase their sensitivity to pollution.	California Environmental Protection Agency	Area-weighted average of the CalEnviroScreen Percentile Index for a ¼ mile buffer from the hexagon centers that overlap with CalEnviroscreen.	10-Point Scale – The average within ¼ mile of a site that is then percent ranked and rescaled. More environmental burdens equate to more points.	Higher Environmental Burdens score results at locations with higher exposure to pollutants and environmental stressors, where mobility hubs could help mitigate cumulative health burdens.	15%
Regional Destinations	**Activity Center Proximity**	The total number of Replica Weekday Non-Homed Based (NHB) Trips per square mile as a measure of activity density to locations outside the home.	Replica Places	Area-weighted average of trips per square mile (Weekday – NHB) within the ¼ mile buffer.	10 Point Scale – The average of trips per square mile within ¼ mile of a site that is then percent ranked and rescaled. Areas with more trips equate to more points.	Higher scores for Activity Center Proximity are located in areas with greater concentrations of non-home-based trips, indicating high levels of economic and social activity.	15%
	Future Land Use Support	The acreage of high-intensity future land uses, including mixed use, multifamily, downtown, and office, designated in Fresno County.	General Plans Across Fresno County	Each ¼ mile buffer is assigned points based on whether it touches an applicable future land use type. The points assigned by category are Downtown/Mixed use/University/Airport (10 points), high-density multifamily/office (8 points), and medium-density multifamily/public facilities/ parks/schools (5 points).	10-Point Scale – The average point total of all hexagons within ¼ mile of a possible hub site percent ranked and rescaled. Areas with more intense future land uses equate to more points.	Higher scores for Future Land Use Support are in locations with a larger share of planned high-density or mixed-use development, signaling stronger long-term potential for multimodal growth.	20%
Sustainability	**Multimodal Orientation**	The number of vehicle miles traveled (VMT) per resident living in each TAZ. Accounting will be for resident VMT rather than all VMT of travel to a TAZ.	SACOG Travel Demand Model	The area-weighted average VMT per capita is ascribed to each ¼ mile buffer.	10-Point Scale – The average VMT of all hexagons within ¼ mile of a possible hub site percent ranked and rescaled. A lower VMT per capita is a higher score.	Locations with high Multimodal Orientation scores have lower vehicle miles traveled (VMT) per capita as a proxy for areas with stronger support for non-auto travel modes or shorter trips.	15%
	Fill Gaps in Charger Network	The number of people to be served by chargers along major roads and not near an existing charger.	US Department of Energy Charger Station Database	The proportional sum of people within each ¼ mile buffer, excluding areas not near major roads or existing chargers.	The number of people served within ¼ mile of a possible hub site is percent ranked in descending order (higher density is a higher score) and rescaled.	Higher scores result at locations with no public charging infrastructure and higher population quantities who correspondingly don't have nearby access to public charging.	10%
	Hazard Risk Index	The probability of flood and fire events as measured by their combined annualized frequencies.	FEMA National Risk Index	The area-weighted average of the ¼ mile buffer with the origin dataset's combined annualized fire and flood events frequencies.	The average percent of all hexagons within ¼ mile of a possible hub site is ranked and rescaled. Fewer hazard events equate to a higher score.	Higher scores for Exposure to Flood and Fire are in locations with lower future projected combined annualized frequencies of flood and wildfire events, reflecting long-term infrastructure durability.	5%
	Future Heat Index	The estimated number of future heat events for climate scenario RCP 4.5 (moderate mitigation) in 2050.	California Heat Assessment Tool (CHAT)	The area-weighted average of the ¼ mile buffer with the origin dataset of future heat events.	The average future heat events of all hexagons within ¼ mile of a possible hub site percent ranked and rescaled. More heat events are considered for a higher score.	Higher scores for Future Heat Risk are in locations that are projected to experience more frequent heat health events, where mobility hubs can support climate resilience and user comfort.	5%

Notes: Metrics used in this analysis had an unknown statistical distribution. When metrics are being created with different distributions, their prioritization behavior can be erratic. For example, if values skew toward very low values, regardless of their weight, the impact of the metric on the final prioritization may be limited. For this reason, the project team elected to percentile rank each metric. Percentile ranks tend to result in uniform distributions that can be useful for cross-metric analysis.

Community Need

Transportation Equity Scoring

A higher Transportation Equity score corresponds to locations with greater concentrations of vulnerable populations, particularly those with transportation access limitations.

Alta used the Caltrans Equity Index (EQI) to develop this Transportation Equity Scoring. The Caltrans EQI is a block-level dataset that evaluates indicators related to multimodal access, traffic and crash exposure, and demographic criteria, including low-income or Tribal land status. By applying thresholds across these measures, the EQI guides the creation of three distinct screening scenarios: a Demographic Overlay, a Traffic Exposure Screen, and an Access to Destinations Screen. Together, these screens pinpoint socially vulnerable communities most burdened by transportation-related challenges and limited mobility options. The EQI classification to points is included in **Table** 2 below.

Table 2. Caltrans Equity Index (EQI) Classifications scores[3]

EQI Classes	Points
Transportation-Based Priority Populations	10
Access to Destinations Screen	8
Traffic Exposure Screen	8
Demographic Overlay	6
Other	1

The aggregate Caltrans EQI was developed by identifying areas that meet the Demographic Overlay threshold, confirming that a community qualifies as low-income or is located on Tribal lands. Within these areas, an additional assessment determines whether there is relatively poor access to destinations by walking, biking, or transit, thereby establishing the Access to Destinations Screen. Concurrently, a separate examination identifies communities with disproportionately elevated levels of traffic volume and crash exposure, culminating in the Traffic Exposure Screen. Areas satisfying all three screens are deemed Transportation-Based Priority Populations by Caltrans. The point assignments in **Table 2** were used to area-weight and average the ¼ mile surrounding each hexagon, ensuring that scores account for neighborhood conditions in transportation equity. The resulting scores can inform the evaluation and selection of potential hub sites, identifying areas where improved mobility access could have the greatest impact.

Figure 5 visually highlights dark red shades as receiving higher equity scores, indicating higher equity needs in relation to transit and mobility hubs. These areas are concentrated primarily within the City of Fresno and along the I-5 and SR 99 corridors in Fresno County, where Transportation-Based Priority Populations tend to reside.

[3] Caltrans (2024). *Caltrans Transportation Equity Index (EQI)*. https://dot.ca.gov/programs/esta/race-equity/eqi

Environmental Burdens

Higher Environmental Burdens scores result at locations with higher exposure to pollutants and environmental stressors, where mobility hubs could help mitigate cumulative health burdens.

The Environmental Justice (EJ) Equity Index leveraged percentile scores from CalEnviroScreen 4.0[4] to identify communities disproportionately burdened by pollution and other environmental risks and demographic characteristics that increase vulnerability. This index was a critical tool for prioritizing mobility hub locations that address environmental justice concerns and promote equitable resource allocation.

For this analysis, Alta spatially overlaid CalEnviroScreen 4.0 percentile scores onto the hex grid evaluation framework. Each hex unit was awarded an area-weighted average score for the area within a ¼ mile buffer of the unit's centroid.

Figure 6 illustrates the spatial distribution of environmental burden across Fresno County, with the dark red representing areas of higher pollution and environmental risk and the dark blue representing areas of lesser relative risk. The highest scoring areas for environmental burden are located within the City of Fresno and west of corridor SR 99. These communities exhibit exceptionally high area-weighted EJ index scores, suggesting that mobility improvements in these areas would serve populations burdened by pollution and other environmental risks. Similarly, higher-scoring hex units indicate areas with greater pollution exposure and populations more vulnerable to environmental risks, making them key candidates for mobility interventions.

[4] *California Communities Environmental Health Screening Tool, Version 4.0 (CalEnviroScreen 4.0): Guidance and Screening Tool*; Office of Environmental Health Hazard Assessment: Sacramento, CA, USA, 2021.

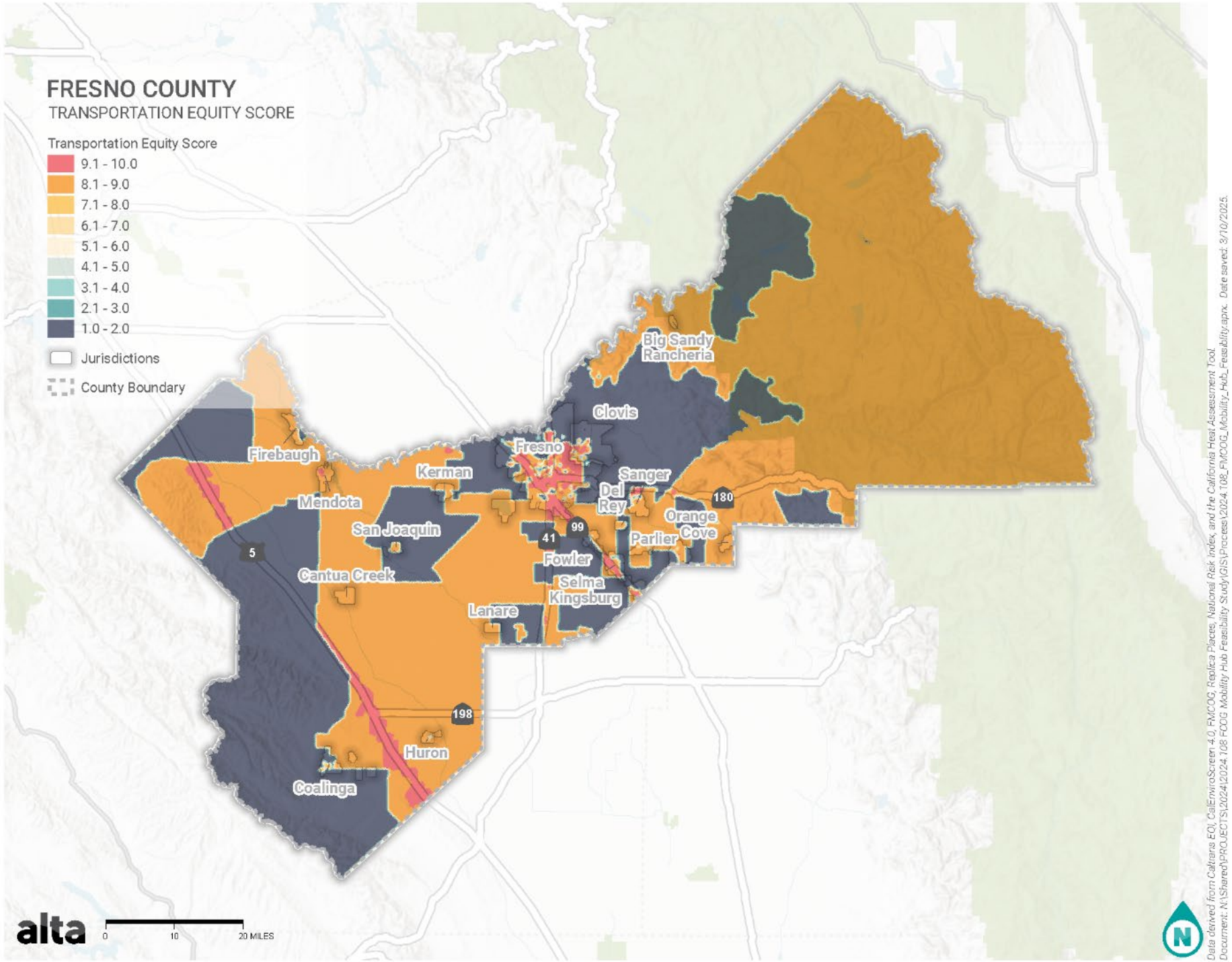

Figure 5. Regional Transportation Equity Scores

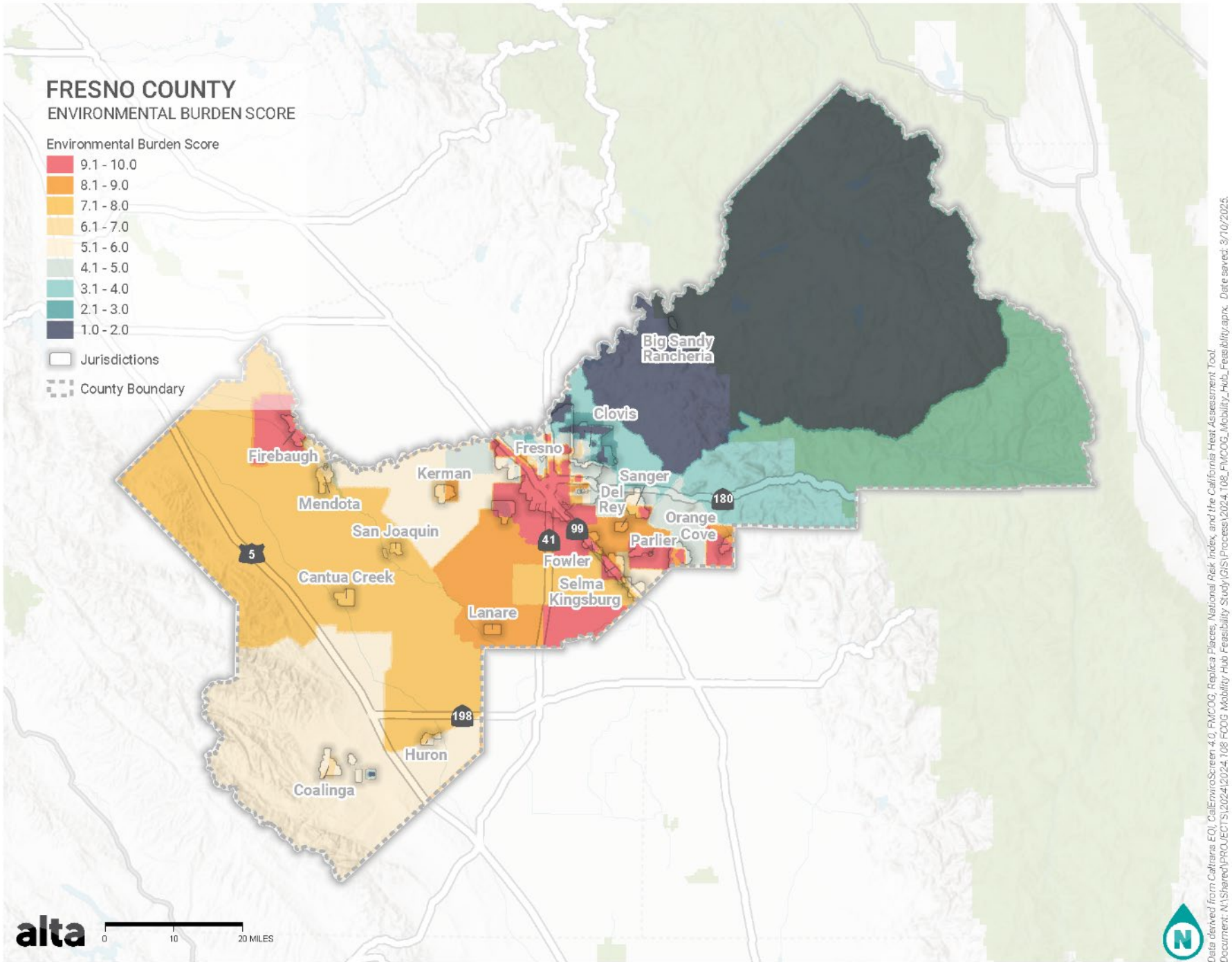

Figure 6. Regional Environmental Burden Scores

Regional Destinations

Activity Center Proximity

Higher scores for Activity Center Proximity are in areas with greater concentrations of non-home-based trips, indicating high levels of economic and social activity.

Alta used Replica Places data to determine activity centers throughout the region. Replica Places[5] is an advanced activity-based model that leverages diverse data sources—including anonymized mobile device data, land use patterns, census demographic information, and transaction records—to generate synthetic travel behavior patterns. The model outputs synthetic trips, which are simulated trips that reflect real-world travel behavior while preserving privacy. These trips provide insights into key mobility metrics such as origins-destinations (OD patterns), mode split, trip purpose, and demographic trends. Replica's modeling framework involves creating a synthetic population, which represents individuals in the region with statistically inferred characteristics (e.g., age, household size, income, and activity patterns). The synthetic trips generated for this population are calibrated against observed data sources to ensure the results are robust and representative of actual travel trends. For this analysis, Alta focused on extracting weekday Non-Home-Based (NHB) trips provided by Replica. NHB trips are defined as trips that do not end at a traveler's residence (e.g., trips such as shopping, school, errands, or leisure activities). To understand spatial activity patterns, the total number of NHB trips per hex unit was used as a proxy for activity density—a critical indicator of mobility demand and the attractiveness of locations outside the home. This metric provided several analytical advantages:

- **Granular Activity Insights**: By disaggregating activity density to the hex unit level, variations in travel patterns across the study area can be better visualized and compared.
- **Trip Intensity and Demand:** High NHB trip density correlates with areas of concentrated economic or social activity, such as employment centers, commercial hubs, or community spaces.
- **Input for Siting Mobility Hubs:** Activity density directly informs the prioritization of potential mobility hub locations by identifying zones with significant intra- and inter-zonal connectivity demand.

Replica's methodology ensured that these trip estimates account for mode splits (e.g., driving, transit, biking, walking) and trip purposes (e.g., work, shopping, recreation), enabling a more nuanced understanding of travel behavior in the region. By integrating NHB activity density into the evaluation grid framework, we can identify areas of high mobility demand that align with broader goals of accessibility and equity for FCOG's mobility hubs. Areas with high activity density are depicted in **Figure 7**, where dark red represents the most active locations in the region and dark blue indicates areas with relatively low activity densities. The highest concentrations of NHB trips are found in the City of Fresno and the town centers of smaller, rural communities, reflecting key destinations where people travel for work, shopping, education, and other activities outside the home. These high-activity clusters highlight areas where mobility hubs could enhance existing transportation options, particularly in dense urban corridors and rural town centers where multimodal connectivity may be limited.

[5] Replica. (n.d). *Seasonal mobility model methodology: Extended Places*. Replica Documentation. https://documentation.replicahq.com/docs/seasonal-mobility-model-methodology-extended-places

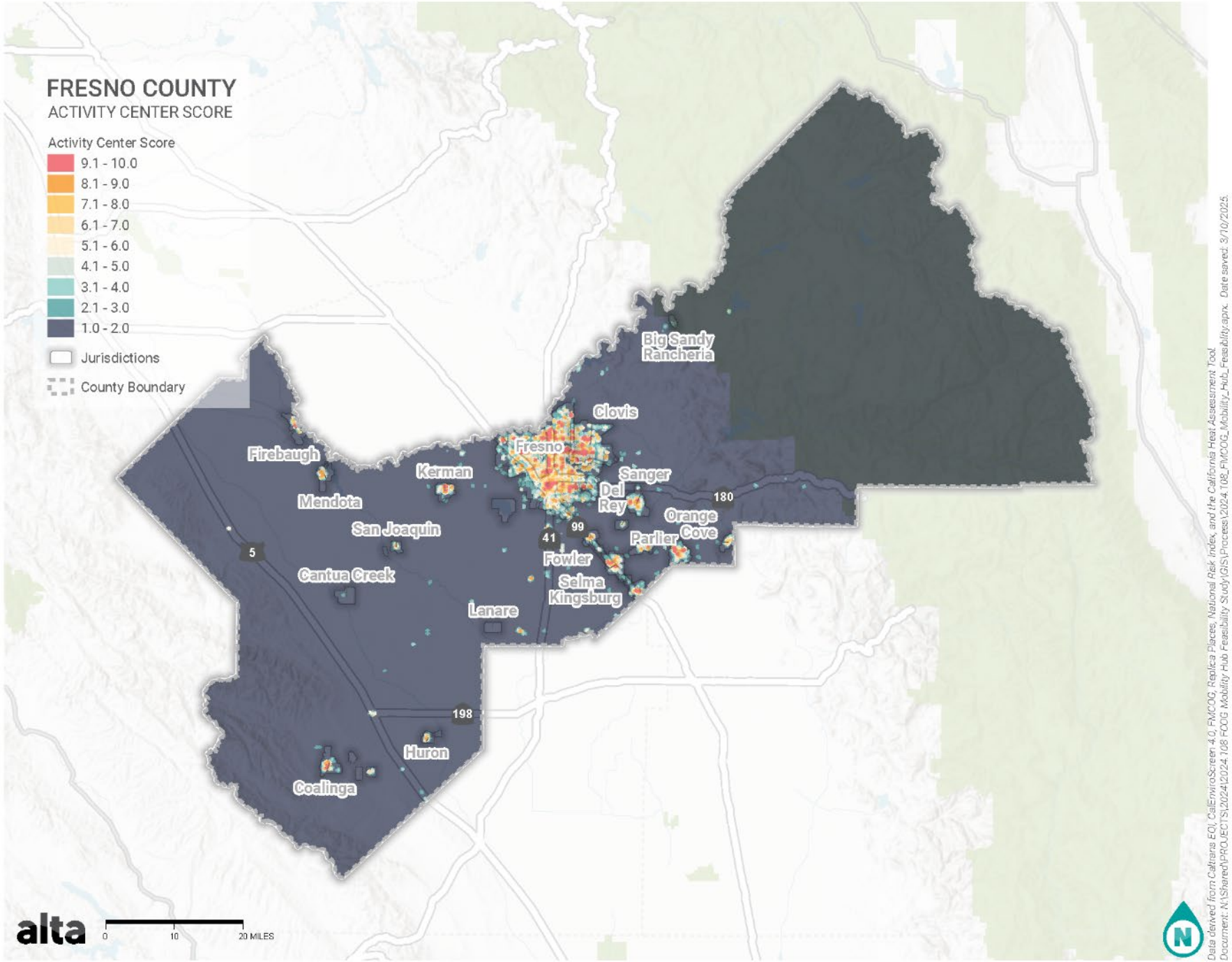

Figure 7. Regional Activity Center Scores

Future Land Use Support

Higher Future Land Use Support scores are in locations with a larger share of planned high-density or mixed-use development, signaling stronger long-term potential for multimodal growth.

High-intensity land uses, including mixed-use, multifamily residential, downtown core, and office designations, are critical components of Fresno's transit use and urban development. These land use categories represent areas with concentrated activity potential due to higher densities, diverse land functions, and significant economic and social destinations. For this analysis, Alta quantified the total acreage designated for high-intensity future land uses across the study area to determine the potential for high-use transit in these areas. These land uses were defined as follows:

- **Downtown/Mixed-Use/University/Airport**: High-intensity areas combining residential, commercial, and institutional functions, such as central business districts, universities, and airports. These zones promote all-day activity, pedestrian-friendly infrastructure, and reduced reliance on automobiles by integrating housing, jobs, and services. They serve as hubs for economic, cultural, and transportation activity, often generating significant non-home-based trips.
- **High-Density Multifamily/Office**: Areas designated for high-density housing, such as apartments, and employment-oriented land uses, like offices. These zones support significant trip demand during peak hours, drive job growth, and are often integrated with transit and multimodal infrastructure to enhance accessibility.
- **Medium-Density Multifamily/Public Facilities/Parks/Schools**: Areas featuring medium-density housing like townhomes, public facilities, schools, and parks. These zones balance residential and community needs, often near transit corridors or employment centers to support connectivity and sustainable growth.

The total acreage of these high-intensity designations was a key input for mobility hub siting, as it identifies areas with existing or planned concentrations of population, activity, and development potential. These zones are expected to exhibit higher trip generation rates due to the presence of jobs, residents, and mixed land uses that foster diverse trip purposes. As a result, the hex units within a reasonable walking distance from these high-intensity land-use areas received higher scores in the analysis, reflecting greater potential to support multimodal infrastructure. Conversely, areas with lower-density future land use projections scored lower, as they are expected to remain more auto-dependent with less demand for high-capacity mobility hubs.

As shown in **Figure 8**, areas in dark red represent the highest future land use scores, primarily in business districts and downtown areas of the City of Fresno and Clovis. These zones reflect planned urban growth and economic activity, reinforcing their role as key mobility nodes. In contrast, more suburban and agricultural areas exhibit lower future land use potential, depicted in mid- to dark-blue shades, indicating more limited potential for growth and multimodal demand.

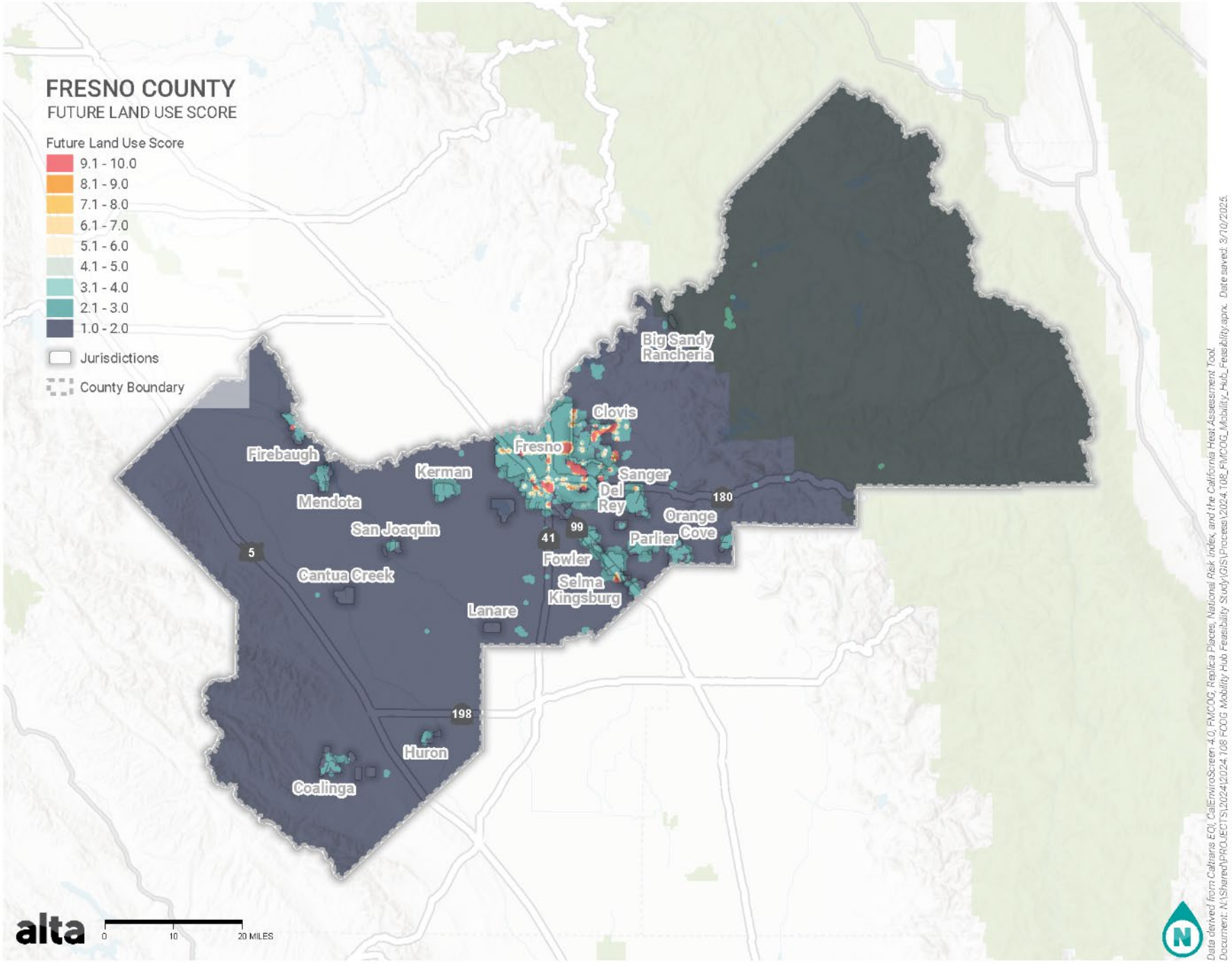

Figure 8. Regional Future Land Use Scores

Sustainability

Multimodal Orientation Scoring

Locations with high Multimodal Orientation scores have lower vehicle miles traveled (VMT) per capita as a proxy for areas with stronger support for non-auto travel modes or shorter trips.

Alta used the average vehicle miles traveled (VMT) per capita as a proxy for multimodal connectivity and travel behavior, with lower VMT per capita indicating greater non-automobile transportation options available. Because VMT measures automobile dependence, this analysis helped identify areas where mobility hubs could support mode shift and multimodal hub siting.

To capture the effects of VMT for each potential hub site, Alta started by disaggregating VMT per capita data, originally provided at the Traffic Analysis Zone (TAZ) level. The average VMT per capita rate was assigned to the ¼-mile area around each hex unit. This resulted in a refined, neighborhood-scale measure of VMT per capita, allowing for a more precise evaluation of mobility hub suitability based on surrounding travel behavior.

As shown in **Figure 9**, areas with lower VMT per capita are depicted in red, suggesting stronger multimodal connectivity and multimodal potential, making them stronger candidates for mobility hubs. These areas are concentrated in urban cores such as the cities of Fresno and Clovis, as well as town centers in smaller, more suburban and agricultural areas in the outlying jurisdictions. Areas with higher VMT per capita are in dark blue and tend to represent very rural areas. These indicate greater automobile reliance, which may still present opportunities for mobility hub investments, but also require additional context-sensitive solutions to support their use.

Fill Gaps in Charger Networks

Higher scores result at locations with no public charging infrastructure and higher population quantities that correspondingly don't have nearby access to public charging.

The availability of public electric vehicle (EV) chargers is a crucial factor for evaluating prospective mobility hub locations, particularly in supporting multimodal transportation and encouraging EV adoption. For this analysis, Alta assessed the availability of public chargers within a ¼-mile radius of hex units, with specific eligibility criteria and scoring based on local infrastructure gaps and population distribution. Data on existing public chargers was obtained from publicly available infrastructure datasets from the U.S. Department of Energy's Alternative Fuel Station Locator[6] and is current as of December 18, 2024.

[6] U.S. Department of Energy. (n.d.). *Alternative fueling station locator*. Alternative Fuels Data Center. Retrieved December 18, 2024, from https://afdc.energy.gov/stations

To ensure the analysis prioritized areas with unmet charging needs, only hex units meeting the following criteria were deemed eligible for scoring:

1. *Proximity to Primary or Secondary Roads:* The hex unit must be within ¼ miles of any road in the MAF/TIGER Feature Class, reflecting locations where vehicle travel demand is higher and charging infrastructure could serve a broad user base.
2. *No Existing Public Charging Station:* Hex units within ¼ mile of an existing public charging station were excluded from scoring. This focused investment on areas with current gaps in EV charging infrastructure, aligning with regional equity and accessibility goals.

Alta scored eligible hex units based on population percentiles for the county, using demographic data from blocks from the 2020 decennial census to prioritize locations with higher populations and greater potential demand for EV charging. The scoring process involved assigning a percentile rank to each eligible hex unit based on its area-weighted proportional allocation of the population relative to all hex units in the county. Higher population percentiles received higher scores, reflecting greater potential demand for charging infrastructure. Only hex units meeting the eligibility criteria (see above) were scored, ensuring that resources target areas with significant infrastructure gaps, accessibility to high-volume roads, and high population density.

This analysis produced a spatial distribution of EV charging gap scores that closely follows the road network and highlights areas with high population and limited public EV chargers, as shown in red in **Figure 10** below. Higher scores can be observed in urban areas such as Fresno and Clovis, where population density is high and charging infrastructure may not be offered close enough to EV demand. Additionally, suburban town centers and key corridors along major highways also received high scores, indicating significant infrastructure gaps in areas where EV charging is likely to increase as adoption rates increase. These results emphasize where mobility hubs with EV charging infrastructure could improve regional accessibility and help support sustainable transportation choices.

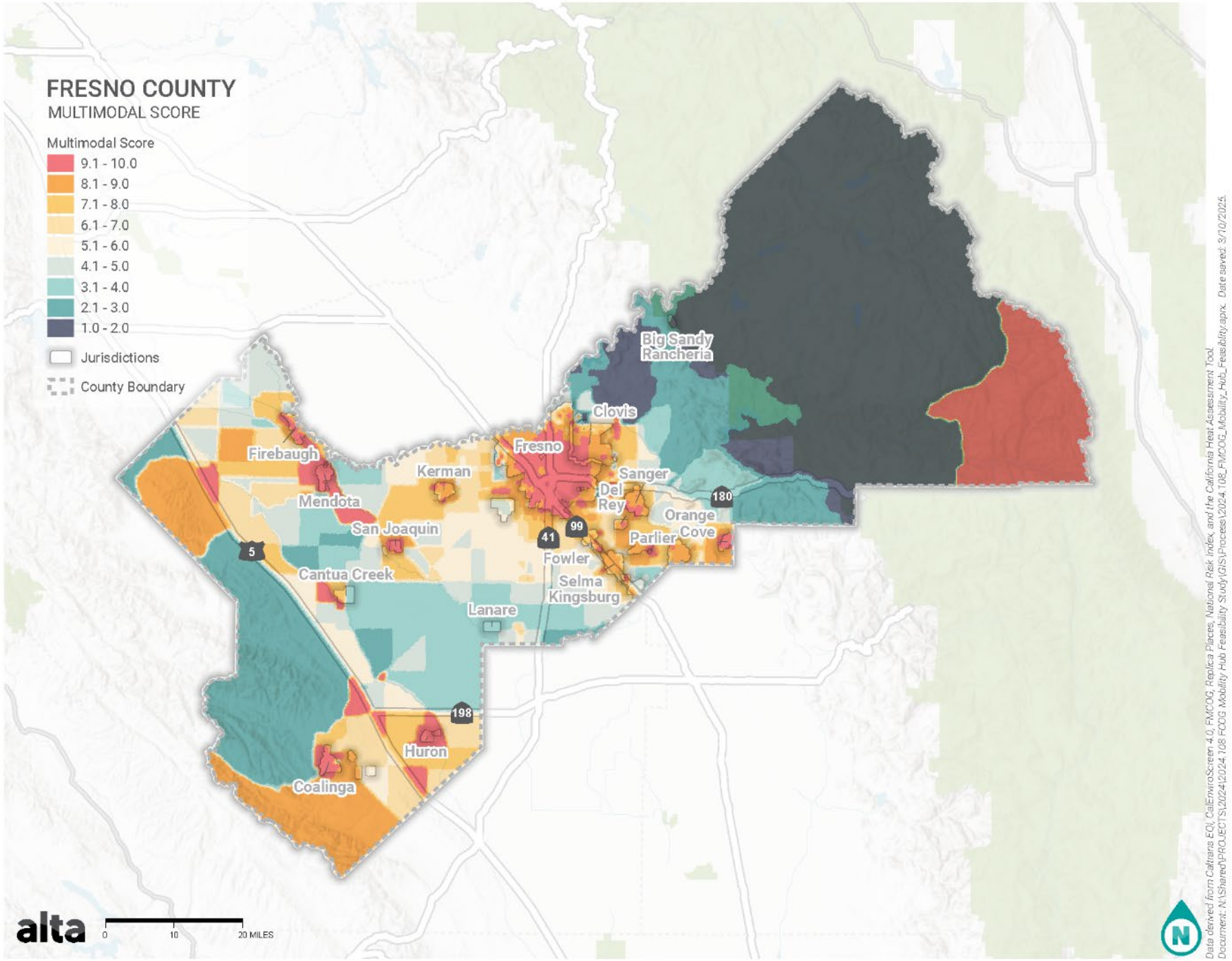

Figure 9. Regional Multimodal Scores

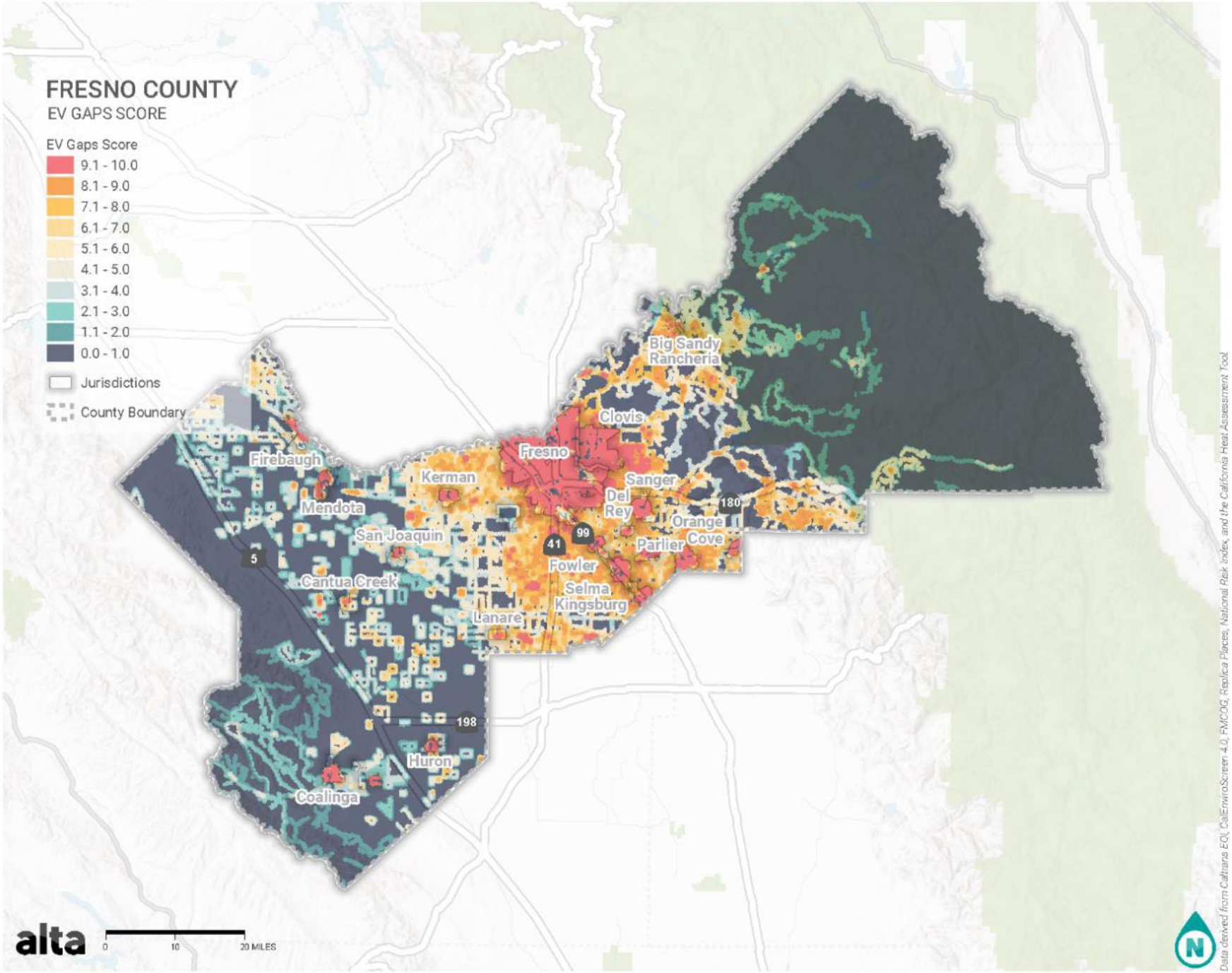

Figure 10. Regional EV Gaps Scores

Exposure to Flood and Fire

Higher scores for Exposure to Flood and Fire are in locations with lower future projected combined annualized frequencies of flood and wildfire events, reflecting long-term infrastructure durability.

For this analysis, Alta used the combined annualized frequencies of flood and fire events as a single exposure metric to identify areas with lower overall hazard risk. Alta used data from FEMA's National Risk Index (NRI)[7] to complete this analysis. By aggregating the probabilities of both hazard types, we achieved a simplified risk measure that allowed for direct comparisons across the study area.

While tools such as NRI provide detailed hazard risk metrics, which include exposure, asset values, and potential damage estimates, their inclusion would introduce biases into the analysis. Specifically, the NRI's damage-oriented metrics disproportionately emphasize urbanized areas with dense infrastructure and assets, where financial losses from natural hazards would be most severe. This focus on economic damage could obscure the broader goal of identifying areas with inherently lower hazard exposure, irrespective of existing assets or infrastructure. To avoid these biases and simplify the analysis, we used combined annualized flood and fire events frequencies.

Alta prioritized grid cells with lower combined annualized frequencies, as these locations offer reduced exposure to natural hazards and are better suited for mobility hub investment. Conversely, areas with higher frequencies signal greater vulnerability and may require additional resilience measures in hub siting decisions. This method aligns with the overarching goal of ensuring the durability and reliability of mobility hub investments over time.

Areas with higher predicted frequencies of future hazard events are primarily concentrated along SR 99, as shown in **Figure 11**, where blue shades indicate regions with elevated hazard risk. While some pockets of lower predicted hazard frequency exist around Fresno and smaller outlying communities, the analysis indicates that rural areas beyond the influence of urban activity generally exhibit fewer predicted fire and flood events. This spatial distribution suggests that mobility hub investments in lower-risk areas may be more resilient long-term, whereas higher-risk areas may require additional adaptation measures.

[7] Federal Emergency Management Agency. (n.d.). *National risk index*. U.S. Department of Homeland Security. https://hazards.fema.gov/nri/

Future Heat Risk

Higher scores for Future Heat Risk are in locations that are projected to experience more frequent heat health events, where mobility hubs can support climate resilience and user comfort.

The estimated frequency of future heat health events (HHE) is critical for understanding climate vulnerability when siting mobility hubs. For this analysis, Alta obtained projections of HHEs from the California Heat Assessment Tool (CHAT)[8] which were based on a moderate mitigation scenario that assumes global greenhouse gas emissions peak around 2040 and subsequently decline. Under this scenario, warming is moderated but not entirely avoided, resulting in increased frequency and duration of heat events (days exceeding historical extreme temperature thresholds).

Alta selected the estimated number of heat events in 2031-2050 to measure the future heat risk for each potential mobility hub. An HHE was defined as any event that results in negative public health impacts, regardless of the absolute temperature. Each local area has a specific HHE related to its climate and the historical sensitivity of people in that area to previous heat events. Daily meteorological data from 1984-2013 was paired with emergency department visitation data from 2005-2013 to identify the signatures of past heat events.

For the evaluation grid, Alta prioritized areas projected to experience more heat events in 2050 for hub siting, as they represent locations where investments in new infrastructure may support cooling effects, such as the construction of new tree canopy or shade structures. This approach supports long-term infrastructure resilience and enhances user safety, ensuring mobility hubs support people's comfort during changing climate conditions.

As shown in **Figure 12,** areas projected to experience the highest number of future HHEs by 2025 are concentrated in the southern portions of the City of Fresno, along SR 99 and SR 41, and within the southwestern areas of Fresno County around Coalinga. These regions are represented in red, indicating higher heat risk and greater potential for heat-related public events. In contrast, northeastern Fresno County, the northern portions of the City of Fresno, and the areas surrounding Kerman exhibit a lower predicted number of HHEs, as demonstrated by their blue shades. This spatial pattern highlights regional variations in climate vulnerability, reinforcing the importance of considering future heat exposure prevention in hub siting decisions to enhance usage and support long-term facility comfort.

[8] *California Heat Assessment Tool (CHAT)*. https://www.cal-heat.org/about

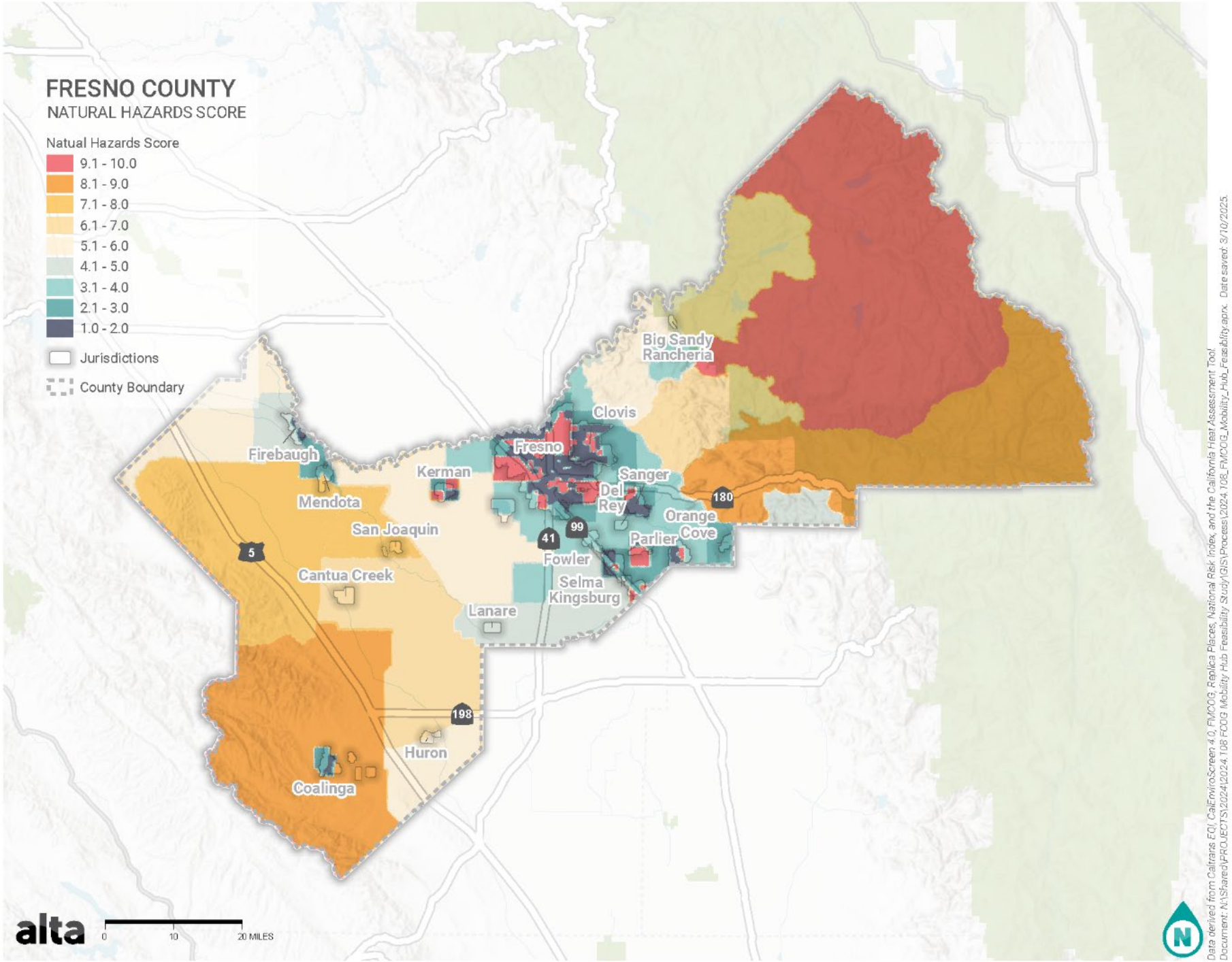

Figure 11. Regional Natural Hazards Scores

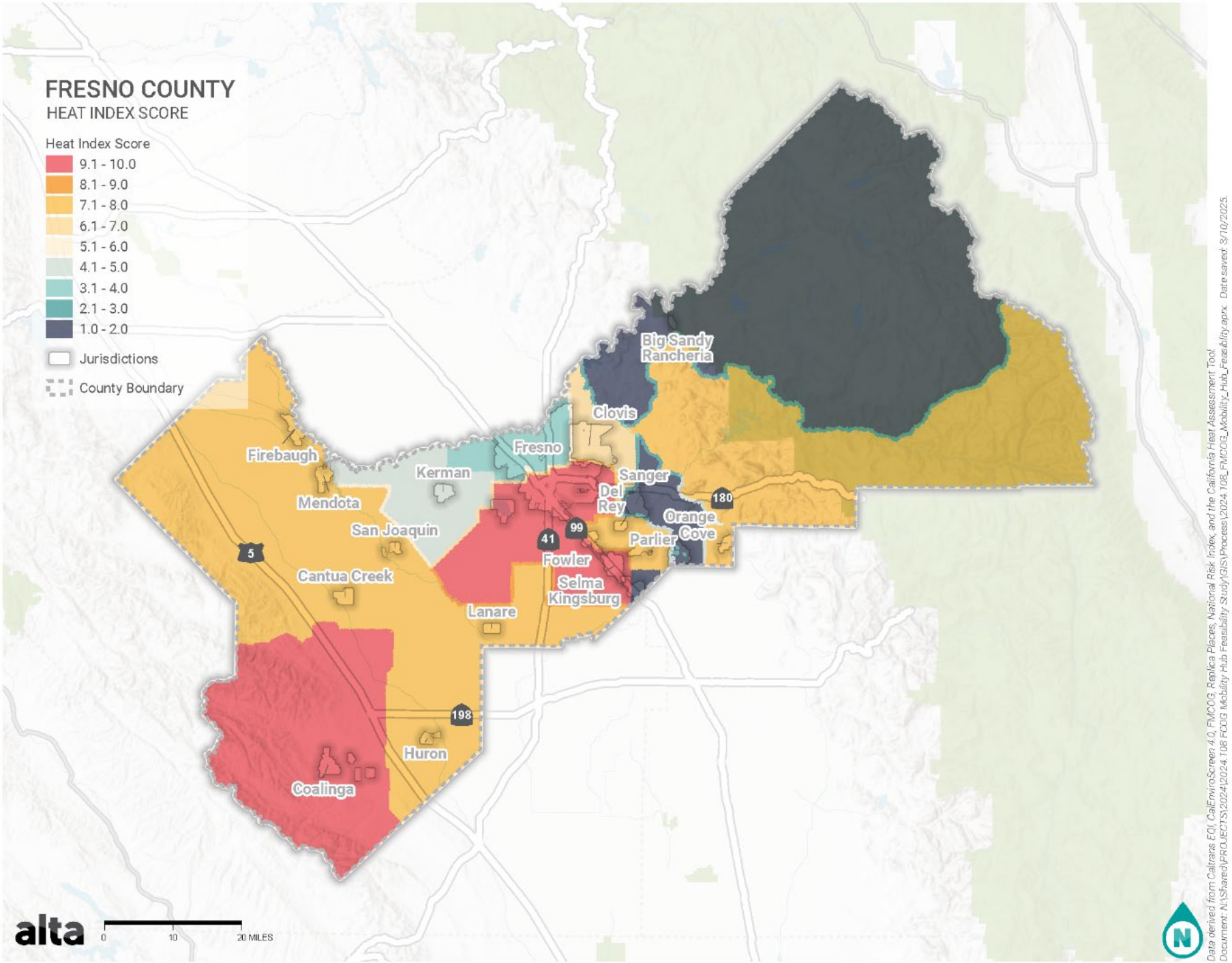

Figure 12. Regional Heat Index Scores

Results

The prioritization analysis evaluated potential mobility hub locations using a composite scoring system where higher scores indicate greater suitability for investment. As noted in **Figure 13** through **Figure 16** below, the scores across Fresno County reveal clear distinctions across different land use contexts. Using the U.S. Department of Transportation's Typology Exploratory Tool,[9] jurisdictions were categorized into four primary types based on their urban form and land use characteristics:

- **Urban cores/job centers:** Fresno, Clovis
- **Dense residential:** Orange Cove, Reedley, Selma
- **Ex-urban and suburban:** Big Sandy Rancheria, Coalinga, Firebaugh, Kerman, Kingsburg, Mendota, Parlier, Sanger
- **Agricultural centers:** Cantua Creek, Del Rey, Fowler, Huron, Lanare, San Joaquin

Among these categories, urban cores and dense residential areas scored the highest (more suitable for mobility hub implementation), particularly in Selma, Reedley, and Fresno, where a substantial proportion of the population lives in an area that scores above average. These jurisdictions also exhibit high population densities, strong multimodal accessibility, and significant transportation equity needs, making them well-suited for mobility hub siting. Within each jurisdiction, the highest-scoring locations were concentrated in commercial corridors and centers of economic activity, where land use diversity and social vulnerability indicate both high travel demand and potential benefits from expanded transportation options.

In contrast, rural and agricultural areas, as well as hilly, ex-urban areas, received lower overall scores, primarily due to lower densities and single-purpose land uses that do not align with optimal mobility hub indicators (ex., higher population densities[10]). However, rural areas had high average heat index scores, indicating that these agricultural centers may experience more frequent heat events in the coming years. Local jurisdictional maps are provided in **Appendix A:** .

[9] Office of Transportation Policy Studies. (2023, February 13). *Transportation typology exploratory tool*. Federal Highway Administration, U.S. Department of Transportation. https://maps.dot.gov/fhwa/ttet/

[10] While higher densities of residents, workers, and visitors in an area is a contributing factor to mobility hub success due to the potential to serve more people with a finite set of mobility resources, low-density and rural areas present others need cases (such as higher transportation costs, lower-income populations, and constrained access to jobs) for improved mobility.

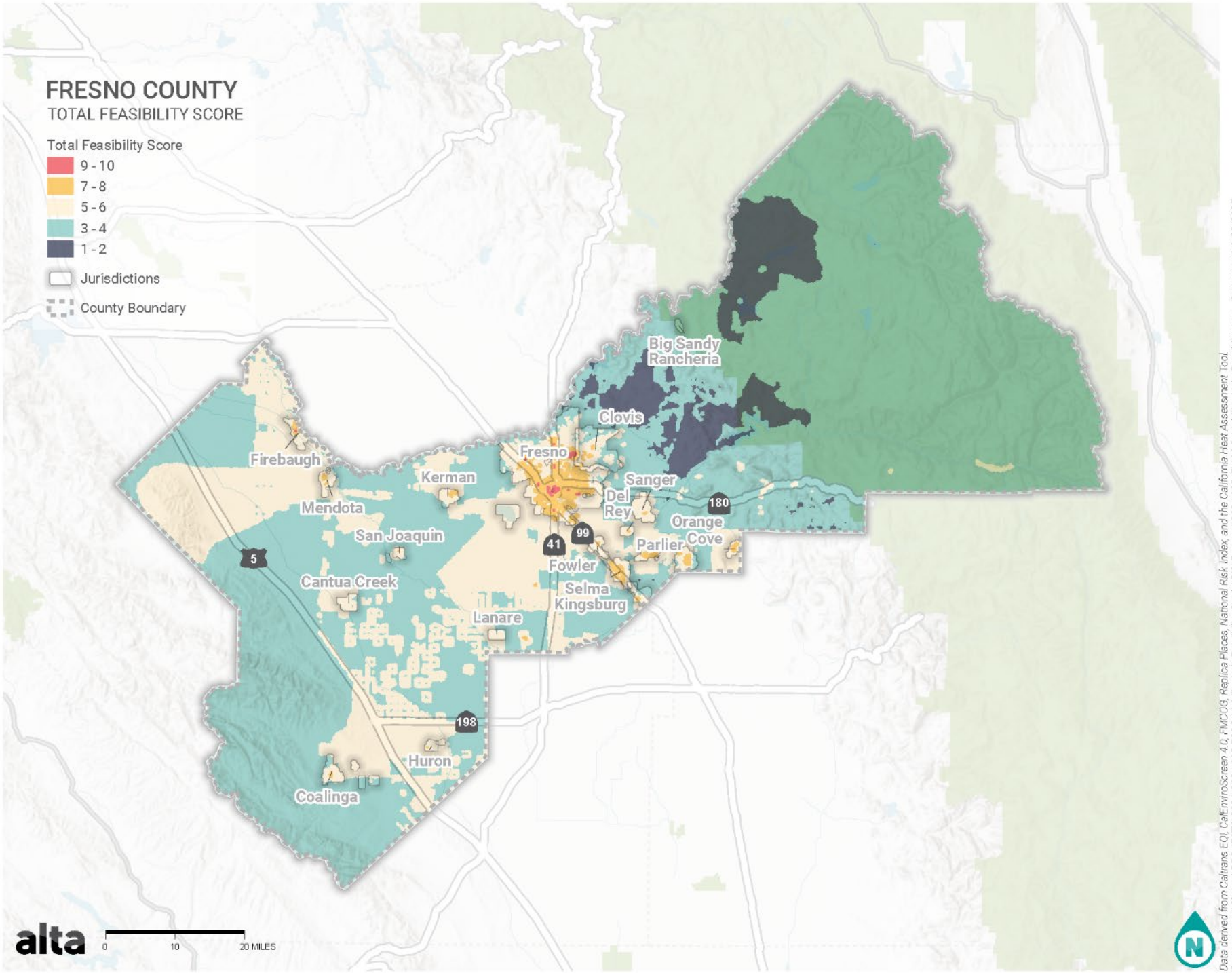

Figure 13. Regional Mobility Hub Feasibility Scores

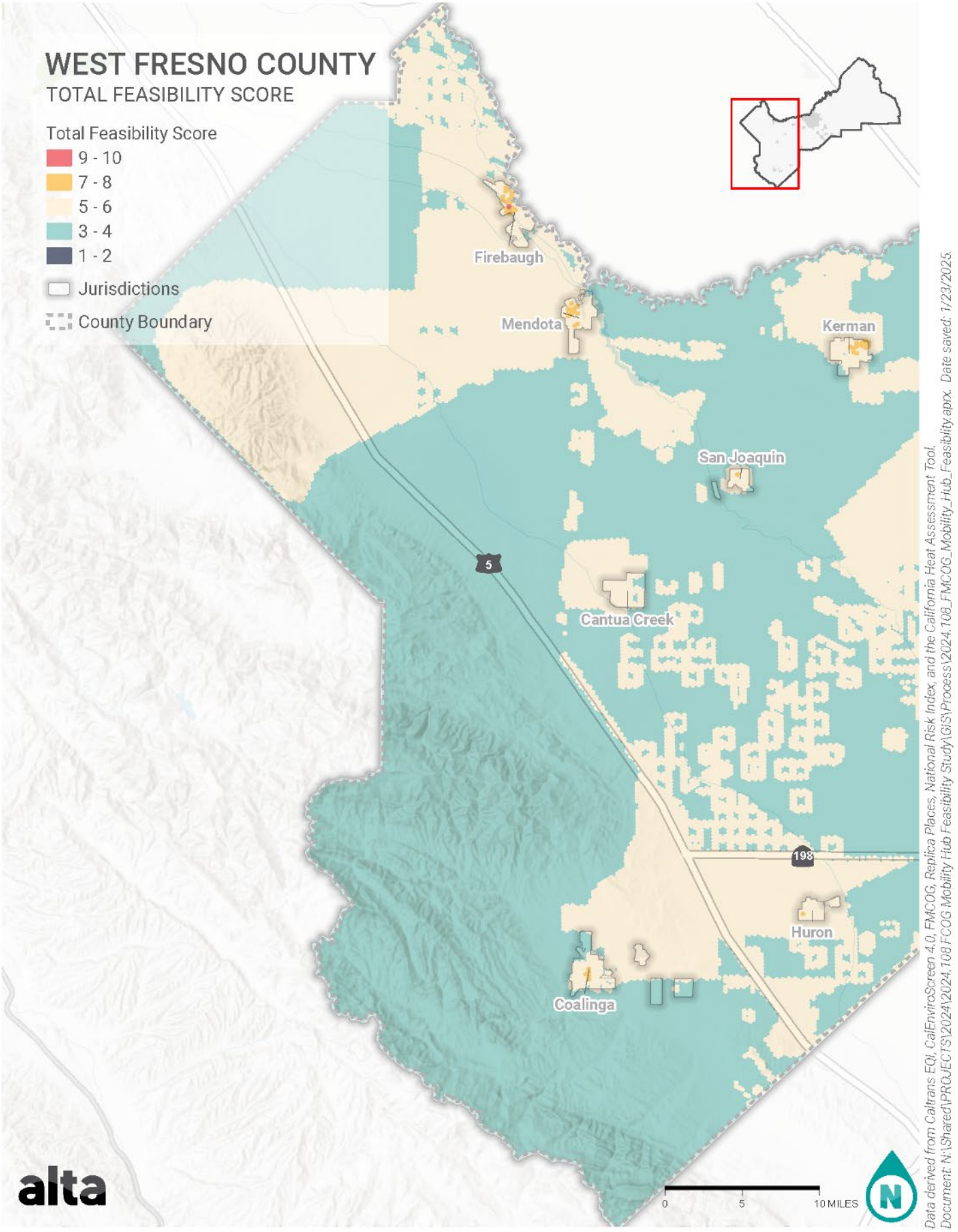

Figure 14. Regional Mobility Hub Feasibility Scores (Western Fresno County)

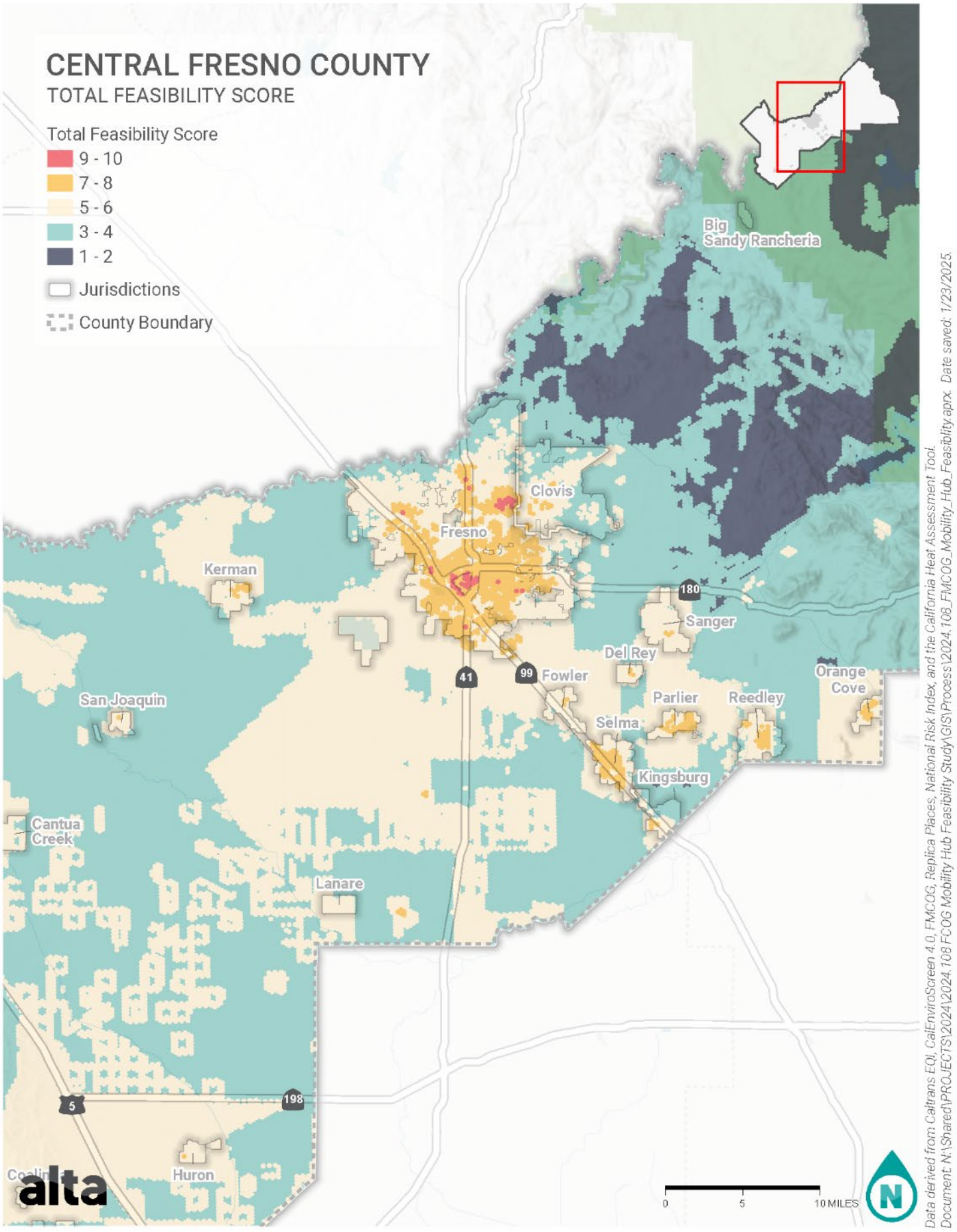

Figure 15. Regional Mobility Hub Feasibility Scores (Central Fresno County)

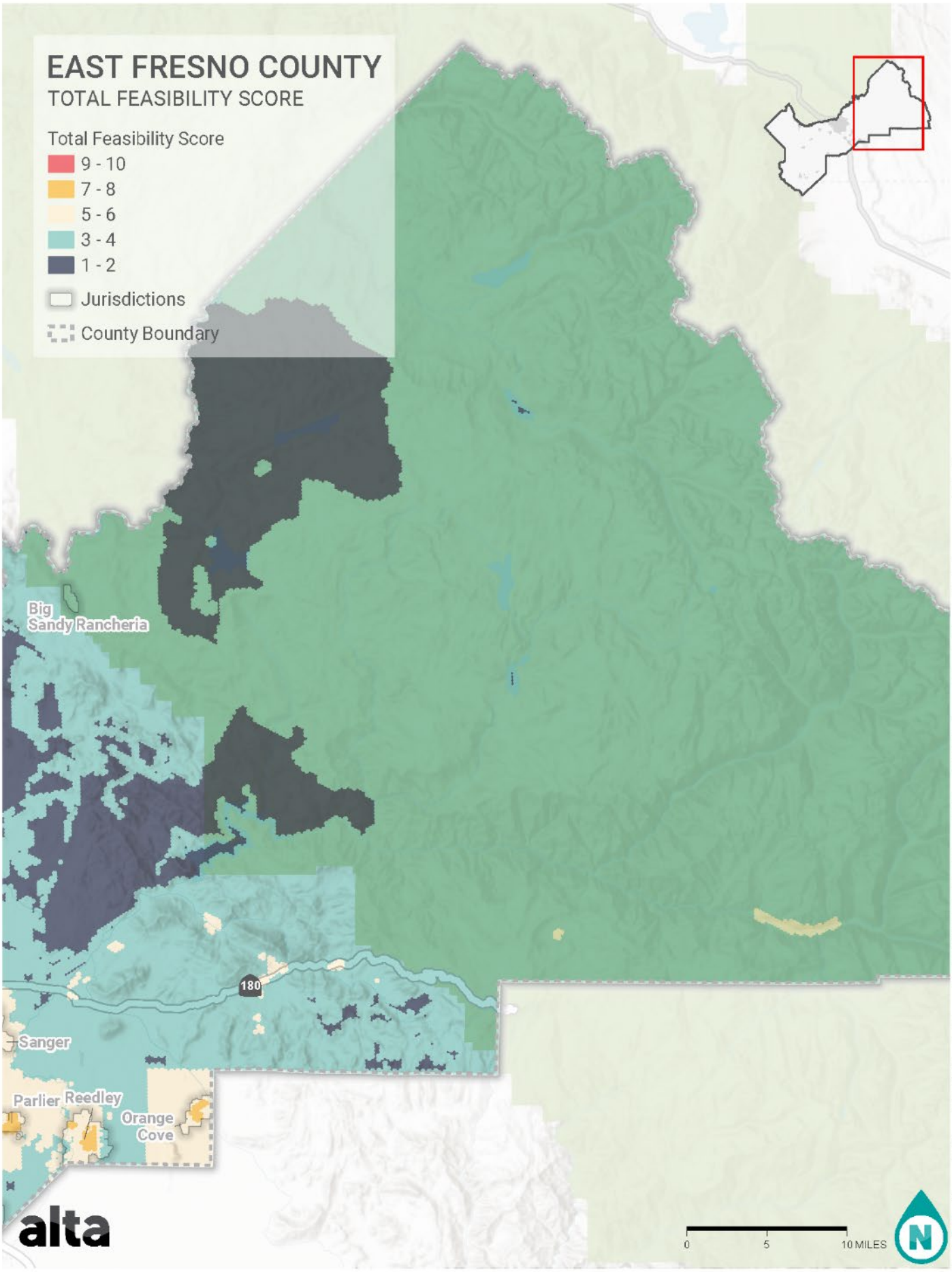

Figure 16. Regional Mobility Hub Feasibility Scores (Eastern Fresno County)

Discussion

The distribution of scores across Fresno County reflects distinct spatial patterns in transportation needs and infrastructure gaps. Urbanized areas consistently scored higher, aligning with their higher population densities, mixed-use activity centers, and greater reliance on multimodal transportation. These areas are more likely to support high-use mobility hubs due to their existing transit connectivity, pedestrian accessibility, and diverse land use mix.

In contrast, suburban and ex-urban areas, as well as rural and agricultural areas, scored moderately, often due to fewer transit-oriented developments and activity centers. While demand for mobility services exists in these locations, long-term development potential for mixed-use employment centers is more limited, which may impact sustained mobility hub viability over time. However, even within lower-scoring regions, certain town centers and commercial corridors still demonstrated high total suitability scores, suggesting targeted interventions could improve mobility for residents facing significant access barriers.

The analysis also highlights key infrastructure disparities, such as EV charging gaps in dense residential areas and the increasing climate vulnerability of agricultural regions. While urban cores and dense residential areas demonstrate strong multimodal and transit connectivity, suburban and rural areas face unique challenges that may require alternative approaches to mobility hub implementation. For example, suburban and rural locations could require hub investments tailored to relatively low demand or an orientation to a different mix of modes served by the hub.

Overall, the findings illustrate how land use characteristics, transportation equity considerations, and environmental factors interact to shape mobility hub suitability across Fresno County. Higher-scoring areas align with existing travel demand and multimodal infrastructure, while lower-scoring areas highlight the need for targeted investments to address mobility gaps and equity concerns.

Limitations

This analysis was conducted at a regional scale using datasets available countywide, which limited some of the criteria that project stakeholders consider ideal for siting mobility hubs. As such, the results should be viewed as a high-level screening that will be refined through the Phase 2 Qualitative Site Assessment to capture practical characteristics not included here. Additionally, proximity to current or planned transit stations was not explicitly incorporated into the analysis as transit services vary widely in the area, making normalizing transit service impractical. Instead, the model centered on areas with low vehicle miles traveled (VMT), supportive land uses for mobility hubs, and populations identified as socially vulnerable. Transit proximity considerations will be addressed in subsequent phases to ensure that the final recommendations align with existing and future transit corridors.

Further consideration is made of how the EV Charging Gap Score was applied, which may have contributed to some non-intuitive results in select locations. To identify complete gaps in public EV charging availability, the analysis excluded areas with existing chargers or those situated away from major roads, assigning them a score of zero. While this approach was intentional—to prioritize underserved areas—it may have resulted in lower scores for places with high charging demand or those which require additional capacity. One potential refinement could involve assigning a moderate score (e.g., 5) to these locations, recognizing that existing chargers may still need additional capacity. Alternatively, the criterion could be given a slightly reduced weight, with the difference redistributed into the Multimodal Orientation category, to better balance the focus on existing infrastructure needs with the goal of closing access gaps.

Next Steps: Phase 2 Qualitative Site Assessment

The second phase of the mobility hub site suitability assessment will integrate qualitative criteria to evaluate the shortlist of locations and help each of the three transit agencies identify their final locations(s) based on site-specific and jurisdiction-specific information. Clovis Transit and FAX will each select one location and FCRTA will select two locations. Phase 2 factors will be documented in Memorandum 3b: Implementation Guidelines and Memorandum 3d: Shortlist Location Evaluation. The considerations these two memos will assess include:

- **Land Availability** – This criterion will assess the suitability of potential sites based on the availability of sufficient land to accommodate the mobility hub. It may include factors such as parcel size, ownership (public parcels or interested private owners), zoning allowances, and the potential for hub expansion over time. Considerations may also include land costs and the feasibility of acquiring or repurposing the site.
- **Access** – This metric will evaluate the ease of access to the site for various transportation modes, including walking, biking, public transit, and private vehicles. It will consider alignment with planned or future infrastructure investments to ensure the hub remains relevant and well-integrated over time. Additional considerations include connectivity to regional transit networks, barriers that may impede accessibility (e.g., topography or infrastructure gaps), and the potential for the site to enhance multimodal transportation integration.
- **Public Support** – This criterion will consider the level of community engagement and support for the proposed site. It includes input from surveys and feedback sessions to understand community priorities, address potential concerns, and build trust and advocacy for the mobility hub project.
- **Practical Feasibility** – This rubric will assess the likelihood of successful project implementation based on practical factors, including partnership potential environmental impacts, infrastructure readiness, and alignment with existing transportation and mobility plans. Partnership feasibility involves support from relevant property owners, stakeholders, the government having authority, and alignment with broader regional and state programs and priorities.

Appendix

Appendix A: Local Jurisdictions Feasibility Scores Maps