

CLOSING THE RURAL EV CHARGING GAP

ELECTRIC VEHICLE PLANNING IN RURAL AREAS

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AGENDA

1 / INTRODUCTION

- Overview of Presentation
- DKS Rural EV Planning Experience

2 / BARRIERS TO RURAL EV ADOPTION

- Higher Energy Costs
- EV Perceptions
- Fewer Opportunities for Incentives

3 / BASICS OF EV CHARGING

- EV Charging 101
- Definition of Charging Use Cases

4 / ANALYSIS METHODOLOGY

- Projected Adoption
- Projected Charger Needs
- Charger Siting Scoring Criteria
- Weighting of Scoring Criteria

5 CONCLUSIONS

- Key Takeaways



INTRODUCTION

OVERVIEW OF PRESENTATION

- **Why rural EV charging matters**
- **Our rural EV planning experience**
- **Barriers to rural EV adoption**
- **Charging use cases**
- **Planning methodology**
- **Key findings and takeaways**



WHY RURAL EV CHARGING MATTERS

Rural communities face distinct challenges in transitioning to electric mobility, yet they remain essential to statewide transportation electrification goals.

This presentation outlines a planning framework developed for jurisdictions that span rural landscapes and areas positioned along the rural–urban transition.



DKS RURAL EV PLANNING EXPERIENCE

We have developed **public** and **fleet** infrastructure plans for diverse rural environments, from agricultural communities to mountain regions and tourist corridors

- Central Valley Counties

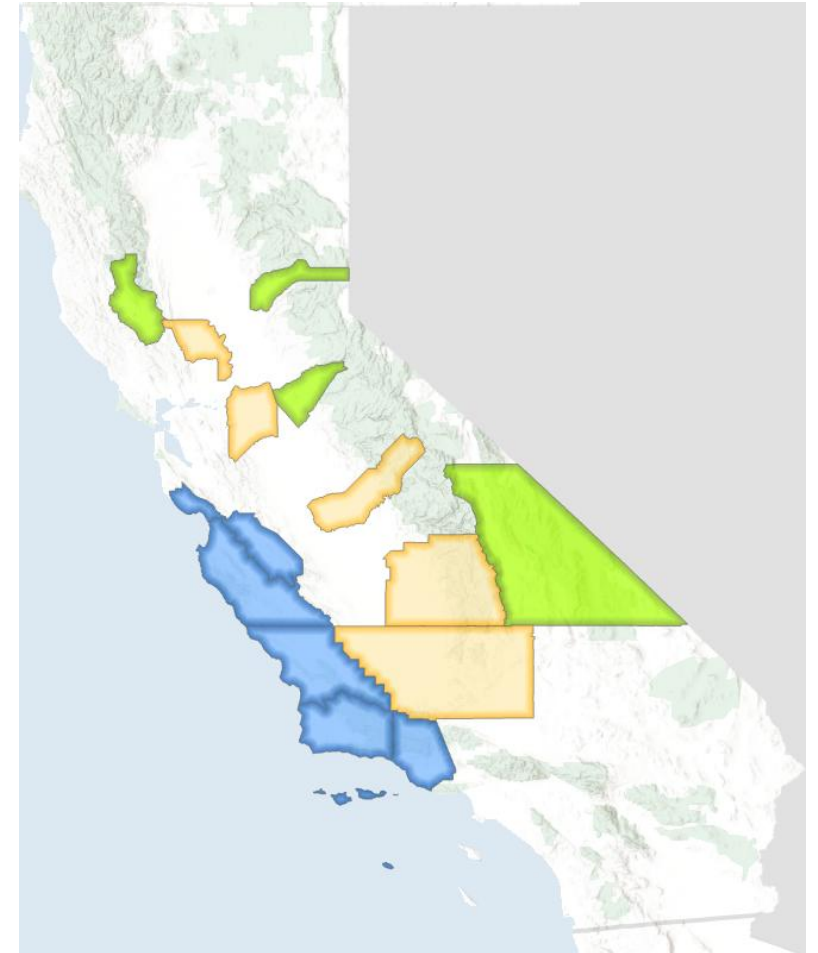
- Yolo, San Joaquin, Madera, Tulare, and Kern Counties

- Foothill/ Mountain Counties

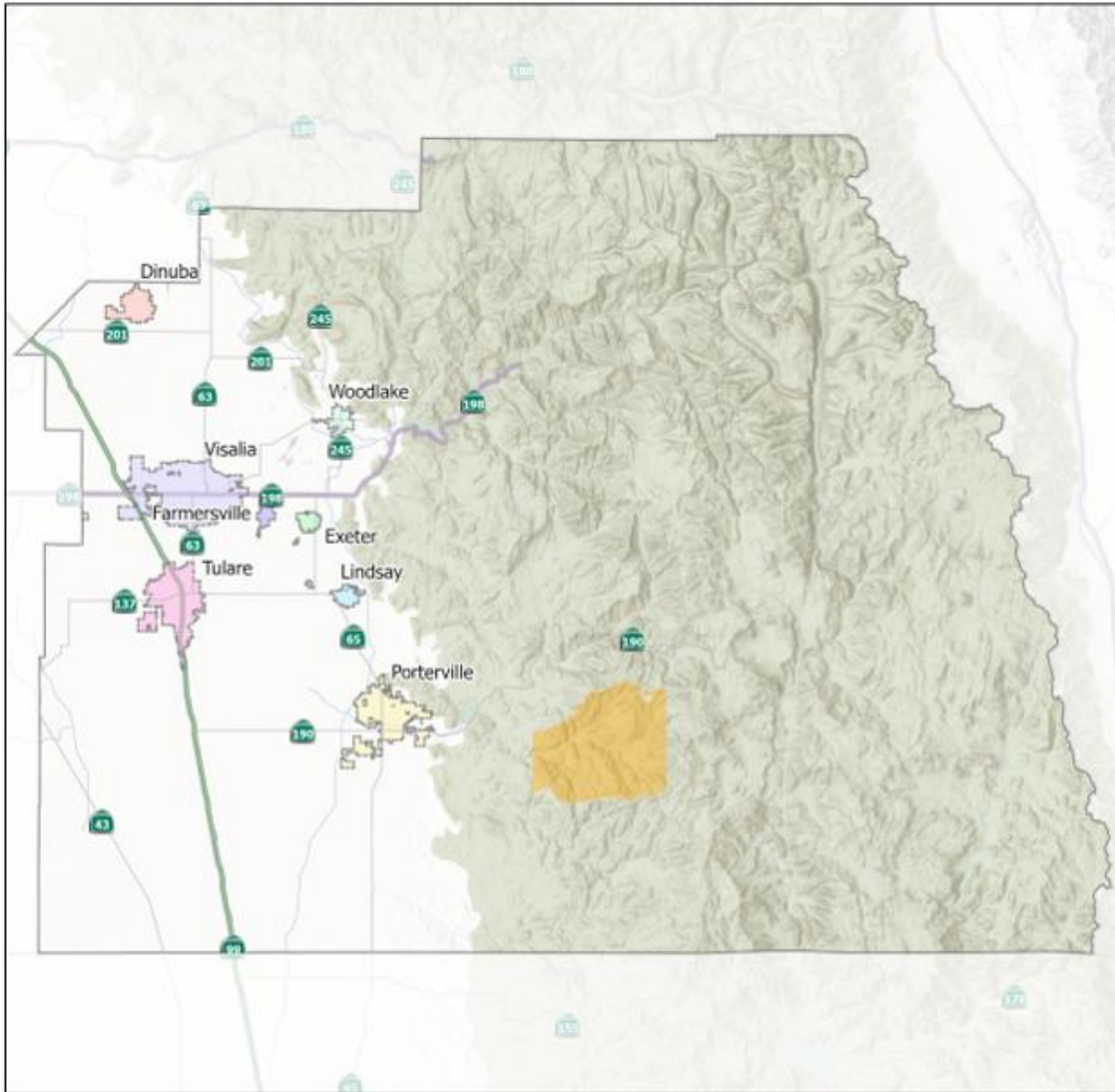
- Inyo, Calaveras, Nevada, and Lake Counties

- Coastal Counties

- Santa Cruz, Monterey, San Luis Obispo, Santa Barbara, and Ventura Counties



RURAL COUNTY CONTEXT – TULARE CO

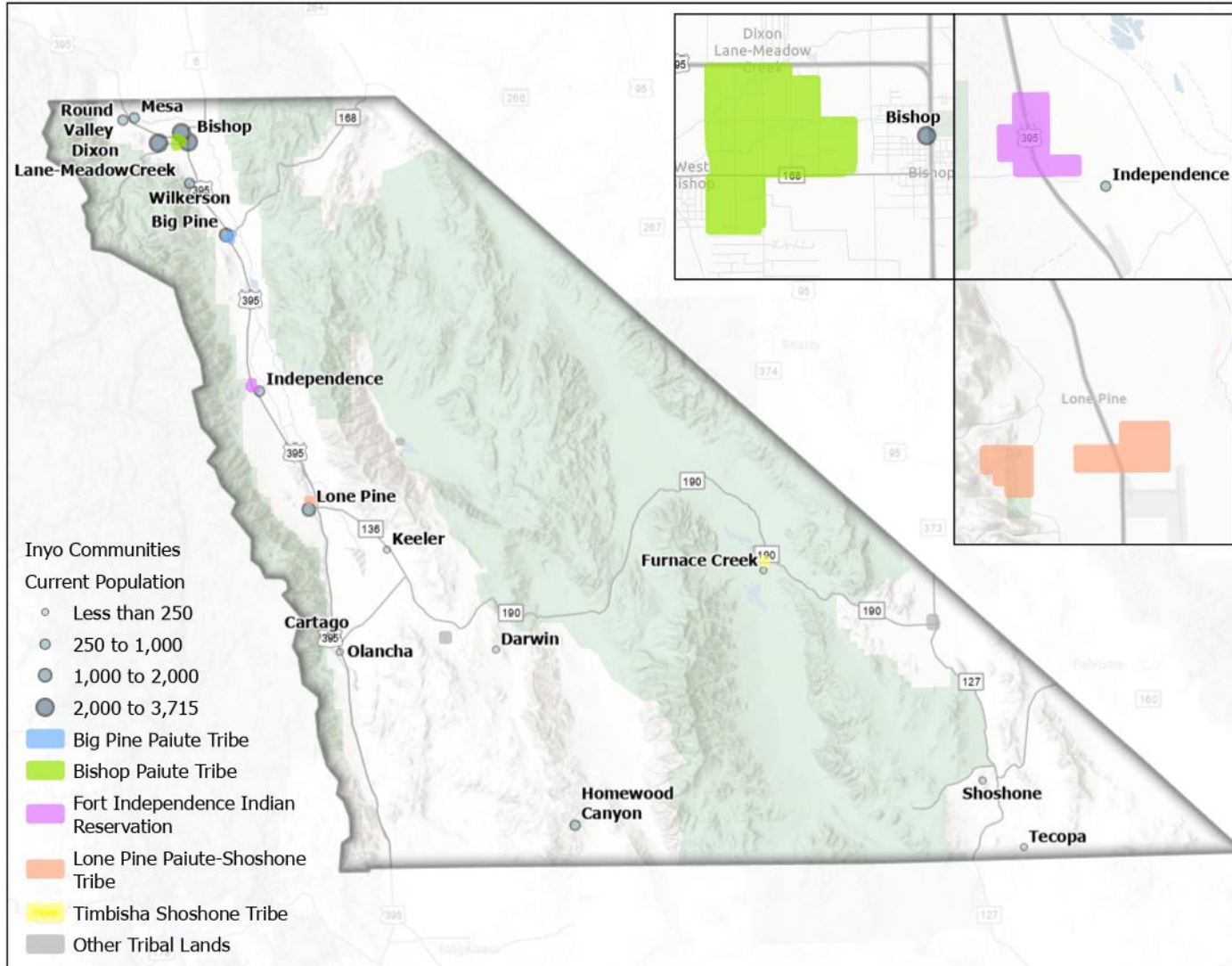


Geographic Context:

- Southeastern Central Valley extending east to Sierra Nevada Mountains
- Bordered by Fresno, Kern, Kings Counties
- Population: ~500,000 residents
- Major cities include Visalia, Porterville, Tulare
- High proportion of DACs, particularly in rural western regions and unincorporated communities



RURAL COUNTY CONTEXT – INYO CO



GEOGRAPHIC CONTEXT:

SOUTHERN SIERRA NEVADA
DEATH VALLEY PROXIMITY

POPULATION: 19,016 (2020 CENSUS)

KEY AREAS: BISHOP, LONE PINE, BIG PINE, INDEPENDENCE, DEATH VALLEY, AND SOUTHEAST COUNTY COMMUNITIES

TRIBES: LONE PINE PAIUTE-SHOSHONE, TIMBISHA SHOSHONE, FORT INDEPENDENCE TRIBE, BIG PINE PAIUTE, AND BISHOP PAIUTE TRIBE

KEY ROUTES: US 395, SR 190, SR 127

RURAL COUNTY CONTEXT – YOLO CO

Incorporated Cities

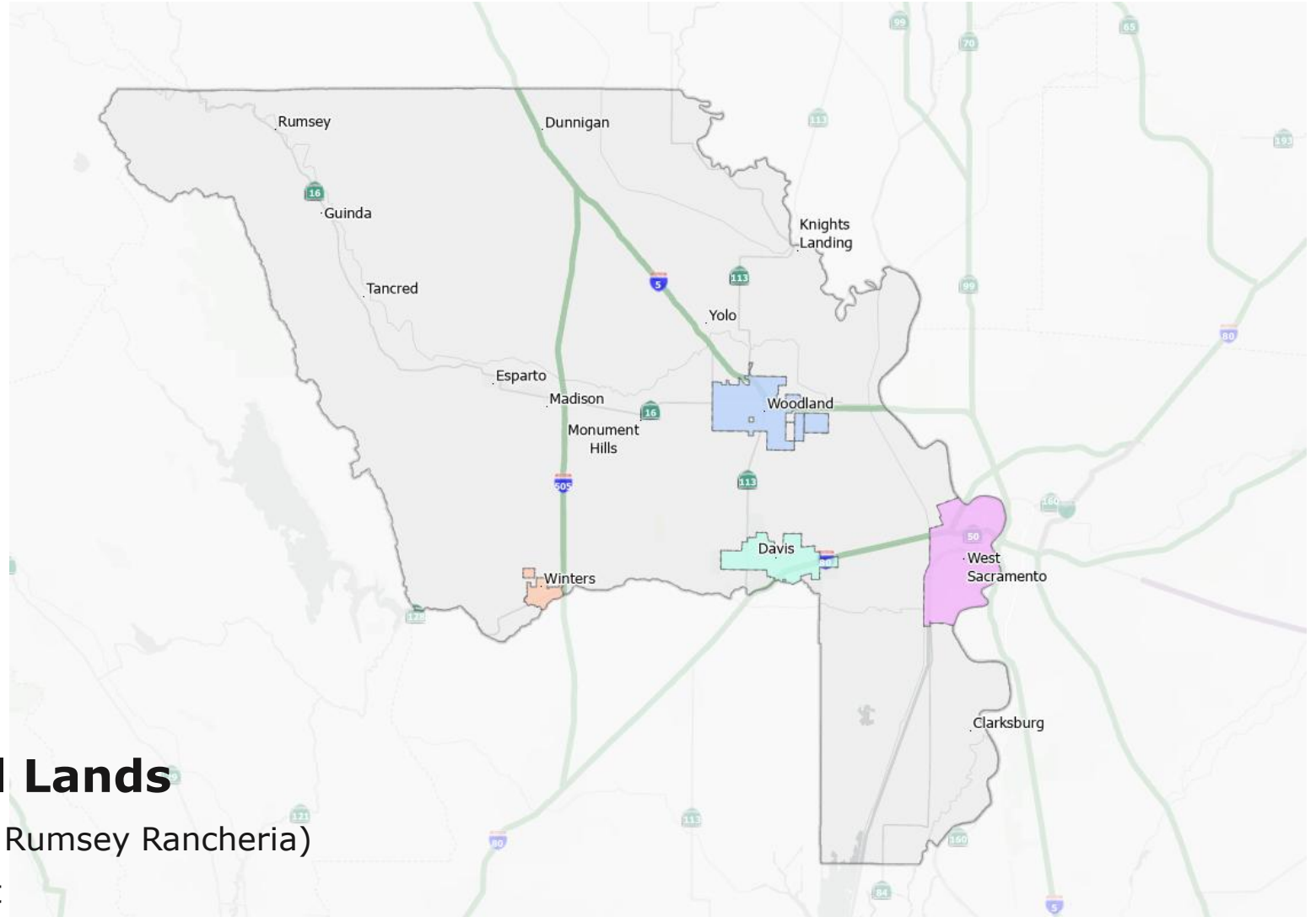
- Davis: 67,100
- Woodland: 63,000
- West Sacramento: 56,000
- Winters: 7,800

Other Communities

- Esparto: 3,720
- Monument Hills: 1,220
- Knight's Landing: 990
- Dunnigan: 950
- Madison: 440
- Clarksburg: 270

Federally Recognized Tribal Lands

- Yocha Dehe Wintun Nation (formerly Rumsey Rancheria)
 - > Home to Cache Creek Casino Resort





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BARRIERS TO RURAL EV ADOPTION

BARRIERS TO RURAL EV ADOPTION

Rural communities face distinct challenges in transitioning to electric mobility, including

- Longer trip distances
 - Commute trips
 - Shopping trips
 - School trips
 - Tourism-based trips



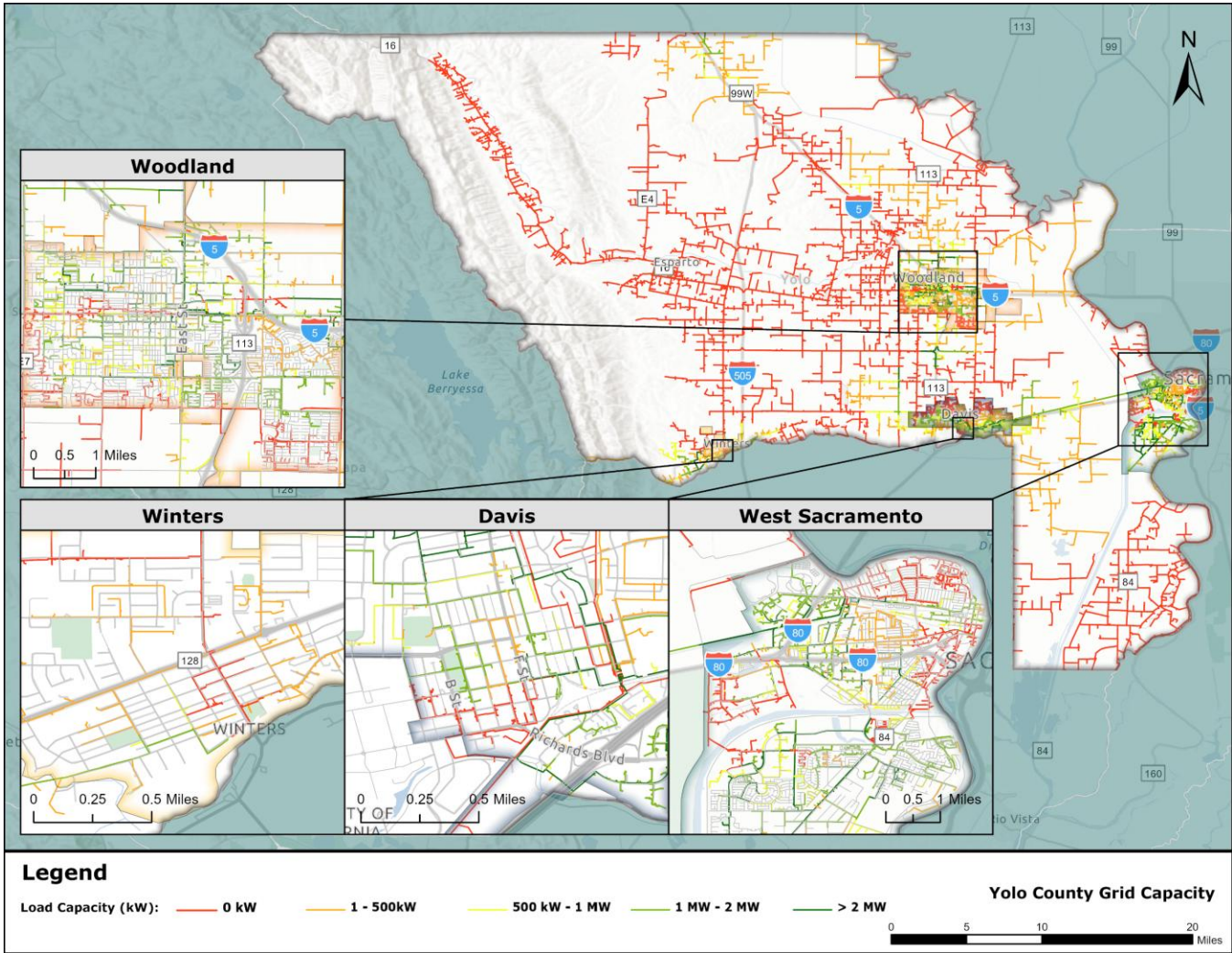
BARRIERS TO RURAL EV ADOPTION

Rural communities face distinct challenges in transitioning to electric mobility, including

- Limited Grid Capacity
 - Higher energy costs
 - Higher infrastructure costs
 - Need for utility upgrades
 - Fewer charging options



BARRIERS TO RURAL EV ADOPTION



BARRIERS TO RURAL EV ADOPTION

Rural communities face distinct challenges in transitioning to electric mobility, including

- Reduced Convenience for EV Drivers
 - More isolated communities separated by greater distances
 - Equity issues based on income disparities
 - Potential conflicts between residents and tourists
 - Lack of facilities such as restrooms at charging locations



BARRIERS TO RURAL EV ADOPTION

Rural communities face distinct challenges in transitioning to electric mobility, including

- Limited awareness of EV technology
 - Challenges to attending public outreach opportunities based on distance
 - Poor perception of EVs
 - Fear of the unknown





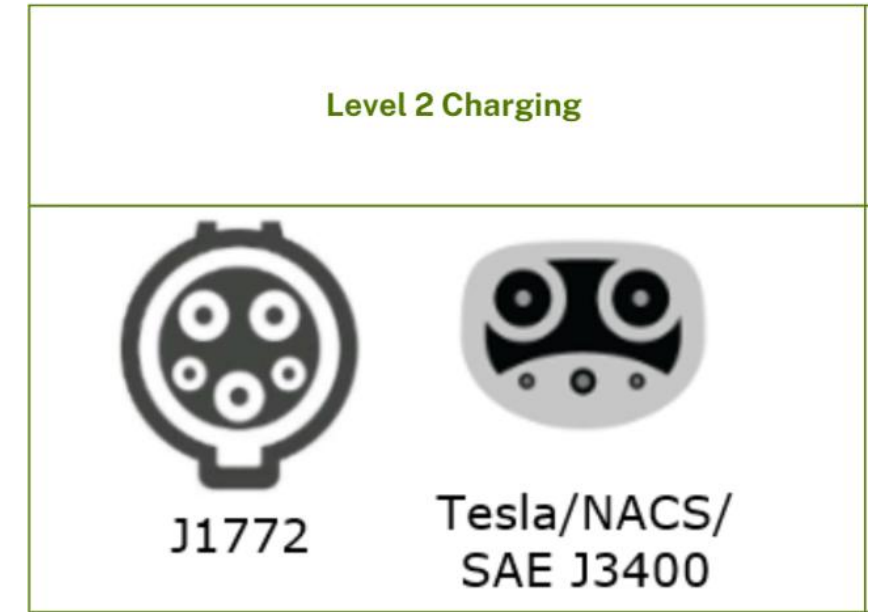
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BASICS OF EV CHARGING

BASICS OF EV CHARGING

Two basic types of EVSE (Electric Vehicle Service Equipment)

- Level 2
 - AC Power
 - Typically 6-12 kilowatts (kW) of power
 - Charges typical vehicle from approximately 20% to 80% in 4 to 10 hours
 - Typically used for overnight charging, workday charging, or opportunity “top off” charging
 - Two port types: J1772 and NACS



BASICS OF EV CHARGING

Two basic types of EVSE (Electric Vehicle Service Equipment)

- DC Fast Chargers (DCFC)
 - DC Power, sometimes known as Level 3
 - Typically 100+ kilowatts (kW) of power
 - Charges typical vehicle from approximately 20% to 80% in 40 minutes or less
 - Typically used for public charging, such as travel, corridor, and
 - Two typical port types: CCS and NACS
 - CHAdeMO port no longer common

DC Fast Charging (Level 3)



CCS



Tesla/NACS/
SAE J1772



CHARGING USE CASES

Level 2 Use Cases

1. Public Destination Charging
2. Public Neighborhood Charging
3. Private Multi-Family Charging
4. Private Workplace Charging

DC Fast Charging Use Cases

5. Public Community Fast Charging
6. Public Corridor Fast Charging



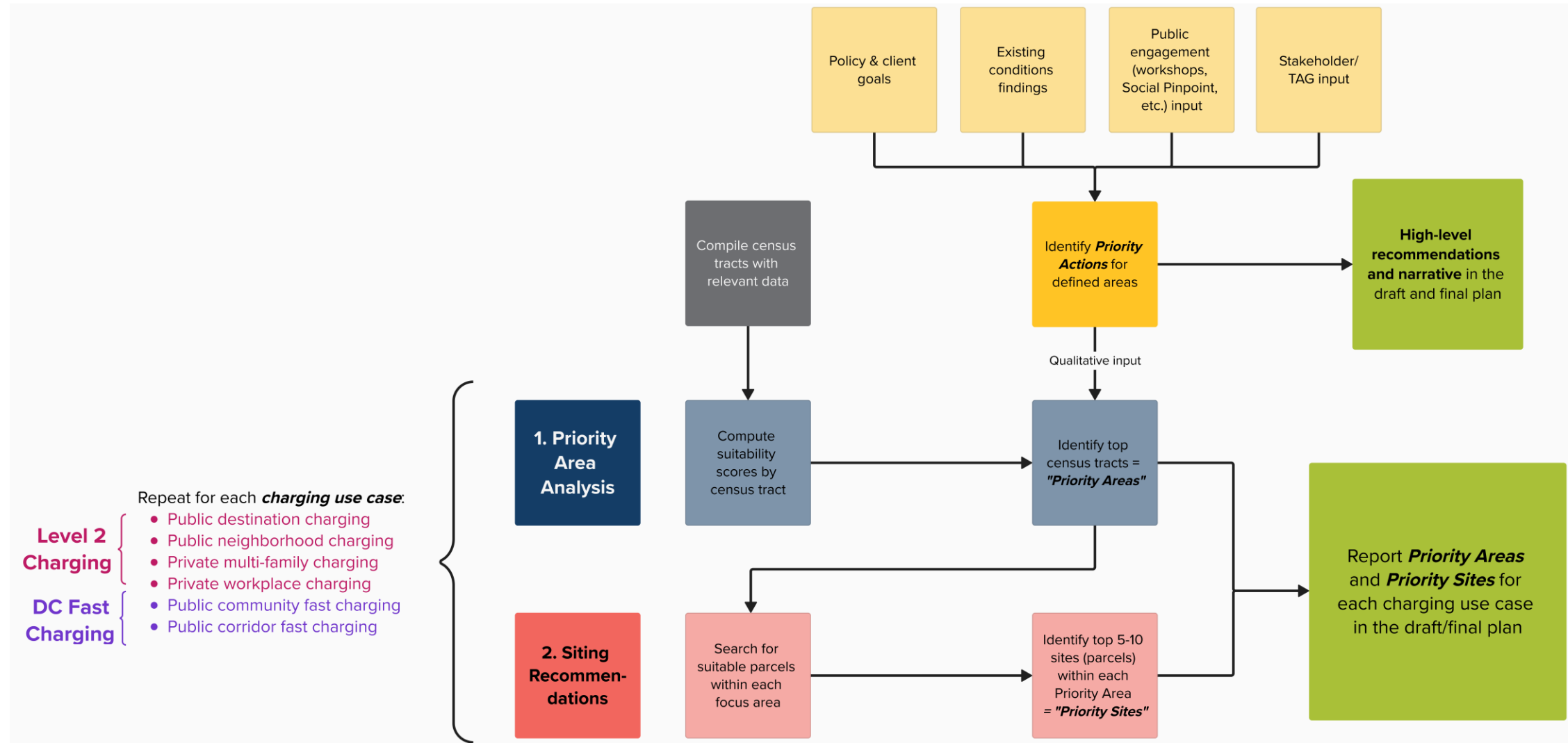
CHARGING USE CASES

USE CASE	CHARGING LEVEL	DESCRIPTION	TYPICAL USERS
PUBLIC DESTINATION CHARGING	Level 2	Charging at public locations like shopping centers, parks, trailheads, airports	Shoppers Visitors Day-trippers
PUBLIC NEIGHBORHOOD CHARGING	Level 2	Charging in public residential or street-side locations (including right-of-way)	Residents without home charging
PRIVATE MULTI-FAMILY CHARGING	Level 2 (or Level 1)	Charging at multi-family buildings, not accessible to the general public	Apartment/condo residents
PRIVATE WORKPLACE CHARGING	Level 2	Charging provided by employers, not accessible to the general public	Commuters
PUBLIC COMMUNITY FAST CHARGING	DC Fast Charging	Fast charging in community hubs such as downtown or near transit	Local drivers Uber/Lyft/taxi drivers Fleets
PUBLIC CORRIDOR FAST CHARGING	DC Fast Charging	Fast charging along highways and major travel corridors for long-distance EVs	Long-distance travelers Road trippers



ANALYSIS METHODOLOGY

CHARGER SITING ANALYSIS



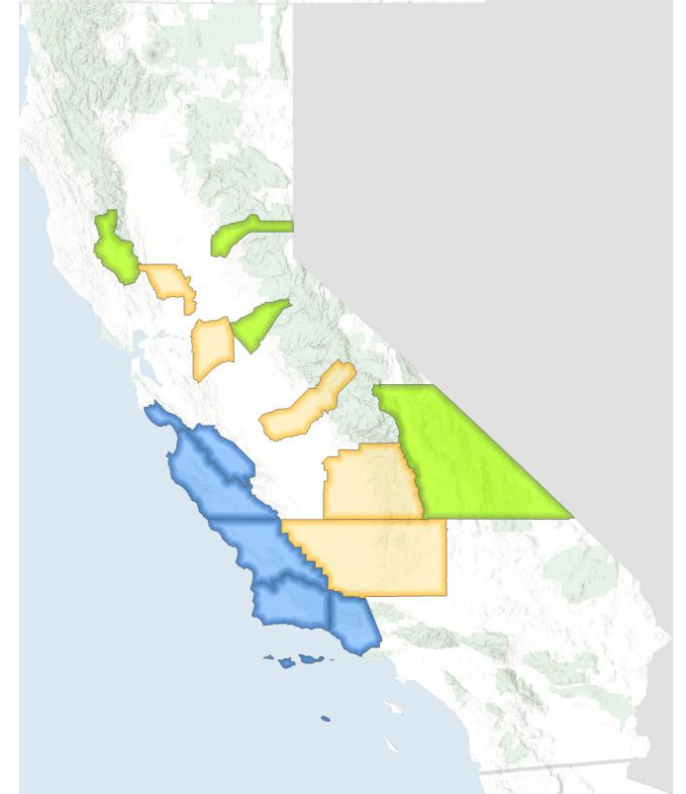
CHARGER SITING ANALYSIS

Key steps in this needs and suitability analysis include:

- Compile census tract data (demographics, travel patterns, grid capacity, land use, existing EV charging infrastructure).
- Develop suitability scores using weighted criteria.
- Map needs and suitability results (identify high and low demand tracts by use case).
- Incorporate qualitative input from the project's existing conditions assessment, stakeholder workshops, and public engagement.

Unique rural county considerations

- Some counties have very small number of census tracts to analyze (Inyo only has 6)



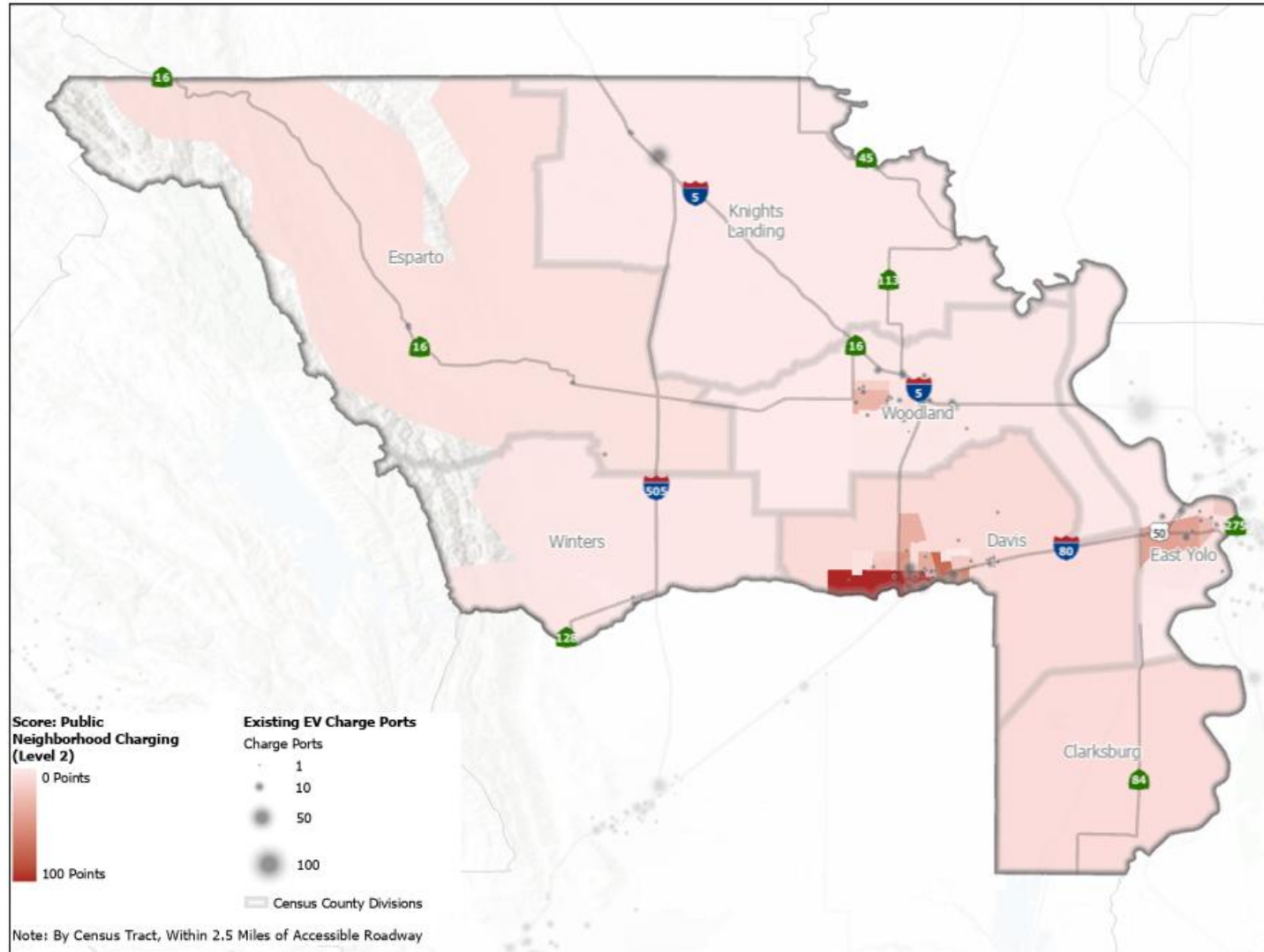
PRIORITY CONSIDERATIONS FOR RURAL COUNTIES

- **Inter-community and regional travel for residents**
 - Daily commutes, retail, groceries, schools, and medical trips between and within communities
- **Agricultural goods movement and freight**
- **Equitable access in disadvantaged, rural, multi-family residential areas**
 - Commutes, retail, groceries, medical, ...
- **Tourism, recreational travel, & downtown destinations**
 - Sequoia and Kings Canyon National Parks, Sierra foothills, etc...
- **Grid capacity and resiliency constraints**
 - Limited electrical capacity in rural areas; need for managed charging, solar, and storage solutions



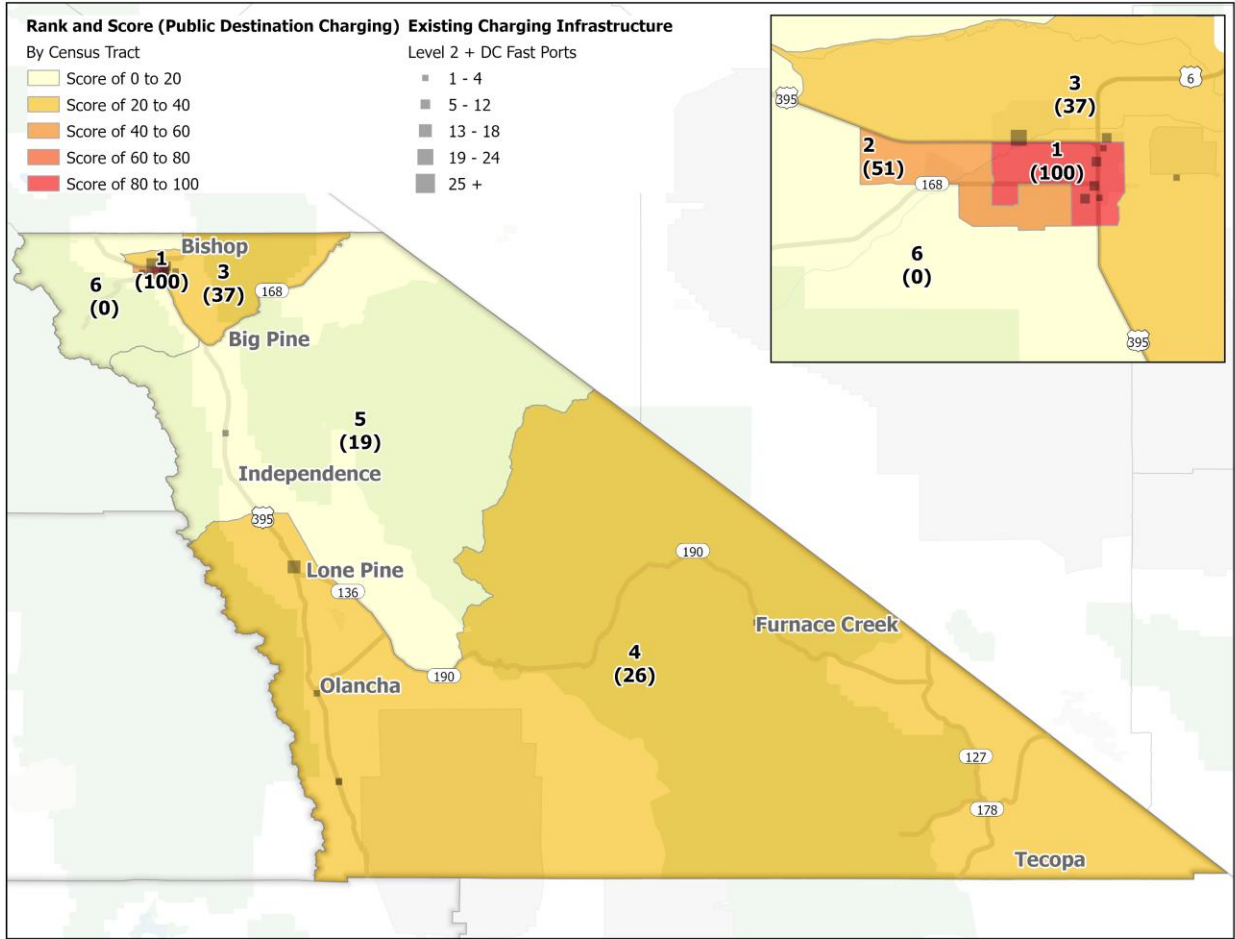
EXAMPLE CHARGING PRIORITY ANALYSES

PUBLIC NEIGHBORHOOD CHARGING (LEVEL 2) – YOLO COUNTY



EXAMPLE CHARGING PRIORITY ANALYSES

PUBLIC DESTINATION CHARGING (LEVEL 2) – INYO COUNTY



Rank	Area	Score
1	Bishop (central)	100
2	Bishop (west)	51
3	Bishop (north/east)	37
4	Lone Pine/Death Valley	26
5	Big Pine/Independence	19
6	Northwest County	0

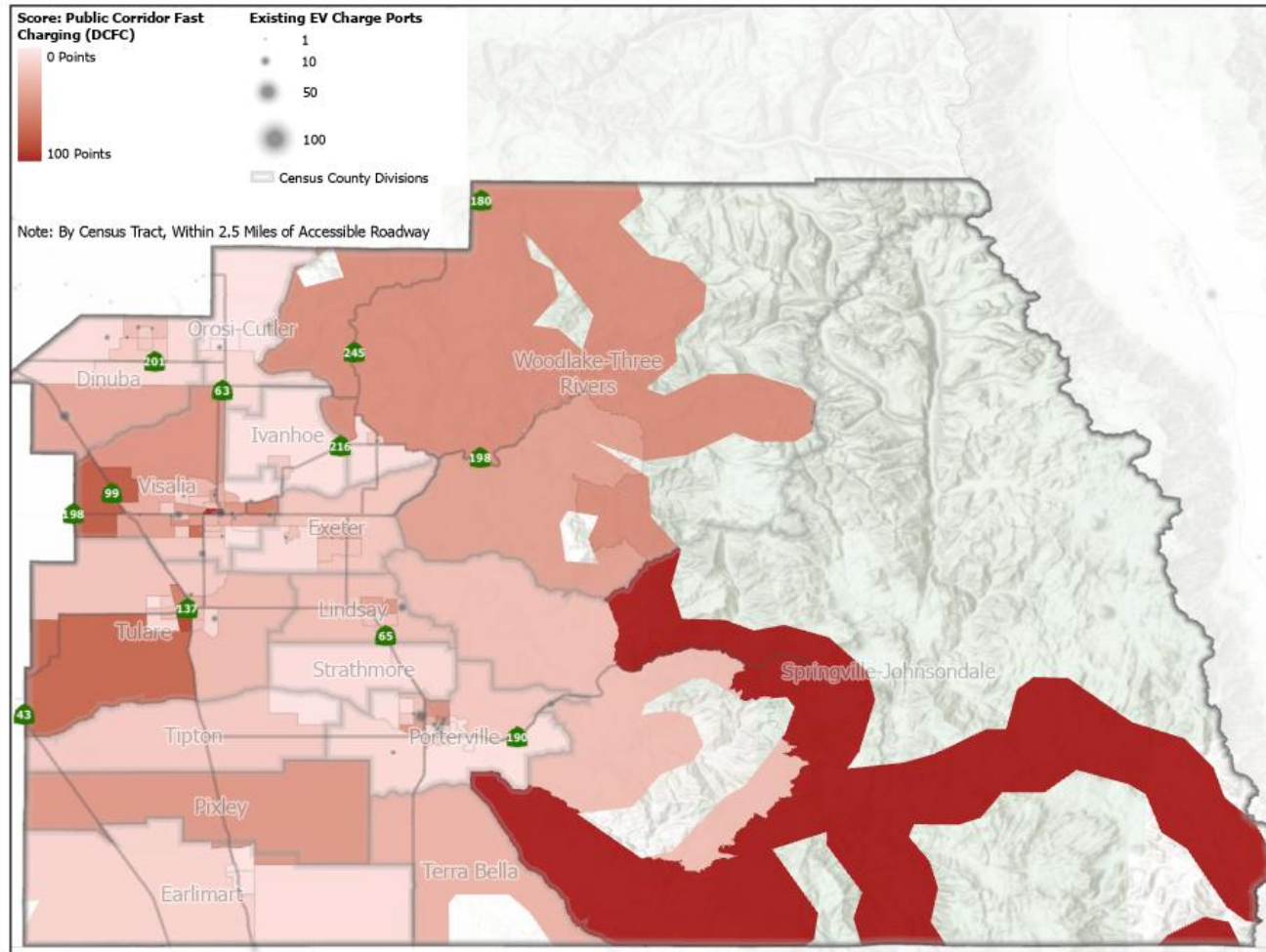
EXAMPLE CHARGING PRIORITY ANALYSES

ALL USE CASES – INYO COUNTY

Area	Public destination charging		Public neighborhood charging		Private multi-family charging		Private workplace charging		Public community charging		Public corridor charging	
	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score
Bishop (central)	 1	100	 1	100	 1	100	2	86	 1	100	5	32
Bishop (west)	 2	51	 3	11	6	0	5	39	4	20	 3	41
Bishop (north/east)	 3	37	4	10	 3	7	 3	61	6	0	6	0
Northwest County	6	0	6	0	4	7	6	0	5	9	4	34
Big Pine/Independence	5	19	5	9	5	4	4	59	 3	23	2	81
Lone Pine/Death Valley	4	26	 2	33	 2	19	 1	100	 2	47	 1	100

EXAMPLE CHARGING PRIORITY ANALYSES

PUBLIC CORRIDOR FAST CHARGING (DCFC) – TULARE COUNTY



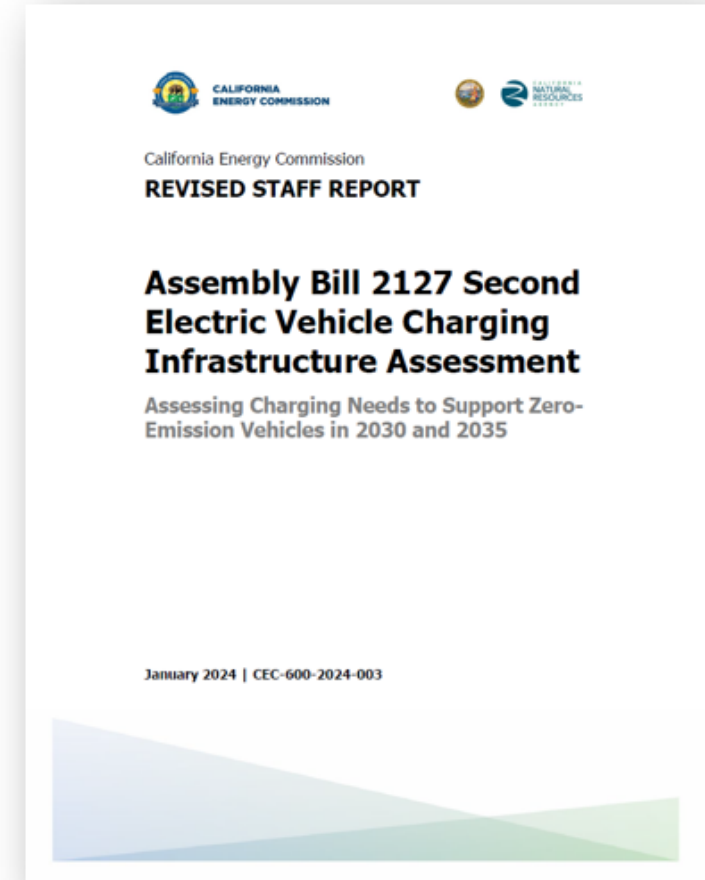
CHARGING NEEDS ANALYSES

KEY USE CASES – YOLO COUNTY

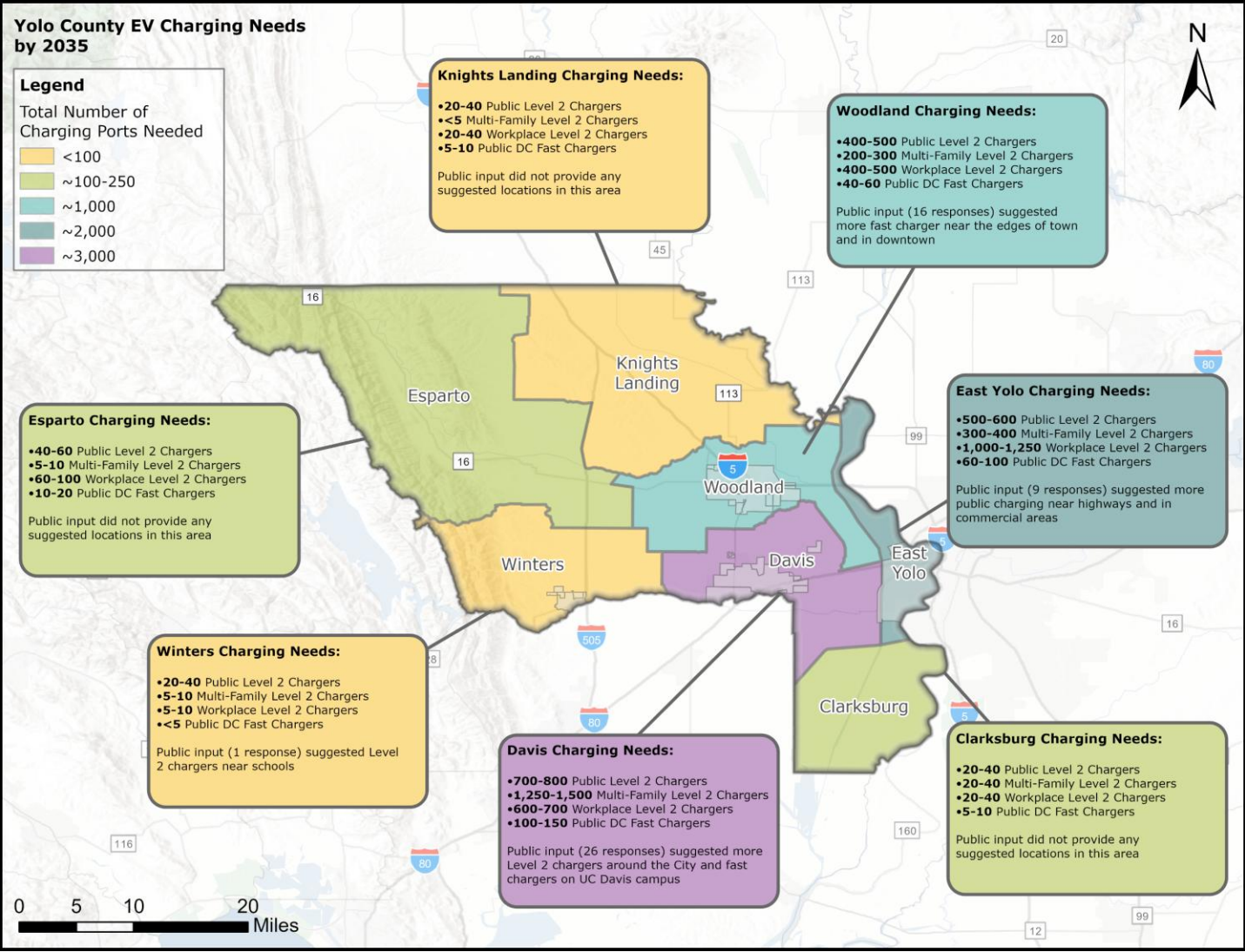
Private Multi-Family Chargers (L1 & L2)	Work & Public L2 Chargers	DCFCs for Local Needs	DCFCs for Long-Distance Travel	Total
114	886	127	32	~1,160
Source in AB 2127 Report: EVI-Pro 3, Table D-4 (MFH)	EVI-Pro 3, Table D-5 (Work & Public L2)	EVI-Pro 3, Table D-6 (DCFC)	EVI-Pro Road Trip (scaled to Inyo County based on long-distance trip activity per Replica)	



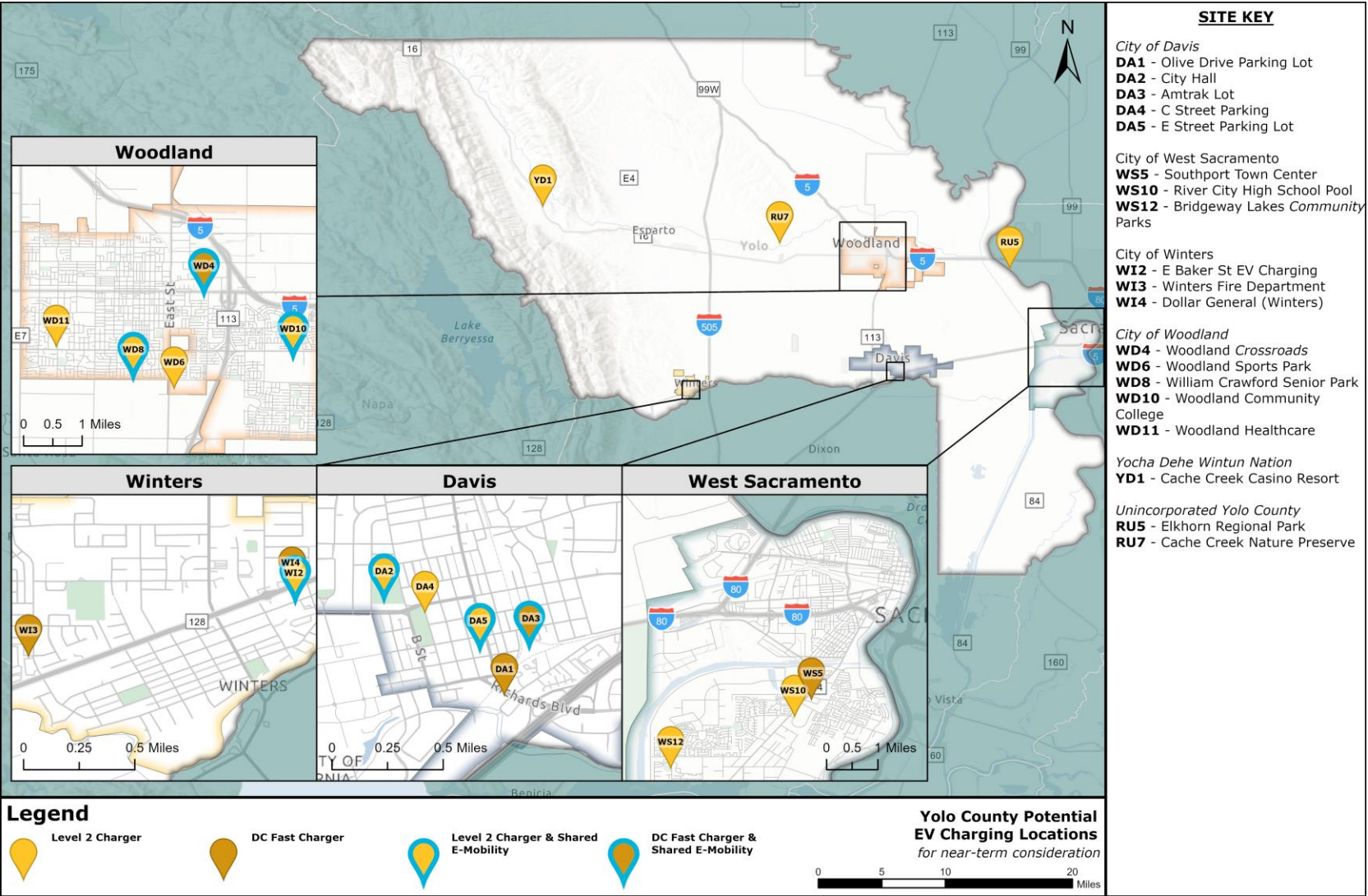
Charging Use Case	Charger Quantity Needed
Public Destination Charging	670
Public Neighborhood Charging	-
Private Multi-Family Charging	110
Private Workplace Charging	220
Public Community Fast Charging	130
Public Corridor Fast Charging	30
Total	~1,160



CHARGING NEEDS ANALYSES



CHARGING SITING RECOMMENDATIONS





CONCLUSIONS

KEY TAKEAWAYS

Our rural county EV plans have taught us that no cookie cutter planning effort can be used for all rural counties

- Not all rural counties are equal
 - Valley counties range from vast agricultural lands and cities in the Central Valley to small towns in the foothills, along with centers of higher education and research
 - Mountain counties such as Inyo have economies based on recreation and tourism
 - Needs of Native American populations and other disadvantaged communities must be prioritized



KEY TAKEAWAYS

Our rural county EV plans have taught us that no outreach is key for rural counties

- Education about EVs and EV charging is paramount
 - Safety of EVs
 - Cost of EVs and cost of ownership
 - EV charging use cases and infrastructure
 - Tools for EV drivers



THANK YOU

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